

Compendium of Technology -

DST Amrita Technology Enabling Centre



1. Automated Cashew Kernel Sorting Machine

Uniqueness of the Technology

The proposed innovation introduces an Automated Cashew Kernel Sorting Machine that utilizes an electronic weighing system for classifying cashew nuts into four distinct weight grades. This continuous motion system offers a significant advancement in the cashew nut processing sector by simultaneously boosting productivity and accuracy at a reduced cost.

Concept and Objectives

Concept: The core concept revolves around developing an automated machinery system capable of sorting cashew nuts into four weight grades based on advanced sensor technology, mechanical components, and automation techniques. This system aims to achieve a highly accurate and efficient sorting process.

Objectives

1. Design and develop a fully automated cashew nut sorting machine.
2. Achieve accurate and efficient weight-based sorting into four predefined categories.
3. Ensure a high degree of accuracy and efficiency in the sorting process.
4. Integrate user-friendly features for simplified operation and maintenance

Primary Area of Application

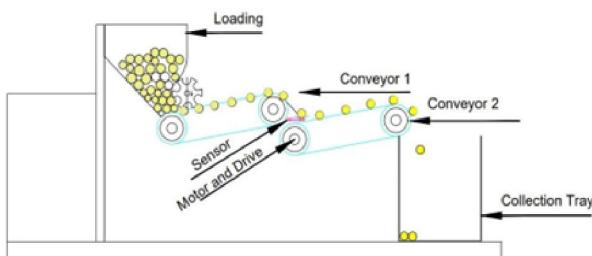
This automated machinery system is ideally suited for the cashew processing industry, specifically designed to segregate cashews into various weight-based categories like W 180 (180 kernels per pound). The application is particularly relevant to Kerala's cashew industry centered around Kollam.

Market Potential

India's cashew exports have faced challenges due to increased competition from countries with highly automated processing methods, leading to lower production costs. This innovative machine addresses this concern by offering several advantages:

- » **Cost Reduction:** Automation significantly reduces reliance on manual labor, leading to lower production costs.
- » **Increased Efficiency:** The continuous sorting process substantially enhances sorting speed.
- » **Improved Quality:** Electronic weighing ensures consistent and accurate grading.

CASHEW KERNEL SORTING MACHINE LAYOUT



2. Crop Pest Specifier: Early Analyzing of Pest in Crop Area and Providing Pesticide According to the Pest with Minimal Usage (Using AI and Quadcopter)

Uniqueness of the Technology

This system offers a novel approach to crop pest management by combining artificial intelligence (AI) and unmanned aerial vehicles (UAVs) known as quadcopters. Here's what sets it apart:

- » **Full Automation and Customization:** The system operates autonomously, but users can leverage AI to define specific pest species for detection, even differentiating between harmful insects and pollinators.
- » **Precision Spraying:** The quadcopter delivers pesticides directly to pest locations, minimizing pesticide usage and environmental impact.
- » **Future Integration with Deep Learning:** The system can be further enhanced by incorporating deep learning algorithms for even more robust pest identification.

Concept and Objectives

Concept

This technology centers on the early detection of pests within agricultural fields, followed by the targeted application of appropriate pesticides using minimal quantities.

Objectives

- » **Early Pest Detection:** The system aims to identify pests at an early stage, preventing significant crop damage.
- » **Targeted Pesticide Application:** Pesticides are applied only to identified pest locations, minimizing overall usage.
- » **AI-powered Pest Recognition:** Keras-RetinaNet, an open-source deep learning model, is employed for accurate pest detection.
- » **Data Acquisition and Processing:** A Raspberry Pi (RPi3) system connected to cameras captures pest data within the crop field. The data is uploaded to a cloud server for storage and processing.
- » **Communication and Action:** Pest data, including location information, is transmitted to the quadcopter. The quadcopter then navigates to the identified pest location and delivers the appropriate pesticide for targeted elimination.
- » **Pollinator Protection:** The AI-powered system can distinguish between harmful pests and beneficial pollinators, preventing unnecessary harm to the ecosystem.

Primary Area of Application

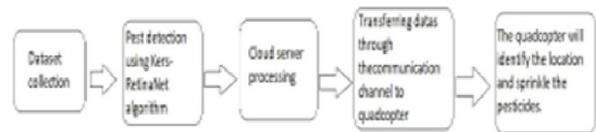
This technology is primarily targeted towards the agricultural sector, specifically for pest management in crop fields.

Market Potential

Crop losses due to pests, diseases, and weeds pose a significant threat to global food security and economic stability. Statistics indicate that these factors cause yield losses ranging from 10% to 30% of crop production. The Crop Pest Specifier offers a compelling solution by:

- » **Minimizing Crop Loss:** Early pest detection and targeted intervention can significantly reduce crop damage.
- » **Optimizing Pesticide Use:** Precise application minimizes pesticide waste and environmental impact.
- » **Enhancing Agricultural Efficiency:** Increased crop yield and reduced production costs lead to a more robust agricultural sector.

