



# CONFERENCE PROCEEDINGS



## INTERNATIONAL CONFERENCE ON TRANSLATIONAL RESEARCH IN LIFE SCIENCES - (ICTRLS' 2025)



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**DHANALAKSHMI SRINIVASAN ENGINEERING COLLEGE (AUTONOMOUS)  
PERAMBALUR - 621 212, TAMIL NADU, INDIA**



# DHANALAKSHMI SRINIVASAN ENGINEERING COLLEGE

(AUTONOMOUS)

(Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai)  
Re-Accredited with 'A' Grade by NAAC, Accredited by TCS.  
Re-Accredited by NBA (BME, ECE & EEE), Accredited by NBA (CSE, IT, MECH & AERO)

PERAMBALUR - 621 212



Counselling Code

**3805**

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- B.E., Biomedical Engineering
- B.E., Civil Engineering
- B.E., Computer Science and Engineering
- B.E., Electrical and Electronics Engineering
- B.E., Electronics and Communication Engineering
- B.E., Mechanical Engineering
- B.Tech., Artificial Intelligence and Data Science
- B. Tech., Computer Science and Engineering  
(Cyber Security)
- B. Tech., Food Technology
- B. Tech., Information Technology

## PG PROGRAMMES

- M.E., CAD/CAM
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**INTERNATIONAL CONFERENCE ON  
TRANSLATIONAL RESEARCH IN LIFE SCIENCES  
ICTRLS-(2025)**

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**Shri. A. SRINIVASAN**  
**ESTEEMED CHANCELLOR**  
**DHANALAKSHMI SRINIVASAN GROUP OF INSTITUTIONS**

### **Message**

I am delighted to know that the Research & Development Cell of Dhanalakshmi Srinivasan Engineering College is hosting the "International Conference on Integrating Recent Innovations in Science and Technology: Shaping the Future" (ICIRIST-2025). The event is scheduled to take place from April 25, at Dhanalakshmi Srinivasan University in Perambalur, Tamil Nadu. The constant emergence of innovative inventions in Science, Engineering, and Technology is a promising trend. The decision to organize an international conference on "Recent Innovations in Science and Technology" is commendable. The primary objective of these conferences is to provide a substantial platform for intellectual exchange. Researchers, industrialists, and students can come together to share their findings and insights in the realm of 'Innovative Researches', contributing to the enhancement of human life on both global and local scales. It is anticipated that the conference will serve as a catalyst for fostering a deeper understanding of various recent innovations from a broader perspective. I extend my best wishes to the organizing committee of ICIRIST-2025, hoping for the success of the event. May the academic deliberation sessions with esteemed scientists be fruitful and contribute significantly to the advancement of knowledge.



**Prof. Dr. D. SHANMUGASUNDARAM, M.E., Ph.D.,**

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**Dhanalakshmi Srinivasan Engineering College (Autonomous)**

**Perambalur – 621212**

### **Message**

I am thrilled to learn that the Research and Development Cell of Dhanalakshmi Srinivasan Engineering College, Perambalur, is orchestrating the "International Conference on Integrating Recent Innovations in Science and Technology: Shaping the Future" (ICIRIST- 2025). This momentous event is scheduled to take place on April 25, 2025, within the esteemed premises of the Dhanalakshmi Srinivasan Engineering College (Autonomous), Perambalur. Additionally, there will be the release of a souvenir and conference proceedings as well, marking this scientific gathering as a significant milestone. The conference proceedings are anticipated to offer valuable insights and perspectives, fostering suggestions for further research and applications in the dynamic fields of innovations in Science, Engineering, and Technology. This holds particular relevance to our region. In light of this auspicious occasion, I extend my warmest greetings to the dedicated Conveners and Organizing Secretaries of the ICIRIST-2025 and all the esteemed participants of the conference. May this gathering serve as a catalyst for intellectual exchange and collaboration, propelling advancements in research and applications. I convey my sincere wishes for the success of the conference and extend my hopes for a future filled with accomplishments for everyone involved. May the ICIRIST-2025 be an outstanding and grand success.

## Members



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**Dr. S. SHANMUGASUNDARAM, M.E., Ph.D.,**  
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**Esteemed Chancellor**

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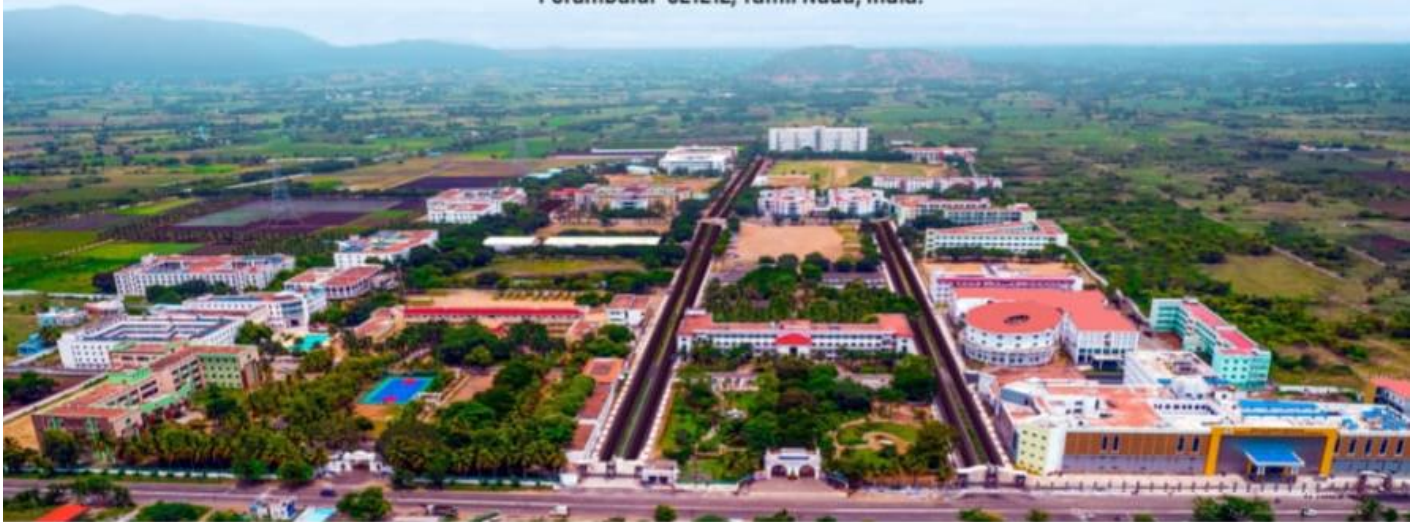
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# Dhanalakshmi Srinivasan Engineering College (Autonomous)



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(Recognized under section 2(f) & 12B of the UGC Act, 1956)  
(NAAC Accredited with 'A' Grade and NBA Accredited Programmes)  
Perambalur-621212, Tamil Nadu, India.



## International Conferences on Integrating Recent Innovations in Science and Technology (ICIRIST – 2025)

Dhanalakshmi Srinivasan Engineering College, powered by its R&D Cell, proudly presents ICIRIST-2025, the second edition of its flagship event. This multidisciplinary platform brings together students and scholars from various fields, providing a space to showcase and exchange their research. The event features five co-located conferences scheduled for April 25, 2025 and centered on the theme **“Integrating Innovations for Shaping a Sustainable Future”**. ICIRIST-2025 eliminates geographical boundaries through hybrid presentation modes (online and offline). With opportunities for publication through reputed Journal partners, this event serves as a vital hub for researchers to share impactful insights and innovations.

- ❖ International Conference on Emerging Trends and Transformative Impact of AI on Business and Management
- ❖ International Conference on Technological Innovations for a Sustainable Future
- ❖ International Conference on Translational Research in Life Sciences
- ❖ International Conference on Power Systems & Communication Engineering
- ❖ International Conference on Smart Intelligent Computing & Applications

### Special Features

- ❖ Conference Proceedings with ISBN by renowned National Publisher.
- ❖ Multidisciplinary Platform.
- ❖ Journal Publications.
- ❖ Paper Presentation Awards.
- ❖ Participation Certificates.

**Date: 25<sup>th</sup> April 2025**

**Venue: Central Auditorium, DSGI, Perambalur.**



## ICIRIST – 2025

# International Conference on Translational Research in Life Sciences

**Organized by Department of Biomedical Engineering,  
Chemical Engineering, Biotechnology, Food Technology and  
Pharmaceutical Technology**



Date: 25<sup>th</sup> April 2025 | Venue: Block D - Auditorium



**Theme:** The event emphasis on innovative breakthroughs and provide a platform for experts and thought leaders to discuss and showcase new developments, technologies, and strategies that promote environmental stewardship, resource efficiency, and long-term sustainability.

### Thrust Areas:

- ❖ System Biology
- ❖ Drug Design & Development
- ❖ Food Processing & Preservation
- ❖ Biomedical Devices
- ❖ Applied Science
- ❖ Artificial intelligence in life sciences
- ❖ Energy & Environment

### Resource Persons

**Dr. T. Panda**  
Professor, Biochemical Engineering,  
IIT-Madras

**Dr. Mesfin Tafesse Gemed**  
Professor, Addis Ababa Science and  
Technology University,  
Ethiopia.

**Conference Proceedings:** Accepted abstracts will be included in the Proceedings of “**International Conference on Translational Research in Life Sciences**”. Registration is required for both abstract submission and publication. You can complete the registration via the ‘**Google Form**’ provided below. For further details on abstract submission, please refer to the instructions under the ‘Call for Abstracts and Full-Length Research Papers’ section in the conference brochure.

**Journal Publications:** Following a successful peer review process, selected full-length research papers will be published in “**Springer - Discover Applied Sciences**” (SCOPUS Indexed). For more details on research paper submission, please refer to the instructions in the ‘Call for Abstracts and Full-Length Research Papers’ section of the conference brochure.

**Registration Link:** <https://forms.gle/y98ouz9X8t1YuR867>



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### Organizing Secretaries

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**Dr. D. Karthikeyan**, HoD - Biomedical Engineering

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# DEPARTMENT OF BIOMEDICAL ENGINEERING

## **Vision:**

Emergence of advanced learning, research and training to strengthen technologies in biomedical engineering for human welfare and Nation needs.

## **Mission:**

The mission of the Biomedical Engineering Department is to construct a platform for bridging engineering principles, science and medicine.

- M1:** To engage with the specific to generic community for knowledge dissemination and career development.
- M2:** To update, analyze and impel the knowledge in the multi-disciplinary fields to strengthen technologies in biomedical engineering.
- M3:** To encourage the students to be aware of engineering principles in medicine for welfare of society.
- M4:** To expertise the students both in engineering and technical fields related to competitive medical technology in research and continuing education.

## **Program Educational Objectives (PEOs)**

- PEO 1:** The graduates of the programme will have ability to improve the technologies by combining the design and problem solving skills for enhancing health care products.
- PEO 2:** Graduates of the programme will function as productive team member and leader who act as bridge between engineering and biology.
- PEO 3:** Graduates will be outstanding professionals by enhancing their advanced learning techniques in the field of biomedical engineering to face the global challenges.
- PEO 4:** Nurture responsible engineers with ethical values to serve the society and to learn and excel in higher education.

## **Program Specific Outcomes (PSOs):**

- PSO1:** Bio- Analysis. Apply mathematical analysis for human paradigm, to problems, thereby to interface engineering and life science.
- PSO2:** Data Interpretation and Problem Solving. Make measurements on and interpret data from physiological systems and decipher the problems associated with the interaction between living and nonliving materials and systems.

# DEPARTMENT OF FOOD TECHNOLOGY

## **Vision:**

Prepare the food engineers to pursue their goals and to have successful career as competent technologist, scientist, researchers, entrepreneurs and personalities which benefits the public welfare through rigorous service in their challenging field.

## **Mission:**

- M1:** Upgrade the scientific knowledge with a lifelong follow up in the areas of food science, food processing and safety for the development of food products through quality research.
- M2:** Extend to know how to identify and analyse the opportunities in Food Technology to adopt strategies that ensure socio-economic growth by collaborating with industries.
- M3:** Providing research and professional services to streamline and optimize operations which contribute to the enhancement of the quality of life.
- M4:** Develop socially responsible professionals and entrepreneurs who are capable of sustainable engineering practices for food industry.

## **Program Educational Objectives (PEOs)**

- PEO 1:** Student will be able to pursue higher education in India or abroad in the field of Food Technology and it's related field and take up the competitive exams
- PEO 2:** Student will be able to come up with solutions for any technical and scientific problems related to Food Technology in institution, industry and society
- PEO 3:** Student will get familiarized in job related skills like communication, designing of experiments and entrepreneur skills in the field of food technology

## **Program Specific Outcomes (PSOs)**

- PEO 1:** Apply basic skills and knowledge in Engineering to develop innovative food processing techniques and food products.
- PSO 2:** Adapt multidisciplinary approaches to solve food industry problems and ensure food quality and safety
- PSO 3:** Develop critical thinking and problem-solving skills in the domain of food technology with professional integrity and ethical values

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## **Role of Research & Educational Institutes in Empowering Food Science Education, Research & Technology**

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### **ABSTRACT**

Research and educational institutes play a pivotal role in advancing food science education, research, and technology, which are critical for ensuring global food security, safety, and sustainability. These institutions serve as hubs for knowledge creation, innovation, and skill development, fostering an environment where theoretical learning is seamlessly integrated with practical application. Through interdisciplinary curricula, state-of-the-art laboratories, and industry collaborations, they equip students and researchers with the scientific and technological competencies required to address emerging challenges in food production, processing, preservation, and nutrition. Moreover, these institutes drive innovation through cutting-edge research in areas such as biotechnology, food safety, functional foods, and sustainable packaging. They also contribute to policy development and public awareness, advocating for science-based solutions to issues like food waste, climate change, and malnutrition. Collaborative research projects with industry stakeholders and international organizations further expand the impact of academic findings, facilitating the transfer of technology from lab to field and promoting entrepreneurial ventures. In addition, educational institutions play a transformative role in capacity building by training the next generation of food scientists, technologists, and policymakers. By fostering critical thinking, ethical awareness, and global perspectives, they ensure that graduates are not only technically proficient but also socially responsible. In essence, research and educational institutes act as catalysts for innovation and change, empowering food systems to meet the needs of a growing population in an equitable and sustainable manner.

**Keywords:** Food waste, Climate change, Malnutrition, Processing, Preservation

## **Network Pharmacology**

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### **ABSTRACT**

Network pharmacology is an emerging interdisciplinary field that integrates systems biology, bioinformatics, and pharmacology to understand the complex interactions between drugs, targets, and disease pathways. Moving beyond the traditional "one drug–one target–one disease" paradigm, network pharmacology adopts a holistic approach, emphasizing the multi-target effects of drugs and the interconnected nature of biological systems. This approach is particularly valuable in addressing complex, multifactorial diseases such as cancer, diabetes, and neurodegenerative disorders, where single-target therapies often fall short. By constructing and analyzing drug-target-disease networks, researchers can identify key nodes and pathways involved in disease progression and drug action. These insights enable the discovery of novel drug candidates, repositioning of existing drugs, and optimization of combination therapies. Network pharmacology also plays a crucial role in traditional medicine research, particularly in elucidating the molecular mechanisms of herbal formulations, which typically exert therapeutic effects through multiple bioactive compounds acting on various targets. Advanced computational tools, high-throughput screening data, and artificial intelligence techniques have further enhanced the predictive power and applicability of network pharmacology. This systems-level perspective not only improves drug efficacy and safety profiles but also reduces the attrition rates in drug development pipelines.

**Keywords:** Neurodegenerative, Systems-level, Applicability, Novel drug, Multifactorial diseases

## **Effect Of Cold Plasma Treatment on Modification of Plant Protein Properties**

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### **ABSTRACT**

Cold plasma treatment is an emerging non-thermal technology gaining attention for its ability to modify the functional properties of plant proteins without the need for excessive heat or chemicals. This method involves the generation of reactive species, such as ions, radicals, and UV photons, under atmospheric or low-pressure conditions. These reactive components interact with the protein surface, causing physical and chemical changes that can enhance protein functionality in food and industrial applications. These structural alterations can increase surface hydrophobicity, unfolding the protein molecules and exposing more reactive sites. As a result, plant proteins like soy, pea, or wheat gluten may exhibit improved solubility, which is often a limitation in their native form. Cold plasma can also enhance emulsifying and foaming properties of plant proteins by increasing their ability to interact at oil–water or air–water interfaces. This makes treated proteins more suitable for use in plant-based dairy and meat alternatives. Moreover, the water and oil holding capacities of proteins can be improved, which is beneficial for texture and moisture retention in food formulations. Another significant benefit is the potential reduction in allergenicity. By modifying epitopes—the specific parts of the protein that trigger immune responses—cold plasma can reduce the allergenic potential of proteins like soy or wheat, making them safer for consumption. From an industrial perspective, cold plasma is a clean and energy-efficient process, producing minimal waste and not requiring water or chemical reagents. It aligns well with the growing demand for sustainable food processing technologies. In conclusion, cold plasma treatment offers a promising approach for enhancing the functional properties of plant proteins. It not only improves their usability in various food applications but also supports cleaner processing practices. As research continues, optimizing treatment conditions and scaling up for industrial application will be key to fully leveraging this innovative technology.

**Keywords:** Cold plasma, Plant proteins, Food processing, Hydrophobicity, Low-pressure.

## Microbial Biomolecules and Their Valuable Products

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### ABSTRACT

Microorganisms are tiny, yet they play a massive role in producing a wide array of valuable biomolecules that have profound applications in health, agriculture, industry, and environmental management. These microbial biomolecules include proteins, enzymes, polysaccharides, lipids, nucleic acids, and secondary metabolites. Due to their diverse biochemical pathways, microbes serve as excellent bio factories for natural and engineered production processes. One of the most notable microbial products is antibiotics, such as penicillin from *Penicillium* species and streptomycin from *Streptomyces*. These compounds have revolutionized modern medicine by treating infectious diseases. Additionally, microbes also produce enzymes like amylases, proteases, and cellulases, which are crucial in food processing, textile manufacturing, biofuel production, and waste treatment industries. Polysaccharides such as xanthan gum from *Xanthomonas campestris* and dextran from *Leuconostoc* species are used as food thickeners, stabilizers, and in pharmaceuticals. Microbial lipids, particularly those from oleaginous yeasts and algae, are being explored as sustainable alternatives to plant and animal fats, with applications in biofuel and nutraceutical production. Secondary metabolites, although not directly involved in microbial growth, play key roles in communication and defense. These include pigments, toxins, and alkaloids, which are exploited for their antioxidant, anticancer, or antimicrobial properties. For instance, *Monascus* species produce natural pigments with health benefits, while *Aspergillus* species are sources of citric acid, a vital food additive. In biotechnology, recombinant DNA technology allows microbes to be genetically modified to produce human insulin, growth hormones, vaccines, and other therapeutic proteins. Genetically engineered *E. coli* and *Saccharomyces cerevisiae* have become standard platforms for large-scale production of these biomolecules. Overall, microbial biomolecules are cornerstones in many sectors, offering eco-friendly and cost-effective alternatives to synthetic chemicals. With advances in synthetic biology and metabolic engineering, the potential of microbes to produce even more valuable products continues to expand, promising new solutions for global challenges in health, sustainability, and industry.

**Keywords:** Antibiotics, Polysaccharides, Microbial, Recombinant DNA,

## **Smart Diaper for Moisture Detection and Monitoring —A Supportive Solution for Elderly and Immobile Individuals**

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### **ABSTRACT**

The Smart Diaper is an efficient and reliable system designed to assist caregivers in managing the hygiene needs of elderly or immobile individuals. It uses a built-in moisture sensor that continuously monitors wetness levels within the diaper. When moisture crosses a specified threshold, the sensor triggers a buzzer to alert caregivers immediately. This early warning helps prevent discomfort and reduces the risk of skin irritation or infections caused by extended exposure to dampness. The system transmits live sensor data to a cloud server using an ESP8266 microcontroller and also includes an on-site buzzer for instant alerts. A caregiver-friendly dashboard—hosted on Netlify and supported by a backend server on Render—displays critical information such as moisture readings, timestamps, and the current diaper condition (e.g., "wet" or "dry"). By integrating fundamental Internet of Things (IoT) technologies, the Smart Diaper improves comfort, hygiene, and response times, offering a smart and practical solution to everyday caregiving challenges.

**Keywords:** Smart diaper, ESP8266, IoT, buzzer, moisture sensor.

## **Heart Attack Detection Through Heart Rate Using Smartwatch**

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### **ABSTRACT**

In the modern world, heart disease is becoming increasingly familiar and is one of the top killers of people. In order to mitigate loss of life, detection and monitoring should be done as early as possible. This project proposes a heart attack monitoring and detection system that consists of a heartbeat sensor, an Arduino Nano, and an ATmega32 microcontroller for monitoring heart rates. The system continuously monitors the heart rate of users and attempts to detect any abnormalities. The Arduino Nano processes captured pulse data in real time and calculates the heart rate. The result is displayed on a screen, allowing the user to receive immediate feedback. If a potential heart attack is detected based on abnormal heart rate values (higher than normal), an alarm is triggered by the system using a buzzer to alert user or medical personnel that could be nearby. An increase of detection speed and response time was made possible by the addition of an ATmega32 microcontroller. This system can be operated personally or in a clinical setup and serves as an affordable and reliable device for monitoring heart health and performing timely medical intervention.

**Keywords:** Heart rate monitoring, Heart attack detection, Arduino Nano, ATmega32, faster detection, real time monitoring

## **IOT Based Portable Health Checker Device**

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### **ABSTRACT**

Monitoring vital health parameters in real-time is essential for early diagnosis and timely intervention, especially in remote or resource-limited settings. This project presents an IOT- BASED Portable Health Checker Device designed for continuous tracking of key health metrics, including blood oxygen saturation (SpO<sub>2</sub>), heart rate, and body temperature. The system integrates a MAX30102 sensor to measure SpO<sub>2</sub> levels, a heartbeat sensor for heart rate monitoring, and a DHT11 sensor to assess body temperature. Sensor readings are displayed on an LCD screen for easy local monitoring and are continuously transmitted to the Blynk Android application via IoT for remote tracking. This allows healthcare providers or care givers to access real-time data and observe trends in patient vitals, making the device ideal for remote health monitoring, telemedicine, or personal health tracking. This portable health checker device offers an efficient and accessible solution for individuals seeking to maintain their health or manage chronic conditions.

**Keywords:** MAX30102, DHT11 sensor, Blynk Android application, LCD screen, blood oxygen saturation (SpO<sub>2</sub>).

## **Advanced Hip Pain Relief System - A Supportive Solution for Hip Pain and Improving Patient Mobility**

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### **ABSTRACT**

This project focuses on developing a smart hip rehabilitation belt designed for individuals of all age groups and fitness levels. The belt features a Peltier device for thermal therapy and a vibration sensor for massage, both controlled via the Blynk app using IoT technology and a microcontroller. The Peltier device provides targeted heat or cold therapy, while the vibration sensor delivers massage to aid in pain relief and muscle relaxation. The Blynk app interface includes two buttons, allowing users to easily control the massage and thermal therapy functions. IoT connectivity enables real-time monitoring, offering users feedback and the ability to track their progress. This personalized rehabilitation system aims to support individuals recovering from injuries, seniors with mobility challenges, and athletes seeking performance enhancement. By leveraging modern sensor technology and IoT integration, the belt promotes effective recovery and improved mobility outcomes.

**Keywords:** Smart Rehabilitation, IoT integration, Peltier Device, Vibration Therapy, Blynk App Control.

## **Early Detection of Lung Cancer by Analysing Respiratory Level**

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### **ABSTRACT**

This study proposes a novel approach for early detection of lung cancer through breath analysis using logistic regression. The system comprises gas sensors, including MQ-135 and CCS811, interfaced with an ATmega32 microcontroller, an LCD16x2 display, and an ESP8266 module for data transmission to a remote server. ATmega32 microcontroller acts as the central processing unit, collecting real-time data on carbon dioxide (CO<sub>2</sub>), carbon monoxide (CO), and total volatile organic compounds (TVOC) levels from the gas sensors. The LCD 16x2 display provides local visualization, while the ESP8266 module facilitates wireless transmission of sensor data to the server. The proposed approach offers several advantages, including real-time monitoring, non-invasive testing, and the ability to adapt and improve accuracy over time. By leveraging logistic regression, the system demonstrates the potential to Revolutionize lung cancer screening by providing cost-effective and accessible diagnostic solutions.

**Keywords:** ATmega32 microcontroller, ESP8266 Module, LCD 16\*2

## Smart Vital Signs Monitor

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### ABSTRACT

This project introduces the design and implementation of an integrated Digital Stethoscope and Respiration Monitoring System for non-invasive, real-time health examination. The digital stethoscope enhances conventional auscultation using digital amplification and filtering of heart, lung, and other internal body noises, producing clearer sounds for correct diagnosis. Such noises are transformed into digital signals that allow real-time analysis, data storage, and wireless transmission for remote consultation. This is followed by the respiration sensor, which monitors breathing rate, pattern, and oxygen level in the blood continuously to detect respiratory disease like asthma, sleep apnea, and COPD at early stages. Respiration sensor and heart rate sensor, an OLED display for local display, and the ESP8266 module for IOT-based connectivity are used. In combination, this system constitutes an extensive solution for remote health monitoring with the goal of enhancing diagnostic efficiency, facilitating continuous care, and providing improved healthcare access, especially in remote or underserved areas.

**Keywords:** Heart rate sensor, Respiration sensor, Chronic Obstructive Pulmonary Disease, (COPD, ESP8266, OLED Display).

## **Real-Time Epilepsy Monitoring System**

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### **ABSTRACT**

Epilepsy is a chronic neurological condition affecting millions of individuals globally, involving seizures that may lead to detrimental or life-threatening conditions in the absence of early diagnosis. This project seeks to design an epilepsy patient monitoring system based on an ATmega32 microcontroller and other sensors such as a vibration sensor, alert buzzer, etc., to enhance patient safety and quality of life. The system continuously monitors a patient's physical movements and vibrations, which are related to seizure activity. Detection of tremor by the vibration sensor. This monitoring system would be an affordable and real-time solution for caregivers in monitoring epilepsy patients in home and hospital environments. This system can also be expanded to offer wireless communication to remotely monitor the data, which is of extreme value when seizing an epileptic patient, as it enhances the safety of the patient by speeding up the response time.

**Keywords:** ATmega32 microcontroller, vibration sensor, buzzer, sensor based monitoring and wireless health monitoring.

## **Threshold Driven Iv Fluid Monitoring System Using Weight Sensor and Micro control**

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### **ABSTRACT**

This initiative aims to create a dependable and efficient automated system for monitoring glucose bottle levels in the healthcare context to address the burdens of monitoring manually, especially to spur quick action when levels are below expected and/or not close to depletion. The system will be based on a microcontroller-based system consisting of a weight sensor to monitor glucose fluid levels in real-time in a reliable manner that provides clinically relevant information about the remaining substance in the bottle. The weight sensor will continuously weigh the bottle, and that information will be updated on a digital display that will provide immediately obvious information to the healthcare professionals about glucose levels. If the glucose levels drop below some set point, the system will sound an alarm to notify staff of a refill before the bottle runs nearly empty- which could delay timely treatment for the patient since it takes time to obtain a new bottle. Primary to the project is ideas of user friendliness, the device will be designed such that it has an easily interchangeable interface, and a low barrier to set-up, making it a good fit for the healthcare environment, down to small clinics.

**Keywords:** Glucose monitoring, Non-invasive, Wearable, Weight sensors, Microcontroller, Arduino, Embedded C, Load cell, Voltage regulator.

## **Antioxidant, Anticancer Properties of *Ocimum Tenuiflorum* L , Associated Endophytic Fungi**

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### **ABSTRACT**

Fungal endophytes have the ability to produce various type of biologically active novel compounds which can be used to treat various diseases. The diverse bioactive compounds produced from the fungal endophytes depend upon the geographical conditions. The bioactive compounds were produced for nine isolates. The antioxidant activity of the fungal endophytic metabolites was assessed by DPPH, FRAP and NO assays. The cytotoxicity of the selected three isolates against HeLa cell lines were evaluated by performing MTT assay. The three selected isolates showed cytotoxicity against HeLa cells with IC<sub>50</sub> value at the concentration of 165.98 µg/ml, 81.11 µg/ml and 256.43 µg/ml, respectively. The third isolate which have more prominent cytotoxic activity against HeLa cells was further selected for metabolite profiling by GC-MS. Nearly 20 bioactive compounds were characterized from the chosen isolate by GC-MS. Apoptosis of HeLa cell lines by the crude extract was assessed by DNA fragmentation assay which showed better cleavage pattern. Measurement of live and dead cells assay was carried out by flow cytometry analysis. The fungal identification was carried out using ITS region genotyping showing that the fungus was closely related with *Diaporthe eres*.

**Keywords:** Fungal endophytes, FRAP assay, NO assay, Cytotoxicity, MTT assay, Apoptosis, DNA fragmentation assay, GC-MS, Flow cytometry, ITS amplification.

## **In Vitro Anticancer Potential of Gmelina Arborea Roxb Methanolic Leaf Extract Against A549 Human Lung Cancer Cell Lines**

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### **ABSTRACT**

The present study investigates the in vitro anticancer potential of Gmelina arborea Roxb. methanolic leaf extract against A549 human lung cancer cell lines. The objective was to evaluate the cytotoxic and pro-apoptotic effects of the extract using a series of bioassays, including MTT, apoptosis, reactive oxygen species (ROS), and mitochondrial membrane potential (MMP) assays. The MTT assay demonstrated a dose-dependent decrease in cell viability, indicating significant cytotoxicity of the extract towards A549 cells. Apoptosis assay results confirmed morphological features characteristic of programmed cell death, including nuclear condensation and membrane blebbing. Furthermore, ROS generation was markedly increased in treated cells, suggesting oxidative stress-mediated apoptosis as a potential mechanism of action. The extract also induced a loss of mitochondrial membrane potential, supporting its role in the intrinsic apoptotic pathway. Collectively, these findings indicate that Gmelina arborea methanolic leaf extract exhibits potent anticancer activity against A549 cells, likely through ROS-mediated mitochondrial dysfunction and induction of apoptosis. This study provides promising preliminary evidence supporting the therapeutic potential of Gmelina arborea in lung cancer treatment and warrants further investigation through in vivo studies and compound isolation.

**Keywords:** Gmelina arborea, A549 lung cancer cells, Apoptosis, ROS-mediated cytotoxicity.

## **Biosynthesis of Flavour Compound, $\gamma$ -Decalactone Using *Sporidiobolus Salmonicolor***

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### **ABSTRACT**

$\gamma$ -Decalactone is a valuable flavor compound widely used in food, cosmetic, and fragrance industries due to its peach-like aroma. This study investigates the biosynthesis of  $\gamma$ -decalactone using *Sporidiobolus Salmonicolor*, a yeast known for its ability to produce lactones. Various parameters such as substrate concentration, pH, temperature, and incubation time were optimized to enhance  $\gamma$ -decalactone production. The biosynthesized compound was characterized using analytical techniques such as gas chromatography-mass spectrometry (GC-MS) to confirm its identity and purity. Additionally, the potential of *Sporidiobolus Salmonicolor* for large-scale production of  $\gamma$ -decalactone and its applications in various industries are discussed. This research provides valuable insights into the biotechnological production of  $\gamma$ -decalactone, offering sustainable alternatives to traditional chemical synthesis methods

**Keywords:** *Sporidiobolus Salmonicolor*,  $\gamma$ -decalactone, GC-MS

## **Development and Assessment of an Herbal Shampoo Bar Enriched with *Rosmarinus officinalis* L. Ethanol Extract**

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### **ABSTRACT**

Shampoo bars are a sustainable and eco-friendly alternative to traditional liquid shampoos. These solid, compact bars are formulated with cleansing agents, natural oils, and conditioning ingredients that effectively clean the scalp and hair while reducing plastic waste. Unlike conventional bottled shampoos, shampoo bars are free from harsh chemicals, require minimal packaging and last longer. Ideal for travel, shampoo bars are both convenient and environmentally responsible. The shampoo bar is enriched with essential oils and botanical extracts, providing deep nourishment and hydration. As consumer awareness of sustainability grows, shampoo bars are becoming an increasingly popular choice for eco-conscious haircare.

**Keywords:** Eco-friendly Shampoo, Hair Care, Natural Ingredients, Shampoo Bars, Travel-Friendly.

## Formulation and Evaluation of an Herbal Toothpaste

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### ABSTRACT

Herbal toothpaste serves as an eco-friendly alternative to conventional formulations and is increasingly preferred over synthetic chemical-based options due to its safety and effectiveness in preventing dental caries and other oral health issues. In this study, we formulated a novel herbal toothpaste incorporating Stevia rebaudiana extract, Moringa oleifera powder, amla powder, clove oil, glycerin, calcium carbonate, and coco glucoside, a novel combination of ingredients in the formulation. These natural ingredients possess anti-caries and antibacterial properties, enhancing oral hygiene. The toothpaste was evaluated for key physical characteristics, including pH, stability, extrudability, spreadability, foamability, and homogeneity, to ensure an effective and stable formulation. The findings of this research demonstrate that our herbal toothpaste formulation performs effectively against oral pathogens responsible for dental caries, making it a promising natural alternative in oral care.

**Keywords:** Anti-caries; Dental Care; Herbal Formulation; Natural Toothpaste; Oral Hygiene.

## Screening of Cytoskeletal Drugs as Anti-Virals

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### ABSTRACT

RNA viruses continue to pose significant global health threats due to their rapid mutation rates, high transmissibility, and frequent emergence of new variants. Traditional antiviral strategies largely focus on targeting viral components; however, these approaches often face limitations due to the development of drug resistance. An alternative and promising strategy is to target host cellular pathways that viruses rely on for their replication. In this study, we explore the potential of repurposing cytoskeletal-targeting drugs as antiviral agents. The cytoskeleton, comprising act in filaments, microtubules, and intermediate filaments, plays an essential role in the viral life cycle, including entry, intracellular trafficking, replication, and egress. By modulating these structural elements, it may be possible to inhibit viral propagation without directly interacting with viral proteins. We conducted in vitro screenings of a curated library of cytoskeletal drugs using a model RNA virus system. The antiviral efficacy of each compound was assessed based on its ability to reduce viral load and prevent cytopathic effects in infected cells. Our results identified several cytoskeletal drugs that exhibited significant antiviral activity, suggesting their potential for therapeutic repurposing. These findings provide strong evidence that targeting host cell machinery, particularly the cytoskeleton, offers a novel and underexplored avenue for broad-spectrum antiviral intervention. Further mechanistic studies and in vivo evaluations are warranted to validate these compounds' clinical potential and safety profiles.

**Keywords:** RNA virus, cytoskeleton, antiviral drugs, drug repurposing, host-directed therapy, in vitro screening, cytoskeletal inhibitors.

## **Advancing Drug Delivery and Therapy with Hybrid Nanofibres: A Multifunctional Approach**

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### **ABSTRACT**

Hybrid nanofibers (HNF) are revolutionizing the field of drug delivery, offering a unique blend of natural and synthetic materials to create multifunctional solutions. This review dives into the applications and potential of these innovative materials in enhancing therapeutic outcomes. Natural HNF; These are crafted from biopolymers like chitosan, collagen, and alginate, bring exceptional biocompatibility and biodegradability to the table, making them ideal for medical use such as initial burst and sustained release throughout 48h. Synthetic HNF; Here polycaprolactone (PCL), poly (lactic-co-glycolic acid) (PLGA), Dimethyl Oxalyl Glycine (DMOG), Poly-(3 hydroxybutyrate-co-3-hydroxyvalerate) (PHBV), and Polyhydroxybutyrate (PHB) polymers add mechanical strength and the ability to control drug release in addition effectively used in the treatment of diabetic & chronic wounds. Mixed Natural and Synthetic HNF; The fusion of natural biopolymers with synthetic counterparts enables HNF to bypass the inherent limitations of individual polymers, paving the way for customized nano fiber drug delivery for anti-bacterial, anti-inflammation etc. Nanoparticle in HNF; The addition of nanoparticles further boosts their potential, enabling targeted delivery, improved drug stability, and better bioavailability, such as silver, iron and cobalt. This review explores the latest advancements in HNF, emphasizing their ability to reduce side effects, sustain drug release, and enhance patient compliance. However, challenges like scalability, reproducibility, and regulatory hurdles still need to be addressed for broader adoption. In conclusion, hybrid nanofibers hold immense promise in transforming drug delivery, offering creative solutions to complex medical problems.

**Keywords:** Hybrid nanofibers, Drug delivery, Natural polymers, Synthetic polymers, Multifunctional.

## **Green Electrospun Pla Nanofiber Mat Infused with Euphorbia Hirta for Air Purification and Copd Management: A Sustainable Approach**

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### **ABSTRACT**

Chronic Obstructive Pulmonary Disease (COPD), a progressive inflammatory lung condition, ranks as the third leading cause of death globally, affecting over 392 million individuals. This study explores a sustainable and biocompatible nanofiber mat composed of Polylactic acid (PLA) infused with Euphorbia hirta extract, intended for use as an air-purifying face mask to mitigate airborne pollutants and reduce COPD symptoms. PLA, a biodegradable and environmentally friendly polymer derived from renewable sources, exhibits excellent biocompatibility, mechanical strength, and processability, making it suitable for electrospinning. Euphorbia hirta is a medicinal plant rich in anti-inflammatory and wound-healing phytochemicals. Scanning Electron Microscopy (SEM) revealed smooth nanofibers ranging from 55.62 nm to 233.2 nm. The integration of Euphorbia hirta was confirmed by using FTIR and GC-MS, for identifying bioactivity, non-toxic compounds. XRD analysis confirmed an amorphous fiber structure and zeta potential measurements indicated good colloidal stability. The cytocompatibility was validated using the THP-1 cell line, where 50 µg/mL of extract showed no significant cytotoxicity. Furthermore, ROS assays via flow cytometry demonstrated reduced oxidative stress compared to LPS-induced inflammation (1.75 µM), affirming protective activity. This green synthesis of PLA-based nanofibers supports sustainable material development for biomedical and environmental applications.

**Keywords:** COPD, PLA nanofibers, Euphorbia hirta, sustainability, ROS assay, THP-1 cells, electrospinning, biodegradable polymer.

## **Development of a Highlighting System for Surgical Instruments in Total Knee Arthroplasty**

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### **ABSTRACT**

Total knee arthroplasty is a complex surgical procedure where precise identification and handling of surgical instruments are crucial for successful outcomes. However, during surgery, the visibility of instruments can be compromised due to poor lighting and distractions, which increases the risk of surgical errors. This project proposes the development of an intelligent highlighting system to improve instrument tracking and visibility during Total Knee Arthroplasty. The system utilizes computer vision and real-time image processing to detect and highlight instruments, enhancing surgical efficiency and accuracy. The goal is to provide a reliable tool to assist surgeons in easily identifying and locating instruments, reducing the likelihood of errors and improving overall surgical performance. The proposed system integrates seamlessly with existing surgical setups, ensuring minimal disruption. Key advantages include improved safety, reduced time spent searching for instruments, and enhanced surgical precision.

**Keywords:** Total Knee Arthroplasty, Surgical Instruments, Computer Vision, Real-time Image Processing, Surgical Safety, Instrument Tracking, Surgical Precision.

## **IOT Based Smart Blood Bank Monitoring System**

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### **ABSTRACT**

Blood is a saver of all existing lives in case of emergency needs. The task of "Automated Blood Bank" is to collect the information from the donors, to monitor the Blood group database and to send the required Blood during the need of recipient in case of emergency. We want to build a network of people who can help each other during an emergency. By using low cost and low power iBeacon module. To assure blood is safe for patient use, it is necessary to constantly maintain optimal temperature. Blood bank monitoring not only reduces waste but provides rigorous support of inventory levels to ensure patients receive blood when they need it. Manual recording of temperatures in blood banks has the potential for suffering human error as well. Customizable and with low learning curves, an automated environmental monitoring system not only documents temperature but also motion and humidity to ensure the safety of blood. Also, with the help of IOT Device the location of the nearby blood banks and blood donors can be identified. This can help more people in many ways even can save live at a critical time.

**Keywords:** Automated blood bank, blood donation, emergency response, iBeacon Module, IOT Devices, Blood Safety, Temperature Monitoring.

## **Production Of Biodegradable Rice Husk Food Wrapping Material**

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### **ABSTRACT**

Rice husk is an excellent source of cellulose, was mixed with PVA, a natural polymer and clove extract for casting films as it has valuable characteristics including antimicrobial effects. Utilization of excess rice husk available in high season and cellulose can from the waste could help reduce waste while making available a value-added product. The cellulose extracted from the rice husk was mixed with 10 % of polyvinyl alcohol and clove extract and the thin film was prepared. Film water vapor permeability, tensile properties, solubility and morphology were investigated. The presence of cellulose in the composite film makes possible water soluble and sealable bags or wraps, while the presence of cloves extract make them the antimicrobial property. The composite bags were found to protect against *Staphylococcus aureus* activity by serving as a good barrier and as a antimicrobial agent. With these properties the bag with its contents can be processed together during food preparation making its use very convenient.

**Keywords:** Rice husk, clove, cellulose, Biofilm.

## **Development Of Biodegradable Carrageenan Films Incorporated with Zinc Oxide Nanoparticles for Enhanced Food Preservation Applications**

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### **ABSTRACT**

The increasing demand for sustainable packaging has led to the development of biodegradable films incorporating natural and functional additives. This study focuses on the development of a biodegradable packaging film using algae-based biopolymers reinforced with zinc nanoparticles (ZnONPs). Algae serve as an excellent biodegradable matrix due to their polysaccharide-rich composition, while ZnONPs enhance the film's mechanical strength, antimicrobial properties, and barrier performance. The incorporation of ZnONPs aims to improve the film's durability and extend the shelf life of food products by inhibiting microbial growth. The characterization techniques we performed is UV-visible to analyse the wavelength of the nanoparticle (335nm) and SEM to analyse the nano particle structure and FTIR analysed with the functional groups of (alcohol, alkanes, amides, metal oxides) and particle size is analysed with the range of (55-90nm) and PH with neutral values, moisture content (6.8%). The results indicate that the ZnONPs-enhanced algae film demonstrates promising biodegradability estimated after 28 days (72–78%), and enhanced antimicrobial activity against foodborne pathogens like Antibacterial efficacy was observed against *E. coli*, *Staphylococcus aureus*, *Bacillus*, and *Enterococcus faecalis*, showing inhibition zones ranging from 65% to 80% compared to control (Gentamycin). Antifungal activity against *Aspergillus Niger* and *Aspergillus flavus* recorded inhibition in the range of 60% to 75%, comparable to Fluconazole control. Minimal Inhibitory Concentration (MIC) results confirmed effective inhibition at concentrations as low as 100–150 µg/mL, reducing microbial growth by over 90% in most cases.

**Keywords:** Biodegradable film, algae-based packaging, zinc nanoparticles, antimicrobial properties, food preservation.

## **Development of Plant-based Cheese**

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### **ABSTRACT**

The increasing demand for plant-based options has operated innovation in dairy-free cheese production. The study examines the growth of a plant-based cheese using sprouted chickpeas milk and a new mixture of coconut milk, with vegetarian cleanser, stable with agar and experienced with salt. Sprout chole increases the nutrition profile and improves digestion, making them a promising basis for milk non-degree. Coconut milk contributes to prosperity and cream, imitating the design of traditional cheese. The vegetarian rennet enables coagulation without animal-oriented enzymes. The plant-based cheese can be related to health concerns such as lactose intolerance or a milk allergy and can be healthy alternative for milk cheese. The status of frozen and processing was adapted to achieve desirable taste, texture and shelf stability. The resulting cheese demonstrated sensory and nutritional properties, reflecting its ability as a permanent and health-conscious alternative in the plant-based dairy market.

**Keywords:** chickpeas milk, coconut milk, animal-oriented enzymes, traditional cheese.

## **Formulation and Development of Nutrient-Enriched Bread Incorporating Apple, Beetroot and Carrot Malt**

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### **ABSTRACT**

The growing demand for healthier food products has driven the development of functional foods enriched with natural, nutrient-dense ingredients. Bread, as widely consumed staple, presents a practical vehicle for nutritional enhancement. This study investigates the formulation of nutrient-enriched bread using malted *Malus pumila* (apple), *Beta vulgaris* (beetroot), and *Daucus carota* (carrot), collectively referred to as ABC malt. The malting process involved germination at 25°C for 48 hours, followed by drying at 50°C for 8 hours and milling into a fine powder. ABC malt was incorporated into bread formulations at varying levels (10%, 20%, and 30%) to assess its effect on the bread's physicochemical properties, nutritional composition, texture, and sensory characteristics. Baking was performed at 180°C for 25 minutes. The results indicated that the inclusion of ABC malt significantly enhanced the nutritional profile of the bread, increasing dietary fiber, antioxidant activity (as measured by DPPH assay), and essential micronutrients such as potassium, vitamin C, and beta-carotene. The presence of natural pigments contributed to improved crust and crumb coloration. Textural analysis showed a moderate increase in crumb firmness at higher malt levels, although the 20% formulation maintained favourable softness and chewiness. Sensory evaluation, conducted using a 9-point hedonic scale, revealed that bread fortified with 20% ABC malt achieved the highest consumer acceptability in terms of appearance, aroma, flavour, texture, and overall liking. The 30% level was less preferred due to a denser crumb and slightly earthy aftertaste. Overall, the study demonstrates the potential of ABC malt as a functional ingredient to produce nutritionally enhanced bread without compromising sensory quality. The 20% inclusion level is recommended for optimal balance between health benefits and consumer appeal.

**Keywords:** Functional bread, ABC malt, antioxidant activity, sensory evaluation, dietary fiber

## **NutriLife: An AI-Driven Personalized Grocery Planning System for Healthy and Affordable Living**

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### **ABSTRACT**

NutriLife is an AI-based grocery planning and shopping platform that supports healthy living through personalized nutrition-based recommendations. The system enables users to receive daily or weekly grocery packages customized to their family's health profile, including Body Mass Index (BMI), existing medical conditions, food preferences, and financial status. On first login, users input editable family data which is used to generate smart, adaptable packages categorized as Normal, Special, or Premium. These suggestions align with national dietary standards and school nutrition charts, making them suitable for families with diverse needs. By integrating artificial intelligence with real-time food pricing, NutriLife offers affordable yet nutritious recommendations, reducing food waste and promoting public health. The application also facilitates purchasing of vegetables, fruits, organic items, and medicines, along with cooking tutorials and recipe suggestions based on selected plans. Future enhancements include integration with wearable health devices, multilingual support, and dynamic meal planning. This research presents NutriLife as an innovative solution to bridge the gap between nutrition, affordability, and convenience, contributing to sustainable and intelligent food consumption.

**Keywords:** AI in Healthcare, Nutrition-Based Recommendation, Smart Grocery Planning, Sustainable Living, Personalized Diet

## **Biological Activity of Bimetallic Nanoparticles from *Stephania Glabra* Tuber leaves**

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### **ABSTRACT**

*Stephania glabra* is a type of climbing vine, specifically belonging to the plant family Menispermaceae. It is a large climbing shrub and the plant tuber has been used for centuries to cure various disorders. Our project involves collection of *S. glabra*. Preparing the extract, assessing its phytochemical constituents. Qualitative analysis of different extracts and fractions used to detection of alkaloids, flavonoids, carbohydrates, phenols, characterization of Ag, CuO and Ag/Cu bimetallic nanoparticles using bioactive fraction of *S. glabra*. Our project focuses on the biological activities, including anti-microbial, anti-oxidant, and potential therapeutic effects.

**Keywords:** *Stephania glabra*, biological activities, anti-microbial, anti-oxidant, anti-cancer and anti-inflammatory activity, clinical applications.

## **Microbial degradation of textile industry effluent and evaluating quality parameters of textile effluent**

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### **ABSTRACT**

Potential of microbes in removing dyes from textile effluent was studied. Effluent samples were collected from Textile industries. Bacteria were isolated from samples collected. The bacteria isolated were screened for their ability to decolourize dyes used in the local textile industries. The isolate with the highest decolourization ability on the dyes was used to decolourize effluents from the textile industry. Gas Chromatography Mass Spectroscopy (GC-MS) analysis and Brine Shrimps Cytotoxicity test was carried out using cell free supernatant of the effluent to determine the degradative ability and the detoxification potential of the isolate. *Bacillus licheniformis* showed the best decolourization ability for the dyes having 90.32% and 63.76% decolourization potential on Gambia gold and army green respectively. GC-MS analysis of the *B. licheniformis* treated effluent revealed reduction in the percentage concentration of compounds such as quinoline and 7-methylquinoline which had a concentration of 19.74% and 5% in the untreated effluent and a final concentration of 2.85% and 0% respectively in the treated effluent. Brine shrimps cytotoxicity test revealed a decrease in the cytotoxicity of the treated effluent which had an LC50 of 642.72 compared to the untreated effluent which had an LC50 of 1.61.

**Keywords:** Textile effluent , GC-MS, Shrimp cytotoxicity

## Prediction And Saving of Neonatal Sepsis

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### ABSTRACT

Early-onset sepsis in babies refers to an infection that occurs in newborns within the first few days of life, typically within the first 72 hours after birth. This type of sepsis is often caused by bacteria that the baby acquires from the mother during delivery, or from exposure to other infections in the neonatal intensive care unit. Early-onset sepsis can be life-threatening and requires immediate medical attention. This type of sepsis can be caused by a variety of bacteria and other pathogens, and can occur in babies who are otherwise healthy as well as in those who are already sick or premature. Both early-onset and late-onset sepsis are serious conditions that require early detection and treatment to prevent complications and improve outcomes. The system consists of a sensor network that includes a heart rate sensor, a temperature sensor, and two switches. The heart rate sensor continuously measures the 's heart rate, while the temperature sensor measures the patient's body temperature. The switches are used to indicate the time intervals at which the heart rate and temperature readings are taken. When the first switch is pressed, indicating events within the last 72 hours, the system checks the heart rate and temperature readings for abnormalities. If either reading deviates from the normal range, it detects early onset of sepsis. When the second switch is pressed, indicating events beyond 72 hours, the system again checks the heart rate and temperature readings. If abnormalities are detected, it signifies late onset of sepsis. All collected data, including heart rate, temperature, and sepsis onset information, is sent to the cloud for further analysis. predictive models can be applied to the cloud-stored data to improve the accuracy of sepsis detection and predict the likelihood of sepsis development in the future. This information can then be used by healthcare professionals to make informed decisions regarding patient care and treatment.

**Keywords:** Heart rate sensor, Temperature sensor, Switches and Buzzers.

## **Experimental Work on Wound Healing Using Ormulstions from Plant Extract**

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### **ABSTRACT**

Wounds have a serious negative impact on the healthcare economy of a country, especially on the economy of developing countries where resources are poor and funding is very limited. It is presumed that about 80% of people living in developing countries use traditional medicines which are majorly prepared from medicinal plants to meet their primary healthcare needs. Due to the large reservoir of medicinal plants and adequate traditional knowledge on wound healing, many people in Africa and other developing countries use medicinal plants in the treatment of diabetic wounds and related complications. Wound healing in the external and internal biological organs involves a series of complex overlapping processes which demand excellent communication between cells. Different approaches have been adopted in the treatment of diabetic wounds, and medicinal plants are certainly one of those approaches that have drawn global attention. *Mimosa pudica* L. (Mimosaceae) also referred to as touch me not, live and die, shame plant and the humble plant is a prostrate or semi-erect subshrub of tropical America and Australia, also found in India heavily armed with recurved thorns and having sensitive grey-green leaflets that fold and droop at night or when touched and cooled. Senna flowers extract used in the treatment of ulcers. In this project, we intend to develop an herbal-based healing gel for the foot ulcer.

**Keywords:** Senna Auriculata, Mimosa Pudica, extract, Wound Healing property.

## **Antimicrobial, Antioxidant, Anti-Inflammatory Activity of Ethanolic Extract of Medicinal Plant**

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### **ABSTRACT**

This study investigates the antimicrobial, antioxidant, and anti-inflammatory activities of ethanolic extracts derived from select medicinal plants. The antimicrobial activity was evaluated against a range of pathogenic microorganisms using the disc diffusion method, while the antioxidant potential was assessed through DPPH free radical scavenging assays. The anti-inflammatory activity was examined via in vitro methods, including protein denaturation and membrane stabilization techniques. Results demonstrated significant inhibition of microbial growth, high free radical scavenging ability, and effective suppression of inflammatory responses, highlighting the potential of these extracts in developing natural therapeutic agents. These findings emphasize the importance of medicinal plants as a source of bioactive compounds with multifunctional therapeutic properties

**Keywords:** Ethanolic Extract, Medicinal Plants, Antimicrobial Activity, Antioxidant Activity, Anti-inflammatory Activity, Bioactive Compounds, Therapeutic Potential, Natural Remedies.

## **An Interactive System for Blind People**

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### **ABSTRACT**

This project has been developed and utilized a device that performs three functions to assist blind individuals in walking without the risk of falling. The first function is achieved by affixing a moisture sensor at an angle of approximately 40° onto a standard white cane that will detect the presence of water at a distance of approximately 48 cm, preventing the occurrence of falls that can result in substantial consequences. The purpose of this research project is to create a long-term monitor that will identify the water level of a river system through the application of moisture detection. Every aspect of modern human life has rapidly progressed in the same vein. This progress is made possible by electronics and information technology. Therefore, a system has been created to automatically detect the presence of water—the moisture sensor provides information about the water level. The system consists of a sensor and a data assessment system. This is an IoT-engineered system with a moisture sensor providing the primary understanding of the water system. The definition of assistive technology is any device that allows people with disabilities to live, work, study, or play independently but also improves the functioning capabilities of that individual. Someone with a severe physical disability may only be capable of small movements, which might be used as unconventional methods in powering assistive technologies. These small movements can be translated through electrical signals, and then a control unit will use these signals as control commands. The goal of this research paper is to assist blind individuals with moving from one place to another using a combination of technologies and the application of devices that contain a microcontroller that manages other devices in aid of blind individuals and also includes a micro controller with a sensor that will act as sight and then let the blind individual know if objects are located ahead or present and finally a buzzer or an alarm.

**Keywords:** Assistive Technology, Blind Assistance Device, Moisture Sensor, Water Level Detection, Smart Cane, Obstacle Detection, Fall Prevention.

## **A Smart Monitoring System for Asthma Patients Using IOT**

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### **ABSTRACT**

Early disease detection and diagnostics are major areas of interest for health and disease management. The two most commonly used physical- and chemical sensors in smart sensor systems are electronic chemical nose and wearable sensors. Nowadays, owing to population growth, increasing environmental pollution, and lifestyle changes, the number of asthmatics has significantly increased. Therefore, the purpose of our study was to determine the asthma-prone areas in India. In this proposed paper, we present an asthma risk prediction tool based on temperature, humidity and gas/smoke level and alert the patient using IOT. Respiratory symptoms are common in early life and often transient. It is difficult to identify in which children these will persist and result in asthma. Wearable sensors for measuring the environmental parameters of the atmospheric condition, there are a few cases to apply wearable biochemical sensors into the smart sensor systems. Wearable physical sensors are devices that are generally attached to the enduser to extract movement data, which are composed of smoke / gas sensor, temperature and humidity and IoT (Esp 8266-12E) NODE MCU and buzzer. The sensor analog and digital output values are fed to IOT controller with wifisheild, and then transmitted to cayenne server and it can be viewed in the cayenne app/webpage. When coupled with IOT and breath analyze can diagnose these types of diseases in a noninvasive, convenient, and economical manner compared with those of traditional method.

**Keywords:** Sensor analog, Wearable sensors NODE MCU and buzzer

## **Effective Foot Pressure Ulcerdetection System for Diabetics Patients**

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### **ABSTRACT**

In today's world, the use of sensor technology to make portable devices can help patients in detecting or monitoring diseases. One such problem is the onset of foot ulcers in diabetic patients. Diabetes often leads to improper circulation of blood to a person's feet, which results in diabetic foot ulcers. This leads to bulge and loss of sensation in the patient's foot. If ignored, leads to lower leg amputation. The proposed system is a device which is developed and evaluated to identify the patients who are likely to develop diabetic foot ulcers at an early stage. This is accomplished by fixing pressure sensors in pressure points of the foot. The foot pressure readings are converted into corresponding data output by force sensor. The microcontroller has collecting the data readings from force sensor. The output of the device decides whether the person has the probability to develop diabetic foot ulcer or not. Based on the foot ulcer level, therapy will be given using Peltier crystal.

**Keywords:** portable Device, peltier crystal therapy, microcontroller, force sensor

## **IoT-Based Urinary Bladder Fullness Detection System**

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### **ABSTRACT**

Urinary incontinence and retention are common issues among patients with neurological disorders, post-surgical conditions, and aging populations. This project proposes an IoT-enabled urinary bladder fullness detection system that integrates infrared (IR), temperature, and humidity sensors to provide real-time, non-invasive monitoring. The system captures physiological signals linked to bladder activity and transmits them via a Node MCU microcontroller to a cloud platform. It alerts patients and caregivers through a mobile app when the bladder reaches a critical fill level. With real-time feedback and mobile alerts, the device ensures timely intervention, enhances patient autonomy, and reduces hospital visits. The prototype achieved a detection accuracy of approximately 90% in controlled conditions, marking a significant advancement in personalized healthcare technology for bladder dysfunction management.

**Keywords:** Bladder monitoring, IoT, wearable healthcare, incontinence alert system, dementia care, real-time sensor integration

## **IOT-Based Smart Heart Attack Detection**

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### **ABSTRACT**

Heart disease is one of the leading causes of mortality worldwide, with heart attacks often occurring without prior warning. Early detection and immediate medical attention are critical for improving patient survival rates. This project presents an IoT-based smart heart attack detection system that continuously monitors a person's vital signs and provides real-time alerts in the event of a possible heart attack. The system integrates various biosensors, including ECG, heart rate, and body temperature sensors, which are connected to a microcontroller (such as Arduino or ESP32). These sensors collect real time physiological data and transmit it via Wi-Fi or GSM modules to a cloud-based server. The data is then analyzed using predefined thresholds or machine learning algorithms to detect anomalies indicative of a heart attack. In case of abnormal readings, the system automatically sends alerts to emergency contacts and healthcare providers through SMS, email, or a mobile application, including the GPS location of the patient for quick response. This IoT-enabled solution aims to provide continuous health monitoring, early heart attack detection, and timely medical intervention, thus enhancing patient safety and potentially saving lives.

**Keywords:** ECG, heart rate, Arduino or ESP32, GSM modules and body temperature sensors

## **Pain Diagnosing and Disappearing Using Vibrators**

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### **ABSTRACT**

This project outlines a cutting-edge system for the ongoing monitoring and evaluation of the comfort levels of patients with the main goal being the enhancement of the quality of care for patients suffering from limited mobility or needing extensive amounts of stationary support to address the dangers of discomfort and complications of immobility this solution uses high-tech sensor technology and real-time data analytics to track patient conditions sense warning signs of discomfort and notify caregivers of subtle yet critical changes by combining several levels of monitoring ranging from generalized comfort checks to targeted foot pressure monitoring the system provides a rich understanding of a patients comfort and movement patterns thus enabling timely and informed medical intervention the design includes a network of sensors strategically located to pick up on subtle movements that signal discomfort with special focus on foot pressure analysis by quantifying and comparing the force exerted in major pressure points particularly in the lower limbs the system can detect early indicators of pain or discomfort that may otherwise be overlooked this feature allows healthcare professionals to respond to patient needs preemptively minimizing the risk of additional complications like pressure sores or circulatory problems an unambiguous easy-to-read display is a crucial component of the system providing caregivers with real-time feedback about current comfort and pressure levels feedback is drawn from actual real-time data giving an instant snapshot of a patients comfort profile to support rapid and accurate decision-making besides local data presentation the system allows remote access enabling healthcare professionals and family members to view the patients status anywhere remote monitoring features give caregivers the power to monitor trends over time observe patterns of comfort levels among patients and make informed decisions based on data to maximize treatment protocols such capabilities are particularly beneficial for homecare or patients receiving treatment in geographically distant locations where the caregiver might not be present all the time.

**Keywords:** Arduino(uno), pressure sensor, LCD display, embedded system.

## **Autism patient proximity tracking device**

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### **ABSTRACT**

Autism Spectrum Disorder (ASD) is a complicated neuro developmental illness characterised by a variety of social, communication, and behaviour difficulties. Early identification and intervention are critical for improving long-term results and maximising the potential of people with ASD. Early intervention programmes, such as behavioural treatments and speech-language therapy, have been proven to dramatically enhance developmental outcomes for children with ASD. Initiating these treatments during the key early years can result in favourable improvements in communication skills, social interactions, and adaptive behaviours. Doctors establish a diagnosis based on the child's developmental history and behaviour. Most youngsters, it appears, do not receive a genuine autism diagnosis until it is too late. To address this issue, a proposed system that can diagnose Autism and arrive to a reliable and effective conclusion without the assistance of a professional is being developed. In this approach, a deep neural network is used to anticipate autism spectrum disorder using a pretrained Brain dataset and a deep learning model named as Convolutional neural network. MRI has provided crucial insights into the brain functions producing ASD. Researchers have uncovered possible biomarkers that may distinguish people with ASD from people who are usually developing by looking at brain connection patterns, activation during social activities, and resting-state networks.

**Keywords:** Autism Spectrum Disorder (ASD), MRI, Convolutional neural network.

## **GSM and IOT based paralysis patient monitoring system**

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### **ABSTRACT**

Paralysis is the loss or impairment of muscle movement and sensation, caused by a disruption in the communication of nerve impulses between the brain and muscles. One of the primary causes of paralysis is spinal cord injury (SCI). Physical therapy (physiotherapy), a complementary and alternative medicine, plays a crucial role in diagnosing and treating various diseases and conditions, including paralysis. A vital type of physiotherapy focuses on improving the health of paralysis patients by helping restore movement and function. Paralysis results from damage to the underlying nerves, leading to a complete loss of muscle function in one or more muscle groups. This system aims to develop a monitoring system tailored for paralysis patients, utilizing GSM and IOT technologies for seamless communication. An accelerometer sensor, placed on the patient's head, detects continuous head movements in various directions front, back, left, and right. These movements are converted into specific instructions, which are transmitted to a microcontroller via a GSM module. The system displays real-time data on both an LCD screen and the Blynk Android application, allowing caregivers to monitor the patient's status remotely. This innovation provides an effective communication tool for patients with limited mobility, enhancing care and responsiveness in real-time, especially in remote healthcare settings.

**Keywords:** Utilizing GSM and IOT technologies, accelerometer sensor.

## Precise Temperature Controller for Baby Incubator

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### ABSTRACT

This project focuses on maintaining the infant's body temperature to prevent hypothermia, promoting optimal growth, Reducing risk of infection, and quick response. A baby incubator temperature works by comparing the actual temperature to the desired set point. The system uses temperature sensor, Humidity sensor, optocoupler sensor, solid state relay, Electric current sensor, LM35 Sensor, thermistor sensor to regulate the incubator's temperature. The proposed system features automated controls for precise temperature and humidity regulation, enhancing neonatal care and safety. It employs a microcontroller to continuously monitor environmental conditions and make real-time adjustments as needed. Cooling mechanisms activate automatically when temperature exceeds a specified threshold, ensuring a stable incubator environment. Heating systems engage when humidity levels drop below optimal settings, maintaining a consistent atmosphere for infants.

**Keyword:** Temperature sensor, Humidity sensor, optocoupler sensor, solid state relay, Electric current sensor, LM35 Sensor, thermistor sensor

## **Non-Invasive Hemoglobin Measurement Device**

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### **ABSTRACT**

The advancement of non-invasive hemoglobin (Hb) measurement technologies offers a promising alternative to traditional blood-based diagnostics, enabling improved patient monitoring and early detection of hematologic abnormalities without the need for invasive procedures. This paper presents a novel optical sensor that utilizes near-infrared spectroscopy (NIRS) and advanced machine learning-driven signal processing to estimate hemoglobin levels through the skin. By analyzing the absorption and scattering of near-infrared light within tissue, the device accurately determines Hb concentration while minimizing interference from skin pigmentation, water content, and other tissue components. The system is calibrated using standard blood tests to ensure reliability across a wide range of hemoglobin values. With its ability to provide continuous, real-time monitoring, this technology has significant potential in clinical and home healthcare settings—particularly for managing conditions such as anemia, cancer-related treatments, and post-surgical recovery. The non-invasive nature of this method offers a more patient-friendly approach to hemoglobin tracking, supporting timely clinical decisions and improved outcomes.

**Keywords:** Non-invasive hemoglobin measurement, Signal processing, Real-time health monitoring, Skin-interfacing devices.

## **Smart health monitoring system for pregnant women**

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### **ABSTRACT**

Pregnancy health monitoring systems have become a vital requirement for medication purposes. Pregnant women require constant observation, which a human can perform continuously. Also, with the support of modern health monitoring devices, errors can be reduced while monitoring women in high-risk pregnancy or postpartum stages. The main aim of this project is to screen the heartbeat and SPO2 level of the pregnant woman and show the measured data to the doctor. The system makes use of an IoT controller, an MAX30100 sensor, and the heartbeat sensor, all connected to the IoT controller, to constantly verify the condition of the pregnant woman. If sensor values cross the threshold value, the GSM will send an alert message to the family members and doctor, and the data will be continuously updated on the LCD display

**Keywords:** Max30100 Sensor, And the Heartbeat Sensor

## **Laser Based Non-Invasive Glucose Monitoring System**

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### **ABSTRACT**

The project focuses on the design and implementation of a "Laser-Based Non-Invasive Glucose Monitoring System" to address blood glucose problems, such as diabetes and hypoglycemia. This device features a blood glucose sensor utilizing laser technology for accurate measurement without invasive methods. It continuously monitors glucose levels and updates the Blynk app via IoT, providing real-time data for users.

**Keywords:** blood glucose problems, blood glucose sensor utilizing laser technology.

## Lab-On-A-Chip Technologies

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### ABSTRACT

Human "organs-on-chips" are revolutionizing drug safety testing by offering a more accurate and efficient alternative to traditional methods. These microengineered devices replicate the structure and function of human organs using living human cells, allowing for real-time evaluation of drug effects on specific tissues. By accelerating the assessment process and improving predictive accuracy, organs-on-chips can reduce reliance on animal testing and enhance the identification of drug candidates with the highest potential to treat human diseases effectively. Herbal medicines have been utilized globally for thousands of years to treat a wide range of diseases. The secondary metabolites derived from these plants exhibit remarkable structural diversity, offering valuable additions to chemically synthesized compound libraries in drug discovery. However, challenges remain in drug screening programs due to the labor-intensive and time-consuming processes required to isolate active compounds from the complex mixtures found in herbal extracts. The quality and quantity of herbal samples are crucial factors that influence the success of high-throughput screening efforts. Recent advancements in HTS technologies particularly the miniaturization and integration of microchip platforms such as Herbochip , DNA chips, protein chips, and cell chips have significantly improved the efficiency and precision of herbal drug screening, bringing them closer in competitiveness to synthetic drug analogs. Natural products are often complex and mixed with other substances, which makes it hard to figure out which ingredients are active and how they work. New microfluidic technologies like organ-on-a-chip, Herbochip, and other small testing systems are helping scientists study drug responses more easily, especially in cancer research. These tools allow quick and accurate testing of toxicity without always needing traditional lab methods. This review looks at how these tools, especially Herbochip and organ-on-a-chip, help identify useful herbal compounds, understand how plant-based drugs work, and test the safety of new medicines. They also show promise in helping develop better natural product-based drugs and support personalized medicine.

**Keywords:** organ-on-a-chip, Herbochip , HTS technologies, Herbal medicines.

## **Cuffless Blood Pressure Monitoring System**

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### **ABSTRACT**

This project develops a cuffless blood pressure and heart rate monitoring system that utilizes a Photoplethysmography (PPG) sensor, microcontroller, and OLED display to provide real-time, non-invasive health measurements. The PPG sensor detects changes in blood volume within the skin's microvascular network, capturing both heart rate and blood pressure data. The microcontroller processes these signals to estimate Mean Arterial Pressure, as well as the heart rate, with high accuracy. The measurements are then displayed on a compact OLED screen, offering a user friendly and portable solution for continuous cardiovascular monitoring. This system eliminates the discomfort and inconvenience associated with traditional cuff-based devices, making it an ideal tool for regular health monitoring. By combining advanced sensor technology with efficient data processing, this project provides a convenient, accurate, and accessible method for tracking blood pressure and heart rate in real-time, enhancing overall health management.

**Keywords:** Cuffless ,Blood pressure, Heart rate ,Photoplethysmography (PPG), Microcontroller, OLED display, Real-time monitoring.

## **Wearable Wellness Tracker for Maternal Health and Elderly Fitness**

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### **ABSTRACT**

Falls are a significant health concern, particularly for elderly individuals and pregnant women, as they are more vulnerable to injuries from sudden falls or loss of balance. This Fall Detection and Emergency Response System aims to provide an efficient solution to detect falls and trigger an immediate emergency response, enhancing safety and reducing the risks of delayed medical intervention. The system is designed using an Arduino Uno microcontroller integrated with a gyro sensor to continuously monitor the user's body orientation and movement patterns. When a fall is detected through a sudden shift in posture or abnormal motion, the system activates an audible alarm through a buzzer and simultaneously displays real-time status updates on an LCD screen. The LCD shows the condition of the user and alerts caregivers or family members to take immediate action.

**Keywords:** Arduino Uno microcontroller, gyro sensor, buzzer and simultaneously displays real-time status

## **IOT, Based Posture Correction Monitoring System**

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### **ABSTRACT**

Individuals In today's digital age, many spend extended hours seated at desks, often working on computers or engaging with screens for entertainment. This prolonged sitting can lead to several health problems, such as poor posture, back and neck pain, muscle tightness, and even serious conditions like deep vein thrombosis (DVT). A key factor contributing to these issues is a lack of awareness about proper sitting posture and movement. To address this, the Sitting Position Monitor has been developed—an innovative solution that utilizes an accelerometer, a buzzer alert system, and IoT integration to encourage better posture habits. The system works by constantly tracking the user's sitting angle through the accelerometer sensor, identifying when someone remains in a poor or static posture for too long. When such a position is detected, an audible alert from the buzzer prompts the user to adjust their sitting position. Beyond real-time feedback, the device also leverages IoT technology to store posture data in the cloud, making it accessible through a mobile app or web platform. Users can monitor their posture history, observe patterns, and receive customized suggestions for improvement. By combining posture monitoring, instant alerts, and cloud-based analytics, this system supports better health, enhanced comfort, and increased productivity for people who spend long hours seated at work or at home.

**Keywords:** Buzzer alert, IOT, posture correction, accelerometer

## **Fuzzy Control of Methanol Distillation Based on SHAP (SHapley Additive explanations) Interpretability and Generative Artificial Intelligence**

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### **ABSTRACT**

The most important control parameters in the methanol distillation process, which are directly related to product quality and yield, are the temperature, pressure and water content of the finished product at the top of the column. In order to adapt to the development trend of modern industrial technology to be more accurate, faster and more stable, the fusion of multi-sensor data puts forward higher requirements. Traditional control methods, such as PID control and fuzzy control, have the disadvantages of low heterogeneous data processing capability, poor response speed and low control accuracy when dealing with complex industrial process detection and control. For the control of tower top temperature and pressure in the methanol distillation industry, this study innovatively combines generative artificial intelligence and a type II fuzzy neural network, using a GAN for data preprocessing and a type II fuzzy neural network for steady-state inverse prediction to construct the GAN-T2FNN temperature and pressure control model for an atmospheric pressure tower. Comparison experiments with other neural network models and traditional PID control models show that the GAN-T2FNN model has a better performance in terms of prediction accuracy and fitting effect, with a minimum MAE value of 0.1828, which is more robust, and an R2 Score of 0.9854, which is closer to 1, for the best overall model performance. Finally, the SHAP model was used to analyze the influence mechanism of various parameters on the temperature and pressure at the top of the atmospheric column, which provides a more comprehensive reference and guidance for the precise control of the methanol distillation process.

**Keywords:** methanol rectification; generative artificial intelligence; type II fuzzy neural network; inverse steady-state prediction; SHAP analysis

## **Lactic Acid Deep Eutectic Solvent with Different Molar Ratios on Water Insoluble Drug Solubility**

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### **ABSTRACT**

In this work, to study the enhancement of water insoluble drugs solubility like fenofibrate is an oral medication of the fibrate class used to treat abnormal blood lipid levels. It is commonly used less when compared to statins because it treats a different type of cholesterol abnormality to statins. Fenofibrate is used together with a proper diet to reduce and treat high cholesterol and triglyceride levels in the blood. For this reason, deep eutectic solvent (DES) such as choline chloride (ChCl) and lactic acid (LA) at different molar ratios such as 1:4, 1:5 and 1:6 were prepared and measured their physical properties including density, refractive index, and pH values at different temperatures from 298.15 K to 343.15 K. Since, the DES produced were clear and homogenized liquids under a microscopic observation, and DES 1:4 was found to meet the eutectic point with the lowest melting temperature. It is noted that density, refractive index and pH decreased with increasing temperature. It was also found that the DES produced were classified as hydrophilic DES because of their solubility in water, highly polar and most semi polar solvent.

**Keywords:** Fenofibrate, Lactic Acid, Choline Chloride, Physical Properties.

## **Acetic Acid Based Deep Eutectic Solvent with Different Molar Ratios on Water in Soluble Drug Solubility Studies**

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### **ABSTRACT**

The main objective of this work, to prepare deep eutectic solvent (DES) is a eutectic system which is consisting of hydrogen bond donor (HBD) and acceptor (HBA). DES has been suggested as a strategy for poorly soluble drugs in pharmaceutical applications. In this reason, choline chloride (ChCl) with acetic acid (AA) in different molar ratios such as; 1:4, 1:5, and 1:6, respectively. Thermal mixing process that involves mixing choline chloride with acetic acid upon mixing. Since, DESs has aroused great interest in recent years in this regard, as a consequence of their excellent physicochemical properties, general low toxicity, and high biodegradability if they are compared with classical organic solvents. The physicochemical characterizations of DES including refractive index, density, pH data was measured at different temperatures (298.15 to 343.15) K. It was observed that density of DES decreased with increasing temperature, whereas Studies the higher values of refractive index, and pH was observed.

**Keywords:** Deep Eutectic Solvent, Choline Chloride, Acetic Acid, Density, Refractive Index.

## **Lidocaine Drug Solubility Enhancement Using Lactic Acid Based Deep Eutectic Solvent with Different Molar Ratios**

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### **ABSTRACT**

Lidocaine is a local anaesthesia used to relieve pain or discomfort due to medical surgery, minor burns, scrapes and insect bites. It is also used to treat Arrhythmias (anti-arrhythmic drug). It is insoluble in Water and soluble in organic solvents. The main intention of the project is to enhance the solubility of the drug by deep eutectic solvents (DESs) using Choline chloride and Lactic acid at molar ratio of (1:1) which is clear and homogenised. The DES is a eutectic system consisting of Hydrogen bond donor and acceptor has been suggested as a promising formulation strategy for poorly soluble drugs. DES exhibit interesting physical and chemical characteristics such as low vapour pressure, non-inflammability, chemically tailorable, solvency, power for a white range solutes and water non- reactivity. Furthermore, they can be easily prepared from low toxicity, readily available, and inexpensive constituents. Due to these properties, DES have attracted growing attention as green solvents in different areas. The physiochemical properties of DES including Density, pH and Refractive index were obtained and based on this the graphical representation were observed.

**Keywords:** Lidocaine, Deep Eutectic Solvent, Choline Chloride, Lactic Acid, Solubility.

## **Lidocaine drug solubility enhancement using acetic acid based deep eutectic Solvent with different molar ratios**

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### **ABSTRACT**

The objective of this study was to enhance the solubility of Lidocaine drug using DES. Lidocaine has been increasingly used as pain treatment in anaesthesiology. To review the scientific literature on the use of lidocaine for perioperative analgesia, a recent technique and still under study to demonstrate its clinical implications. Renowned for their nontoxic, biodegradable, and water miscible nature with reduced volatility, DESs are mostly synthesized through heating and stirring methods. DES differs from the conventional organic solvent and ionic liquids as it offers several advantages of recyclability, biodegradability, less volatile, non-toxic, non-flammability, high tunability, high dissolution capability, ease, short time of preparation, and low costs. Here, deep eutectic solvents (DES) using Choline-chloride (ChCl) with acetic acid (AA) at a molar ratio of 1:7 was prepared. The DES produced were clear and homogeneous liquid under microscopic observation. Further, the density, specific gravity, refractive index and pH was measured at different temperatures from 298.15 K to 343.15K. It is noted that the density, refractive index, pH values are decreased with increasing temperatures.

**Keywords:** Lidocaine, Deep eutectic solvent, Density, Refractive Index, pH values.

## **Production Of Purity Pentyl Acetate Using Deep Eutectic Solvents**

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### **ABSTRACT**

The synthesis of pentyl acetate, a valuable ester used in flavor, fragrance, and solvent industries, traditionally involves acidic catalysts that pose environmental and safety concerns. In this study, Deep Eutectic Solvents (DESs) were explored as green and sustainable alternatives for the production of high-purity pentyl acetate via esterification of pentanol and acetic acid. Various DESs, primarily composed of choline chloride and hydrogen bond donors such as glycerol and urea, were synthesized and evaluated for their catalytic performance. Reaction parameters including temperature, molar ratio, and reaction time were optimized to maximize yield and purity. The esterification reactions carried out in the presence of DESs demonstrated enhanced selectivity and yields exceeding 90%, with product purity above 98% confirmed via GC-MS and FTIR analysis. Additionally, the recyclability of DESs was assessed over multiple reaction cycles, showing minimal loss in catalytic activity. This study highlights the potential of DESs as efficient and eco-friendly catalysts for ester production, aligning with principles of green chemistry and offering a promising route for industrial-scale synthesis of esters.

**Keywords:** Pentyl acetate, Deep eutectic solvent (DES), Esterification, Green chemistry, High-purity synthesis

## **Impact of Extrusion Conditions on the Structural, Nutritional, and Functional Properties of Millet-Based Rice Analogues**

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### **ABSTRACT**

Millet analogue rice was made from pearl millet, sorghum, and parboiled rice using extrusion technology. The impact of extrusion process conditions in terms of screw speed (540- 900rpm), feed rate (300- 540 kg/h), and die temperature (80 - 100 ° C) and materials moisture content (28- 32 % wb) on cooking characteristics viz. water absorption ratio (WAR), cooking losses (CL) and cooking time (CT), and physiochemical properties viz. water solubility index (WSI) and water absorption index (WAI) were assessed to obtain a quality millet analogue rice using central composite design of RSM model. The optimized process condition of 28%wb moisture content, 720 rpm screw speed, 5 kg/h feeder rate, and 80 ° C die temperature showed 5.67 % CL, 943 s CT, 2.155% WSI, 7.093 g/g WAI and 6.815 WAR had a significant effect of  $p < 0.05$  with the desirability value of 0.858. Millet analogue rice exhibited a significant difference of  $p < 0.05$  in the proximate analysis, physical characteristics, textural properties when related to the raw rice. The relative crystallinity of millet analogue rice was lower than raw rice with similar FTIR Spectral patterns and showed surface cracks and internal voids during SEM analysis.

**Keywords:** pearl millet, sorghum, parboiled rice.

## **Development of Automated Portable Grain Warmer**

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### **ABSTRACT**

Occurrence of pests and insects in grains and cereals have been considered as a serious problem in households and at industrial scale. The traditional practice of sun drying have some limitations like uncontrolled temperature and impurity contamination. Thus, an equipment was developed and studied for better preservation and storage. The equipment helps to maintain an environment that inhibits the growth of worms and insects. Therefore, when the environment within the storage is maintained at a temperature range of 35 to 40oc, it enables to eradication of the pests for better quality of grains and flour. The equipment consists of an outer layer made of an insulating material and the inner layer consists of a heat-conducting material. In between the layers, a heat-trapping, material is used to maintain the temperature for a good time duration. The temperature is altered or set by using a temperature controller. A time relay is used to operate the equipment once in 12 or 24 hrs so that the system is automated with no requirement of human intervention. A blower is fixed at the lid to maintain the temperature and evenly spread the heat in order to prevent hotspots. The equipment ensured cost efficiency as well as better storage of grains without affecting the quality of them.

**Keywords:** Sun drying, storage, automated, temperature, moth larvae.

## **Printing Inner Ear-Using 3D Bioprinting: A Review**

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### **ABSTRACT**

Hearing loss represents a global health issue, with structural or functional damage within any segment of the ear leading to varying levels of auditory impairment. According to the World Health Organization, more than 1.5 billion people worldwide live with hearing loss, a number that could rise to over 2.5 billion by 2030 with the aging population. The majority of hearing loss cases are caused by the damage to inner ear hair cells or connected spiral ganglion cells, and there is a lack of effective treatment measures. In surgical treatment requires organ donor, who are in the state of cardiac death or brain death. Their analysis showed that the subset of donors with cardiac death, rather than brain death, were optimal for obtaining intact sensory epithelia with hair cells and supporting cells. This was in part because they had shorter resuscitation time, less severe brain insults, and shorter time between pronouncement of death and tissue procurement than for those with brain death. “The two types of donors have different availability of viable tissue. With cardiac death, it’s more likely that there was enough oxygen and no tissue damage”. Despite numerous advancements, there remains a significant gap in effective and safe therapeutic strategies for managing hearing loss. Here, we use 3D Bioprinting is an advanced technology that uses 3D printing techniques to create biological structures, such as tissues and organs, by layering bioinks made of living cells, biomaterials, and growth factors. This process is primarily used in tissue engineering. Our aim is to construct a three-dimensional (3D) organ of Corti organoid through 3D bioprinting, which combines “3D cultures scaffold + multiple induction signals + inner ear stem cells. “By doing this technique 3D Bioprinting, we reduce the demand for getting inner ear from the Donar. Here this article gives information about inner ear transplantation and the additive method of 3D Bioprinting.

**Keywords:** Auditory impairment, Spiral ganglion cell, Cardiac or brain death, 3D Printing., etc.

## **CRISPR - CAS 9 Mediated Gene Editing: Current Advances and Ethical Implimentations in Treating Genetic Disorders**

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### **ABSTRACT**

Gene editing has emerged as a transformative frontier in biomedical engineering, enabling precise and efficient modification of genetic material to prevent, treat, or potentially cure a wide range of genetic disorders. CRISPR stands for Clustered Regularly Interspaced Short Palindromic Repeats. Among the various technologies developed, CRISPR-Cas9 stands out due to its simplicity, cost-effectiveness, and high precision. This technologies allows scientists to target specific DNA sequences, cut them, and either disable defective genes or replace them with correct sequences. Applications of gene editing span across inherited genetic disorders such as Duchenne muscular dystrophy, sickle cell anemia, and cystic fibrosis, as well as complex conditions like cancer. HIV, and neurogenerative diseases. In biomedical engineering, the integration of gene editing with advanced delivery systems -such as viral vectors, lipid nanoparticles, and microfluidic devices-has significantly improved the accuracy, efficiency, and safety of gene therapies. Moreover, bioengineers are developing synthetic regulatory systems and genome- targeting strategies to ensure tissue- specific and temporally controlled editing, minimizing off- target effects immune responses. Despite its immense potential, gene editing also raises critical ethical, regulatory, and societal concerns, particularly in the context of germline editing and human enhancement. As biomedical engineering continues to evolve, gene editing is set to play a crucial role in the development of next- generation therapies, ushering in a new era of personalized and precision medicine.

**Keywords:** Gene editing, genetic therapy, delivery system, genome engineering, genetic disorders, regenerative medicine.

## **Infrared Vein Detector**

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### **ABSTRACT**

The infrared vein detector is an innovative biomedical imaging device designed to facilitate the visualization and identification of subcutaneous veins using near-infrared (NIR) light technology. This device has become increasingly significant in modern clinical practices, especially in procedures requiring precise venous access such as intravenous cannulation, phlebotomy, and infusion therapy. Traditional methods of vein detection rely heavily on visual assessment and palpation, which can often be inadequate or challenging in certain patient populations including neonates, obese individuals, patients with dark skin tones, or those suffering from chronic illness where veins are not easily visible or palpable. The working principle of the infrared vein detector is based on the optical absorption characteristics of hemoglobin in the NIR spectrum, typically ranging from 700 to 1000 nanometers. When NIR light is emitted onto the skin surface, it penetrates the epidermal and dermal layers. Due to the higher absorption rate of deoxygenated hemoglobin in blood compared to surrounding tissue, veins appear as dark patterns in the captured image. The differential reflection and absorption are detected by a sensor, such as a CCD or CMOS camera, and processed using advanced digital image processing techniques. The processed image can then be projected directly onto the patient's skin or displayed on an external monitor, enabling healthcare professionals to locate veins with greater speed and accuracy. Modern vein detectors incorporate a variety of enhancements including real-time image processing algorithms, motion compensation, depth estimation, and automatic contrast adjustment to accommodate a wide range of skin types and physiological conditions. Portability and ease of use are further achieved through battery-operated, handheld designs, making them suitable for both hospital and field applications.

**Keywords:** Infrared vein detector, near infrared light, CCD/COMS Camera Noninvasive, vein visualization

## **Automated Ambulance Traffic Clearance Using Embedded Sensors**

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### **ABSTRACT**

Ambulance delays due to traffic congestion remain a critical issue, often resulting in life-threatening consequences. Traditional traffic management systems lack real-time responsiveness to emergency vehicles, causing unnecessary delays. This paper proposes an intelligent traffic control system designed to prioritize ambulance movement by detecting their presence using a combination of pressure sensors embedded in speed breakers and sound sensors that recognize siren frequencies. When an ambulance approaches, the system detects the pressure exerted on the speed breaker and the specific siren sound pattern, triggering an automated signal control mechanism to clear the route ahead. This dual-sensor approach ensures higher detection accuracy and faster response times, enabling efficient traffic clearance and significantly reducing ambulance travel delays. The proposed system presents a cost-effective, scalable solution that can be integrated into existing infrastructure to enhance emergency response services in urban areas. The system architecture integrates microcontrollers with pressure and sound sensors to ensure precise detection of ambulances in real-time. Upon detection, the system communicates with traffic signal controllers to alter the signal phases, giving immediate green passage to the ambulance. This minimizes manual intervention and improves the efficiency of emergency response. Simulation results and field tests demonstrate the reliability and effectiveness of the proposed system in various traffic scenarios. By leveraging low-cost sensors and existing infrastructure, the solution is both economically feasible and easy to implement in smart city applications.

**Keywords:** Dual sensors, Traffic clearance, Health care, etc...

## Studying of Drug Solubility in Water Using Xylitol Based Deep Eutectic Solvent

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### ABSTRACT

In accordance with the principles of the economy and sustainable chemistry, the adoption of environmentally friendly chemical products in the pharmaceutical industry has garnered increasing attention. Conventional organic solvents have faced numerous regulatory restrictions due to their adverse environmental impacts and potential toxicity to human health. As a greener alternative, deep eutectic solvents (DESs) have emerged, offering advantages such as low toxicity, biocompatibility, cost-effectiveness, and environmental compatibility. In this study, a series of DESs were prepared using choline chloride as the hydrogen bond acceptor (HBA) and xylitol as the hydrogen bond donor (HBD), with varying molar ratios of 1:0.5, 1:1, and 1:1.5 (HBA: HBD). The primary objective was to evaluate the ability of these DESs to enhance the solubility of indomethacin, a widely used nonsteroidal anti-inflammatory drug (NSAID). The physicochemical properties of the prepared DESs were characterized by determining their density using a DMA 4500M density meter and measuring the refractive index with a LT-738 refractometer. Additionally, pH values and optical studies will be assessed to further investigate the characteristics of the DESs and drugs.

**Keywords:** Indomethacin, Deep Eutectic Solvent, Density, Refractive index, Polarized Optical Microscope.

## **Smart Wearable System: Design and Development for Upper Limb Stroke Rehabilitation**

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### **ABSTRACT**

Stroke is still one of the main causes of adult disability globally, commonly producing serious motor deficits, particularly in the upper limbs. Standard therapeutic approaches entail monitoring that is required over time and repeated motion exercises that need to be done frequently in a non-clinical environment. To tackle this problem, this project proposes the design and development of a smart wearable rehabilitation system that helps stroke survivors recover upper limb function. The system consists of multiple inertial measurement units (IMUs) such as accelerometers, gyroscopes, and flex sensors mounted inside a wearable arm brace for precise tracking of movement parameters (e.g., joint angles, speed, and range of motion). We afterwards designed a mobile and desktop application that is wirelessly connected over Bluetooth Low Energy (BLE) to the wearable system, giving real-time visual feedback, progress tracking and gamified rehabilitation exercises. This interactive approach encourages the user to engage with the process, and exercises can be tailored to the patient's stage of recovery. The session data is then uploaded to a cloud platform where ongoing analysis can take place. The system also utilizes machine learning, which processes data from each user to estimate their progress rate and adjust the intensity of the therapy accordingly. This is leading to improvements in the continuity of care, especially when remote physiotherapist access is available to facilitate in vivo real time intervention, exercise modification, etc. Making adaptable and inexpensive, the wearable system allows stroke patients to conduct follow-up training at home, promoting compliance and accelerating functional recovery.

**Keywords:** Stroke treatment; Smart wearable; Inertial measurement unit; upper limb recovery; remote physiotherapy; real-time monitoring.

## Poorly Water- Soluble Drugs Enhancement Using Citric Acid Based Deep Eutectic Solvents

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### ABSTARCT

Deep eutectic solvents (DESs) are considered environmentally benign solvents with the capability to dissolve bioactive compounds without altering their inherent properties. Recently, DESs have emerged as promising alternatives to ionic liquids (ILs), owing to advantages such as the abundance of raw materials, ease of synthesis and storage, and cost-effectiveness. To minimize experimental trial and error, this study employed the COSMO-RS computational method to predict the interaction between the solvents and the target drug indomethacin. The sigma profile, sigma potential, and sigma surface of both the drug and the DESs were generated to elucidate the influence of DESs on the drug's behaviour. Subsequently, DESs were synthesized by combining choline chloride, serving as the hydrogen bond acceptor (HBA), with citric acid monohydrate, acting as the hydrogen bond donor (HBD), in molar ratios of 1:0.5, 1:1, and 1:1.5, to evaluate their efficacy in enhancing the solubility of drug. Binary mixtures of DESs and water will be prepared in varying proportions to investigate the impact of water content on key properties, including viscosity, conductivity, solubility, and thermal stability. Furthermore, analyses of density, pH, and refractive index will be conducted for both the pure DESs and their aqueous mixtures. Optical studies will also be performed to assess indomethacin's solubility within the DES systems.

**Keywords:** Indomethacin, Deep Eutectic Solvents, Water effect, Optical microscopy.

## **Brain-Computer Interfaces for Motor Recovery**

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### **ABSTRACT**

Brain-Computer Interface (BCI) technology offers a novel approach for motor recovery in patients with neurological impairments such as stroke or spinal cord injuries. This paper investigates the effectiveness of non-invasive EEG-based BCIs in restoring motor function by translating neural activity into control signals for external devices, including robotic exoskeletons and functional electrical stimulation (FES) systems. The study focuses on how BCI systems promote neuroplasticity and enhance patient engagement through real-time feedback. Experimental findings from recent clinical studies demonstrate measurable improvements in motor performance and brain activation in motor-related regions. The results suggest that BCI-assisted rehabilitation can serve as a valuable adjunct to conventional therapy. Future advancements in signal processing, machine learning, and user adaptability are expected to further improve the clinical impact of BCIs in neurorehabilitation.

**Keywords:** Brain-Computer Interface, EEG, Motor Recovery, Neurorehabilitation, Functional Electrical Stimulation, Neuroplasticity.

## Graphene-Based Tear Fluid Biosensor for Early Detection Of Neurodegenerative Diseases

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### ABSTRACT

Neurodegenerative diseases (NDs) such as Alzheimer's and Parkinson's remain a global health burden due to the lack of accessible and effective early diagnostic tools. Traditional diagnostic techniques like neuroimaging and cerebrospinal fluid (CSF) analysis are invasive, expensive, and not suitable for large-scale screening. Tear fluid has emerged as a promising medium for non-invasive diagnostics, containing a rich profile of biomarkers relevant to systemic and neurological conditions. In this paper, we present a novel graphene-based biosensor integrated into a smart contact lens platform for detecting early-stage biomarkers of NDs in tear fluid. The sensor exploits graphene's exceptional electrical and surface properties, functionalized with specific antibodies for proteins such as  $\beta$ -amyloid and tau. We detail the design, fabrication process, sensor integration, and validation studies. Experimental results demonstrate high sensitivity (LOD  $\sim$ 0.8 pg/mL), selectivity, and biocompatibility. The platform offers a practical, wearable solution for continuous health monitoring and early neurodegenerative disease detection.

**Keywords:** Graphene, biosensor, neurodegenerative disease, tear fluid, smart contact lens, wearable diagnostics,  $\beta$ -amyloid, tau protein, point-of-care, non-invasive.

## **Ai-Driven Early Detection of Dengue Through Cbc Analysis**

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### **ABSTRACT**

Dengue fever is a life-threatening mosquito-borne viral infection that poses a significant public health challenge, especially in tropical and subtropical regions. Early detection is crucial to prevent severe complications such as Dengue Haemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS). Traditional diagnostic methods like NS1 antigen tests and RT-PCR can be expensive and inaccessible in remote areas. This study explores the use of Artificial Intelligence (AI) for the early detection of dengue using Complete Blood Count (CBC) data, which is a widely available and cost-effective blood test. AI models, including machine learning algorithms such as Support Vector Machines (SVM), Random Forest, and Deep Learning, can analyze CBC parameters (e.g., platelet count, white blood cell count, hematocrit levels) to identify early-stage dengue cases. By training these models on large datasets of dengue and non-dengue patients, AI can provide fast, accurate, and automated diagnoses, enabling early medical intervention. The integration of AI in dengue detection can enhance healthcare accessibility, particularly in resource-limited settings, reducing the burden on hospitals and saving lives.

**Keywords:** Support Vector Machines (SVM), Complete Blood Count (CBC) data, NS1 antigen tests and RT-PCR.

## **SIDS Prevention**

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### **ABSTRACT**

Many frequent deaths of children occur when they are cared for by non-parental caretakers. Continuous health care monitoring of infants is achieved with the development and fusion of sensor technologies. There are many risk factors that cause the death of infants during the postnatal period of the child. The position of the baby is an important parameter to be monitored. The irregular position of the baby may cause suffocation, asphyxia, and entrapment, which leads to sudden infant death syndrome (SIDS). In this system, we have discussed the causes of SIDS and the way to prevent it using sensor technologies. The major objective of the system is to monitor the movement of the child using an accelerometer sensor and also the temperature of the child using a temperature sensor. If a temperature level abnormal is detected, then the buzzer will be ON. IoT is the main controller of this system; the accelerometer value continuously monitors the Blynk Android application using IoT.

**Keywords:** Sudden Infant Death Syndrome (SIDS), sensor technologies, Blynk Android application using IoT.

## **Automatic Insulin Injector-Based Non-Invasive Glucose Monitoring System Based on Laser Technology**

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### **ABSTRACT**

Blood glucose monitoring (BGM) is necessary for diabetic patients to prevent complications of deranged glucose levels, but conventional methods are painful and invasive finger pricks that can lead to infection. Laser light sensors, particularly those using visible red laser light (650 nm), have the potential as a non-invasive method. Red laser light provides several important advantages over traditional near-infrared (NIR) BGM methods, including significantly higher transmittance in human tissue (~30 times better), quicker response times (7-10 seconds), and more precise and linear measurement of glucose change. The system, if designed to communicate with IoT, can perform real-time measurement of blood glucose levels and remotely control insulin infusion. Using a mobile app, healthcare professionals can monitor a patient's blood glucose and adjust insulin dosing remotely based on real-time readings from the device. Not only does this system based on IoT minimize patient discomfort by eliminating repeated finger pricks, but it also enables physicians to make timely adjustments to insulin therapy, improving glucose control and avoiding complications. The combination of non-invasive glucose monitoring and remote insulin adjustment is a significant advancement in diabetes care, offering both patients and physicians a more effective, individualized, and dynamic system of care.

**Keywords:** Blood glucose monitoring (BGM), Non-invasive, Laser light sensors, Internet of things (IoT), Real-time monitoring, Remote insulin adjustment, Diabetes care, Personalized medicine

## Green Synthesis of Zinc Nanoparticles Using *Boswellia Serrata*: A Dual Therapeutic Approach for Diabetes And Periodontal Disease

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### ABSTRACT

The plant-based synthesis of nanomaterials has garnered significant attention for its ecofriendly and cost-effective nature. In this study, zinc nanoparticles (ZnNPs) were synthesized using *Boswellia serrata* via a green synthetic approach, and their biological activities were systematically evaluated. The synthesized ZnNPs were characterized through UV-Visible spectroscopy, X-ray diffraction (XRD), Fourier-transform infrared (FTIR) spectroscopy, scanning electron microscopy (SEM), and energy-dispersive X-ray (EDX) analysis. The UVVis spectrum exhibited a characteristic absorption peak at 387.6 nm, confirming the formation of ZnNPs. FTIR analysis indicated the presence of biomolecules responsible for the reduction and stabilization of the nanoparticles. XRD analysis confirmed their crystalline nature, revealing a face-centered cubic (FCC) structure. SEM and EDX analyses showed that the ZnNPs were predominantly spherical, with an average size ranging from 132.1 to 136.8 nm. Biologically, the ZnNPs demonstrated potent antidiabetic activity, with maximum inhibition of alpha-amylase (74.75%) and alpha-glucosidase (80.35%) at a concentration of 100 µg/mL. Furthermore, their anti-periodontal activity was evaluated, showing maximum inhibition zones against *Streptococcus mutans* (6 mm), *Streptococcus sobrinus* (13 mm), *Streptococcus salivarius* (9 mm), and *Staphylococcus aureus* (6 mm) at 100 µg/mL. These findings suggest that *Boswellia serrata*-mediated ZnNPs hold considerable promise for therapeutic applications in diabetes management and the treatment of periodontal diseases.

**Keywords:** Zinc nanoparticles (ZnNPs), *Boswellia serrata*, Green synthesis, Antidiabetic activity, Alpha-amylase inhibition, Alpha-glucosidase inhibition, Anti-periodontal activity, UV-Vis spectroscopy, FTIR, XRD, SEM, EDX, Eco-friendly nanotechnology.

## **Removal of Dyes from Textile Wastewater using Anaerobic Digestion Process**

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### **ABSTRACT**

In this research, the treatability of dye wastewater using starch-based wastewater as a co substrate by the anaerobic process was demonstrated. The objective of this work was to study the application of anaerobic reactors inoculated with flocculent biomass for the degradation of textile dye wastewater with sago effluent as a co-substrate. An anaerobic digestion technique was applied to textile dye wastewater, aiming at colour and COD removal. Five pet bottles of 5liter capacity each were used as reactors, which contained methanogenic sludge of half a liter, which was used for the treatment of combined synthetic textile dye and starch wastewater at different ratios of 20:80, 30:70, 40:60, 50:50, and 60:40 with initial COD concentrations of 3520, 3440, 3360, 3264, and 3144 mg/l, respectively. The pH of the reactor and the room temperature were maintained at 7 (neutral) and  $30\pm 10^{\circ}\text{C}$ , respectively. The maximum COD and colour removal were 81.0% and 87.3 % at an optimum mixing ratio of 30:70 of textile dye and starch wastewaters.

**Keywords:** Anaerobic batch process, Bio-mass, Dye removal, Textile Waste water, Bioremediation

## **Isolation and Characterization of Probiotic Bacteria from the Gastrointestinal Tract (Git) of Wild Tilapia Fish Inhabiting Polluted Aquatic Environments**

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### **ABSTRACT**

Probiotics play a crucial role in maintaining gut health by promoting a balanced microbiota, enhancing digestion, and supporting immune function. This study focuses on the isolation and characterization of probiotic bacteria from the gastrointestinal tract (GIT) of wild fish inhabiting polluted aquatic environments. Wild Tilapia fish were collected from contaminated water bodies, and their gut microbiota was screened for potential probiotic candidates. Following isolation, bacterial strains were identified based on morphological and biochemical characteristics, including Gram staining, catalase activity, and hemolytic properties. A promising isolate was confirmed as *Bacillus pumilus* through 16S rRNA gene sequencing. The strain demonstrated significant probiotic potential by exhibiting biofilm formation and surviving extreme gastrointestinal conditions, such as acidic pH (2, 4, and 6), bile salt concentrations, and varying NaCl levels (2%, 4%, and 6%). Antibiotic susceptibility testing revealed that *Bacillus pumilus* was sensitive to multiple antibiotics, including Cefuroxime, Cefadroxil, Ceftazidime, Cefepime, Cefpirome, Ceftriaxone, Ceftizoxime, and Polymyxin B. Notably, it did not show antagonistic or antibacterial activity against *Staphylococcus aureus* and *Escherichia coli*. Additionally, the isolate was capable of fermenting glucose, suggesting potential interactions with prebiotics. The findings highlight the potential application of *Bacillus pumilus* as a probiotic candidate, particularly for use in aquaculture, livestock, and human health. Further research is required to evaluate its efficacy and safety in practical applications.

**Keywords:** Probiotics, *Bacillus pumilus*, wild fish, polluted water, 16S rRNA, biofilm, antibiotic susceptibility.

## Toxicity Analysis of Propyl-4-Hydroxy Benzoate Compound Using Artemia Model System

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### ABSTRACT

*Artemia spp.* is an historically popular biological model still requiring an official internationally based standardization. Several endpoints are currently available. Short-term acute endpoints include biomarker (acetylcholinesterase; heat stress proteins; lipid peroxidation; thiobarbituric acid reactive substances; thioredoxin reductase; glutathione-peroxidase; glutathione, S-transferase; glutathione reductase; aldehyde dehydrogenase; and adenylypyrophosphatase and Fluotox), hatching (dry biomass, morphological disorders and size), behavioral (swimming speed and path length), teratogenicity (growth), and immobilization (meaning mortality after 5–30s observation). Long-term chronic tests focus on growth, reproduction and survival or mortality after 7–28 days exposure from larval to adulthood stage. Following gathering propyl-4-hydroxy benzoate from the lab, a workable solution containing 5 mg/ml was made. The created working solution was then used to treat *artemia* at ten various concentrations after it had been removed from the lab. Analysis of *artemia* mortality after 24 hours revealed that only *artemia* treated with the lowest dose (0.1 PPM) were still alive, whereas *artemia* treated with the highest concentration (500 µg/ml) were dead. After calculating the percentage of dead *artemia*, it was discovered that 50% of the lowest concentration and 100% of the greatest concentration were found to be alive. The mortality rate was used to determine *artemia's* LD50 value, which came out to be 0.4959 mg/ml. *Artemia* cysts were treated based on the value that was obtained. Aquatic animals may contract infections from *artemia*, commonly referred to as brine shrimp. Shrimp and other crustaceans can become ill due to bacteria and viruses that *artemia* can carry and spread. At 500 µg/ml, Propyl-4-hydroxy benzoate was shown to kill *artemia* in our investigation.

**Keywords:** immobilization, lipid peroxidation, thiobarbituric acid, teratogenicity.

## **Fiber-Optic Sensors for Physiological Measurements**

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### **ABSTRACT**

Fiber-optic sensors have gained significant attention in the field of biomedical engineering due to their unique advantages in physiological measurements. These sensors, which utilize the transmission and reflection of light through optical Fibers, offer remarkable sensitivity, flexibility, and immunity to electromagnetic interference, making them ideal for medical applications. One of the most prominent Fiber-optic sensor technologies is the Fiber Bragg Grating (FBG) sensor, which utilizes changes in the reflected light wavelength to measure physical parameters such as strain, temperature, and pressure. Furthermore, the sensitivity of FBGs to pressure changes makes them suitable for non-invasive blood pressure measurements. Fabry-Pérot interferometers (FPI), another type of Fiber-optic sensor, offer high precision for measuring strain and pressure changes, and are increasingly employed in medical applications requiring fine resolution. Distributed Temperature Sensing (DTS) and Raman/Brillouin scattering sensors enable temperature mapping in real-time, which can be used for internal body temperature monitoring or detecting changes in tissue oxygenation and blood flow. Additionally, issues such as calibration and the interpretation of sensor data require advanced signal processing techniques to ensure accuracy. Recent developments, however, are addressing these challenges by improving sensor durability, reducing system complexity, and integrating artificial intelligence algorithms for enhanced data analysis and interpretation. The combination of Fiber-optic technology with advancements in miniaturization, wireless communication, and data processing holds the potential to make physiological monitoring more accurate, affordable, and widely accessible, paving the way for future innovations in personalized medicine and health management.

**Keywords:** Fiber Bragg Grating (FBG), Fabry-Perot interferometers (FPI), Distributed Temperature Sensing (DTS), Raman/Brillouin scattering sensors.

## **Practical Skills in Biomedical and Biomolecular Sciences**

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### **ABSTRACT**

Practical skills in biomedical and biomolecular sciences are fundamental for advancing medical research, diagnostics, and treatment strategies. These skills include a wide range of laboratory techniques used to analyze biological molecules and systems at the cellular and molecular levels. Techniques such as PCR, gel electrophoresis, ELISA, spectrophotometry, cell culture, and microscopy play a crucial role in understanding disease mechanisms, identifying biomarkers, and developing therapeutic approaches. Mastery of these practical techniques allow researchers and students to accurately investigate genetic material, proteins, and cellular behaviour, for instance, helps in amplifying DNA segments for genetic analysis, while ELISA is widely used to detect specific proteins or hormones in biological samples. Cell culture enables the study of cell responses to drugs or other stimuli under controlled environments. Furthermore, these laboratory skills are essential in biomedical research fields like cancer biology, immunology, pharmacology, and personalized medicine, they support accurate diagnostics and contribute to drug discovery by enabling high-throughput screening and molecular profiling. As biomedical and biomolecular sciences continue to evolve, hands-on practical experience remains a cornerstone of scientific innovation, empowering future professionals to make meaningful contributions to healthcare and biotechnology.

**Keywords:** PCR, gel electrophoresis, ELISA, spectrophotometry, cell culture, and microscopy.

## **Process and production of Hydrochloric acid**

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### **ABSTRACT**

Hydrochloric acid (HCl) is a vital industrial chemical used in various sectors, including chemical synthesis, metal treatment, and food processing. The production of HCl involves several methods, with the most common being the chlor-alkali process and the synthesis from hydrogen and chlorine gases. The chlor-alkali process produces HCl as a byproduct of chlorine and sodium hydroxide production, while the direct synthesis method involves burning hydrogen in chlorine gas. Both methods require careful control of reaction conditions to ensure high purity and yield. HCl production is crucial for manufacturing PVC, fertilizers, dyes, and in oil and gas well acidizing. This study reviews the industrial processes, applications, and safety considerations in HCl production, highlighting its significance in the chemical industry.

**Keywords:** Hydrochloric Acid Production, Chlor-Alkali Process, Hydrogen Chloride Synthesis, Acidizing, PVC Production, Chemical Synthesis

## **AR VR in Biomedical rehabilitation**

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### **ABSTRACT**

Augmented Reality (AR) and Virtual Reality (VR) are transforming biomedical rehabilitation by providing immersive and interactive environments for patients to practice movements while being monitored and guided by professionals. These technologies have shown promise in neurological rehabilitation, psychological treatment, pain distraction, cardiopulmonary rehabilitation and visual-spatial disorder treatment. AR and VR enhance patient engagement, motivation and adherence to therapy, allowing for more precise musculoskeletal evaluations and improved pain management. Studies have demonstrated the effectiveness of AR and VR in physical therapy, with benefits including improved range of motion, reduced reaction times and enhanced motor function. By leveraging AR and VR, healthcare professionals can create personalized treatment plans, improve patient outcomes and revolutionize the rehabilitation experience.

**Keywords:** musculoskeletal evaluations, improved pain management. Augmented Reality (AR) and Virtual Reality (VR)

## **Isolation, Identification, Characterization of pathogenic microbes from gut of Spiny loach**

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### **ABSTRACT**

Fish is in high demand as food, food additives, and supplements as they are a rich source of carbon, proteins, vitamins, and minerals. In this work, the isolation and identification of the micro flora from the gut of culturable fresh water fish Spiny loach (*Lepidocephalichthys thermalis*) have been shown to be a source of microorganisms of public health significance for the gills and gut of fresh water fish. If not properly cooked, fresh fish might induce food borne illnesses by eating polluted water. As the relationship between pollution and the diversity of microbiomas separated from fish exists, it is crucial that the fish habitats are properly cared for and publicly healed. The present investigation was on testing for the microflora in guts of *Lepidocephalichthys thermalis* collected from Vaigai river Madurai. Ten fish samples of size weighing about 3g were used for the microbial study. *Alcaligenes faecalis*, clostridium species. un identified bacteria were distributed in different parts of the fish with varying percentages occurrence. Tryptic soy agar agar was used for the isolation of bacteria and 6 strains were obtained which were identified up to *Alcaligenes faecalis* genus level using biochemical identification methods as per Bergey's manual of determinative bacteriology. Nucleotide sequences of Clostridium species were confirmed by 16S r DNA sequencing with universal bacterial primers.

**Key words:** Micro flora, Tryptic soy agar agar, Spiny loach, *Alcaligenes faecalis*

## **Sustainable Development of Biodegradable Cups from Onion Peel Reinforced with Silver Nanoparticles, Orange Peel and Rice Bran**

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### **ABSTRACT**

The growing environmental concerns associated with plastic waste have highlighted the need for sustainable alternatives in food packaging. This study focuses on the development of biodegradable cups using natural agro-waste materials such as onion peel (*Allium cepa*), orange peel (*Citrus sinensis*), and rice bran (*Oryza sativa*), reinforced with silver nanoparticles (AgNPs) to enhance antimicrobial properties and improve the overall functionality of the cups. Onion peel extract plays a dual role, acting as a natural reducing and stabilizing agent for the green synthesis of AgNPs while also contributing to the structural integrity and biodegradability of the cups. Orange peel and rice bran are incorporated as reinforcing agents to improve the mechanical strength, thermal stability, and durability of the biopolymer matrix, making the cups more resilient for practical use. The addition of AgNPs further boosts antimicrobial efficacy, ensuring the cups provide an added layer of protection against microbial contamination, thereby enhancing food safety and extending shelf life of the cups. The developed cups are subjected to various analyses to assess their physicochemical properties, biodegradation behavior of the developed cups. The results indicate that the integration of agro-waste materials and silver nanoparticles leads to a robust biodegradable material. This eco-friendly approach not only reduces the environmental burden caused by plastic waste but also promotes the valorization of agricultural by-products, aligning with the principles of sustainable development and circular economy. The development of these biodegradable cups contributes to global environmental conservation with promising sustainability.

**Keywords:** Biodegradable cups, onion peel extract, silver nanoparticles (AgNPs), orange peel, rice bran, biodegradation, eco-friendly, sustainable development.

## **Characterization of Bioactive compound from *Pseudomonas fluorescens* of jelly fishes**

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### **ABSTRACT**

*Pseudomonas fluorescens*, a bacterium associated with jellyfish, has been found to produce bioactive compounds with potential therapeutic applications. This study aimed to characterize the bioactive compounds from *Pseudomonas fluorescens* isolated from jellyfish. The bacterial extracts were analyzed using chromatography and spectroscopy techniques, revealing the presence of compounds with antimicrobial, antioxidant, and anti-inflammatory properties. The characterization of these bioactive compounds showed promising results for pharmaceutical and biomedical applications. The findings suggest that *Pseudomonas fluorescens* from jellyfish could be a valuable source of novel bioactive compounds for drug discovery and development.

**Keywords:** fluorescence, Jellyfish, Antimicrobial, Antioxidant, Anti-inflammatory, Chromatography, Spectroscopy

## **Rf Smart Helmet Ignition System with Alcohol and Crash Detection Based On GSM**

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### **ABSTRACT**

This project focuses on the development of an innovative and intelligent safety system designed specifically for two-wheeler riders. With the increasing number of accidents involving motorcycles and scooters, often due to human error such as riding under the influence of alcohol, neglecting to wear helmets, or falling asleep while driving, there is a critical need for enhanced safety measures. This system is developed with the primary objective of preventing such risky behaviors by monitoring key rider conditions before allowing the vehicle to operate. The system utilizes a combination of sensors and advanced detection techniques to monitor three crucial safety aspects: alcohol consumption, helmet usage, and rider drowsiness. If the alcohol level is above the legal limit, the system immediately disables the vehicle's ignition, ensuring that an intoxicated individual cannot start or operate the two-wheeler. Additionally, the system checks for helmet usage through a sensor either embedded in the helmet or integrated into the vehicle. If sleep or lack of alertness is detected, the vehicle either remains immobilized or issues a warning. Moreover, this project aims to reduce road accidents, minimize fatalities, and promote responsible riding by providing an added layer of safety and communication. By integrating smart technology into a two-wheeler's control system, this project aims to significantly enhance road safety, reduce accident rates, and promote responsible riding habits. The system not only safeguards the rider but also contributes to public safety by preventing potentially hazardous situations on the road. Ultimately, this intelligent safety mechanism represents a step toward the future of safer, smarter transportation.

**Keywords:** Alcohol detection, sleep detection, helmet usage, real time alert, GSM, crash detection.

## Glass Based Microfluidic Chips for High Throughput Applications

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### ABSTRACT

Microfluidic systems have emerged as powerful platforms for manipulating small volumes of fluids with high precision, enabling a wide range of applications in chemical synthesis, biological analysis, and diagnostics. In this work, we present the design and development of a robust glass-based microfluidic chip integrated with Quake-style pneumatic valves, tailored for precise control and automation of chemical and biological reactions at the microscale. The microfluidic device is fabricated using borosilicate or ultra-thin glass substrates, offering several advantages over conventional polymer-based platforms such as superior chemical resistance, optical transparency, thermal stability, and biocompatibility. These properties make glass an ideal material for high-fidelity imaging, aggressive solvent handling, and long-term biochemical assays. The control of fluid pathways is achieved through monolithically integrated Quake valves, which rely on the deflection of a flexible membrane under pneumatic actuation. The Quake valve mechanism provides rapid switching, high repeatability, and minimal cross-contamination, making it highly suitable for dynamic reaction environments. To demonstrate the utility of the platform, we implement and characterize multiple reaction schemes, including colorimetric and enzymatic assays, under dynamically modulated flow conditions. Valve actuation is controlled via an external pneumatic interface, and real-time observation of the reactions is carried out using optical microscopy and impedance-based sensing integrated into the chip layout. This work lays the foundation for next-generation lab-on-glass systems, combining the precision of pneumatic valving with the durability and inertness of glass, making it a valuable tool for chemical analysis, synthetic biology, point-of-care diagnostics, and pharmaceutical research. Future directions include full automation with on-chip electronics and extension to high-throughput platforms.

**Keywords:** Quake-style pneumatic valves, point-of-care diagnostics, chemical synthesis, biological analysis, and diagnostics.

## Investigation of antioxidant and antimicrobial effect of polyherbal

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### ABSTRACT

Urinary stone is one of the major problems in all over the world. Ammonium Magnesium phosphate hexahydrate is commonly known as struvite among the magnesium phosphates. Calcium oxalate, magnesium ammonium phosphate uric acid and calcium phosphate are major constituents present in the urinary stones. Urolithic microorganisms in the urinary tract cause the urinary calculi up to 15-20%. magnesium hydrogen phosphate trihydrate is the maximum constituent in Renel calculi up to 15-20%. struvite is also called as urea stone inflection stone are triple phosphate stone. Treatments are carried out by surgical removal extracorporeal shock the lithotripsy and laparoscopic methods. There for a mandatory to examine the efficacy safety better compability of herbal plants and lesser side effects for human. The concentration of aqueous extract of *polyherbal plants (Melia Azedarach, Syzgium Cumini, Boswellia Serrata)* increased the crystals weight is gradually decreased from 2.57g to 0.38g in struvite crystals. The ethanolic extract of polyherbal used for the antioxidant activity on the basis of scavenging effect of the stable DPPH free radical activity and Hydrogen peroxide assay by ethanolic extract of polyherbal plants is taken at the different concentrations (20-100µg/ml). Sterilized molten agar media was inoculated with gram-positive bacteria (*Staphylococcus aureus*) and gram-negative bacteria (*E. coli*) and *pseudomonas aeruginosa (PA)* separately by aseptic transfer under the laminar air flow bench. Sabouraud agar media was used for determining the antifungal activity for the developed herbal formulations. Sterilized molten sabouraud agar media was inoculated with gram-positive fungi (*Candida albicans*) and gram-negative fungi (*Aspergillus flavus*) separately by aseptic transfer under the laminar air flow bench. The research gives many versatile approaches for the characterization of struvite crystals grown in vitro to help formulate prevention or dissolution strategies in controlling the growth of calcium urinary stones.

**Keywords:** *Melia Azedarach, Syzgium Cumini, Boswellia Serrata*

## **Investigation Of Antioxidant and Anticariogenic Activity of Stigmasterol from Phyllanthus Emblica Seeds**

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### **ABSTRACT**

The study aims to evaluate the anti-cariogenic and antioxidant activity of isolated compounds from *Phyllanthus emblica* seeds. Cariogenic bacteria producing or promoting the development of tooth decay lead to the breakdown of teeth. Cavities have become more common in both children and adults. In recent years, *Phyllanthus emblica* seeds have been used to treat numerous ailments. *Phyllanthus emblica* are already known for their medicinal properties, of which their anti-cariogenic nature will be studied. Characterization of isolated stigmasterol compound was followed by a test for its antioxidant activity using the DPPH method and anti-cariogenic activity using the agar well diffusion method. The *Phyllanthus emblica* seeds exhibit significant anticarcinogenic activity. From the present study, it can be concluded that the Stigmasterol compound isolated from *Phyllanthus emblica* seeds has considerably high anti-cariogenic activity at high concentrations. This can be used for further investigations in employing them as less biotoxic alternatives to already existing chemically synthesised anti-cariogenic material.

**Keywords:** *Phyllanthus emblica*, synthesised anti-cariogenic, anticarcinogenic activity, Stigmasterol compound.

## Smart glove for stroke rehabilitation

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### ABSTRACT

Stroke is a major cause of long-term disability worldwide and often leads to impaired motor function, particularly of the upper limb. The task of rehabilitation is critical to encouraging recovery, while traditional therapy is often resource intensive and not continuously monitored. The design and development of a smart glove to assist stroke patients to carry out their rehabilitation process is proposed by this project. It is embedded with flexible sensors to monitor finger and hand movements in real time. It is a device that captures the motion data and then processes it to evaluate the range of motion, the strength of the grip, and muscle coordination. The data is transmitted to a mobile or desktop application using Bluetooth or Wi-Fi connectivity with real time feedback, tracking of progress and remote supervision by healthcare professionals. The goal of the smart glove is to help with repetitive motor exercises, gamify to Increase patient engagement, and measure outcomes for personalized therapy. This low cost portable solution has the potential to enhance accessibility and effectiveness of stroke rehabilitation, particularly in home based Patients recovering from hand function related neurological injuries, musculoskeletal disorders or surgeries require rehabilitation. Traditional therapy methods are based on the need of continuous supervision and lack of objective tracking of the patients' progress. In this project, we present a smart glove that aids hand rehabilitation modality of motor recovery exercises by monitoring and guiding at the same time.

**Keywords:** evaluate the range of motion, the strength of the grip, and muscle coordination.

## Smart Traffic Light System Using YOLO For Real Time Traffic Control

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### ABSTRACT

In today's fast-paced urban environments, efficient traffic management is essential for minimizing road congestion and ensuring the swift movement of vehicles especially emergency vehicles like ambulances. Unfortunately, traditional traffic light systems operate based on fixed-time schedules or basic sensors, which do not dynamically respond to real-time traffic conditions. This often leads to delays for ambulances trying to navigate crowded roads, potentially endangering lives. Manual traffic control and GPS-based interventions provide limited relief but are prone to human error, hardware dependency, and high costs. Therefore, there is a critical need for an intelligent, automated system that can detect ambulances in real-time and prioritize their movement through traffic intersections without disrupting overall traffic flow. This project presents an Intelligent Traffic Light Optimization System that leverages deep learning techniques for real-time detection of emergency vehicles using both visual and audio data. By integrating the YOLO (You Only Look Once) model for real-time image-based vehicle detection and a Convolutional Neural Network (CNN) for audio-based siren recognition, the system accurately identifies ambulances even under low-visibility conditions such as night-time, fog, or heavy rain. The system processes data from live camera feeds and microphone inputs, classifies the presence of an ambulance, and communicates with a traffic light controller to instantly adjust the signal, giving priority to the ambulance's route. This not only enhances emergency response times and reduces congestion but also improves overall traffic efficiency and road safety. Additionally, an interactive interface allows traffic authorities to monitor and override decisions, ensuring human control when necessary. This approach marks a significant step toward smarter, AI-driven urban infrastructure. Traditional traffic light systems operate on pre-set timing sequences or basic sensor-based mechanisms, which fail to adapt dynamically to urgent situations involving emergency vehicles. To address this pressing issue, the proposed system introduces an intelligent and automated traffic light optimization framework powered by deep learning.

**Keywords:** microphone inputs, classifies the presence of an ambulance, and communicates with a traffic light controller to instantly adjust the signal, giving priority to the ambulance's route.

## **Design and Implementation of a Breathing-Controlled Nebulization System for Enhanced Respiratory Therapy**

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### **ABSTRACT**

Nebulization is a widely utilized method in the treatment of respiratory disorders, primarily aiding in the humidification and dilution of thickened airway secretions to promote effective clearance. When combined with therapeutic agents such as bronchodilators and antibiotics, it enables direct, localized action within the airways to alleviate inflammation, constriction, or obstruction. Conventional nebulizers typically operate using oxygen flow or ultrasonic mechanisms. However, oxygen-driven nebulizers may pose a risk of hypercapnia in patients with acute exacerbations of chronic obstructive pulmonary disease (AECOPD) accompanied by type II respiratory failure. While ultrasonic nebulizers avoid this issue by excluding supplemental oxygen, they may not sufficiently support patients requiring oxygen therapy. To address these challenges, a novel breathing-controlled nebulization system has been developed. The hardware component of the system is nearly complete, with approximately 90% of the implementation finalized and initial testing yielding positive outcomes. This system is engineered to synchronize drug delivery with the patient's breathing pattern. It automatically adjusts the nebulization rate—accelerating during slower respiratory rates and decelerating during rapid breathing—thereby minimizing drug wastage during exhalation and reducing physiological strain on the patient. This adaptive approach ensures efficient and targeted medication delivery, making respiratory therapy more effective and patient-centric.

**Keywords:** *Breathing-Controlled Nebulizer, Chronic Obstructive Pulmonary Disease, Drug Delivery Optimization, Respiratory Therapy, Ultrasonic Nebulization*

## **Invitro And Insilico Approach on Control of Helminthic Infection by Using Drynaria Quercifolia Extract Pr**

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### **ABSTRACT**

Helminthic infections continue to pose a significant public health challenge, particularly in tropical and subtropical regions. The emergence of resistance to conventional anthelmintic drugs necessitates the exploration of alternative therapeutic agents. This study investigates the potential anthelmintic activity of *Drynaria quercifolia* extract using both in vitro and in silico approaches. Phytochemical analysis of the extract revealed the presence of bioactive compounds with possible antiparasitic properties. In vitro assays were conducted using *Pheretima posthuma* as a model organism to evaluate the extract's efficacy. The results demonstrated a dose-dependent paralysis and death of the worms, comparable to standard drugs. Molecular docking studies were carried out to assess the interaction of key phytoconstituents with helminth-specific protein targets. The in silico findings supported the in vitro results, showing strong binding affinities and stable interactions. ADMET profiling confirmed the drug-likeness and safety of the selected compounds. These findings suggest that *Drynaria quercifolia* possesses significant anthelmintic potential. The dual approach enhances the reliability of the results and supports further pharmacological investigation. This integrated study provides a scientific basis for the development of plant-based anthelmintic agents. Future research should include in vivo studies and clinical validation.

**Keywords :** Anti helmenthic activity, invitro analysis, phytochemicals screening, parasite control, traditional medicine, bioactive compounds, molecular docking.

## **Analytics for Banking: Transforming Unprocessed Data into Useful Knowledge**

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### **ABSTRACT**

In today's data-driven era, the banking sector generates and collects massive volumes of data from diverse sources such as customer transactions, digital banking activities, credit applications, and financial operations. However, the true potential of this data often remains untapped due to fragmented storage, manual processing, and lack of advanced analytics. This project focuses on harnessing the power of data science and analytics to transform raw banking data into valuable insights that support strategic and operational decision-making. The project involves the implementation of a comprehensive data analytics framework that incorporates key processes such as data collection, preprocessing, exploratory data analysis (EDA), predictive modeling, and trend analysis. The system identifies hidden patterns and detects anomalies, enabling banks to address critical areas like customer segmentation, fraud detection, loan approval, and risk assessment with greater accuracy and speed. Central to the project is the use of tools like Python for data transformation and modeling, Power BI for interactive visualization, and cloud platforms like AWS for scalable data storage and management. The application of supervised and unsupervised machine learning models provides actionable predictions and classifications that enhance the bank's ability to make informed decisions. Ultimately, the goal of this project is to drive digital transformation in the financial sector by leveraging data analytics to reduce operational risks, improve service personalization, and enhance overall efficiency. By converting complex datasets into intelligent, real-time insights, this system empowers banks to stay competitive, comply with regulatory requirements, and deliver a superior customer experience.

**Keywords:** the true potential of this data often remains untapped due to fragmented storage, manual processing, and lack of advanced analytics.

## **Isolation And Purification of Protease Enzyme By Dialysis Method Form the Bacterial of Food Waste**

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### **ABSTRACT**

Protease enzymes are hydrolytic enzymes that degrade proteins into peptides and amino acids, playing a vital role in biological and industrial processes. This study focuses on the isolation, characterization, and purification of protease-producing bacteria from food waste. The bacterial count in the AKNK test sample was determined using the spread plate method, yielding a CFU/ml of  $1.46 \times 10^9$ . Protease-producing bacteria were identified through the formation of clear zones on milk agar, indicating casein hydrolysis. Protease production was optimized using milk agar medium, and enzymatic activity was assessed through the agar well diffusion method. Protein purification was carried out using ammonium sulfate precipitation, dialysis, and SDS-PAGE analysis. SDS-PAGE confirmed successful protein purification based on molecular weight, with Coomassie Brilliant Blue staining enhancing visualization. This study highlights the potential of protease-producing bacteria in industrial and biotechnological applications, presenting efficient methodologies for enzyme isolation, characterization, and purification.

**Keywords:** Protease-producing bacteria were identified through the formation of clear zones on milk agar, indicating casein hydrolysis.

## Development Of Bio-Scaffold For The Treatment Of 3<sup>o</sup> Burn Wounds

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### ABSTRACT

Wound healing, as a normal biological process in the human body, is achieved through four precisely and highly programmed phases: hemostasis, inflammation, proliferation, and remodeling. A better understanding of the influence of these factors on repair may lead to therapeutics that improve wound healing and resolve impaired wounds.. The results showed that the bioscaffolds were compatible towards the RBC cells with an IC 50 value of 124.2 µg/ml. Anti-inflammation assay exhibited anti-inflammation activity maximum at the concentration of 500 µg/ml with an IC 50 value of 51.02 µg/ml. The bioscaffold showed a significant antibacterial and antifungal activity against human microbial pathogens: such as *Propionibacterium acnes*, *Proteus vulgaris*, *E.Coli*, *Staphylococcus aureus*, *Candida albicans* and *Aspergillus niger*. The efficiency of sample Gelatin+sample against *Propionibacterium acnes* and *Staphylococcus aureus* found to be high at the concentration of 500 µg/ml and the zone of inhibition was found to be 10 mm. The maximum zone of inhibition against fungal species were found to be 7 mm against *Candida albicans* at the concentration of 500 µg/ml. results showed that the gelatin-based bio scaffold could be a promising approach for the treatment of wounds.

**Keywords:** *Propionibacterium acnes*, *Proteus vulgaris*, *E.Coli*, *Staphylococcus aureus*, *Candida albicans* and *Aspergillus niger*.

## **Automated drug dispenser**

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### **ABSTRACT**

This project proposes the development of an Automated Drug Dispenser equipped with Optical Character Recognition (OCR), a QR code scanner, and a Voice Pod system to streamline and secure the medication dispensing process. The device is designed to accurately identify and dispense medications based on digital prescriptions, using the QR scanner to quickly extract patient and dosage information and the OCR scanner to verify printed labels or instructions. The integration of a Voice Pod enhances user interaction by providing audible instructions, dosage reminders, and warnings, making the system especially beneficial for elderly or visually impaired patients. By combining multiple recognition technologies with voice assistance, the system ensures accurate medication delivery, improves patient compliance, and reduces the risk of human error in medication administration. This smart dispenser represents a step forward in leveraging automation and AI for safer and more efficient healthcare solutions.

**Keywords :** Optical Character Recognition (OCR), Automated Drug Dispenser.

## **Fake Job Detection in LinkedIn**

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### **ABSTRACT**

This project develops a system to identify potentially fraudulent job postings, leveraging machine learning, web scraping, and web development techniques. A Random Forest Classifier, trained on job descriptions, company profiles, requirements, and benefits extracted from real and fake job listings, classifies new job postings as either "FAKE" or "GENUINE." A Flask web application enables users to submit LinkedIn job URLs, scrape job details using Selenium, and receive a classification result. User history is maintained in a SQLite database, and an admin dashboard provides oversight of user activity. The system aims to mitigate the risk of job scams by providing users with a tool to assess the legitimacy of online job opportunities. The machine learning model was trained and evaluated using a publicly available dataset of job postings, ensuring a diverse representation of both legitimate and deceptive listings. Extensive preprocessing steps including text cleaning, feature engineering, and vectorization were applied to enhance model accuracy. The web scraper, powered by Selenium, dynamically extracts relevant content from LinkedIn postings, overcoming the limitations posed by static scraping methods. The Flask-based user interface emphasizes usability, allowing seamless interaction for both general users and administrators. Users can view their submission history and results, while the admin panel provides insights into overall system usage, user behaviours, and flagged posts. The application also implements basic authentication to secure user data and restrict admin access. In future iterations, the system could be expanded to support additional job platforms, integrate real-time phishing detection algorithms, and utilize natural language understanding for deeper context awareness. This tool offers a practical, user-friendly solution to a growing digital concern, combining automation and AI to protect job seekers in the digital recruitment space.

**Keywords:** Flask web, SQLite database, web scraper , Flask-based.

## **Ai Based Wireframe to Code Generator**

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### **ABSTRACT**

The field of web development is constantly evolving, pushing developers to seek efficient methods to translate design concepts into functional interfaces. The traditional approach involves manual coding of HTML, CSS, and JavaScript based on design mockups, which is time-consuming and prone to errors. This project addresses these challenges by introducing a Wireframe to Code Generator, an innovative web application that automates the conversion of wireframe images into working HTML code. This application uses advanced Artificial Intelligence through Gemini AI's latest Gemini 2.0 Exp, that provides the capability to understand the visual structure in images and translate them into code. This technology facilitates a dramatic reduction in manual coding effort and enhances the overall efficiency of the web development process. The application is developed using the Python Flask framework, chosen for its simplicity and flexibility, ensuring a robust and easy-to-manage environment.

**Keywords :** HTML, CSS, and JavaScript, Gemini AI's latest Gemini 2.0 Exp, Python Flask framework.

## **An innovative Approach of Brain tumor segmentation and classification in 3D Brain MRI Image using Multimodal-Tumor-Deep Net (MmT-DN) protocol**

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### **ABSTRACT**

A brain tumor, a primary source of unregulated cellular proliferation in the central nervous system, poses significant difficulties in medical detection and therapy. It is crucial to identify on time and precisely in order to intervene successfully. In this study, a new framework known as Multimodal-Tumor DeepNet Architecture is being utilized to aid in the better finding and classifying of brain tumors in Magnetic Resonance Imaging (MRI) scans. The MRI data used in the study come from the original CPM-RadPath dataset. To enhance the tumor classification accuracy, an MmT-DN based network was presented for MRI image decision fusion. Each model that had been trained was fed the MRI data of each one to determine their tumor lesion areas through a model already trained. All the tumor regions extracted from the original MRI images were centrally extracted and then were subjected to max-min normalization. Thus, we followed with a deep learning network built with a common DenseNet architecture in which features are extracted by a sequence of dense blocks. Then, to classify the tumor characteristics into 3 tumor classifications, we used two completely linked layers. Using the training set images from each modality, the tumor was first segmented and the network was taught using the images from each modality after the tumor was segmented in training, and then accuracy of the network was tested on our testing set. The proposed technique got an accuracy of 93.5%, AUC of 91.5%, and sensitivity of 84.5%.

**Keywords :** Magnetic Resonance Imaging (MRI) scans, CPM-RadPath dataset, MmT-DN.

## **Autism Spectrum Disorder Detection Using Deep Neural Network**

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### **ABSTRACT**

Autism Spectrum Disorder (ASD) is a complicated neuro developmental illness characterised by a variety of social, communication, and behaviour difficulties. Early identification and intervention are critical for improving long-term results and maximising the potential of people with ASD. Early intervention programmes, such as behavioural treatments and speech-language therapy, have been proven to dramatically enhance developmental outcomes for children with ASD. Initiating these treatments during the key early years can result in favourable improvements in communication skills, social interactions, and adaptive behaviours. Doctors establish a diagnosis based on the child's developmental history and behaviour. Most youngsters, it appears, do not receive a genuine autism diagnosis until it is too late. To address this issue, a proposed system that can diagnose Autism and arrive to a reliable and effective conclusion without the assistance of a professional is being developed. In this approach, a deep neural network is used to anticipate Autism Spectrum Disorder using a pretrained Brain dataset and a deep learning model named as Convolutional neural network. MRI has provided crucial insights into the brain functions producing ASD. Researchers have uncovered possible biomarkers that may distinguish people with ASD from people who are usually developing by looking at brain connection patterns, activation during social activities, and resting-state networks.

**Keywords:** Autism Spectrum Disorder, MRI, Convolutional neural network.

## **Pre-Operative Surgical Planning for Spine Disk Dislocation Using 3d Printing Technology**

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### **ABSTRACT**

Preoperative surgical planning has become an essential tool for any type of surgical treatment. A healthcare professional is frequently unprepared for the treatment because two-dimensional (2D) scanning images of anatomical structures may not accurately depict their three-layered (3D) complexity. Three-dimensional (3D) printing has become an equipment for surgeons to use in surgical planning, education, and training of students and residents. By converting the anatomical information into stereolithography (STL) files for printing, this method enables the fabrication of physical prototypes from conventional medical images. Here, we segmented the spinal cord related severe diseases by using 3d technology. We fabricated a patient specific spine disk dislocation model can determine the feasibility of the treatment and provide the relevant information about the size and position of the spin disk deformities. Our aim is to model and segment the patient specific spine disk dislocation for pre-operative surgical model and demonstrate a potential benefit in cases of abnormal condition. We collected the real time patient data from the radio pedia for the spine disk dislocation disease. For the fabrication of 3D printed prototype, we segmented the spine disk dislocation using MIMICS software. This 3D printed model allows to construct the spine disk diseases in realistic prototype and offering a 3D view from the two dimensional images of Magnetic Resonance Imaging (MRI) permitting the better surgical planning for the surgeons in very specific cases.

**Keywords:** Magnetic Resonance Imaging (MRI), MIMICS software , stereolithography (STL) files.

## Structure-Based Identification of Novel Mineralocorticoid Receptor Antagonists for Retinal Therapeutics

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### ABSTRACT

The advancement of retinal disorders causes a considerable loss of vision, underscoring the urgent need for better treatment options. About 3.28 million people had moderate to severe visual impairment, and 1.07 million people were blind from diabetic retinopathy globally as of 2020. Similarly, 6.23 million people had vision impairment, and 1.85 million people were blind due to age-related macular degeneration. Numerous ocular illnesses are caused by the overactivation of mineralocorticoid receptors (MR), which are found in neuronal and glial cells, retinal and choroidal arteries, and other ocular tissues. This overactivation causes oxidative stress, inflammation, fibrosis, and endothelial dysfunction. Although spironolactone and eplerenone are examples of mineralocorticoid receptor antagonists (MRA), their effectiveness in treating retinal disorders including central serous chorioretinopathy (CSCR) has been investigated. This project aims to identify potential mineralocorticoid receptor (MR) antagonists by screening structural analogues of known MRAs, spironolactone and eplerenone. The approach involves evaluating the pharmacokinetics of these analogues and assessing their receptor binding efficiency. Structure repositories like PDB, Drug Bank, and Computational tools like Swiss ADME, and Auto Dock were utilized. This integrated approach successfully identified a promising MR inhibitor with enhanced pharmacokinetic properties, and binding specificity, demonstrating potential for development as a retinal therapeutic aimed at preventing or mitigating vision loss.

**Keywords:** Retinal diseases, Mineralocorticoid receptor (MR), Drug screening, Molecular docking.

## **Formulation and Characterization of Lima Bean (*Phaseolus lunatus*) Biscuit to analysis the nutritional values**

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### **ABSTRACT**

The growing demand for nutritious, gluten-free, and functional foods has driven the exploration of alternative ingredients with enhanced health benefits. This thesis focuses on the formulation and characterization of Lima Bean biscuits, presenting a novel approach to incorporating legumes into snack foods. Lima beans (*Phaseolus lunatus*) are rich in protein, fiber, vitamins, and essential minerals, making them ideal for enhancing the nutritional profile of biscuits. The objective of this study was to develop a biscuit formulation using Lima bean flour as a primary ingredient and to assess its sensory, nutritional, and physical properties. The formulation involved substituting a portion of wheat flour with Lima bean flour at varying concentrations to identify the optimal blend for taste, texture, and nutritional value. The biscuits were analyzed for nutritional content, including protein, fiber, fat, carbohydrates, and minerals. A trained panel conducted sensory evaluations to assess color, taste, texture, and overall acceptability. Results showed that incorporating Lima bean flour increased the protein and fiber content of the biscuits while maintaining desirable texture and flavor. The biscuits balanced nutritional enhancement with consumer acceptability. This research highlights Lima beans' potential as a functional ingredient in biscuit production, offering a nutritious, gluten-free snack option with added health benefits. These findings suggest that Lima bean biscuits could diversify plant-based food products, catering to health-conscious consumers seeking functional, gluten-free snacks.

**Keywords:** Lima Bean, formulation, gluten-free snacks, protein, food products

## **Study On Solvent Extract of Medicinal Plant Against Polycystic Ovary Syndrome and Their Bioinformatics Binding Process**

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### **ABSTRACT**

Polycystic Ovary Syndrome (PCOS) is a common endocrine disorder affecting women of reproductive age, characterized by hormonal imbalances, ovarian cysts, and various metabolic disturbances. Despite the availability of treatment options, a significant portion of the population continues to suffer from its symptoms and long-term complications. The present study investigates the potential therapeutic effects of solvent extracts from medicinal plants on PCOS and explores their bioinformatics binding interactions. The research focuses on identifying active compounds from these extracts and evaluating their ability to bind to key proteins involved in the pathophysiology of PCOS. Using molecular docking simulations and other bioinformatics tools, we assess the interactions between plant-derived compounds and relevant biological targets such as insulin receptors, luteinizing hormone receptors, and androgen receptors. Our findings suggest that certain medicinal plant.

**Keywords:** Polycystic Ovary Syndrome (PCOS), pathophysiology, molecular docking simulations and other bioinformatics tools.

**A comparative analysis on transesterification and physicochemical characterization for biodiesel from seeds of cucurbita Maxima and milletia pinnata**

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**ABSTRACT**

An experimental study was conducted to treat industrial wastewater using sugarcane bagasse as a low-cost adsorbent. The bagasse was processed using carbonization and dehydration (biosorption) methods. The study examined the effects of pH, adsorbent dosage, particle size, and the removal of pollutants like BOD, COD, and turbidity. Results showed that activated sugarcane bagasse (ASB) performed better than raw sugarcane bagasse (RSB). ASB removed 77.82% BOD, 64.80% COD, and 70.30% turbidity, while RSB achieved 41.35% BOD, 34.02% COD, and 57.16% turbidity removal. This confirms that ASB is more effective for wastewater treatment.

**Keywords:** sugarcane bagasse, low-cost adsorbent, BOD, COD, Turbidity, waste water treatment.

**Studies on anti-diabetic activity by alpha amylase inhibition using poly herbal extract of stevia and guava leaf's**

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**ABSTRACT**

Diabetes Mellitus is a chronic metabolic disorder characterized by hyperglycemia, insulin resistance, and oxidative stress, leading to severe complications like cardiovascular diseases, neuropathy, and nephropathy. Aqueous extracts of Stevia and Guava leaves contain bioactive compounds like steviosides, flavonoids, tannins, and quercetin, which help in reducing blood sugar levels and preventing  $\beta$ -cell damage. This study aims to evaluate the protective role of encapsulated aqueous extracts of Stevia and Guava leaves in managing diabetes and preventing its complications.

**Keywords:** Anti diabetic,  $\alpha$ -Amylase

## **Smart Posture Wearable for Individuals with Cerebral Palsy**

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### **ABSTRACT**

The smart Posture Correction Wearable is designed to assist individuals with cerebral palsy (CP) in maintaining proper posture through real-time feedback. The device utilizes posture sensors and a haptic feedback mechanism to detect misalignments and provide gentle vibrations or alerts for correction. The methodology involved designing a wearable system with embedded sensors, processing real-time data using machine learning algorithms, and integrating the device with a mobile application for posture tracking. A pilot study was conducted on individuals with CP over four weeks, where data on posture deviations, user responses, and comfort levels were recorded. Results showed a 30% improvement in posture stability and a 20% reduction in musculoskeletal discomfort, with users reporting increased mobility and ease of movement in daily activities. The mobile app provided data-driven insights, enabling users to track progress and adjust their posture accordingly. The lightweight and adjustable design ensured comfort, making it suitable for prolonged use. Overall, the wearable technology demonstrated significant potential in enhancing postural alignment, reducing the risk of musculoskeletal issues, and improving the quality of life for individuals with CP. Future enhancements will focus on increasing sensor precision and expanding clinical trials for broader validation.

**Keywords:** cerebral palsy (CP), posture sensors, posture tracking.

## **Development of herbal dermal cream for insects in pets**

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### **ABSTRACT**

This study focuses on developing an herbal dermal cream to protect pets from insect bites and skin irritations. The cream is formulated using natural ingredients known for their insect-repellent and skin-soothing properties. The herbal extracts were selected based on their efficacy and safety for topical application on pets. The cream's physical characteristics, stability, and efficacy were evaluated through various tests, including pH, viscosity, and insect repellence assays. The results showed that the herbal dermal cream provided significant protection against insects and helped soothe irritated skin in pets. The cream's natural ingredients make it a safe and effective alternative to chemical-based products. This herbal dermal cream offers a promising solution for pet owners seeking natural and gentle protection for their pets' skin.

**Keywords:** Herbal Dermal Cream, Pet Care, Insect Repellent, Skin Soothing Natural, Herbal Extracts

## **Preparation of adsorbent using punica granatum to removal of dyes**

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### **ABSTRACT**

This study explored the effect of activated carbon preparation conditions on their adsorption performance. Activated carbon prepared from peels of punica granatum has been utilized as the adsorbent for the removal of dyes from an aqueous solution. Punica granatum was used as source material to prepare activated carbon by pyrolysis process using H<sub>2</sub>SO<sub>4</sub> activation. The effects of various H<sub>2</sub>SO<sub>4</sub> impregnation ratios, temperature and time on physical characteristics of the activated carbon were investigated. The Characterization of produced activated carbon will be determined by FTIR analysis. The best activated carbons were obtained at a temperature of 400°C with the impregnation ratio 1:2. Punica granatum based activated carbon could be employed as a low-cost alternative to commercial activated carbon in the removal of dye from wastewater.

**Keywords:** Chemical Activation, Adsorbent, Color Removal

## **Anti Inflammatory Properties of Orthosiphon Aristatus An Centella Asiatica**

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### **ABSTRACT**

Orthosiphon aristatus (commonly known as cat's whiskers) and Centella asiatica (also known as gotu kola) are two medicinal plants widely used in traditional medicine across Asia. Both species exhibit potent anti-inflammatory properties attributed to their rich phytochemical compositions. Orthosiphon aristatus contains bioactive compounds such as rosmarinic acid, sinensetin, and eupatorin, which inhibit pro inflammatory mediators like TNF- $\alpha$ , IL-6, and COX-2. Meanwhile, Centella asiatica is rich in triterpenoids such as asiaticoside and madecassoside, which have been shown to suppress inflammation by modulating NF- $\kappa$ B signaling pathways and reducing oxidative stress. Preclinical and in vitro studies support their role in treating inflammatory conditions such as arthritis, dermatitis, and neuroinflammation. This review highlights the pharmacological mechanisms underlying the anti-inflammatory activities of both plants and supports their potential as complementary therapies for inflammatory diseases.

**Keywords:** Anti-inflammatory, medicinal plant

## **Assessing the Efficacy of Aloe Vera-based Mobile Cases in Attenuating Electromagnetic Radiation (EMR) Exposure from Mobile Devices**

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### **ABSTRACT**

Mobile phone usage has become ubiquitous, but prolonged exposure to electromagnetic radiation (EMR) emitted by these devices poses potential health risks, including cancer and infertility. Current solutions to mitigate mobile radiation—such as shielding cases—often lack effectiveness, safety, or aesthetic appeal. This project introduces an innovative, ecofriendly mobile case infused with Aloe vera gel or extract, leveraging the plant's natural radiation-absorbing properties. Designed to be both functional and stylish, the Aloe Vera Mobile Case offers a non-toxic, user-friendly alternative for reducing EMR exposure. Preliminary results suggest a significant reduction in radiation levels, making this product a promising step toward safer mobile technology usage. Marketing strategies focus on digital outreach and health-conscious consumers, aiming for broad adoption of this natural solution.

**Keywords:** Aloe Vera, Mobile Radiation, Electromagnetic Radiation (EMR), Radiation Shielding, Eco-friendly Mobile Case, Natural Radiation Absorption, Health and Technology, Mobile Phone Safety, Health-conscious Consumers.

## **Development And Optimization of a Fermentation System for Multi-Fruit Wine Production Using Grapes, Papaya and Strawberry**

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### **ABSTRACT**

This study aims to evaluate the oenological potential of grape (*Vitis vinifera*), papaya (*Carica papaya*), and strawberry (*Fragaria × ananas*'s) for the production of fruit-based wines through controlled fermentation. Traditionally, grapes are the primary substrate for wine production. however, the use of alternative fruits can enhance flavor diversity and promote the utilization of locally available produce. The experimental procedure involved juice extraction, sugar concentration adjustment, and fermentation using *Saccharomyces cerevisiae* under regulated conditions. Post-fermentation, the wines were analyzed for physicochemical parameters such as pH, alcohol content, total soluble solids, and sensory characteristics. The results demonstrated that papaya and strawberry, either individually or in combination with grapes, are viable substrates for wine production, yielding distinct aromatic profiles and acceptable alcohol levels. This research underscores the potential of tropical fruits in expanding the diversity and commercial appeal of fruit wines.

**Keywords:** Fruit wine, grape (*Vitis vinifera*), papaya (*Carica papaya*), and strawberry (*Fragaria × ananases*), Fermentation, *Saccharomyces cerevisiae*, Tropical fruits, Sensory evaluation, Alcohol content.

## **A Decentralized and Trustworthy Authentication Mechanism for IOV Using Blockchain**

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### **ABSTRACT**

The Internet of Vehicles (IoV) is transforming modern transportation by enabling intelligent and interconnected vehicular networks. As IoV systems rely heavily on seamless communication and data exchange, ensuring secure and efficient driver authentication is crucial to prevent unauthorized access and potential cybersecurity threats. To address these challenges, we propose a blockchain-based secure distributed face authentication scheme that leverages decentralized and tamper-resistant technology to enhance security, privacy, and efficiency in IoV networks. A lightweight deep learning-based face recognition model is incorporated to ensure real-time authentication with high accuracy, making it suitable for IoV environments where computational efficiency is essential. Additionally, smart contracts facilitate automated, transparent, and tamper-proof identity verification, enhancing trust in the authentication process. To evaluate the effectiveness and robustness of the proposed authentication scheme, MATLAB-based simulations are conducted. The results demonstrate high recognition accuracy, computational efficiency, and strong resistance against adversarial attacks, ensuring reliable performance in real-world IoV scenarios. By integrating blockchain, deep learning, and cryptographic security measures, this scheme provides a scalable, future-proof, and highly secure authentication solution for next generation IoV ecosystems, paving the way for enhanced vehicular security and privacy.

**Keywords:** Internet Of Vehicles, Blockchain, Face Authentication, Cybersecurity, Biometric Security, Privacy Preservation, Smart Contracts.

## **Improving Knee Osteoporosis Detection Using Machine Learning Techniques**

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### **ABSTRACT**

Bone osteoarthritis (OA) is a degenerative joint disorder that significantly impairs mobility and quality of life by affecting the bones and cartilage within joints. Traditional diagnostic approaches, such as visual inspection of X-ray or MRI scans by radiologists, are often time-intensive, subjective, and prone to inconsistencies. These limitations highlight the pressing need for a fast, accurate, and objective diagnostic tool. To address this, the present study proposes a deep learning-based automated system utilizing the YOLO (You Only Look Once) algorithm to detect and classify osteoarthritic regions in radiographic images. The model leverages annotated datasets to precisely localize affected areas in real-time, offering enhanced diagnostic support. By integrating preprocessing techniques like image normalization, augmentation, and noise reduction, the system boosts accuracy and generalization across varied imaging conditions. The proposed model is evaluated using key performance metrics including mean Average Precision (mAP), Intersection over Union (IoU), and classification accuracy, ensuring a thorough assessment of detection and classification capabilities. Moreover, the incorporation of Grad-CAM (Gradient-weighted Class Activation Mapping) visualization allows for better interpretability by highlighting the specific regions influencing the model's predictions, aiding medical professionals in understanding the decision-making process. Experimental results demonstrate high detection accuracy and robust performance, positioning the system as a promising solution for early diagnosis and clinical integration. By reducing diagnostic time and minimizing human error, this approach holds significant potential to enhance osteoarthritis detection, improve patient outcomes, and streamline the clinical workflow.

**Keywords:** X-ray or MRI scans, Grad-CAM (Gradient-weighted Class Activation Mapping).

## **A Hybrid Approach for Alzheimer's Disease Detection and Its Classification by Deep Learning and Machine Learning Models**

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### **ABSTRACT**

Alzheimer's Disease (AD) is a progressive neurodegenerative disorder affecting millions worldwide, with early detection being crucial for effective treatment and management. HealthCoder - Alzheimer's Disease Classification is an AI based system designed to classify different stages of AD using brain MRI images. The project utilizes a preprocessed dataset of 6,400 MRI images categorized into Non-Demented, Very Mild Demented, Mild Demented, and Moderate Demented stages. The classification process integrates CNN models, transfer learning techniques (VGG16, ResNet, EfficientNetB0, etc.), and hybrid models (CNN-XGBoost, VGG16-SVM-GNB-XGBoost) to enhance accuracy. Data preprocessing techniques such as resizing, normalization, and augmentation are applied to improve model robustness. Performance evaluation is conducted using accuracy, precision, recall, and AUC metrics, with Grad-CAM visualization providing model explainability. The system overcomes limitations of traditional AD detection by incorporating multi-model learning, explainability tools, and improved generalization techniques. Future enhancements will focus on multimodal data integration (fMRI, PET), longitudinal analysis, and clinical data fusion to further improve diagnostic precision and reliability.

**Keywords:** HealthCoder - Alzheimer's Disease Classification is an AI based system designed to classify different stages of AD using brain MRI images.

## **Chemical Synthesis of Copper Oxide and Zinc Oxide Nanocomposite and Application Studies in Seed Germination**

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### **ABSTRACT**

In the present study aimed to enhanced the seed germination process, antioxidant, anti-inflammatory and antibacterial activities of the successively synthesized copper oxide and zinc oxide nanocomposite. The formation of copper oxide and zinc oxide nanocomposite was monitored by recording the UV-Vis absorption spectra which showed surface Plasmon resonance at 295nm. The chemically synthesize;0d copper oxide and zinc oxide nanocomposite was further characterized by FTIR, DLS and SEM. FTIR identified the presence of active and phenolic groups. The crystalline morphology and size of the nanoparticles were determined by Dynamic Light Scattering and SEM analysis. The average particle size of CuO-ZnO nanocomposite was found to be in the range of 379 nm. The antioxidant activity carried out by using H<sub>2</sub>O<sub>2</sub> assay method. The anti-inflammatory activity carried out by using Protein denaturation method. The antibacterial activity was performed by using Bacillus subtilis. The Oryza sativa seeds were treated under different concentration (5,10,15,20 ppm) of nanocomposite synthesized by chemical method up to 5 days of germination was observed

**Keywords:** The chemically synthesize;0d copper oxide and zinc oxide nanocomposite was further characterized by FTIR, DLS and SEM. FTIR identified the presence of active and phenolic groups.

## **Food Development of Eco-Friendly Pva Packaging Films Infused with Natural Antioxidant and Antimicrobial Extracts for Food Packaging Application**

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### **ABSTRACT**

The rising demand for sustainable food packaging has led to the development of biodegradable films as alternatives to synthetic plastics. This study investigates PVA-based films plasticized with polyethylene glycol (PEG) and infused with natural bioactive extracts to enhance food preservation. Antioxidant flavonoids from hibiscus, antibacterial agents from guava leaves, and antifungal compounds from Tropical almond leaves were incorporated to combat oxidation, microbial contamination, and spoilage while ensuring environmental degradability. The films were produced via solution casting using optimized extract concentrations. Their mechanical and barrier properties including flexibility, water vapor permeability, and thermal stability were evaluated. Antibacterial activity was tested against *E. coli* and *B. subtilis*, antifungal effects against *Aspergillus Niger*, and antioxidant capacity via the DPPH assay. Composting confirmed the films' biodegradability. Results showed that hibiscus extracts reduced oxidation, guava leaf compounds suppressed bacterial growth, and Tropical almond extracts prevented fungal spoilage, helping extend the shelf life of foods like meat and fruit. PEG improved flexibility, though higher extract levels slightly affected strength and permeability. The films biodegraded within weeks to months, offering an effective, eco-friendly packaging solution. With further optimization and scaling, these films present a promising step toward greener food packaging systems.

**Keyword:** Hibiscus, Tropical almond Leaf, Guava leaf, PVA films.

## **Hybrid Deep Learning Model for Brain Tumor Detection and Classification Using Cnn and Lstm**

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### **ABSTRACT**

Brain diseases classification is the most challenging process due to their sensitivity, the difficulty of executing operations, and the high expenses. Brain tumors are a significant and potentially life-threatening medical condition that demands accurate and timely diagnosis for effective treatment planning. Magnetic Resonance Imaging (MRI) has emerged as a vital tool in the field of medical imaging, offering detailed and non-invasive visualization of the brain's internal structures. Brain tumor detection using MRI images has become a cornerstone in the diagnosis and management of these conditions. The proposed approach begins by pre-processing the dataset, which consists of MRI scans and clinical data from individuals with different brain disease conditions. Dataset consists a diverse range of brain images, including both tumor and non-tumor cases. The dataset is divided into training and testing sets, ensuring a balanced distribution of samples for each class. On MRI scans, many procedures are needed to identify tumors, including image pre-processing, feature extraction, and classification. The hybrid model, known for its deep architecture and robust feature extraction capabilities, it will be employed alongside the LSTM, a highly efficient architecture designed for image classification tasks. The findings will be revealing several notable advantages of LSTM model. The hybrid learning models automatically learning hierarchical features from raw image data, eliminating the need for manual feature engineering. This feature extraction capability enables CNNs to capture subtle and complex patterns within brain images, enhancing their diagnostic accuracy. The results of proposed work will demonstrate the effectiveness of the proposed method to detect the brain tumors, which will achieve high accuracy, precision, recall and F1-measure. Based on model accuracy, user can input the test brain MRI image to predict the tumor with types and also provide the diagnosis details about predicted disease. Experimental results shows that the proposed model provide improved efficiency in disease prediction.

**Keywords:** Convolutional Neural Networks with Long Short-Term Memory (LSTM) will be using in this project.

## **NeuroGenAI: A Mul modal AI Framework for Early Detect on of Neurodegenerative Diseases Using Genomic and Behavioral Biomarkers**

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### **ABSTRACT**

Neurodegenerative diseases, including Alzheimer's and Parkinson's, are increasingly prevalent and diagnosed at advanced stages when treatment options are limited. This paper proposes NeuroGenAI, a modal artificial intelligence framework that enables early detection of neurodegenerative disorders by integrating genomic biomarkers with behavioral data collected from digital and wearable devices. The model architecture combines Convolutional Neural Networks (CNNs) for genomic sequence analysis and Long Short-Term Memory (LSTM) networks for time-series behavioral analysis, including gait patterns, speech irregularities, and sleep disturbances. The system is trained using publicly available genomic datasets (such as ADNI and UK Biobank) alongside simulated behavioral data. To enhance interpretability, NeuroGenAI incorporates a mechanism that highlights critical genetic variants and behavioral trends contributing to its predictions. The objective is to support early, personalized risk stratification, enabling proactive medical intervention and improved patient outcomes. This research bridges genomics, behavioral science, and AI to form a scalable, explainable, and clinically applicable tool for precision neurology, addressing a critical gap in current life sciences and digital healthcare innovation.

**Keywords:** The system is trained using publicly available genomic datasets (such as ADNI and UK Biobank) alongside simulated behavioral data.

## **Chemical Synthesis of Zinc Oxide Nanoparticle and Evaluation of Their Anti-Cancer Activity**

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### **ABSTRACT**

Cancer is one of the leading causes of death and morbidity, with a complex Pathophysiology. Chemotherapy, radiation therapy, targeted therapy, and Immunotherapy are examples of conventional cancer treatments. Nevertheless, Obstacles like cytotoxicity, lack of selectivity, and multidrug resistance provide a Significant obstacle to effective cancer treatment. The advent of nanotechnology has Revolutionized the arena of cancer diagnosis and treatment. In this study, a Nanoparticle of zinc oxide was synthesized, and it will be tested in a cancer cell line. Zinc sulphate and sodium hydroxide are used as starting materials to synthesize a Zinc oxide nanoparticle. Then the nanoparticles were characterized by a UV-Spectrophotometer, FT-IR, DLS and SEM analysis. The crystalline morphology and Size of the nanoparticles were determined by SEM analysis and DLS. The size of the Nanoparticle was 100 nm. Furthermore, antimicrobial activities were evaluated, and They showed significant activity against the Gram-negative bacteria *E. coli* and the Gram-positive bacteria *Bacillus subtilis*. The nanoparticles also showed significant Activity in the MCF-7 cell line.

**Keywords:** cancer, chemotherapy, SEM, zinc oxide.

## **Smart Bed Technology for Real-Time Monitoring and Improved ICU Patient Management**

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### **ABSTRACT**

Intensive Care Units ICUs play a critical role in delivering lifesaving treatment and continuous monitoring for critically ill patients. However, traditional monitoring systems often focus solely on basic vital signs, potentially leading to delayed interventions. To address this gap, we propose a smart bed system designed specifically for ICU settings, integrating advanced patient monitoring features. The system monitors key parameters such as patient posture, intravenous IV fluid levels, temperature, glucose concentration in IV fluids, urine bag filling levels, and includes both regular and emergency buzzers, along with an LCD display for real-time updates. The smart bed architecture incorporates biosensors, a data acquisition module, and a microcontroller to facilitate real-time comprehensive and accessible patient information, enhancing decision-making and patient management. This innovation not only improves patient safety but also reduces the burden on medical staff and boosts overall ICU operational efficiency. By leveraging emerging technologies, the proposed system sets a benchmark for intelligent, proactive, and continuous critical care monitoring, aiming to significantly improve patient outcomes.

**Keywords:** Smart ICU Bed, Patient Monitoring, Real-Time Data Acquisition, Biomedical Sensors, Intravenous Fluid Monitoring, Glucose Sensing, Urine Output Monitoring, Microcontroller-Based System, Emergency Alert System

## Disease Detection Using Tongue Analysis

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### ABSTRACT

The tongue, often considered a mirror of internal health, displays distinct visual features corresponding to various systemic conditions. Leveraging this principle, our project proposes a non-invasive, image-based system for automated disease detection using tongue analysis, focusing on identifying anaemia, oral cancer, geographic tongue, and tongue swelling. This approach is designed to assist in early screening, particularly in areas with limited access to advanced diagnostic tools. A custom dataset comprising high-resolution tongue images was compiled from open sources and clinical references. Each image underwent preprocessing steps including color space conversion (RGB to HSV), contrast enhancement, noise reduction, and region of interest (ROI) extraction to isolate the tongue area. Morphological operations and contour-based segmentation techniques were applied to refine the tongue boundaries. Following preprocessing, relevant features such as color distribution, texture (using GLCM), and shape descriptors were extracted. A Convolutional Neural Network (CNN) model was developed and trained to classify the tongue images into predefined categories corresponding to specific diseases. The model achieved promising results in terms of accuracy, precision, and recall, demonstrating its potential for clinical screening applications. The system was implemented in Python. Emphasis was placed on creating a lightweight, scalable model that can be deployed in resource-constrained environments. Future developments include expanding the dataset with clinically verified images, integrating mobile-based acquisition, and linking with electronic health records for broader healthcare impact. This project aims to bridge the gap between traditional diagnostic wisdom and modern AI technology, offering a cost-effective, accessible solution for preliminary disease screening.

**Keywords:** This approach is designed to assist in early screening, particularly in areas with limited access to advanced diagnostic tools.

Hydrogels in Drug

## Hydrogels in Drug Delivery applications

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### ABSTRACT

Hydrogels are versatile biomaterials with broad applications in the biomedical field, including drug delivery, tissue engineering, wound dressings, and more. Their ability to mimic the extracellular matrix, high water content, and biocompatibility makes them attractive for various medical applications. These are three-dimensional network of hydrophilic polymers that can absorb and retain large amounts of water while maintaining its structure. They are essentially water-swollen polymers that can expand and contract with changes in their environment, offering unique properties for various applications. They are highly hydrated 3D networks of polymers, they can provide chemical and mechanical signals and also an environment for cells to adhere, proliferate, and differentiate; thus, they are suitable for cell delivery and tissue development goals. Their porosity and compatibility with aqueous environments make them highly attractive biocompatible drug delivery vehicles. Hydrogels facilitate drug delivery by acting as a controlled-release system. They swell in the presence of a fluid, increasing the pore size and allowing the drug to diffuse out. This swelling can be triggered by specific environmental cues, allowing for targeted drug delivery to specific areas of the body. These hydrogels are classified into 3 types; natural, synthetic and hybrid. We use mostly natural and synthetic hydrogel in the drug delivery systems. Hydrogels used in drug delivery are preferred by their unique properties such as high-water content, swelling behaviors, and biocompatibility make them suitable for various delivery routes, including oral, transdermal, and ocular. This paper explores the design, synthesis and functionalization of hydrogels for controlled and targeted drug delivery applications. Challenges such as mechanical stability, scalability and regulatory considerations are also addressed.

**Keywords:** Hydrogels, drug delivery, Tissue engineering, Poly ethyl glycol, Targeted drug delivery, medical regeneration

## Deep learning algorithm for Autism Spectral Disorder classification using facial images via Convolutional Neural Networks

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### ABSTRACT

To design a Convolutional Neural Network (CNN) model for classifying autism spectrum disorders (ASD) using facial images. This model automatically learns and extracts discriminative facial features that distinguish ASD from non-ASD individuals. It aims to support non-invasive, early screening of ASD through facial image analysis. The main objectives include collecting and preprocessing facial image datasets of individuals with and without autism spectrum disorders (ASD), to design and implement a Convolutional Neural Network (CNN) architecture for facial feature extraction, to train, validate, and test the model for accurate classification of ASD and non-ASD individuals, to evaluate model performance using metrics like accuracy, precision, recall, F1-score, and visualizations like confusion matrix and Grad-CAM heatmaps, to compare alternative CNN models, i.e. MobileNetV2 and Custom CNN model for improved classification accuracy. Facial dataset has been chosen since they can reflect the underlying neurological and developmental conditions of a person. In autism detection, research has shown that certain facial structures or expressions can differ slightly in individuals with ASD. An increased number of facial images in the dataset will increase the accuracy as well as improve the model's performance at training and learning the characteristic facial features. The VGG16 model achieved 92% accuracy, indicating strong performance in distinguishing ASD from non-ASD faces. t-SNE Visualization The t-SNE plot shows clear separability between the samples. Grad-CAM results reveal that the model focuses on eye and mouth regions for ASD classification, aligning Confusion Matrix with clinical features associated with ASD. The confusion matrix indicates most ASD cases were correctly identified. Evaluation Metrics High precision and recall scores in CNN model demonstrate that the model performs well in both correctly identifying ASD and minimizing false negatives.

**Keywords:** In autism detection, research has shown that certain facial structures or expressions can differ slightly in individuals with ASD

## **Manufacturing methods of acetone**

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### **ABSTRACT**

Acetone is a vital industrial solvent and chemical intermediate used in various applications. The cumene process, direct oxidation of propylene, and fermentation of biomass are prominent manufacturing methods. This review examines these methods, highlighting their advantages, disadvantages, and recent developments. The cumene process remains dominant due to its established infrastructure and efficiency. However, alternative methods are gaining attention for their potential to improve sustainability and cost-effectiveness. The direct oxidation method offers a simpler process route, while fermentation-based methods utilize renewable biomass feedstocks. Recent advancements in catalyst design, process optimization, and biotechnological approaches have improved the efficiency and sustainability of acetone production. This review discusses the current state of acetone manufacturing, highlighting opportunities for innovation and improvement. The manufacturing methods of acetone continue to evolve, driven by demands for efficiency, sustainability, and cost-effectiveness. Understanding the advantages and limitations of each method is crucial for developing innovative and environmentally friendly production processes.

**Keywords:** Acetone production, Cumene process, Direct oxidation, Fermentation, Biomass conversion, Industrial solvents, Chemical manufacturing, Process optimization, Sustainable production, Chemical engineering

## **IOT BASED FOOD ADULTERATION DETECTION SYSTEM**

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### **ABSTRACT**

Food adulteration poses a serious threat to public health and food safety. Traditional methods of adulteration detection are often time-consuming, require laboratory analysis, and are not readily accessible to consumers. This project proposes an IoT-based Food Adulteration Detection System that leverages colour analysis to identify potential adulterants in commonly consumed food items. The system utilizes a colour sensor integrated with a microcontroller (such as Arduino) to capture the colour profile of food samples. These readings are then compared to standard colour values stored in a cloud database to detect discrepancies indicative of adulteration. Through wireless connectivity, results are transmitted in real-time to a mobile or web application, providing users with immediate feedback on food quality. The proposed solution is low-cost, portable, and user-friendly, making it suitable for household use, small-scale vendors, and regulatory bodies. By enabling on-the-spot adulteration detection, the system aims to promote safer food consumption and empower consumers to make informed choices.

**Keywords:** Food Adulteration detection system, IOT based, Arduino uno, sensor analysis, Real time detection, Food safety.

## **Influence of Osmotic Dehydration on the Physical, Mechanical, and Textural Properties of Paneer from various Milk Sources**

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### **ABSTRACT**

This study evaluates the effects of osmotic dehydration (OD) on the physical, mechanical, and textural properties of paneer made from buffalo, cow, and full-cream milk. Paneer slices were pre-treated at 4°C with four different concentrations of salt solution for 12h at an osmotic solution-to-product ratio of 1:4 (w/w). Following pre-treatment, the samples were dried in a tray dryer at 50°C. The full-cream milk paneer was found to have the highest moisture content compared to other paneer varieties due to the homogenization process. The overall dimensional properties of OD-treated paneer, including average length, width, thickness, geometric mean diameter, surface area, and volume, ranged from 0.0174 to 0.0196m, 0.0164 to 0.0186m, 0.004 to 0.0054m, 0.0108 to 0.0121m,  $0.34 \times 10^{-3}$  to  $0.464 \times 10^{-3} \text{m}^2$ , and  $11.71 \times 10^{-7}$  to  $17.991 \times 10^{-7} \text{m}^3$ , respectively. The highest sphericity value of 0.6656 was noted in 12% OD-treated full-cream milk paneer. Bulk and true density increased non-linearly, while porosity decreased linearly with a reduction in moisture content from 12.46% to 9.25% (w.b) in buffalo milk samples. Untreated full-cream milk paneer exhibited the lowest angle of repose ( $29.89^\circ$ ) and volume shrinkage (19.82%) with an 8.37% decrease in moisture (w.b). Osmotic dehydration was found to have a favorable effect on the weights of 10, 50, and 100-paneer slice samples in buffalo milk, while cow milk paneer with higher solute concentration exhibited the highest rehydration ratio of 1.89. The OD-treated paneer sample with 12% concentration from cow milk exhibited a higher volume shrinkage value of 37.84%. The OD-treated paneer with a solute concentration of 3% from cow and buffalo milk was found to have the highest volume expansion of 60.25% and 88.81%, respectively, at room temperature. Regarding external friction coefficients, the highest value was observed for aluminum plates (0.59) in full-cream milk paneer, followed by galvanized iron (0.52) and stainless steel (0.42) in buffalo milk paneer. Paneer prepared from buffalo milk with a 3% solute concentration showed a significant decrease in hardness value to 393.56N.

**Keywords:** volume expansion, rehydration ratio, hardness value, porosity, moisture content and paneer.

## **Lung Nodule Detection and Classification from Ct scans**

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### **ABSTRACT**

Early and accurate detection of lung nodules in chest CT scans is critical for timely diagnosis and treatment of lung cancer. This paper presents a fully automated system for lung nodule detection and classification using advanced medical image processing and machine learning techniques. The proposed framework consists of six main stages: image acquisition, preprocessing to enhance image quality and isolate lung regions, nodule detection using image processing or deep learning methods, feature extraction to quantify morphological and textural characteristics, classification of nodules as benign or malignant using supervised learning models, and performance evaluation using standard metrics such as accuracy, sensitivity, specificity, and area under the ROC curve (AUC). Additionally, explainable AI methods such as class activation maps are employed to provide visual interpretability of the classification results, enhancing trust and usability in clinical settings. The system demonstrates potential for integration into clinical decision support tools, aiming to assist radiologists in improving diagnostic accuracy while reducing false positives.

**Keywords:** This paper presents a fully automated system for lung nodule detection and classification using advanced medical image processing and machine learning techniques.

## Extraction of bio ethanol from Vegetables waste

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### ABSTRACT

The growing demand for renewable energy has led to the exploration of bioethanol production from vegetable waste as a sustainable fuel alternative. This study investigates the conversion of carbohydrate-rich vegetable waste into bioethanol through fermentation using *Saccharomyces cerevisiae*, followed by distillation and purification. The fermentation process was carried out under anaerobic conditions at a controlled temperature of 30–35°C for one month, enabling efficient sugar-to-ethanol conversion. The ethanol-rich broth was subjected to fractional distillation to achieve a purity level of 90–95%, with additional dehydration processes refining the ethanol to over 99% purity, making it suitable for fuel applications. To confirm the purity and composition of the bioethanol produced, various analytical techniques were employed. The burning test demonstrated a clean, blue flame, indicating high purity and efficient combustion properties. UV-Vis spectrophotometry confirmed ethanol's characteristic absorbance range of 235–340 nm, with a UV cutoff at 210 nm, verifying its optical properties and purity. Additionally, FTIR spectroscopy identified key functional groups such as C-H and C-O bonds, ensuring the ethanol's molecular structure and chemical consistency. These findings validate the potential of vegetable waste as an efficient raw material for bioethanol production. This study highlights the feasibility of utilizing vegetable waste for sustainable bioethanol production, reducing environmental pollution and offering an alternative to fossil fuels. Future advancements in fermentation and purification techniques could enhance ethanol yield and efficiency, enabling large-scale production. This approach supports waste management, sustainable energy generation, and environmental conservation.

**Keywords:** This study investigates the conversion of carbohydrate-rich vegetable waste into bioethanol through fermentation using *Saccharomyces cerevisiae*, followed by distillation and purification.

## **Generation Of Mutant Plasmodium Falciparum Reader Protein Via Site Directed Mutagenesis and Its Purifications**

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### **ABSTRACT**

Malaria remains a significant global health burden, with *Plasmodium falciparum* (*P. falciparum*) being the deadliest causative agent. Epigenetic mechanisms regulate various aspects of the parasite's life cycle, including gene expression, immune evasion, and virulence. Among these mechanisms, oligomerizing epigenetic reader proteins play a crucial role by recognizing histone modifications and recruiting chromatin-modifying complexes. This study focuses on generating single and double mutants *P. falciparum* oligomerizing epigenetic reader proteins using site-directed mutagenesis to investigate their roles in histone mark recognition and transcriptional regulation. The mutated proteins were expressed in a bacterial system, purified using affinity chromatography, and analyzed through SDS-PAGE and Western blotting. Understanding the binding affinity and structural implications of these mutations may provide valuable insights for developing novel antimalarial therapeutics targeting epigenetic pathways.

**Keywords:** *P. falciparum*, chromatography , immune evasion, and virulence.

## Formulation Of Mosquito Repellent Using Indigenous Herbs

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### ABSTRACT

The increasing threat of mosquito-borne diseases, such as malaria, dengue, and Zika virus, highlights the need for effective and safe mosquito repellents. This study focuses on the production, validation, and evaluation of herbal mosquito repellents, specifically in the form of liquid formulations, made from various indigenous plant extracts known for their mosquito-repelling properties. Unlike synthetic repellents, these herbal liquid vapourizers are non-toxic, biodegradable, and cost-effective, making them a promising alternative for mosquito control. Process involves solvent extraction to extract the phytochemicals in the selected plants that could be utilized in herbal mosquito repellents. The formulation typically includes the blend of herbal extracts from various plant sources. Essential oils like lemongrass and Eucalyptus also included which enhance the repellent activity, also provides a liquid-based barrier that deters mosquitoes. Evaluation parameters included efficacy, safety and toxicology, odor, evaporation rate, and mosquito repellent activity to ensure reliability of the product. Validation processes involve phytochemical profiling and bioactivity assessments, showing up mortality in mosquitoes within specific time for optimized herbal blends, comparable to commercial products. This research contributes to the development of natural mosquito control solutions, addressing public health concerns while promoting environmental sustainability.

**Keywords:** Herbal mosquito repellent, plant extract, Liquid vapourizer, essential oils, Formulation.

## **Delivery Of Advanced Therapy Without the Need for Needles Using a Hypobaric Patch.**

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### **ABSTRACT**

Even when advanced medicines function within the skin tissue, they are frequently supplied via injection, which raises the possibility of unintended actions. Here, we describe how medicines can be delivered needleless into the skin of pigs, rats, and mice using a skin patch with a hypobaric chamber inducing a skin dome formation. According to finite element modeling, the hypobaric chamber in the patch thinned the skin, squeezed the appendage wall epithelia, and expanded the skin appendages by 32%. These modifications made it possible to directly deliver a diclofenac nanotherapeutic and an H1N1 vaccination antigen into the skin. Infrared skin mapping and fluorescence imaging revealed needleless administration through the appendages. The patch's effectiveness in vivo was proven by a better methods. It is difficult to target the viable epidermis because it lies between the lipid-rich stratum corneum (SC) and the vascular dermis. Hydrophobic drugs bind to the SC but fail to penetrate further. These challenges lower the effectiveness of treatments such as corticosteroids, anti-inflammatory drugs, and treatments for cancer. Liposomes, for example, are considered useful for delivering drugs but fail to be fully penetrative unless their SC is stripped off. Successful noninvasive methods include physical stretching or mechanical massage of skin to open various appendages momentarily, such as hair follicles. A hypobaric patch, which stretches skin under vacuum to enhance drug delivery, is also a new approach. This device offers controlled tissue deformation and opens appendages for the appropriate delivery of macromolecules and nanomaterials. In porcine and rodent models, it was determined that drug distribution and efficacy were increased. Such advantages were observed in inflamed skin as well as vaccine delivery.

**Keywords:** Needle-free delivery, Advanced therapies, Finite element modelling, Skin appendages, Hypobaric chamber, Drug administration, Off-target effects.

## Revolutionizing Varicose Vein Assessment with Deep Learning

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### ABSTRACT

Varicose veins, a prevalent vascular condition affecting a significant portion of the population, necessitate early detection for optimal intervention and improved patient outcomes. This study introduces a novel diagnostic approach for varicose vein detection, leveraging the capabilities of deep learning. Varicose veins represent a prevalent vascular condition that can lead to discomfort and complications if not identified and treated promptly. This research introduces an advanced diagnostic methodology for varicose vein detection, utilizing deep learning techniques. Fine-tuning through transfer learning ensures adaptability to variations in patient demographics and imaging conditions. To enhance diagnostic precision, our system incorporates advanced image processing techniques and feature extraction methods. Furthermore, the model is designed to accommodate multi-modal imaging data, incorporating information from various imaging modalities to enhance diagnostic accuracy. The results underscore the superior performance of our deep learning-based diagnostic system, achieving notable sensitivity and specificity in varicose vein detection. This proposed enhanced diagnostic tool holds promise for healthcare professionals, streamlining the diagnostic process and facilitating early and accurate identification of varicose veins. The potential implications include improved patient outcomes through timely intervention and the development of personalized treatment strategies. As we continue refining and expanding our model, its integration into clinical practice could contribute to a more efficient and effective management of varicose vein disorders.

**Keywords:** Varicose veins, Deep learning techniques and convolutional neural network (CNN) architecture

## **Technological Evolution of Laparoscopic Surgery: A Biomedical Instrumentation Perspective**

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### **ABSTRACT**

Laparoscopic surgery, a major advancement in the field of minimally invasive procedures, has become a cornerstone of modern surgical practice. Its success is largely attributed to the evolution of advanced biomedical instrumentation that enables high-precision operations through small incisions. Central to this technique is the laparoscope—a fiber-optic instrument equipped with a high-definition camera and light source—that allows real-time visualization of internal organs on external monitors. Complementary instruments such as trocars, insufflators, electrosurgical devices, and energy-based tools (e.g., ultrasonic scalpels, bipolar and monopolar cautery systems) have significantly improved surgical control, accuracy, and safety. Advanced imaging systems, including 3D visualization and 4K resolution monitors, enhance depth perception and anatomical detail. Integration of robotics and computer assisted navigation systems has further refined instrument dexterity, offering surgeons enhanced ergonomics and precision. In addition, advancements in sensor-based technologies and smart feedback systems now allow real-time monitoring of tissue parameters such as pressure, temperature, and impedance during surgery, reducing the risk of tissue damage. Despite its advantages, laparoscopic surgery poses unique challenges, including limited tactile feedback, steep learning curves, and dependency on complex instrumentation. Biomedical engineers continue to address these issues through innovations in haptics, AI-based surgical assistance, and simulation-based training tools. As biomedical instrumentation continues to evolve, laparoscopic surgery is expected to become even more efficient, intelligent, and widely accessible, further transforming the landscape of modern surgery.

**Keywords:** Its success is largely attributed to the evolution of advanced biomedical instrumentation that enables high-precision operations through small incisions.

## **Artificial transparent heart**

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### **ABSTRACT**

The artificial transparent heart is an innovative advancement in biomedical engineering designed not only to replicate the function of the human heart but also to allow visual observation of its internal mechanisms. This transparency enables real-time monitoring of blood flow, valve function, and mechanical operation, offering valuable insights for medical research, education, and device testing. Made from biocompatible, transparent materials, the device maintains physiological performance while providing a unique platform for studying hemodynamics and improving design optimization. This paper explores the design, materials, functionality, and potential applications of the artificial transparent heart in clinical and research settings, highlighting its role in the future of cardiovascular innovation. The artificial transparent heart is a cutting-edge biomedical innovation that combines life-support functionality with enhanced visual accessibility for research and educational purposes. Constructed using advanced biocompatible, transparent polymers, this device mimics the mechanical function of the human heart while allowing real-time observation of internal components, such as valve movements and blood flow dynamics.

**Keywords:** This transparency enables real-time monitoring of blood flow, valve function, and mechanical operation, offering valuable insights for medical research, education, and device testing.

## **Deep Learning Applications in Skin Cancer Recognition and Categorization**

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### **ABSTRACT**

Cancer is among the most troublesome global healthcare issues, carrying the second highest mortality rate after heart diseases. Cancer does not develop suddenly; it usually forms slowly as the result of a chain of genetic mutations that modifies how a specific cell behaves. It is these changes and the parent cancerous cell which result from many exposures to certain chemical agents. For instance Tobacco smoke possesses many toxic substances which can cause the development of lung cancer. Also, chemical ingredients present in the surrounding atmosphere may either directly or indirectly interfere with the cell's basic functions, resulting in changes to the chromosomes. Less prominently, certain viruses, bacteria, as well and radiation also result in cancers. Disturbance of central cancer genes and or intercellular communication leads to perpetually dividing cells. Generally, proto-oncogenes which are known for taking cell division and growth into control, under certain circumstances begin to operate as oncogenes leading to mushrooming cell numbers otherwise known as carcinosis. In the same boat is the loss of tumor suppressor genes which leave some important controls to cell division. These are a group of vital DNA repair genes which perform this function and when they don't do it correctly it guarantees a greater probability of cancer misuse. Certain mechanisms are collated and are capable of controlling what genetically is performed on a cell and what isn't which is known as epigenetics. Take methylation of the DNA for example, in abnormal cases like cancer cells, it diminishes. Likewise, modification of the histone is what is changed, Changes in these procedures are still undergoing their research. Attempting to cover cancer in its entirety, this paper aims to delve deeply into the disease from the perspective of the molecules that elicit it.

**Keywords:** Mixtures that induce cancer, origins of malignant cells, chromosomal aberrations.

## **Smart Wound Dressing with Integrated Sensors for Monitoring Healing Progress**

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### **ABSTRACT**

Chronic wounds such as diabetic ulcers, pressure sores, and surgical incisions require continuous monitoring to ensure proper healing and prevent infections. Traditional wound care methods rely on periodic visual inspections, which are subjective and may delay the detection of complications. This project presents the development of a smart wound dressing embedded with integrated biosensors capable of real-time monitoring of key healing parameters such as pH, temperature, moisture, and wound exudate levels. These parameters are critical indicators of wound status, infection, and healing rate. The system utilizes flexible, biocompatible sensor arrays incorporated within a hydrogel or nanofiber-based dressing. Sensor data is acquired and transmitted wirelessly to a mobile application using a low-power Bluetooth module, allowing caregivers or clinicians to remotely track wound conditions. An embedded microcontroller unit (MCU) manages sensor operations and data processing. The solution also includes an early warning system that alerts medical personnel when parameters deviate from normal ranges, thereby enabling timely intervention. This smart dressing aims to enhance patient outcomes by enabling continuous, noninvasive wound monitoring, reducing hospital visits, and improving the accuracy of treatment decisions. The project demonstrates the integration of biomedical sensors, flexible electronics, and IoT in a single, scalable platform for next-generation wound care management.

**Keywords:** These parameters are critical indicators of wound status, infection, and healing rate.

## **Evaluation study of PLA, ABS and PETG materials reinforced with TCP and alginate to address the biocompatibility using 3D printed scaffolds**

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### **ABSTRACT**

This project investigates the fabrication and characterization of graphene-coated PETG polymer scaffolds for tissue engineering applications using 3D printing. PETG, a biocompatible thermoplastic, offers desirable properties for scaffold fabrication. Bone defects, especially critical-sized ones, remain a significant challenge due to the body's limited natural healing capacity. This project aims to address this issue by developing a novel 3D-printed scaffold composed of biodegradable polymers reinforced with tricalcium phosphate (TCP) and alginate. This study investigates the fabrication and evaluation of 3D-printed scaffolds using polylactic acid (PLA), acrylonitrile butadiene styrene (ABS), and polyethylene terephthalate glycol (PETG) as base materials. The scaffolds were designed with interconnected porous structures and subsequently filled with tricalcium phosphate (TCP) and alginate in three different compositional ratios. The mechanical strength of the composite scaffolds was assessed to determine structural integrity, while cytotoxicity assays were performed to evaluate biocompatibility. Additionally, inductively coupled plasma optical emission spectrometry (ICP-OES) was utilized to analyze elemental release and confirm material stability. The results provide insight into the potential of these material combinations for use in bone tissue engineering applications.

**keywords:** 3-D printing, Tricalcium phosphate, Biocompatibility, Material evaluation.

## **UV Light Therapy Treatment**

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### **ABSTRACT**

This project focuses on developing a UV light therapy device designed for portable, safe, and targeted treatment of skin conditions like psoriasis, eczema, and vitiligo. By using UV-B light, known for its effectiveness in controlling abnormal skin cell growth and reducing inflammation, the device offers localized therapy sessions with controlled exposure. Key safety features include exposure timers, adjustable intensity, and protective filters to prevent overexposure. Aimed at providing a cost-effective, convenient alternative to clinical phototherapy, this device improves access to effective skin treatments for home use and advances personalized dermatological care.

**Keywords:** UV Light Therapy, Dermatology, Psoriasis, Eczema, Vitiligo, UV-B Light, Inflammation Reduction, Portable Device, Safety Measures, Home Treatment

## **Mycoprotein: A Sustainable and Nutrient-Rich Solution for Future Food Systems**

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### **ABSTRACT**

Mycoprotein, a rich and dense meat alternate protein source, produced by fermenting the Fungus *Fusarium Venenatum* and it sold as Quorn in almost 17 countries worldwide. It contributes human health factors such as heart health, muscle growth, satiety & blood sugar control. It is rich in fiber and protein and low in fat and cholesterol. As it is a infrequent allergic response, worthy addition in the balance diet and cause benefits to environmental and general health. World population is increasing up to 50% by 2050, rate of malnutrition is raising due to urbanization, poverty, climate change thus sustainable protein source is important. Mycoprotein, a single cell protein derived from fermentation of fungi called *Fusarium Venenatum*, offers a possible cure. The fungus is grown in large fermenters using glucose, oxygen, and nutrients. Mycoprotein is a viable, affordable alternative because of its distinct nutritional profile and meat like texture. In an attempt to use less farmable land, study is also looking for the manufacture of glucose from agrarian waste, like rice straw. Life and techno-economic studies reveal the opportunity for cost savings and environmental rewards, when proteins compared from plants and animals. Where the Mycoprotein are still made using process of aging fermentation. This procedure is expandable and efficient, and new technologies like artificial intelligence and advanced bioreactors may develop its productivity and availability. Mycoprotein is perfectly suited to play a important role in upcoming food systems, because it's a low impact, beneficial protein promotes environmental sustainability and human health.

**Keywords:** Mycoprotein, *Fusarium Venenatum* Sustainable protein, Meat substitute, Environmental impact, Fermentation.

## Designing Foot Insoles for Diabetic Patients

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### ABSTRACT

Diabetic Foot Ulcers (DFUs) are one of the most common and severe complications associated with diabetes mellitus, resulting in significant morbidity and healthcare costs. The formation of DFUs is primarily caused by impaired sensory and motor functions, leading to excessive plantar pressure in specific areas of the foot. Preventive strategies, such as offloading pressure from high-risk areas, are critical in managing and preventing DFUs. Printed orthotic insoles that incorporate pressure-sensing technology represent an innovative and effective solution for reducing these pressures and monitoring foot health in real-time. This study explores the design, fabrication, and performance of volumetric thermoplastic polyurethane (TPU)-based 3D-printed insoles for pressure offloading and DFU prevention. The research compares commercial insoles, 30% infill TPU, and volumetric TPU designs to evaluate their effectiveness in reducing plantar pressures across different regions of the foot. By employing advanced pressure sensors embedded within these insoles, this study aims to provide valuable insights into the long-term effectiveness and wearability of custom-made orthotics. Results indicate that volumetric TPU insoles offer significant improvements in pressure distribution, especially in high-risk areas such as the heel and forefoot, when compared to traditional commercial insoles. The integration of real-time pressure monitoring further enhances the clinical applicability of these insoles, allowing for early intervention and better overall management of diabetic foot complications. This approach, with its customizable design and cost-effectiveness, could revolutionize the way diabetic foot care is managed, leading to better patient outcomes and reduced healthcare costs.

**Keywords:** Diabetic mellitus, Diabetic neuropathy, 3D printing, pressure offloading, thermoplastic polyurethane, FSR sensor, ESP32 microcontroller, Continuous pressure monitoring.

## **Vital Sign Monitoring Using Lifi Technology**

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### **ABSTRACT**

The Li-Fi-Based Patient Monitoring Band is a wearable device designed to monitor vital signs such as heart rate, SpO<sub>2</sub>, temperature, and motion. It leverages Li-Fi (Light Fidelity) technology for wireless communication, ensuring safe, high-speed data transmission without electromagnetic interference. The band is equipped with sensors to continuously track the patient's vital signs and transmit data in real time to a remote monitoring system, providing medical professionals with critical information for timely diagnosis and intervention. This design offers a non-invasive, efficient, and secure solution for continuous patient monitoring across various healthcare environments, including Intensive Care Units (ICUs), where uninterrupted and interference-free monitoring is crucial for patient safety.

**Keywords:** It leverages Li-Fi (Light Fidelity) technology for wireless communication, ensuring safe, high-speed data transmission without electromagnetic interference.

## **A short Review on Basalt Fiber reinforced polymer composites and their applications in green energy environment**

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### **ABSTRACT**

Compared to other existing fibres, Basalt fibre (BF) has a potential of high mechanical strength, excellent temperature resistance, good chemical stability, low energy consumption, and an environmentally friendly production process. Owing to its good corrosion resistance and designability, BF reinforced composites suits for the application requirements of hydrogen storage equipment, which has composite liners and shell cover materials. However, there are still a series of technical issues in the application of BF, and the stability of the products needs to be further improved. Therefore, the research on the production, modification, and application of BF is necessary. This paper discusses the possible application of BF in storage of hydrogen and summarizes the storage problems and identified some methods of filled Polymer composites. It introduces the application prospects of BF in the field of green energy environment which is expected to provide a reference for the application and promotion of BFRP in the future energy storage devices.

**Keywords:** Basalt, Green, Hydrogen, Polymer, composites.

## Portable X-Ray Image Enhancing Using Image Processing and Identification Using Deep Learning

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### ABSTRACT

Portable X-ray machines offer a flexible and accessible solution for medical imaging, especially in remote and emergency settings. However, these machines typically produce lower-quality images than their high-resolution counterparts, which may hinder accurate diagnosis. This paper presents a deep learning-based approach to enhance the image quality of portable X-rays, aiming to improve diagnostic precision and reliability. Using a curated dataset of lung X-ray images from both standard and portable machines, paired with corresponding segmentation masks, we propose the development of an AI model that enhances image clarity. The model is designed to learn the structural and intensity differences between low- and high-quality images, thereby generating outputs that closely mimic those produced by advanced imaging systems. Advanced neural architectures, including Convolutional Neural Networks (CNNs), Generative Adversarial Networks (GANs), and Transformer-based models, are explored for tasks such as super-resolution and noise reduction. The use of segmentation masks ensures that essential anatomical features are preserved during enhancement. Our expected outcome is an efficient, AI-powered enhancement system that significantly improves the utility of portable X-ray devices, especially for telemedicine, rural healthcare delivery, and emergency medical services. This technology holds the potential to democratize access to high quality radiological assessments without dependence on bulky imaging infrastructure. Index Terms Portable X-ray, Deep Learning, CNN, GAN, Image Enhancement, Medical Imaging, Segmentation Mask, Super-resolution.

**Keywords:** Advanced neural architectures, including Convolutional Neural Networks (CNNs), Generative Adversarial Networks (GANs), and Transformer-based models, are explored for tasks such as super-resolution and noise reduction.

## **Intelligent prediction of airborne disease using cloud-based machine learning techniques**

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### **ABSTRACT**

In the 21st -century airborne diseases were responsible for the biggest number of early death and disability worldwide. According to the Centers for Disease Control and Prevention (CDC) statement, the coronavirus can spread through airborne particles. This Research has developed a model Intelligent Prediction of Airborne Disease System (IPADS). In this research paper, we present a new method, which applies four different machine learning algorithms and then develop an ensemble approach that consists of all the four diverse machine learning techniques as a single unit. This paper aims to inspect and evaluate the accuracy of the machine learning algorithms with receiver operating characteristic (ROC) curve for predicting the airborne diseases. The ensemble method used on UCI airborne datasets give better performance as compared to different classifier algorithms. Ensemble technique gives more accurate and efficient airborne disease prediction.

**Keywords:** Centers for Disease Control and Prevention (CDC), Intelligent Prediction of Airborne Disease System (IPADS), receiver operating characteristic (ROC).

## **Non-Invasive Hemoglobin Measurement Device**

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### **ABSTRACT**

The advancement of non-invasive hemoglobin (Hb) measurement technologies offers a promising alternative to traditional blood-based diagnostics, enabling improved patient monitoring and early detection of hematologic abnormalities without the need for invasive procedures. This paper presents a novel optical sensor that utilizes near-infrared spectroscopy (NIRS) and advanced machine learning-driven signal processing to estimate hemoglobin levels through the skin. By analyzing the absorption and scattering of near-infrared light within tissue, the device accurately determines Hb concentration while minimizing interference from skin pigmentation, water content, and other tissue components. The system is calibrated using standard blood tests to ensure reliability across a wide range of hemoglobin values. With its ability to provide continuous, real-time monitoring, this technology has significant potential in clinical and home healthcare settings—particularly for managing conditions such as anemia, cancer-related treatments, and post-surgical recovery. The non-invasive nature of this method offers a more patient-friendly approach to hemoglobin tracking, supporting timely clinical decisions and improved outcomes.

**Keywords:** Non-invasive hemoglobin measurement, Signal processing, Real-time health monitoring, Skin-interfacing devices,

## **Yolov3 Based Blind Assistant System for Real Time Object Detection**

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### **ABSTRACT**

Real-time object detection plays a critical role in automation, smart systems, and assistive technologies. This project presents an ESP32-based object detection system that integrates an ultrasonic sensor, an LCD display, a speaker for voice alerts, and IoT connectivity. The system accurately detects objects in its vicinity, providing real-time feedback via an LCD screen and auditory cues. The integration of IoT technology enables remote monitoring and control through a mobile application, enhancing accessibility and user interaction. The ESP32 microcontroller processes sensor data and facilitates wireless communication, making the system cost-effective and energy-efficient. Python programming ensures flexibility and ease of customization. Compared to traditional object detection systems, which primarily rely on proximity sensors without real-time feedback or IoT capabilities, this system introduces enhanced interactivity through voice playback and cloud-based monitoring. Existing systems often require complex setups and lack remote accessibility, limiting their usability. A literature review highlights the increasing adoption of IoT-based detection systems, especially leveraging ESP32 for low-cost and efficient Wi-Fi communication. Voice-based feedback has been explored in automation applications, but its integration with real-time object detection in low-power systems remains underutilized. This project provides a comprehensive and scalable solution for applications in home automation, security, and assistive technologies. Future enhancements could incorporate machine learning for advanced object recognition and the integration of additional sensors for improved detection accuracy. By leveraging IoT and voice feedback, this system represents a significant advancement in real-time object detection technology.

**Keywords:** The system accurately detects objects in its vicinity, providing real-time feedback via an LCD screen and auditory cues.

## **Advancing Sustainable Communication Through IOT Driven Green Networking**

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### **ABSTRACT**

The history, culture, current and future socio economic status and environmental sustainability of India and its people are intricately linked to the water resources which are available from dams. These water resources available through dams are one of the main sources available for the usage to industries, livestock, irrigation etc, and there is a critical need to ensure the safety of the water level at these dams against any natural or anthropogenic threats and to develop an effective Water Level Management system using IoT. This paper gives an outline for the development of an information system based on the existing systems with the utilization of some sensors and IoT. This paper also proposes a novel idea of collecting and sharing real-time information about water levels to an authorized central command center through far field communication. The authorized central command center then takes a call whether to release the water by opening dam gates or keep them closed. By doing so, the operation of dams all over the country is centralized and automatized.

**Keywords:** Water Level Management, Dam Safety, IoT (Internet of Things), Real-time Monitoring, Sensor Network, Centralized Control System, Environmental Sustainability, Far Field Communication, Automation.

## **Rekneevate: Smart Knee Cap Supporting ACL Therapy**

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### **ABSTRACT**

Anterior Cruciate Ligament (ACL) injuries are common in athletes and active individuals, often requiring lengthy rehabilitation. Traditional methods like physiotherapy, cold/heat therapy, and bracing have limitations, including inconsistent application, lack of real-time monitoring, and reliance on frequent clinic visits. To address these issues, this paper presents Rekneevate, a smart kneecap that combines automated therapy, motion tracking, and personalized rehabilitation. Rekneevate features a Peltier module that alternates between heat and cold treatments based on the recovery stage, reducing pain and inflammation while enhancing circulation. A vibration motor provides targeted mechanical stimulation to promote healing and muscle recovery. An MPU6050 gyroscope sensor, integrated with IoT technology, continuously tracks knee movements and triggers alerts during risky or excessive motion, helping prevent re-injury. By integrating therapy and real-time monitoring into a wearable form, Rekneevate offers a cost-effective, user-friendly alternative to traditional rehabilitation. It enables personalized, consistent care at home, reducing dependence on clinical supervision and enhancing recovery outcomes.

**Keywords:** ACL Rehabilitation, Wearable Healthcare, Motion Tracking, Smart Therapy, Sensor-Based Recovery.

## Modernized Wheelchair

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### ABSTRACT

A joystick-controlled wheelchair is a vital innovation for physically challenged individuals, offering them greater independence by allowing autonomous mobility. The wheelchair's movement is manually controlled through a joystick, which sends directional commands to an Arduino Uno microcontroller. These commands are processed and converted into digital signals, which are then relayed to a motor driving IC that controls the movement of the wheelchair's motors. The system allows for smooth and precise navigation in all directions. In addition to mobility, the system incorporates a heartbeat sensor to monitor the patient's vital signs, specifically heart rate. The sensor data is continuously transmitted to the Blynk Android application via IoT, allowing real-time monitoring by caregivers or healthcare providers. This feature enhances the system's utility, providing both mobility and health monitoring in a single device. The integration of IoT technology ensures that the system is not only user-friendly but also allows remote access to health data, enhancing safety and offering timely interventions in case of abnormalities. This combination of mobility support and health monitoring makes the joystick-controlled wheelchair an indispensable tool for improving the quality of life for individuals with physical limitations.

**Keywords:** These commands are processed and converted into digital signals, which are then relayed to a motor driving IC that controls the movement of the wheelchair's motors.

## **Investigating The Use of Deep Learning for Image Reconstruction in Low-Dose CT scans**

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### **ABSTRACT**

Computed Tomography (CT) is a powerful diagnostic tool, but the radiation exposure it involves remains a concern, especially for patients requiring repeated scans. To address this, low-dose CT (LDCT) imaging has become more common, but it often comes at the cost of increased image noise and reduced clarity, potentially affecting clinical decisions. This project investigates how deep learning techniques can be used to reconstruct high-quality images from LDCT scans, aiming to bridge the gap between safety and diagnostic accuracy. We focus on training convolutional neural networks (CNNs), particularly architectures like U-Net and Generative Adversarial Networks (GANs), to learn the complex mapping between noisy, low-dose images and their corresponding high-dose counterparts. These networks are trained using large datasets of paired LDCT and normal-dose CT images, allowing the model to identify and restore fine structural details while effectively suppressing noise. Our approach emphasizes not only visual quality but also clinical relevance, with reconstruction performance evaluated using metrics such as Peak Signal-to-Noise Ratio (PSNR) and Structural Similarity Index (SSIM), along with expert radiologist reviews. By combining deep learning with medical imaging, this project aims to improve the safety of CT scanning without sacrificing image quality. The outcome demonstrates the potential of AI-driven reconstruction methods to make low-dose scanning more reliable, paving the way for safer, smarter diagnostic tools in healthcare.

**Keywords:** Computed Tomography (CT), low-dose CT (LDCT), convolutional neural networks (CNNs), Generative Adversarial Networks (GANs).

## **Harnessing Egg Shell and Ulva Fasciata Powder for Sustainable Filtration, Dye Degradation and Antibacterial Activity**

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### **ABSTRACT**

Access to clean water is a fundamental necessity, yet water contamination remains a major challenge. This project focuses on an innovative approach to purifying lake water using eco-friendly, nanoparticle-based filtration. We synthesized four types of nanoparticles-Eggshell Nanoparticles (ES NPs), Ulva fasciata Nano particles (UF NPs), and their combinations with Zinc Nitrate Hexahydrate and Titanium Dioxide (ES + Zn(NO<sub>2</sub>), 6H<sub>2</sub>O + TiO, NPs and UF + Zn(NO<sub>2</sub>), 6H<sub>2</sub>O + TiO, NPs). These nanoparticles were incorporated into a syringe-based filtration column to evaluate their effectiveness in removing contaminants. The filtration column consists of a non-absorbing cotton layer at the bottom, a 0.5-gram nanoparticle filtration layer, and a top cotton layer to ensure uniform flow. The efficiency of these filters was assessed based on improvements in water clarity, removal of pollutants, and potential antibacterial properties. Additionally, dye degradation experiments using methylene blue were conducted under visible light to analyze the photocatalytic properties of the nano particles. By integrating sustainable materials like eggshells and Ulva fasciata with advanced nanotechnology, this project explores a cost-effective and environmentally friendly solution for water purification. The findings could contribute to developing affordable filtration systems for communities facing water scarcity and pollution challenges.

**Keywords:** Ulva fasciata, methylene blue, nanoparticles-Eggshell, advanced nanotechnology.

## **Synthesis And Characterization of Edta Encapsulated ZnO: Mn<sup>2+</sup> Nanoparticles and Its Potential Application in Biodiesel Production**

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### **ABSTRACT**

In recent years, the energy sources like fossil fuel including the both conventional and nonrenewable energy sources are exhausted. The alternative source for conventional fossil fuel is biodiesel. The Steps involved in Transesterification reaction, Experimental Section, Synthesis of EDTA encapsulated ZnO: Mn<sup>2+</sup> nanoparticles, Catalyst characterization, Transesterification of Palm Oil. The results and discussion on Morphological Analysis of EDTA encapsulated Mn doped ZnO Nano catalyst, Structure analysis of EDTA encapsulated Mn doped ZnO nano catalyst. This study focus on biodiesel production.

**Keywords:** Transesterification reaction, Experimental Section, Synthesis of EDTA encapsulated, Catalyst characterization, Transesterification of Palm Oil.

## **Sustainable Biodiesel Production from Citrullus lanatus Seed Oil Using Biochar impregnated Calcium oxide Catalyst**

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### **ABSTRACT**

This study explores the sustainable production of biodiesel from *Citrullus lanatus* (watermelon) seed oil using a biochar-impregnated calcium oxide (CaO) catalyst. Watermelon seeds, an agricultural waste product, serve as a non-edible and renewable source of oil, addressing food vs. fuel concerns. The extracted oil undergoes transesterification, where it is converted into biodiesel using methanol and a solid catalyst. The catalyst is synthesized by impregnating CaO onto biochar, a carbon-rich material derived from biomass, which enhances surface area, thermal stability, and catalytic efficiency. To optimize the transesterification process, Response Surface Methodology (RSM) is applied to study the effects and interactions of key parameters such as methanol-to-oil ratio, catalyst loading, reaction time, and temperature. RSM helps determine the optimal conditions for maximizing biodiesel yield. Additionally, an Artificial Neural Network (ANN) model is developed to predict biodiesel yield based on experimental data. The ANN model exhibits high prediction accuracy, making it a valuable tool for process modeling and control. The optimized process results in high biodiesel yield, and the produced biodiesel meets standard fuel quality parameters. This research demonstrates a cost-effective, efficient, and environmentally friendly method for biodiesel production using agricultural waste and advanced modeling techniques, contributing to the development of sustainable biofuels.

**Keywords:** Response Surface Methodology (RSM), Artificial Neural Network (ANN), *Citrullus lanatus*

## **Food Industry Applications: Meat Tenderization, Dairy, Leather Processing, and Food Waste Management**

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### **ABSTRACT**

Enzymes are integral to various applications in the food industry, offering improved efficiency, product quality, and sustainability. In meat tenderization, proteases are used to break down muscle fibers, enhancing texture and reducing the need for mechanical tenderization, thus improving processing time and quality. In the dairy industry, enzymes like rennet and lactase are essential for cheese production, yogurt fermentation, and lactose hydrolysis, enabling the creation of diverse dairy products and catering to lactose-intolerant consumers. Enzymes also play a crucial role in leather processing, where proteases help remove unwanted proteins from raw hides, promoting better quality leather and faster processing. In food waste management, enzymes are employed to break down organic matter in waste, facilitating composting, biogas production, and reducing landfill impact, contributing to a circular economy. As the food industry faces growing demands for efficiency and environmentally friendly practices, enzyme technologies offer innovative solutions. Further research into enzyme innovation and optimization will continue to enhance their roles in meeting consumer needs and addressing environmental challenges.

**Keywords:** Sustainability. Landfill, Faster processing, Energy consumption, Friendly practices.

## **Microbial Proteases in detergent, waste valorization**

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### **ABSTRACT**

Microbial proteases are gaining prominence in both detergent formulations and waste valorization due to their efficiency, specificity, and eco-friendly properties. In detergents, these enzymes effectively degrade proteinaceous stains like food, blood, and bodily fluids, enhancing cleaning performance. Microbial proteases, derived from bacteria, fungi, and actinomycetes, are advantageous in detergent products as they function at lower temperatures, reducing energy consumption and environmental impact. In waste valorization, microbial proteases contribute to recycling protein-rich organic waste, such as food scraps, agricultural residues, and animal by-products. They break down proteins into valuable products like amino acids and peptides, promoting the sustainable recovery of nutrients and bioactive compounds. The review focuses on the overlooked aspects of microbial proteases in detergent and waste valorization, addressing gaps in the current literature.

**Keywords:** Eco-friendly, Pharmaceuticals, Reducing energy, Food scraps, Agricultural residues

## **Investigation and purification studies of immunoglobulin-y from native chicken egg yolk using ion exchange chromatography & hydrophobic interaction chromatography**

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### **ABSTRACT**

IgY is an immunoglobulin present in yolks of leg horn eggs, quail eggs, native hen eggs. So far it has been isolated successfully from both immunized and unimmunized chicken (leghorn) and quail eggs. Compared to mammalian antibodies, IgY possesses several biochemical advantages, prevents a stressful moment in animal handling, as no bleeding is necessary. Among the numerous extraction methods suggested water dilution method and PEG precipitation methods gave good yield of IgY. In PEG precipitation method, the egg yolk was diluted 5 times in PBS, with 3.5% PEG 6000, followed by 12% and 24% concentration. This fraction collected was purified by loading in different ion exchange columns: anion exchanger (DEAE FF) column using phosphate buffer at a range of pH (7.5-8) and tris-HCl buffer at p<sup>H</sup> range (8-8.5), cation exchanger (CMC, SP) columns using citrate buffer at p<sup>H</sup> range (3-4.8). The elution was performed using elution buffers with 0.5-1M NaCl. The maximum peak eluent was obtained with phenyl column and this eluent was confirmed for its purity by running SDS-PAGE using 9% acrylamide separating gel and 5% stacking gel. In this crude sample and the final, HIC eluent were compared with marker protein and the purity was checked qualitatively.

**Keywords:** IgY, Egg yolk antibody, SDS-PAGE, PEG precipitation, Ion exchange chromatography, Hydrophobic interaction chromatography.

## Performance Analysis of Food Storage Container from Agro-Waste

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### ABSTRACT

Food preservation can be characterized as the systematic treatment and management of food items aimed at halting or significantly retarding spoilage, thereby mitigating the risk of foodborne illnesses while concurrently preserving nutritional integrity, texture, and sensory attributes. The present investigation sought to develop food preservation boxes by using Bamboo and coir fiber as a base material and rigorously evaluate their anti-microbial efficacy as well as their impact on water permeability. In the context of antibacterial efficacy, the food preservation box (AT) demonstrated an inhibition zone of (15.5±0.7) mm against *Pseudomonas aeruginosa*, (13.8 ± 0.7) mm against *Escherichia coli*, (13 ± 1.4) mm against *Staphylococcus aureus*, and (15.5 ± 0.7) mm against *Propionibacterium acnes*. With regard to antifungal activity, the food preservation box (AT) exhibited inhibition zones of (16.5±0.7) mm against *Aspergillus acculeatus*, (12.5 ± 0.7) mm against *Candida albicans*, (14 ± 1.4) mm against *Aspergillus niger*, and (10 ± 1.4) mm against *Aspergillus fumigatus*. A water permeability assessment was conducted for the food preservation box, resulting in the calculation of a swelling ratio of 85%.

**Keywords:** Food preservation box, anti-microbial activity.

## Evaluation of Anti-Diabetic Property in *Cissus Quadrangularis* Through Inhibition of Alpha-Glucosidase Activity

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### ABSTRACT

Diabetes mellitus is a chronic disease from which more than 62 million people are suffering. There are two types of diabetes that are caused either by deficiency of insulin or malfunction of the same. Starch or glycogen present in the dietary supplements is hydrolyzed into glucose moieties by enzymes such as  $\alpha$ -amylase and  $\alpha$ -glucosidases. Accumulation of the glucose moieties in blood causes diabetes. Hence diabetes can be controlled by inhibiting the action of these enzymes.  $\alpha$ -glucosidase hydrolyses terminal, non-reducing (1->4)-linked  $\alpha$ -D-glucose residues and releases  $\alpha$ -D-glucose, leading to diabetes. *Cissus quadrangularis* is a climber that has a lot of medicinal values, one among which is anti-diabetic property. Plant extracts were prepared using soxhlet extraction and maceration extraction. The extracts were subjected to various phytochemical assays to confirm the presence of the phytochemicals such as flavonoids, alkaloids, proteins, carbohydrates, glycosides, phenols and tannins. The extract is also checked for its inhibitory action against the enzyme. The  $K_m$  value of the substrate, p-Nitrophenyl  $\alpha$ -D- Glucopyranoside was determined.

**Keywords:** Diabetes mellitus, *Cissus quadrangularis*, anti-diabetic property, *In-silico* analysis.

## **Inception of Anti-phlogistic and Anti-hyperglycemic Gummies from *Allium cepa***

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### **ABSTRACT**

*Allium cepa* is an herbaceous biennial plant cultivated for its edible pulp and the elementary ingredient in the Indian cooking. It is commonly known as onion, a staple ingredient in Indian cuisine. However, surplus onions often incur significant losses due to issues like drying, rotting, and fungal damage. Onions are rich in antioxidants and compounds that have potential health benefits, such as reducing the risk of heart disease by combating inflammation and lowering cholesterol levels, as well as potentially aiding in diabetes management. Notably, onions are abundant in quercetin, a flavonoid with antioxidant and anti-inflammatory properties, which may also contribute to reducing high blood pressure. Formulating onion gummies provides a convenient and palatable way to harness these health-promoting properties, serving as a rich source of antioxidants to support overall health and disease prevention. Our study focuses on developing antioxidant, anti-inflammatory, and anti-diabetes rich gummies using big red onions, aiming to offer a medicinal value product that contributes to promoting healthy living and preventing diseases.

**keywords:** *Allium cepa*, antioxidants, anti- inflammation, anti- diabetes

## **Development Of Probiotic Based Inoculum/Fish Feed By Fermented Poultry Waste**

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### **ABSTRACT**

This study explores a novel approach by developing a probiotic-based biofloc inoculum and fish feed derived from fermented poultry waste. Poultry waste, rich in organic matter, serves as a valuable substrate for microbial fermentation. Through a carefully designed fermentation process, beneficial probiotic microorganisms are cultivated to enhance the health and performance of aquatic organisms. The research investigates the microbial composition and dynamics during the fermentation of poultry waste, emphasizing the selection and proliferation of probiotic strains. The resulting biofloc inoculum and fish feed are evaluated for their impact on water quality, growth performance, and disease resistance in aquaculture systems. The study aims to contribute to sustainable aquaculture practices by providing an eco-friendly alternative to conventional feed. The outcomes of this research not only advance the understanding of probiotic-based interventions in aquaculture but also offer practical solutions for recycling organic waste into valuable resources. The findings have implications for optimizing aquaculture practices, improving resource efficiency, and fostering environmental sustainability in the rapidly evolving field of aquaculture.

**Keywords:** Biofloc Technology, lactobacillus Plantarum, E.Coli Nissle, poultry waste, probiotics.

## Elemental Composition of the Nanoparticles Based Antifouling Coatings

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### ABSTRACT

Combinations of nanoparticles based antifouling coatings were made by Center for Ocean Research to combat the biofouling problem in the marine environment. As the TBT based antifouling paints are banned in the industry due to the TBT leaching and its adverse effect caused to marine organisms, shipping industries are searching for a new solution to solve this marine biofouling adhesion. Any coatings or product developed to solve this problem should be evaluated properly to know the concentration of the leachate, exited out from the surface. In this backdrop, the present study will evaluate the concentration of the nanoparticles leaching in a control environment using ICPMS. Metal surfaces coated with the combination of nanoparticles will be characterized with Energy-dispersive X-ray spectroscopy to know the percentage of nanoparticles on the surface. Then the coated surfaces will be exposed to control seawater environment for 100 days with a constant temperature, salinity, light and pH. Elemental composition in the seawater will be determined with Inductively Coupled Plasma Mass Spectrometry (ICP-MS) on 0, 25, 50 and 100<sup>th</sup> day of the experiment. The elemental composition will be spastically analysed to know the impact of leaching in a seawater environment. This will be a baseline data to know the toxicity of the nanoparticles used to design the coatings to combat marine biofouling.

**Keywords:** Biofouling, Epoxy resin, X-Ray spectroscopy, Nanoparticles, TBT and ICP – MS.

## Hydrothermal Synthesis of Hydroxyapatite-Magnesia (Ha-Mgo) Nanocomposites for Bone Repair

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### ABSTRACT

Hydroxyapatite (HA), a calcium phosphate bio ceramic, has garnered significant attention in bone tissue engineering due to its chemical similarity to the mineral component of natural bone. However, its inherent brittleness and limited mechanical strength restrict its application in load-bearing sites. To address these limitations, this study presents the hydrothermal synthesis and characterization of hydroxyapatite-magnesia (HA-MgO) nanocomposites, aiming to enhance their mechanical and biological performance for bone repair applications. The nanocomposites were synthesized via a one-step hydrothermal method, ensuring uniform dispersion of MgO nanoparticles within the HA matrix. Structural, morphological, and compositional analyses were conducted using XRD, SEM, TEM, and FTIR techniques, confirming the successful integration of MgO and the preservation of HA crystallinity. Mechanical testing revealed improved compressive strength and fracture toughness with increasing MgO content, attributed to the reinforcing effect of MgO nanoparticles and their grain refinement capability. In vitro bioactivity and cytocompatibility studies demonstrated enhanced osteo conductivity and cell viability, indicating the material's potential to support bone regeneration. These findings suggest that hydrothermally synthesized HA-MgO nanocomposites are promising candidates for advanced bone repair scaffolds, combining bioactivity with superior mechanical properties.

**Keywords:** Hydroxyapatite, Magnesia, Mechanical, Biological, Osteo conductivity.

## **In Vitro And In Vivo Synergistic Antitumor Activity of Fucoidan-Encapsulated Linoleic Acid-Loaded Liposomes Toward Prostate Cancer**

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### **ABSTRACT**

Prostate cancer remains one of the leading causes of cancer-related deaths among men worldwide, necessitating the development of novel, effective, and safe therapeutic strategies. This study explores the synergistic antitumor potential of a novel drug delivery system comprising fucoidan-encapsulated, linoleic acid-loaded liposomes (F-LA-Lip) against prostate cancer, both *in vitro* and *in vivo*. Fucoidan, a sulfated polysaccharide derived from brown seaweed, is known for its biocompatibility and intrinsic anticancer properties, while linoleic acid is an omega-6 polyunsaturated fatty acid implicated in tumor suppression via induction of apoptosis and inhibition of cell proliferation. By encapsulating linoleic acid within fucoidan-coated liposomes, we aimed to enhance its stability, bioavailability, and targeted delivery to prostate tumor cells. *In vitro* assessments using prostate cancer cell lines (PC-3 and DU145) for cytotoxicity, increased apoptosis, and cell cycle arrest upon treatment with F-LA-Lip compared to free linoleic acid or non-encapsulated liposomes. The combination showed a clear synergistic effect, as confirmed by combination index (CI) analysis. *In vivo*, a xenograft mouse model revealed substantial tumor growth inhibition with no significant systemic toxicity, as evidenced by histopathological and biochemical assessments. Overall, our findings suggest that fucoidan-encapsulated linoleic acid liposomes exhibit promising synergistic antitumor activity against prostate cancer and represent a potential strategy for targeted cancer therapy with enhanced efficacy and reduced side effects.

**Keywords:** fucoidan, linoleic acid, liposomes, prostate cancer, targeted drug delivery, synergistic therapy, apoptosis, *in vitro*, *in vivo*, tumor suppression

## Therapeutic Potential of Medicinal Plants in the Management of Polycystic Ovary Syndrome (Pcos): A Review of Natural Alternatives

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### ABSTRACT

Polycystic Ovary Syndrome (PCOS) is a common endocrine disorder affecting women of reproductive age, characterized by hormonal imbalance, irregular menstrual cycles, insulin resistance, and the presence of ovarian cysts. While conventional treatments primarily involve hormonal therapy and lifestyle modifications, there is growing interest in the use of medicinal plants as complementary or alternative therapies due to their minimal side effects and holistic benefits. This review explores the potential of various medicinal plants in managing PCOS symptoms, focusing on their phytochemical constituents and mechanisms of action. Notable plants such as *Trifolium pratense* (red clover), *Glycyrrhiza glabra* (licorice), *Cinnamomum verum* (cinnamon), *Vitex agnus-castus* (chaste tree berry), and *Aloe vera* have demonstrated effects in regulating hormonal levels, improving insulin sensitivity, and restoring ovarian function. The therapeutic efficacy of these botanicals is attributed to bioactive compounds including flavonoids, saponins, and phytoestrogens. This paper highlights the pharmacological actions, clinical evidence, and safety profiles of these herbs, supporting their role as complementary or alternative treatments for PCOS. Further research and clinical trials are necessary to standardize dosages and ensure efficacy and safety.

**Keywords:** Polycystic Ovary Syndrome, Medicinal Plant, Phytotherapy, PCOS Management.

**Isolation and identification of lipase, producing Bacterium from soil sample****Jayasri V, Shinikka J, Kavibala K and Chandran Masi\****Department of Biotechnology, Dhanalakshmi Srinivasan Engineering college (Autonomous), Perambalur-621212, Tamil Nadu, India.***ABSTRACT**

Lipases (triacylglycerol acylhydrolases, EC 3.1.1.3) are enzymes that belong to the class of hydrolases and are specific for the hydrolysis of fats into fatty acids and glycerol at the water-lipid interface. They were first reported in the second half of the nineteenth century, and since then, their use has significantly increased across various industries. In addition to hydrolysis, lipases can also catalyze the reverse reaction in non-aqueous media. These enzymes are abundantly present in nature. To isolate potent lipase producers, samples were collected from lipid-rich sources such as dairy waste, oil-contaminated soils, and food processing effluents. Selective enrichment and screening methods were used for the isolation process. The obtained microbial isolates were cultured under optimized conditions to enhance lipase production. The crude enzyme extract was then partially purified and subjected to activity assays to evaluate its catalytic efficiency. The results demonstrate the potential of microbial sources for sustainable and efficient lipase production, paving the way for further applications in industrial biotechnology.

**Keywords:** Enzyme, Lipase, Fatty acids, Microbial sources, non-aqueous

## **Xylan Breakdown Reimagined: Biochemical Profiling of a Newly Isolated Xylanase**

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### **ABSTRACT**

Understanding microbial xylanolytic systems has advanced significantly in recent years, but there is still much to learn about the precise processes by which microbes and the enzymes they produce break down xylan. A significant amount of hemicellulose, an essential structural element of plant cell walls, is made up of xylan, the second most prevalent polysaccharide in nature after cellulose. Because they break down hemicellulose, microorganisms—especially hemicellulolytic microbes - play a vital ecological role in the natural recycling of plant biomass. Xylanases (EC 3.2.1.8), a class of enzymes that hydrolyse xylan into its component sugars, are essential to this process. These enzymes have a lot of potential to improve the economic viability of bioconversion processes, particularly when it comes to processing lignocellulosic biomass to produce valuable liquid chemicals and biofuels. Apart from xylanases, a group of auxiliary enzymes such as endo-1,3(4)- $\beta$ -glucanase, alpha-amylase, subtilisin, and protease aid in the effective breakdown of intricate hemicellulosic materials. These enzymes work in concert to break down plant material more thoroughly and quickly, which is essential for a variety of industrial operations as well as the natural cycling of nutrients. Because of its wide range of applications, xylanase is now used in a variety of industries, including bio-refineries, paper and pulp production, food and feed production, bakeries, pharmaceuticals, and textiles. This review aims to provide an overview of the microbial origins of xylanase, its biochemical properties, and its versatile applications, with a focus on how this enzyme system can be harnessed to support sustainable development and benefit human society.

**Keywords:** Xylan, Xylanases, Lignocellulose, Hemicellulose, Plant Polysaccharides, Subtilisin.

## **Formulation of the nutritional enriched instant noodles as a functional food**

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### **ABSTRACT**

Noodles was one of the most commonly consumed food all among the world. In recent times the consumption of instant noodles has increased. The nutritional composition of refined wheat noodles does not completely satisfy the nutrient requirement of people. This makes the incorporation of other nutrient rich food substances to noodles. The aim of this research was to develop noodles by incorporating black rice, finger millet and pearl millet. This not only helps in the benefits such as easier way to cook, longer shelf life, price convenience but also increment of nutrients such as protein content, anti-oxidant property and anti-cancerous properties. Different formulations were made for optimization of noodles dough, out of which the formulation with most acceptance in cooking properties was chosen and analysed for physicochemical, microbial and nutritive analysis. The instant noodles prepared using black rice, finger millet, pearl millet and whole wheat flour in the ratio of 3:1:1:5 were the most acceptable and possess the best quality attributes. The chemical composition of functional noodles utters the information such as 74.61 % carbohydrate, 9.32 % protein and 2.03 % fat content, prominent texture, which was best of its kind. Microbial studies on the other hand offered standard plate count, yeast & mould count and coli form count in the range which standard for noodles as per FSSAI. The results of the study have shown that instant noodles incorporated with black rice, pearl millet flour and finger millet flour was a good source of nutrient and also it prevents diabetes, improves heart health, prevents the risk of obesity.

**Keywords:** Black rice, cooking properties, diabetes, finger millet, instant noodles, pearl millet.

## Treatment Of Tannery Effluent Using Natural Coagulant

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### ABSTRACT

Tannery is an oldest and fastest growing industry in India. Almost every tannery industry uses significant amounts of chemicals in the process of transforming animal hides into leather. Those chemicals discharged through tannery effluent leads to water pollution. Therefore, this project puts forth the characterization and treatment of tannery effluent by synthesizing aloe vera leaf as a natural coagulant. The analysis results show that the effluents possess extremely high values of Turbidity, hardness, chlorides, TSS, Total solids, TDS, TS, BOD and COD. Those values were far above the standard permissible limits set by the Central Pollution Control Board (CPCB). Hence it is necessary to treat the tannery effluent for safe disposal. This study focused on the Coagulation - flocculation process which is one of the foremost physicochemical treatment steps employed in tannery industrial wastewater treatment to reduce suspended and colloidal materials. The tests were carried out using tannery wastewater with conventional jar test apparatus. This study also conducted the optimization of various process parameters such as pH, Coagulant dosage and contact time. It was found that the percentage of reduction are high for the optimal dosage of about 1.5g/l, which shows reduction efficiency of physico-chemical parameters such as Turbidity, Chlorides, Hardness, TSS, TS and TDS. The efficiency removal was about 86%, 87% and 88% for Turbidity, TDS, TS and TSS whereas the removal efficiency of Chlorides and Hardness was found to be 75% and 77% respectively.

**Keywords:** Tannery effluent, Aloevera, Natural coagulant, Turbidity, hardness, chlorides, Flocculation, Coagulation, Colloidal materials.

## **Removal Of Aromatic Compound from Liquid Fuels Using Deep Eutectic Solvents**

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### **ABSTRACT**

The presence of aromatic compounds in liquid fuels poses significant challenges to their efficient utilization and environmental impact. This study investigates the efficacy of deep eutectic solvents (DES) for the removal of aromatic compound from liquid fuels. DES, composed of a hydrogen bond acceptor and a hydrogen bond donor, offer a promising alternative to traditional solvents due to their tunable properties and low toxicity. Through a series of experiments, various DES formulations were synthesized and evaluated for their ability to selectively extract aromatic compounds from model liquid fuel samples. The effects of DES composition, temperature, and extraction time were systematically studied to optimize the removal efficiency. Additionally, the regenerated liquid fuels were characterized to assess the extent of aromatic removal and the potential impact on fuel properties. The results demonstrate the effectiveness of DES as a promising strategy for the purification of liquid fuels, paving the way for cleaner and more sustainable energy sources.

**Keywords:** Aromatic, Liquid fuels, Deep eutectic solvents (DES), Removal Extraction, Purification, Sustainability, Environmental impact, Fuel properties, Renewable energy.

## **Development Of Polyherbal Formulation and Their Anti-Diabetic Activity**

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### **ABSTRACT**

The present study investigates the development of polyherbal formulation and their anti-diabetic activity. Plant extract against *Andrographis paniculata* and *Justicia adhatode*. The objective was to evaluate the Plant Material Collection and Extraction, GCMS phytochemical profiling of plant extract, Antidiabetic activity of plant extract by  $\alpha$  amylase inhibition assay, antidiabetic effect of plant extract  $\beta$  glucosidase inhibition assay method, antidiabetic potential of plant extract by  $\alpha$  glucosidase inhibition assay, statistical analysis of results by Graphiten Prism software. Diabetes mellitus is a global health concern characterized by elevated blood glucose levels, and despite conventional treatments, there is growing interest in alternative therapies, particularly through natural products. The study will involve selecting herbs based on their effects on glucose metabolism, insulin sensitivity, and anti-inflammatory properties. These combine multiple medicinal plants, potentially offering safer, more effective solutions. This study aims to develop and evaluate a polyherbal formulation for its anti-diabetic activity, focusing on its ability to regulate blood glucose, improve insulin sensitivity, and reduce inflammation. This study provides promising preliminary evidence supporting the therapeutic potential of *Andrographis paniculata* and *Justicia adhatode* in anti-diabetic treatment and warrants further investigation through in vivo studies and compound isolation.

**Keywords:** *Andrographis paniculata*, *Justicia adhatode*.

## **An Efficient Eye Disease Glaucoma and Retinopathy Detection Using Convolutional Neural Network**

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### **ABSTRACT**

Glaucoma and retinopathy are leading causes of blindness, is a multifaceted disease with several patho-physiological features manifesting in single fundus images (e.g., optic nerve cupping) as well as fundus videos (e.g., vascular pulsatility index). Convolutional neural networks (CNNs) developed to detect glaucoma and retinopathy are all based on spatial features embedded in an image. In our project we categorized the disease in 2 phase that is normal images which has no disease and second is glaucoma and third is retinopathy. So, we have taken left and right-side images of each class and trained our data with the help of 372 images so that our model can learn from it and converted the input dataset in grayscale format for better understanding of its feature. The dataset is converted with help of one software Visual Studio. Using SMT lib mailing process is done. The content of the mail consists of whether the patient has glaucoma or retinopathy or normal.

**Keywords:** Glaucoma, retinopathy, CNN, SMT, Image Enhancement, Medical Imaging, Segmentation Mask, Super-resolution

## **Evaluation of Tamarindus indica as cost of effective excipient in tablet formations & an characteristics**

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### **ABSTRACT**

Tamarind Seed Polysaccharide (TSP) shows more valuable properties making it a useful excipient for a wide range of applications. TSP is a natural polysaccharide obtained from the seeds of Tamarindus indica, recently gaining a wide potential in the field of pharmaceutical and cosmetic industries. The present research work focuses on the extraction of tamarind seed polysaccharide by ultrasound Assisted Extraction (UAE) and Chemical method. Characterization study includes Physicochemical and micromeritic properties. The results obtained from study showed that the ultrasound assisted extraction (UAE) was gives better extraction of polysaccharide from tamarind seed as compare to chemical method. Results from characterization study predict the fact that extracted polysaccharide can be used as a pharmaceutical excipient.

**Keywords:** TSP, Tamarindus indica, Excipients, Ultra Sound Assisted Extraction.

## **An Automatic Brain Tumors Detection and Classification Using Deep Convolutional Neural Network with Vgg 19**

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### **ABSTRACT**

This project presents an automated system for brain tumor detection and classification using a Deep Convolutional Neural Network (CNN) based on the VGG-19 architecture. Given the increasing reliance on MRI scans for accurate medical diagnoses, this system aims to enhance the efficiency and accuracy of brain tumor identification. The approach involves the collection of a comprehensive dataset of brain MRI images, which are preprocessed through resizing, normalization, and augmentation techniques to improve model robustness. Utilizing transfer learning, the VGG-19 model is fine-tuned for the specific task of classifying various types of brain tumors, including gliomas, meningiomas, and pituitary tumors.

**Keywords:** deep learning, brain tumor, MRI, transfer learning, convolutional neural network.

## Hybrid Sweat Biosensor with Ai-Enhanced Predictive Modeling for Personalized Glucose Monitoring in Diabetic Risk Assessment

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### ABSTRACT

Accurate and non-invasive glucose monitoring remains a critical need in the early diagnosis and management of diabetes. While sweat-based biosensing technologies offer a promising alternative to blood-based methods, single-analyte approaches are often hindered by inter-individual variability in sweat composition and hydration levels. In this study, we present a novel hybrid biosensing platform that simultaneously detects glucose and lactate concentrations in human sweat using a graphene-based electrochemical sensor. The device integrates enzyme-functionalized electrodes within a flexible, skin-conforming patch, allowing continuous and real-time data acquisition. To enhance the reliability and contextual interpretation of bio signals, we introduce an embedded AI module trained on a dataset of sweat and blood biomarker profiles from diabetic and prediabetic subjects. This algorithm dynamically calibrates glucose estimates based on lactate trends and user-specific physiological baselines, significantly improving accuracy in diverse metabolic states and environmental conditions. The system also incorporates wireless connectivity for seamless data transmission and alerts. In validation trials, the hybrid biosensor achieved a high correlation ( $R^2 > 0.92$ ) with conventional glucometer readings and demonstrated predictive capabilities in detecting hyperglycemic trends before onset. This approach opens new avenues for early-stage diabetic risk assessment, continuous health monitoring, and personalized medicine, particularly in non-clinical and low-resource environments.

**Keywords:** Non-invasive glucose monitoring, sweat biosensor, hybrid sensor, wearable technology, graphene electrode, artificial intelligence, diabetes prediction, personalized healthcare, lactate biomarker, electrochemical sensing.

## **Phytochemical analysis and medicinal properties of *Strelitzia reginae* leaf extract**

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### **ABSTRACT**

Our project involves the collection of leaves of *Strelitzia reginae* and to access its physiochemical and medicinal properties. Leaves sample were collected and extract was prepared by using polar and non-polar solvent. Qualitative analysis of primary metabolites and secondary metabolites were carried out and result were tabulated. *Staphylococcus aureus*, *Klebsiella pneumoniae* were taken from accessing antimicrobial activity of the extract. The extract were taken in different concentration and zone of inhibition value and measured. Moreover, minimum inhibitory activity was determined for gram positive bacteria and Gram-negative bacteria.

**Keywords:** *Strelitzia reginae*, polar and non-polar solvent, *Staphylococcus aureus* *Klebsiella pneumoniae* and Minimum inhibitory concentration.

## **Experimental Investigation on Influence of Transition State metals on Transesterification of Oil Extracted from Citrus Limon seeds for Production of Biodiesel**

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### **ABSTRACT**

The decline in diesel fuel availability and its associated pollution have necessitated the exploration of alternative energy sources, with biodiesel emerging as a prominent contender due to its similar combustion properties to diesel. In this study, Citrus limon was assessed for the biodiesel production. Amidst several customary processes, transesterification is ascertained to be a globally well-adopted cost-competent and scalable method of biodiesel manufacturing. A novel heterogeneous catalyst, zinc-doped calcium oxide (Zn–CaO), was synthesized using waste eggshells as the calcium precursor via calcination followed by wet impregnation with zinc nitrate, aiming to enhance the catalytic efficiency and reusability. Transesterification of Citrus limon seed oil using a Zn–CaO catalyst derived from eggshells was optimized via Response Surface Methodology (BBD), achieving a maximum biodiesel yield of 93.85% at a 1:4methanol-to-oil ratio, 3 wt.% catalyst loading, and 65 minutes reaction time. An Artificial Neural Network (ANN) modeled complex nonlinear relationships between inputs and bio diesel yield, achieving high accuracy ( $R = 0.97995$ ) and low error ( $MSE = 1.9152$ ), ensuring efficient, eco-friendly prediction. These findings confirm the process as an efficient, eco-friendly route for quality biodiesel production from waste resources.

**Keywords:** Citrus limon, Transesterification, Zn–CaO catalyst, RSM, ANN, Biodiesel.

## **Fetal Heart Rate Monitoring System**

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### **ABSTRACT**

Traditional fetal monitoring equipment, such as Doppler ultrasound and electronic fetal monitoring (EFM), often presents significant challenges in resource-limited settings. EFM requires attaching electrodes to the maternal abdomen, which can cause discomfort and increase the risk of infection. Additionally, traditional fetal monitoring systems are bulky and stationary, limiting the mobility of pregnant individuals. This restricts their freedom during labor and often requires continuous monitoring in a hospital setting, further straining resources. To address these limitations, we propose a novel approach using the MAX30100 sensor for transabdominal fetal heart rate (FHR) detection.

**Keywords:** Fetal monitoring, Doppler ultrasound, Electronic fetal monitoring (EFM), MAX30100 sensor, Fetal heart rate (FHR) detection, On-invasive, Low-cost solution, Portable device, care, Low-resource healthcare, Continuous monitoring.

## **Microwave Assisted Extraction of Polyphenol from *Abutilon Indicum* and Evaluation of The Antioxidant and Antimicrobial Activity**

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### **ABSTRACT**

One of the most important medicinal plants of India, *Abutilon indicum*, is used for various therapeutic applications. The current study aimed to extract the polyphenol compounds from *Abutilon indicum* (AI) leaves using Microwave-Assisted Extraction (MAE) technique. Optimization of extraction parameters was carried out using Response Surface Methodology (RSM), considering four key factors: microwave power (MWP), extraction time, liquid–solid ratio (LSR), and solvent concentration. The optimal conditions were determined to be 365.74 WMWP, 229.08 seconds extraction time, 39.03 mL/g LSR, and 39.60% solvent concentration, resulting in a maximum total polyphenol content (TPC) of 359.05 mg GAE/g. To enhance predictive accuracy and evaluate non-linear interactions, an Artificial Neural Network (ANN) model was also developed, showing high correlation and minimal error in modeling TPC outcomes. The polyphenol-rich extracts demonstrated substantial antioxidant activity, as assessed by DPPH and ABTS assays. The study concludes that MAE, in conjunction with RSM and ANN, offers a rapid, efficient, and eco-friendly approach for extracting natural antioxidants and antimicrobials from plant-based sources.

**Keywords:** *Abutilon indicum*, polyphenol, MAE, LSR, RSM, ANN

## AI and deep learning in histopathology

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### ABSTRACT

AI and deep learning are revolutionizing histopathology by automating the analysis of complex tissue samples, significantly enhancing diagnostic accuracy and efficiency. Using advanced techniques such as convolutional neural networks (CNNs), AI can detect subtle patterns in histopathological images, aiding in the AI and deep learning in histopathology yearly detection and classification of diseases like cancer, as well as tumor grading, staging, and prognostic prediction. By integrating histology with multi-omics data, AI also opens new avenues for personalized medicine and the discovery of novel biomarkers. Despite challenges related to data quality, transparency, and biases, AI's potential to improve diagnostic work flows, reduce variability, and ultimately enhance patient outcomes makes it a transformative force in modern pathology.

**Keywords:** Histopathology, Deep Learning, Artificial Intelligence, Convolutional Neural Networks (CNNs), Image Analysis, Diagnostic Accuracy, Tumor Detection, Cancer Classification, Automated Diagnosis, Microscopic Imaging, Tissue Segmentation.

## **Enhancing Varicose Vein Assessment With Deep Learning For Greater Accuracy**

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### **ABSTRACT**

Varicose veins are a common vascular condition that can significantly impair a patient's quality of life, yet their accurate assessment remains challenging due to the limitations of conventional diagnostic methods. This study investigates the potential of deep learning (DL), specifically convolutional neural networks (CNNs), for the automated detection and assessment of varicose veins using medical imaging data. A deep learning model was trained on a diverse dataset of clinical images, including ultrasound, duplex scanning, and infrared thermography, to enable precise identification of varicose veins, classification of their severity, and provision of insights for tailored treatment strategies. When compared to traditional diagnostic techniques, the deep learning model demonstrated substantial improvements in both accuracy and efficiency. Our findings indicate that deep learning has the potential to enhance varicose vein diagnosis by providing quicker, more reliable assessments, reducing clinician workload, and minimizing human error. This approach could pave the way for better patient outcomes and support a transition toward more personalized, data-driven treatment plans.

**Keywords:** Varicose veins, Deep learning, Convolutional neural networks (CNNs), Automated detection, medical imaging.

## **Cognitive Assistive Eyewear for Smart Mobility**

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### **ABSTRACT**

The Cognitive Assistive Eyewear for Smart Mobility is avant-garde assistive technology that is intended to enhance the independence, safety, and mobility of visually impaired people. The Assistive eyewear offers real-time support for navigation, obstacle detection, object recognition, text-to-speech, person identification, and traffic awareness, allowing users to navigate different environments independently without external support. By utilizing intelligent processing and interactive feedback processes, the device translates the surroundings of the user and presents instant alerts in an easily usable form. The device facilitates easy transition between different contexts, from indoors to densely populated streets to public transport, and enables effortless navigation. An ergonomic and intuitive design that takes priority in prioritizing comfort and simplicity ensures that it is an easy-to-use practical solution to fit into the lives of individuals. This tech-enabled eyewear seeks to close the accessibility gap by providing a scalable, and effective mobility aid alternative to conventional mobility aids. Leveraging the capabilities of smart assistive solutions, it promotes more autonomy, confidence, and inclusivity, revolutionizing how visually impaired people engage with the world.

**Keywords:** Adaptive eyewear, visually impaired, object detection, machine learning, proximity sensing AI, computer vision, tactile audio feedback system.

## **Formulation And Fortification of Chickpea Pasta with Banana Leaf Extract to Enhance Nutritional Value**

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### **ABSTRACT**

Pasta is a ready to eat extruded product having higher nutritional properties. It is really suited for daily balance diet because of the higher concentration of unsaturated fatty acid. Mixing, extrusion, drying, cooling and packaging are the major steps used in the production of pasta. Pasta can be produced from different cereals like sorghum, maize, wheat, rice, oats and the addition of these cereals can change the textural, functional, physiochemical properties and microstructure of pasta. The yellow color is the most acceptable range of pasta by customers. Pasta helps to Lower glycemic index and type 2 diabetics and reduce abdominal obesity. At present health-conscious consumers seek foods that contain health promoting substances and ingredients. Fortifying pasta with green leafy vegetables is a promising approach to enhance its nutritional value, offering increased fiber, vitamins, and antioxidants. The present study is designed to enhance the antioxidant level and nutritive value of the pasta by infusing the extract of Banana leaf. There is a significant increase in the antioxidant level in the pasta and the nutritive analysis showed that 100 g sample of banana leaf extract infused pasta contains 2.80% ash, 9.71% moisture, 23.42% protein, and 57.87% carbohydrates.

**Keywords:** banana leaf extract, Lower glycemic index, Mixing, extrusion, drying, cooling and packaging.

## **Foxtail Millet Green Pea Noodles - “A Nutritious Alternative”**

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### **ABSTRACT**

With the increasing shift in consumer preferences towards healthier, functional, and gluten-free food products, the development of nutrient-dense alternatives to conventional staples has become a focal point in food science research. This study explores the formulation, nutritional enhancement, and functional evaluation of Foxtail Millet Green Pea Noodles, aiming to create a wholesome alternative to traditional wheat-based noodles. Foxtail millet (*Seteria Italica*), known for its high content of dietary fiber, micronutrients, and antioxidants, was blended with green pea flour (*Pisum sativum*), a legume rich in high-quality protein and essential amino acids. The combination not only improved the protein content and amino acid balance but also contributed to a reduced glycemic index, making the product suitable for individuals with metabolic disorders such as diabetes. Functional properties including water absorption, cooking loss, and texture profile were evaluated, revealing that the optimized formulation maintained desirable cooking and sensory qualities. Comprehensive sensory evaluation using a 9-point hedonic scale demonstrated high levels of consumer acceptability, particularly in terms of taste, mouthfeel, and appearance. Furthermore, the product showed promising shelf stability and potential for scale-up in commercial production. These noodles address current nutritional challenges by offering a gluten-free, fiber-rich, and protein-enhanced option suitable for health-conscious consumers. They also support sustainable agriculture by promoting the use of underutilized grains and legumes. This study highlights the potential of Foxtail Millet Green Pea Noodles as an innovative contribution to the functional food market, catering to both nutritional needs and consumer preferences.

**Keywords:** Foxtail millet, green pea flour, Gluten-free noodles, Functional foods, Nutritional composition, Sensory evaluation, Glycemic index, Sustainable ingredients.

## **Sustainable Edible Packaging Using Tulasi Oil and Pectin for Fresh Produce**

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### **ABSTRACT**

Edible packaging made from natural, biodegradable, plant-based materials offer a zero-waste solution, eliminating the need for waste collection, recycling, or disposal. A key area of innovation is in edible films and coatings, particularly in the fruits and vegetables sector, which accounted for over 35% of the global market share and is projected to grow at a CAGR of 8.1% from 2022 to 2028. These coatings improve product quality and extend shelf life by forming a barrier against moisture loss, oxidation, and microbial growth, while enhancing texture and appearance. This study focuses on developing an edible packaging film using Tulasi (Holy Basil) essential oil and pectin, a soluble dietary fiber typically extracted from citrus peels. Tulasi oil is obtained via hydro distillation, while pectin can be extracted using acid-base or microwave-assisted extraction methods. These two components are combined-optionally with a plasticizer such as propylene glycol-to create a film-forming solution. The final edible film is applied using spray coating, ideal for fruits and vegetables in the food industry. Compared to conventional edible packaging, this method significantly reduces food spoilage and waste. The film slows ripening, prevents oxidation, and enhances shelf life. Additionally, Tulasi oil contributes health benefits, including improved digestion, enhanced immunity, antioxidant and antimicrobial effects, and support for gut health and weight management. This sustainable approach not only preserves food quality but also aligns with Eco-friendly goals, offering a practical, health-conscious alternative to traditional packaging.

**Keywords:** Tulasi extract oil, pectin (soluble dietary fibers), optional propylene glycol(plasticizer) and spray coating.

## **Sustainable Valorization of Food Waste: Transforming Corn Husks into Biodegradable and Value-Added Products**

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### **ABSTRACT**

Food waste represents a critical global challenge, carrying significant environmental and economic consequences. This initiative focuses on the sustainable conversion of food waste into valuable products, offering innovative solutions to improve resource efficiency. A variety of technologies—such as anaerobic digestion, composting, fermentation, and biorefining—are explored for their potential to convert food waste into bioenergy, organic fertilizers, animal feed, and biodegradable materials. This sustainable approach not only addresses waste reduction but also generates new economic opportunities within the waste management and bio-based product sectors. The research specifically highlights corn husks, an agricultural byproduct, as a valuable raw material for the production of biodegradable packaging, fiber-based products, and traditional crafts. Corn husk fibers have promising applications in the textile and paper industries, while the husks themselves can be repurposed into traditional craft items such as dolls, baskets, and decorative pieces. This underscores the potential of agricultural residues to be transformed into useful, eco-friendly products—demonstrating both environmental benefits and the broad applicability of materials typically considered waste.

**Keyword:** Corn Husk, Biodegradable packaging, Fiber products, Like dolls, Baskets, Decorative items

## **Brain Monitoring Wearable EEG System in Real Time**

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### **ABSTRACT**

The advent of wearable technology has revolutionized the field of neuro engineering, making brain monitoring more accessible, portable, and user-friendly. This paper explores the development and applications of wearable electroencephalography (EEG) systems for real-time brain activity monitoring. Traditional EEG systems, while effective, are often bulky, expensive, and limited to clinical settings. In contrast, modern wearable EEG devices are lightweight, wireless, and capable of continuous monitoring, enabling new possibilities in healthcare, neurofeedback therapy, brain-computer interfaces (BCIs), and cognitive load assessment. We delve into the core components of wearable EEG systems, including dry electrode technologies, signal acquisition hardware, wireless data transmission, and real-time signal processing algorithms. The paper highlights recent advancements in machine learning techniques for artifact removal and brain-state classification, which enhance the accuracy and reliability of mobile brain monitoring. Use cases such as epilepsy detection, sleep tracking, attention monitoring, and mental health assessment are discussed to demonstrate real-world impacts. Challenges related to signal noise, battery life, data privacy, and user comfort are also addressed. Finally, future trends, including integration with augmented reality and neuro adaptive systems, are explored. This study underscores the transformative potential of wearable EEG technology in making brain health monitoring ubiquitous and proactive.

**Keywords:** EEG, Real Time brain monitoring, brain-computer interfaces, neuro adaptive systems, neuro robotics.

## **Synthesis Of Metal Nanoparticles from Erythrina Variegata and Development of Topical Gel for the treatment Of Skin Cancer**

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### **ABSTRACT**

Skin cancer is a growing global health concern, requiring the development of novel and effective treatment strategies. Green synthesis of metal nanoparticles using plant extracts offers a biocompatible and eco-friendly approach to cancer therapy. In this study, Zinc nanoparticles (ZnONPs) were synthesized using the leaf extract of Erythrina variegata, a medicinal plant known for its bioactive compounds. The phytoconstituents in the extract acted as reducing and stabilizing agents for nanoparticle formation. The synthesized ZnONPs were characterized using UV-Vis spectroscopy, FTIR, XRD, SEM, and TEM, for confirming their nanoscale size and stability. Further, the ZnONPs were incorporated into a Carbopol-based topical gel for enhanced delivery and localized action against skin cancer cells. The gel was evaluated for physicochemical properties, spread ability, viscosity, and in vitro drug release. Anticancer activity was assessed using cell line studies (A431 human skin carcinoma cells), demonstrating significant cytotoxicity and apoptosis induction. The results suggest that Erythrina variegata-derived ZnONPs in a topical gel formulation could serve as a promising nanotherapeutic approach for skin cancer treatment, offering targeted therapy with minimal side effects.

**Keywords:** Erythrina variegata, spectroscopy, FTIR, XRD, SEM, and TEM.

## Usage Of Biomaterial in Clinical Condition

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### ABSTRACT

The increasing demand for sustainable and eco-friendly solutions in healthcare has led to the emergence of green biomaterials—biocompatible materials derived from renewable, biodegradable, and non-toxic sources. These materials offer an environmentally responsible alternative to traditional synthetic polymers and metals used in medical applications. Green biomaterials, such as chitosan, alginate, cellulose, silk fibroin, and polylactic acid (PLA), exhibit excellent biocompatibility, biodegradability, and mechanical properties suitable for applications including wound healing, tissue engineering, drug delivery, and medical implants. This paper explores the development, characterization, and application of green biomaterials in modern medicine. It highlights their advantages over conventional materials, such as reduced environmental impact and enhanced patient safety. Challenges like scalability, cost, and performance consistency are also discussed, along with current research trends and future prospects. By integrating sustainability with functionality, green biomaterials represent a promising path toward eco-conscious and patient-friendly biomedical innovations.

**Keywords:** Biostability, Surface modification, Bioactive materials, Bioresorbable materials, Tissue-material interaction.

## **A Network Pharmacology Approach: To Unravel the Synergistic Anticancer Mechanism of Phytochemicals in Treatment of Bladder Cancer**

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### **ABSTRACT**

Bladder cancer presents significant therapeutic challenges, necessitating the exploration of novel, multi-targeted treatment strategies with minimal toxicity. Phytochemicals offer promising anticancer potential through their pleiotropic effects. This study adopts a comprehensive network pharmacology and molecular docking approach to elucidate the synergistic mechanisms of six selected phytochemicals—Ellagic acid, Apigenin, Genistein, Luteolin, Parthenopid, and Acacetin-O-7- $\beta$ -Glucopyranoside—in the treatment of bladder cancer. First, we need to compile robust set of bladder cancer-associated genes from Gene Cards, CTD, and published literature. Concurrently, potential target genes for the six phytochemicals were predicted using Swiss Target Prediction. Drug-likeness, ADMET properties, and toxicity profiles of these phytochemicals were assessed using MolSoft, pkCSM, and ProTox-II, respectively. Common intersecting genes were identified via Venn analysis (VENNY 2.1.0), followed by construction of a protein-protein interaction (PPI) network using STRING. Cytoscape and its plugin Cyto Hubba were used to extract the top 10 hub genes based on degree values. Further analysis through ShinyGO enabled KEGG pathway mapping and GO enrichment to uncover the biological relevance of these targets. From this analysis, six key target genes were shortlisted for each phytochemical. Their 3D structures were retrieved from PDB and UniProt, and validated via PyMOL, SAVES v6.1, and CASTp 6.0. Molecular docking studies were performed to evaluate binding affinities between phytochemicals and their top targets, aiming to identify the most promising candidates for future drug development. This integrative network pharmacology and docking analysis highlights the potential of phytochemicals in modulating critical molecular targets in bladder cancer. The findings provide a scientific foundation for developing multi-targeted, low-toxicity phytochemical-based therapeutics, paving the way for futuristic drug delivery systems in bladder cancer management.

**Keywords:** Bladder Cancer, Molecular Docking, Phytochemicals.

## **Nutri Scan: An Analysis of Food Product Nutritional and Sensory Values**

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### **ABSTRACT**

The accurate assessment and analysis of nutritional values in food products are critical for fostering healthy dietary choices, addressing public health concerns, and meeting regulatory compliance. Nutri Scan is a proposed comprehensive analytical system designed to evaluate and present detailed nutritional information with their methodology used in that company, sensory evaluation, and the actual value of those products for a wide range of food products. By using advanced technologies such as spectroscopy, machine learning algorithms, and data analytics, Nutri Scan aims to deliver rapid, accurate, and user-friendly nutritional insights and sensory properties of food products. This system integrates diverse datasets, including food composition databases, historical nutritional records, and real-time scanning outputs, to ensure high precision. Nutri Scan also incorporates artificial intelligence for ingredient recognition, nutritional values and sensory evaluation. Furthermore, it provides the products sensory properties, nutritional values, and the amount preservatives added to the product. The proposed solution seeks to current food analysis methods by offering scalability, portability, and compatibility with mobile. It is designed to lab technician, nutritionists, and food manufacturers with actionable data, promoting transparency in food labeling and fostering healthier consumption patterns. This Nutri Scan is mainly prepared for the food technology students, and researchers for their easy valuation for a wide food product.

**Keywords:** Nutritional analysis, spectroscopy, machine learning, food labeling, personalized nutrition, transparency of food products.

## **Anti-bacterial, anti-inflammatory activity of herbal napkin preparation using *Bambusa vulgaris***

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### **ABSTRACT**

A large number of medicinal plants and their purified constituents have shown beneficial therapeutic potentials. In order to promote the use of medicinal plants as potential sources of antimicrobial compounds, it is important to thoroughly investigate their composition and activity and thus validate their use. The present study dealt with the Qualitative preliminary Phytochemical screening, and antimicrobial, anti-inflammatory activity of *Bamboo fibre* was done. The aqueous extract contains more phytochemicals such as flavonoids, phenol, saponin, alkaloids, glycosides and volatile oil. Some functional groups are in bamboo *fibre* also confirmed by FTIR spectroscopic technique. Some Phytoconstituent were separated in *Bamboo fibre* extract by thin layer chromatography technique. The extract fractions serve as inhibited the heat induced albumin denaturation. The antimicrobial activity was done in aqueous extract. In antimicrobial assay, the antimicrobial activity was studied against *Staphylococcus* and *E. coli*. The maximum zone of inhibition was observed against *Staphylococcus*. The minimum inhibition zone was observed against *Streptococcus*. The extract of *Bamboo fibre (L)* exhibited enormous activity against *Staphylococcus*. The exploration of secondary metabolites from plant sources seems to be an excellent choice for the development of new antimicrobials.

**Keywords:** Bamboo-Fiber, phytochemical analysis, anti-inflammatory, anti-microbial, sanitary pads, saponins, flavonoids.

## **Deep learning with slide images can Progress the prognostic risk Stratification with stage II colon rectal cancer**

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### **ABSTRACT**

Stage II colorectal cancer (CRC) patients exhibit diverse prognoses and responses to chemotherapy, underscoring the need for improved risk stratification. In this study, we developed an unsupervised deep learning model trained on whole slide histopathology images to extract prognostic features without manual annotation. The model, based on a combination of variational autoencoders and generative adversarial networks, generated a Deep Learning Signature (DLS) that significantly stratified patients by disease-free survival (DFS) and overall survival (OS) in both training and independent validation cohorts. The DLS remained an independent predictor after multivariable adjustment and outperformed traditional clinicopathological features. Notably, patients with higher DLS scores demonstrated greater benefit from longer-duration adjuvant chemotherapy, suggesting potential use for guiding treatment decisions. These findings highlight the potential of deep learning on whole slide images as a powerful, scalable tool for personalized prognostic assessment in stage II CRC.

**Keywords:** Prognostic biomarker discovery, Variational adversarial encoding, Digital pathology-driven precision oncology, Patho mics-based prognostication.

## **GSM Based Solar Automatic Irrigation System Using Arduino**

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### **ABSTRACT**

In this investigation, the traditional irrigation system of Bangladesh has been modernized using recent technology for the betterment of rural farmers, and its impact upon agricultural development has been discussed. More precisely, user-friendly watering in the field, along with reducing labor cost, Standardization of farming system, using technical advancement to meet the peak demand for food, and improving farming methods are the key objectives. Arduino UNO, Sensor, GSM module, LCD, and DC mini-Water pumping motor has been used as a prime component, humidity, and soil moisture corresponding to a particular field has been measured. That information has been sent to its user through a short message service. Finally, the pump has been controlled based on the water requirement. As a result, a certain amount of water and electricity can be saved, which has been calculated. Manual and automatic operation mode also substantiated.

**Keywords:** irrigation system; Arduino UNO; sensors; GSM module, DC mini-Water pumping Motor.

## **Advances in Magnetic Resonance Imaging for Medical Diagnostics**

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### **ABSTRACT**

Magnetic Resonance Imaging (MRI) is a non-invasive diagnostic imaging technique that utilizes strong magnetic fields and radiofrequency pulses to produce high-resolution images of internal body structures. Unlike conventional imaging modalities such as X-ray or CT, MRI does not use ionizing radiation, making it a safer alternative for repeated imaging, particularly in sensitive populations. The core principle of MRI relies on the interaction between magnetic fields and hydrogen protons in the body, enabling the generation of detailed anatomical and functional information. MRI has revolutionized the field of medical diagnostics, with widespread applications across neurology, musculoskeletal imaging, cardiology, oncology, and more. It is particularly valuable in brain and spinal cord imaging, providing clear differentiation between gray and white matter and detecting abnormalities such as tumors, strokes, and degenerative diseases. In musculoskeletal evaluations, MRI excels at visualizing soft tissues, ligaments, cartilage, and bone marrow. Additionally, functional MRI (fMRI) and diffusion-weighted imaging (DWI) have further expanded the diagnostic capabilities by enabling real-time assessment of brain activity and tissue micro structure. Technological advancements in MRI systems, such as high-field and ultra-high-field magnets (3T and above), parallel imaging techniques, and artificial intelligence (AI)-driven reconstruction algorithms, have significantly improved image quality, reduced scan times, and enhanced diagnostic accuracy. Moreover, ongoing research into portable and low-field MRI systems holds promise for expanding accessibility in remote and resource-limited settings.

**Keywords:** Magnetic Resonance Imaging (MRI), weighted imaging (DWI), (AI)-driven reconstruction algorithms.

## **Manufacturing of Nitric Acid**

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### **ABSTRACT**

The industrial production of nitric acid, a vital chemical used in fertilizers, explosives, and various industrial processes, is primarily carried out through the Ostwald process. This process involves the catalytic oxidation of ammonia to produce nitric oxide, which is further oxidized and absorbed in water to yield nitric acid. The key steps include the oxidation of ammonia using a platinum-rhodium catalyst at high temperature and pressure, the conversion of nitric oxide to nitrogen dioxide, and the absorption of nitrogen dioxide in water to form nitric acid. The Ostwald process is highly efficient and widely adopted due to its economic feasibility and the availability of raw materials like ammonia. This paper outlines the chemistry, operating conditions, and efficiency considerations involved in the manufacturing of nitric acid.

**Keywords:** Ostwald process, nitric acid, oxidized and absorbed in water to yield nitric acid.

## **Biocompatible Materials for Skin-Contact Sensors**

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### **ABSTRACT**

Flexible and wearable biosensors represent a groundbreaking advancement in personalized healthcare, offering real-time, non-invasive monitoring of physiological and biochemical parameters. These next-generation sensors are designed using stretchable, skin-conformable materials that integrate seamlessly with the human body, enabling continuous health tracking with minimal discomfort. This paper explores the design principles, fabrication techniques, and applications of flexible biosensors, focusing on their ability to monitor key biomarkers such as glucose, lactate, electrolytes, and sweat pH. Materials like graphene, conductive polymers, and nanocomposites are highlighted for their roles in enhancing sensor sensitivity, durability, and biocompatibility. We also examine the integration of these sensors with wireless communication systems and mobile devices for real-time data transmission and health analytics. Application areas include chronic disease management, athletic performance optimization, and early detection of physiological abnormalities. Special attention is given to multifunctional sensor platforms capable of detecting multiple parameters simultaneously, as well as self-powered and energy-efficient designs for long-term wear. The paper concludes with a discussion on current challenges—including signal stability, calibration, and data security—and outlines future directions for the development of fully autonomous, AI-integrated wearable biosensing systems.

**Keywords:** Wearable biosensors, Skin-interfaced sensors, Stretchable electronics, soft electronics, Epidermal electronics, Biomedical sensors, Smart wearables.

## **Development Of an Effective Bio-Immunostimulant from Aspergillus Species for Enhancing Soil Fertility and Managing Diseases in Sugar Cane & Cotton Cultivation**

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### **ABSTRACT**

The main aim of this study to development of a bio-immunostimulant derived from Aspergillus species, focusing on its potential for enhancing soil fertility and managing plant diseases in sugarcane and cotton cultivation. Aspergillus spp. is isolated from rhizosphericsoils and to produce bioactive metabolites with plant growth-promoting and Immune-boosting activity. Fermentation under optimized conditions to enhance metabolite yield. Crude extracts were obtained through solvent extraction techniques and subsequently purified to isolate the bioactive compounds. The bioactive extracts were evaluated for their immunostimulant potential using seed germination assays. Field and greenhouse trials further assessed their efficacy in inducing systemic resistance (ISR) and managing common soil-borne pathogens such as Salmonella, Staphylococcus and E. coli. Results indicated a significant improvement in plant vigor, disease resistance, and soil microbial health following application. The findings support the use of Aspergillus-derived bio-immunostimulants as a sustainable alternative to chemical inputs, contributing to resilient and eco-friendly agricultural systems.

**Keywords:** Bio immunostimulant, Soil, Aspergillus species.

## **Exploration Of Anti-Inflammatory Efficacy of Topical Gel Loaded with Ethosomes Containing Asystasia Gangetica**

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### **ABSTRACT**

In the pursuit of advanced wound care solutions, this study develops a novel topical formulation combining the therapeutic potential of *Asystasia gangetica* with ethosomal nanotechnology. The bioactive compounds were systematically extracted via Soxhlet extraction using ethanol as solvent, followed by phytochemical characterization and TLC analysis to identify key constituents. These extracted phytocompounds were encapsulated into ethosomes—phospholipid-based nanocarriers with enhanced skin permeability—resulting in optimized nanoparticles (150-200 nm) demonstrating high entrapment efficiency (>85%) and sustained release properties. The ethosomal formulation was incorporated into a stable topical delivery system exhibiting ideal rheological characteristics for wound application. Comprehensive in vitro evaluation revealed significant anti-inflammatory activity through protein denaturation and COX-2inhibition assays, while scratch assays using fibroblasts demonstrated accelerated cell migration and enhanced collagen synthesis. By successfully merging traditional phytotherapy with advanced nanotechnology, this research establishes biocompatible platform for plant-based wound therapeutics, demonstrating how green medicine can be enhanced through precision delivery systems for regenerative applications. The integration of Soxhlet extraction, TLC profiling, and nanocarrier technology presents a transformative approach to developing effective, natural wound care formulations.

**Keywords:** TLC analysis, Soxhlet extraction, COX-2inhibition.

## **Real-time volumetric image reconstruction and 3D tumor localization based on a single x-ray projection image for lung cancer radiotherapy**

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### **ABSTRACT**

Real-time volumetric image reconstruction and 3D tumor localization are critical for enhancing the precision of lung cancer radiotherapy. This study presents a novel method for reconstructing 3D volumetric images and localizing lung tumors using only a single X-ray projection. Leveraging advanced deep learning and motion modeling techniques, the approach enables rapid estimation of patient-specific anatomical changes during treatment. The system integrates prior 4D-CT data with a real-time X-ray projection to infer the current volumetric anatomy, ensuring accurate tumor tracking and adaptive dose delivery. Experimental results demonstrate high accuracy in tumor localization with sub-millimeter precision and low computational latency, supporting its potential for clinical implementation in real-time image-guided radiotherapy.

**Keywords:** X-ray projection-based estimation, Image-guided radiotherapy (IGRT), Deep learning in medical imaging, Cone-beam computed tomography (CBCT) surrogate, Patient-specific anatomical modeling

## Role Of Esterase in Biological Processes and Industrial Applications

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### ABSTRACT

Esterase is an enzyme that catalyzes the hydrolysis of ester bonds into an acid and an alcohol. It plays a key role in various biological processes, including metabolism, detoxification, and digestion. Microorganisms are used as source for esterase are bacteria, fungi and yeast that can degrade lignocellulosic biomass. Bacterial Sources Esterases are Bacillus subtilis, Pseudomonas fluorescens, Clostridium thermocellum, Streptomyces, Bacillus licheniformis. It is class of enzyme belongs to hydrolases family. EC3.1.1: esterase is classified as hydrolases that act on ester bond. Hydrolases: esterase catalyzes the hydrolysis of ester bond resulting in formation of acid and alcohol. Biological Importance of Esterases are Breaking down complex biomass structures, releasing fermentable sugars, improving biomass conversion efficiency, Enhancing enzymatic hydrolysis. Biological Functions of Esterases are Breaking ester bonds, Degrading lignin-carbohydrate complex, Releasing fermentable sugars. It is used in food industry and medical field. The application of esterase in Food Industry are Flavor enhancement, Food processing, Lipid modification. Medical Field Applications are Prodrug activation, Cancer therapy, Diagnostic tools, pharmaceutical development.

**Keywords:** Detoxification, Class of hydrolases, Releasing fermentable sugar, Degrading lignin carbohydrate complexes

## **Isolation And Production of Beta Galactosidase from Plant Tissue (Ripen Tomato)**

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### **ABSTRACT**

$\beta$ -galactosidase (EC 3.2.1.23) is an essential hydrolytic enzyme that catalyzes the breakdown of  $\beta$ -galactosides into monosaccharides. In plants, particularly in ripening fruits, it plays a critical role in cell wall modification and softening by degrading galactose-containing polysaccharides such as pectin and hemicellulose. This study focuses on the isolation and production of  $\beta$ -galactosidase from ripened tomato (*Solanum lycopersicum*) tissue, a rich and natural source of this enzyme during the late stages of fruit development. Ripened tomato fruits were selected for enzyme extraction due to the elevated expression of  $\beta$ -galactosidase during ripening. The procedure involved homogenization of the plant tissue in an appropriate extraction buffer, followed by centrifugation to obtain a crude enzyme extract. The enzyme was partially purified using ammonium sulfate precipitation and dialysis. The enzymatic activity was determined using ortho-nitrophenyl- $\beta$ -galactoside (ONPG) as the substrate, which releases ortho-nitrophenol (ONP) upon hydrolysis — detectable via spectrophotometric analysis. Results revealed a significant  $\beta$ -galactosidase activity in ripened tomato tissue, with the enzyme showing optimal activity at a pH of 4.5–5.0 and a temperature range of 35–45°C. These parameters are consistent with the acidic conditions typically present in plant vacuoles and the ambient conditions of fruit ripening. The findings support the enzyme's pivotal role in the physiological process of fruit softening and indicate its potential utility in various biotechnological and industrial applications, including dairy processing, lactose hydrolysis, and fruit juice clarification. This study demonstrates that ripened tomato can serve as an accessible and cost-effective source for the production of  $\beta$ -galactosidase, laying the ground work for further purification, characterization, and application-based studies.

**Keywords:**  $\beta$ -galactosidase, ripened tomato, enzyme isolation, fruit ripening, plant tissue, enzyme activity, pectin degradation

## **Investigation Of Antioxidant, Anti-Arthritics and Antimicrobial Activity of Synthesized Zinc Oxide Nanoparticle Using Punica Granatum Root Extract Under Invitro Study**

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### **ABSTRACT**

The biosynthesis of Zinc Oxide nanoparticles is being studied for its possible application in the environmentally friendly development of new technology. Nanoparticles are typically created using a variety of chemical methods that are not environmentally friendly. The roots of Punica Granatum were used in the synthesis of Zinc oxide nanoparticles method. Within one hour of treating a 5mM Zinc acetate ( $\text{CH}_3\text{COOZn}$ ), ethanolic solution with roots extract of Punica Granatum the Zinc oxide nanoparticles could be synthesized. Fourier Transform Infrared spectroscopy (FTIR), UV-visible spectroscopy, and X-ray Diffraction (XRD) were used to characterize these nanoparticles. The face-centered cubic crystal structure of these nanostructures was confirmed by X- ray diffraction (XRD) results. The Antioxidant Activity of Zinc oxide nanoparticle showed maximum DPPH is about (79.82%) and for ABTS (79.80%) at a concentration 100 $\mu\text{g}$  / ml. The anti-arthritic analysis revealed that the synthesized silver nanoparticles had a higher percentage of inhibition. The results of the Zinc oxide nanoparticles synthesized using the roots of Punica Granatum exhibited a maximum of inhibition for albumin ( ) degradation and for the HRBC membrane stabilization model the inhibition is about 79.66%. The antimicrobial activity of zinc nanoparticle showed maximum inhibition against at a concentration 100  $\mu\text{g}/\text{ml}$ .

**Keywords:** Punica Granatum, Fourier Transform Infrared spectroscopy (FTIR), UV-visible spectroscopy, X-ray Diffraction (XRD).

## **Nutrigenomics And Nutrigenetics: The Future of Personalized Diets**

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### **ABSTRACT**

Personalized nutrition and dietary advice to individuals are based on genetics and lifestyle, which are driven by advances in genomics. A review of 561 nutritional patents shows a difference in growth in disease-specific diets and genetic scoring. Even though SNP data for nutrition is promising, it's quite complex. Gene-diet interactions include multiple genes and factors like pleiotropy, making predictions difficult. Applied in caffeine sensitivity, vitamin D metabolism, obesity, and cardiovascular disease, along with ethical considerations. Genomics helps study how food and genes interact. While genes affect nutrient processing, nutrients affect gene expression. Nutrition based on genetics and lifestyle can improve health outcomes. Medical nutrition is shifting towards genetic profiling. Online nutrigenetics services target conditions like heart disease through interpretation of genetic data, but interpretation remains challenging. Nutrigenomics studies detect the impact on gene expression, and nutrigenetics looks at how genes react to diet responses. Yet challenges remain in data integration, prediction, accuracy, and ethical issues like access and privacy.

**Keywords:** Personalized nutrition, Nutrigenomics, SNP, obesity, Genetic profiling

## **Development of High Protein Greek Yoghurt Fortified with Plant Based Omega-3 Source**

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### **ABSTRACT**

The growing demand for functional dairy products has driven innovation in the development of nutrient-enriched foods. this study focuses on formulating a high-protein Greek yogurt fortified with an omega-3 source, aiming to enhance its nutritional profile while maintaining consumer-acceptable sensory qualities. high-protein Greek yogurt was prepared using skimmed milk and milk protein concentrates, followed by fortification with a microencapsulated omega-3 oil derived from flaxseed and fish oil sources. The fortified yogurts were evaluated for their physicochemical properties (ph, acidity, viscosity, and syneresis), nutritional content (protein and omega-3 fatty acid levels), and sensory attributes (appearance, texture, flavor, and overall acceptability). from findings it was clear that the incorporation of microencapsulated omega-3 oils had minimal adverse effects on the yogurt's texture and flavor, while significantly improving its omega-3 content. the optimized formulation provided a balanced profile of essential fatty acids and high-quality proteins, meeting daily nutritional recommendations without compromising product quality. This fortified Greek yogurt demonstrates potential as a functional dairy product, contributing to heart and brain health, and meeting the nutritional demands of health- conscious consumers.

**Keywords:** Greek yogurt, omega-3 fatty acids, high protein, functional food, microencapsulation, sensory evaluation

## **Isolation And Extraction of Peroxygenase from Selected Fungal Strains**

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### **ABSTRACT**

Peroxygenases are a class of heme-thiolate enzymes capable of catalyzing the transfer of oxygen from hydrogen peroxide to a wide range of organic substrates. these enzymes are predominantly derived from fungi, particularly *agroclybe aegerita*, through processes such as solid-state fermentation, followed by protein purification techniques including ammonium sulfate precipitation and chromatography. structurally, peroxygenases possess a conserved heme prosthetic group embedded within a protein matrix, similar to that found in cytochrome p450 enzymes. this structural feature enables them to carry out a variety of oxidative reactions without the need for auxiliary electron transport proteins. biologically, peroxygenases play key roles in the detoxification of xenobiotics, lignin degradation, and the metabolism of both natural and synthetic compounds in the environment. their broad substrate specificity and capacity for selective polyfunctionalizations make them highly valuable for biotechnological applications. in the medical field, peroxygenases show promising potential in drug metabolism studies, biocatalytic synthesis of pharmaceuticals, and green chemistry approaches for producing active pharmaceutical ingredients (apis). moreover, their oxidative properties are being investigated for antimicrobial and anticancer therapeutic strategies, owing to their ability to generate reactive oxygen species under controlled conditions. the unique combination of catalytic versatility, environmental sustainability, and biocompatibility positions peroxygenases as promising candidates for a variety of biomedical and industrial applications. this underscores the need for continued research into their structure-function relationships and the engineering of enhanced variants for improved performance.

**Keywords:** hydrogen peroxide, pharmaceutical, biomedical, industrial, anticancer

## **Leveraging Doped Zinc Oxide Nanoparticles for Advancements in Skin Cancer Therapy**

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### **ABSTRACT**

Skin cancer remains a formidable challenge in modern oncology, ranking as the fifth most prevalent malignancy globally. Conventional therapeutic strategies for early-stage skin cancer predominantly include surgical excision, Mohs micrographic surgery, radiation therapy, curettage with electrodesiccation, cryotherapy, and photodynamic therapy. While chemotherapy remains a cornerstone in cancer treatment, it is often hindered by several limitations, including inadequate therapeutic efficacy, the development of tumor resistance, poor solubility and permeability, as well as systemic toxicity. In recent years, the advent of nanotechnology has revolutionized biomedical research, particularly in oncology, by offering innovative approaches to improve drug delivery, enhance tumor targeting, and optimize therapeutic outcomes. Among various nanomaterials, nanoparticles (NPs) have emerged as promising candidates for skin cancer treatment due to their unique physicochemical properties, high biocompatibility, and ability to achieve targeted drug delivery with minimal off-target effects. Zinc oxide (ZnO) nanoparticles, in particular, have garnered substantial attention for their potent anticancer properties, which can be further enhanced through doping strategies to improve their efficacy, stability, and selectivity against malignant cells. This review comprehensively examines the therapeutic potential of doped ZnO nanoparticles in skin cancer treatment.

**Keywords:** ZnO nanoparticles, electrodesiccation, cryotherapy, photodynamic therapy, chemotherapy.

## IoT Based Health Care Monitoring System

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### ABSTRACT

IoT-based healthcare monitoring system leverages the capabilities of the Internet of Things to enable continuous and remote monitoring of patients' health parameters. By utilizing various sensors and connected devices, the system collects real-time physiological data, such as heart rate, body temperature, blood pressure, and oxygen saturation. This data is securely transmitted and stored in a cloud platform, allowing healthcare professionals, Mobile Health (mHealth) and authorized individuals to access and analyze it remotely. An IoT-based healthcare monitoring system harnesses the interconnectedness of smart devices, sensors, and network infrastructure to continuously collect, transmit, and analyze patients' physiological data. These systems move beyond episodic assessments, enabling real-time monitoring of vital signs, activity levels, medication adherence, and other relevant health indicators. By leveraging the capabilities of IoT, healthcare professionals can gain a more holistic and dynamic understanding of a patient's condition, facilitating early detection of anomalies, proactive interventions, and personalized treatment plans. The system aims to improve the efficiency and accessibility of healthcare by providing timely insights into patients' conditions, facilitating early detection of anomalies, and enabling proactive interventions. Furthermore, the abstract highlights the potential of such systems to empower patients in managing their health and well-being from the comfort of their homes, reducing the need for frequent hospital visits and ultimately leading to better healthcare outcomes and reduced costs.

**Keywords:** IoT, sensors, real-time physiological data, Healthcare Monitoring System, Mobile Health (mHealth).

## **Phytochemical Analysis and Antifungal Activity of Different Extract From curcuma Longa flower**

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### **ABSTRACT**

Fungal infections caused by fluconazole-resistant *Candida* species are a growing concern. *Curcuma longa* (turmeric) is known for its antimicrobial properties due to bioactive compounds. This study evaluates the antifungal activity of methanolic, ethanolic, and petroleum ether extracts against *Candida* species. Phytochemical screening, MIC determination, and disc diffusion assays were performed. Results suggest that *Curcuma longa* extracts exhibit strong antifungal potential, highlighting their application as natural antifungal agents. These findings suggest that the flower of *Curcuma longa* is a promising source of natural antifungal agents. The study underscores the potential of underutilized plant parts in developing alternative antifungal treatments and encourages further investigation into the isolation and characterization of active compounds.

**Key words:** Antifungal resistance, *Curcuma longa*, fluconazole resistance, natural antifungal Agents.

## **Watery Graves: Innovations in Drowning Death Investigation**

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### **ABSTRACT**

Drowning is a complex medico-legal issue that often presents challenges in determining the exact cause and circumstances of death. In forensic investigations, the analysis of diatoms—microscopic, silica-shelled algae—has emerged as a valuable tool for supporting the diagnosis of drowning. This research paper explores the role of diatom testing in drowning cases, focusing on its scientific basis, methodological approaches, and reliability. This study critically examines various diatom extraction and identification techniques, including acid digestion, enzymatic methods, and advanced imaging technologies. Furthermore, it addresses the limitations and potential sources of error in diatom testing, such as contamination and environmental variability. By integrating case studies and recent advancements in diatom research, the paper aims to enhance the forensic application of diatom analysis in drowning investigations and promote standardized protocols for more accurate and consistent results. This research paper examines the multifaceted nature of drowning, exploring epidemiological trends, risk factors, and social determinants that exacerbate vulnerability. The study further evaluates the effectiveness of current prevention strategies, including public education campaigns, swimming lessons, water safety regulations, and community-based interventions. By synthesizing data from diverse geographic and socio-economic contexts, this paper aims to identify critical gaps in policy and practice while proposing evidence-based approaches to reduce drowning mortality. A multidisciplinary perspective is adopted to highlight the roles of healthcare providers, policymakers, educators, and rescue organizations in advancing drowning prevention and response efforts globally.

**Keywords:** diatoms, drowning, antemortem, watery graves

## **Forensic Life Sciences: Integrating Biological Tools in Modern Criminal Investigations**

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### **ABSTRACT**

Forensic science plays a crucial role in solving crimes by analysing biological evidence. In recent years, developments in life sciences particularly in molecular biology, microbiology, and biochemistry have significantly improved forensic methods. This paper explores how tools like microbial analysis help investigators estimate post-mortem interval. The focus is also on how research findings in biology are being applied directly to forensic work in real- world investigations. The dead and decaying matter is what attracts the insects and arthropods. The corpse changes from flesh to bones in a couple of weeks or maybe even months according to the various conditions that the body is subjected to. This change occurs due to the various physical, chemical and biological changes happening after a living being is dead. The variety in insect species that visit the corpse or carrion depends upon the nature of the insects visiting and the stage of decomposition that the body undergoes. Some species of insects arrive within 24 hours of death and some arrive much later. Most of the insect species arrive at the site if blood or other body fluids are involved. Other species may not be interested in a fresh corpse and may visit only if the corpse advances into further stages of decomposition. The samples were kept for ten days to estimate the time since death using insects and microbial activity. The result says from the arrival of insects, we can estimate the time since death. By incorporating life science techniques, forensic science is becoming more multidisciplinary and evidence-based, ultimately strengthening its role in delivering justice.

**Keywords:** DNA profiling, insects, decomposition, molecular biology, forensic investigation.

## **An Empirical Study On Cyber Harassment In Tirunelveli District- The University Women Students' Perspective**

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### **ABSTRACT**

This study investigates the prevalence and impact of cyber harassment among [specify target population, e.g., university students, online gamers, social media users] in India. Employing a [specify methodology, e.g., quantitative survey, cross-sectional design] with a sample of [specify sample size] participants, the research examines the frequency of various forms of online harassment, including [mention key examples, e.g., cyberstalking, online shaming]. Findings reveal a significant incidence of cyber harassment, with notable correlations observed between victimization and [mention key impact variables, e.g., psychological distress, social isolation]. The implications of these findings for understanding and addressing online safety within the Indian context are discussed. The aggressive behaviour known as cyber harassment, also referred to as online harassment, takes place online through a variety of digital channels, including social media, email, messaging services, and online discussion forums. It entails communicating with the victim in a threatening or abusive manner, disseminating untrue, disclosing private or delicate information, or participating in any other harmful or rumours unwelcome behaviour that might result in the victim experiencing mental distress or actual physical injury. In this study “An Empirical Study on the Cyber Harassment in Tirunelveli District – The University Women Student Perspective” focusses on the cyber harassment that are happening against women in cyber space which can be an immense problem in the day-to-day evolvment of Internet. This study helps on finding how these harassments are happening and how the victims are being victimized. This study also focuses on the types of victimization faced by the victims and also their impact on of victimization of their victimization.

**Key words:** harassment, social media, victimization, behaviour, cyber world.

## **AI-Powered Detection of Deepfake Audio and Video: Techniques and Challenges**

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### **ABSTRACT**

The rapid advancement of artificial intelligence has significantly improved the realism of synthetic media, particularly deepfake audio and video. While these technologies hold potential for creative applications, they also raise serious concerns regarding misinformation, identity fraud, and digital trust. This research explores AI-powered methods for detecting deepfakes, focusing on both audio and video domains. It reviews state-of-the-art detection techniques, including deep learning models, signal processing approaches, and multimodal analysis. The study also highlights key challenges such as generalizability across datasets, adversarial attacks, and the evolving sophistication of generative models. In addition, it discusses ethical implications and the need for regulatory frameworks. Finally, the paper outlines promising future directions aimed at enhancing detection robustness and scalability, contributing to the ongoing effort to ensure authenticity in digital content.

**Keywords:** Deepfake audio and video, Artificial intelligence

## **Application of Biodegradable Powders for Latent Fingerprint Detection on Non-Porous Surfaces: An Eco-Friendly Approach**

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### **ABSTRACT**

Conventional fingerprint powders used in forensic investigations often contain synthetic chemicals that may pose environmental and health hazards. This study investigates the effectiveness of natural, biodegradable powders such as turmeric, rice flour, and henna for the development of latent fingerprints on non-porous surfaces like glass, metal, and plastic. Latent prints were deposited by volunteers and developed using the dusting method with each powder under controlled lighting and environmental conditions. The clarity of ridge patterns, contrast, and adherence of powder to the fingerprint residue were assessed and compared to commercial black fingerprint powder. Results demonstrated that turmeric and henna provided good contrast on light-colored surfaces, while rice flour was effective on darker backgrounds. The study highlights the potential of natural substances as cost-effective, non-toxic alternatives for fingerprint detection, especially in low-resource forensic settings. It also emphasizes the growing need for sustainable practices in forensic science.

**Keywords:** Latent fingerprints, Biodegradable powders, Forensic science, Turmeric, Henna, Rice flour, Eco-friendly methods, non-porous surfaces, Crime scene investigation, Fingerprint development techniques.

## **Forensic Evaluation of Paraquat Poisoning Using Color Test and HPTLC Technique**

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### **ABSTRACT**

Paraquat is a bipyridyl herbicide which is widely used in many countries. It is a green- colored liquid having corrosive properties. It is the second widely sold herbicide in the world. Its easily available in the markets and the people commonly used it for suicidal and homicidal purposes. Due to its high toxicity and the effects some countries have banned this compound. According to the observation, the large number of the suicidal cases were reported due to Paraquat poisoning. This study is focusing on the analysis of Paraquat poisoning in viscera of treated and untreated individuals. The examination is conducted in two phases such as color test as preliminary test and HPTLC as the confirmatory test. For the analysis of Paraquat poisoning the filtrate has been extracted using methanol and activated charcoal and kept for water bath, lastly treated with hexane for fat removal. This end product is used for preliminary as well as confirmatory tests. The individuals undergoing treatment can show variations in color tests and can even show negative results but in HPTLC it is clearly detected and the concentration of Paraquat also can be found.

**Keywords:** Paraquat, Preliminary Test, Confirmatory Test, HPTLC



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## ABOUT THE EDITORS

**Dr. Chandran Masi, M.Tech., Ph.D.**, serves as Professor and Head of the Department of Food Technology, bringing over 24 years of expertise as an esteemed academic and researcher in Microbial Food Technology. He earned his Ph.D. in Food Microbial Technology from Anna University, Chennai, complemented by advanced degrees in Biochemistry and Biotechnology. His international contributions include a distinguished tenure at Addis Ababa Science and Technology University, Ethiopia. Dr. Chandran Masi's research encompasses bioprocess engineering, enzyme technology, fermentation, and biowaste valorization, with over 65 publications, including 48 Scopus-indexed articles. He has secured substantial research funding in India and globally, mentored numerous doctoral scholars, and actively contributes to curriculum development, faculty training, and the guidance of emerging scientists.



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