WORK FLOW DIAGRAM:



ARCHITECTURE DIAGRAM:



3. Fabrication of a Hybrid Electrochemical Device using Cathodic Ni-based LDHMoS₂/MXene Nanocomposites and Anodic MoS₂/MXene

Uniqueness of the Technology

This proposal presents a novel approach to fabricating a coin cell for battery-type supercapacitor applications. The innovation lies in two key aspects:

- » **Ternary Nanocomposite Electrodes:** The proposed device utilizes novel ternary nanocomposite electrodes. The cathode will be composed of Ni-based LDH (layered double hydroxide) integrated with MoS₂ (molybdenum disulfide) and MXene (transition metal carbide/nitride). This combination has not been previously reported.
- » **Integration of Battery and Supercapacitor Properties:** The device aims to achieve the combined benefits of batteries and supercapacitors by using a hierarchical arrangement of electrodes with distinct characteristics.

These factors contribute to the significance of this proposal, offering advancements in both electrode material design and practical applications.

Concept and Objectives

Concept

The core concept involves creating a single device that merges the high energy storage capacity of batteries with the rapid power delivery of supercapacitors. This is achieved through the strategic design of the electrodes:

- » **Cathode:** A high-capacity cathode material is formulated using a combination of Ni-based LDH, MoS₂, and MXene. The Ni-based LDH offers high capacity, while MoS₂ and MXene contribute to exceptional electrical conductivity.
- » **Anode:** The anode will be comprised of MoS₂ and MXene, chosen for their superior conductivity.

By combining these electrodes in a coin cell configuration, the device is expected to exhibit:

- » **High Energy Density:** Enabled by the Ni-based LDH component in the cathode.
- » **High Power Density:** Facilitated by the excellent conductivity of MoS₂ and MXene in both electrodes.

Objectives

- » Fabricate a coin cell exhibiting both high energy density and high power density.
- » Explore the practical applications of LDH and MXene-based electrode materials for energy storage devices.

Primary Area of Application

The target market for this innovation lies in the energy and energy storage device manufacturing industries. There is a strong demand for improved batteries with exceptional energy and power density, particularly for applications in:

- » **Consumer Electronics:** Portable devices require batteries that provide both long-lasting power and the ability to deliver rapid bursts of energy.
- » **Electric Vehicles:** Electric vehicles necessitate batteries with high energy density for extended range and high power density for fast charging and acceleration.

4. Production of Eco-Friendly Cement and Tile from Waterhyacinth

Uniqueness of the Technology

This innovation proposes a novel method for producing cement and tiles using waterhyacinth, a fast-growing aquatic plant considered a nuisance. Here's what makes it unique:

- » **Waste Utilization:** Waterhyacinth, typically seen as a problematic weed, becomes a valuable resource in this process.
- » **Sustainable Alternative:** This method offers an eco-friendly approach to cement and tile production, potentially reducing reliance on traditional methods with higher environmental impact.
- » **Potential for Lower Emissions:** Cement manufacturing is a significant contributor to greenhouse gases. Utilizing waterhyacinth could lead to a lower-carbon footprint for these building materials.

Concept and Objectives

The core concept involves developing a process to convert waterhyacinth into usable components for cement and tile production. This would involve:

- » **Waterhyacinth Collection:** Developing efficient methods for harvesting and processing the plant material.
- » **Fiber Extraction and Treatment:** Extracting and treating the waterhyacinth fibers to prepare them for use in cement and tile production.
- » **Cement and Tile Formulation:** Formulating effective cement and tile mixtures incorporating waterhyacinth fibers.
- » Reduce environmental impact associated with conventional cement and tile production.

Primary Area of Application

The target market for this innovation encompasses the construction industry, particularly for:

- » **Tile Manufacturers:** Producers interested in eco-friendly tile materials.
- » **Environmentally Conscious Builders:** Construction projects aiming to minimize their environmental footprint.

Market Potential

The market potential for eco-friendly building materials is rapidly growing. Consumers and businesses are increasingly seeking sustainable solutions, creating a strong demand for:

- » **Green Building Practices:** Waterhyacinth-based cement and tiles can contribute to greener construction practices.
- » **Reduced Environmental Impact:** This innovation aligns with the global push for reduced carbon emissions and sustainable resource utilization.
- » **Cost-Effectiveness:** Depending on the production process, waterhyacinth-based materials could potentially offer cost benefits compared to traditional methods

5. Drone-based Pest Control using Mobility Kit

Uniqueness of the technology

This innovation offers a comprehensive drone-based pest control system with a unique mobility kit. Here's what sets it apart:

- » **On-Demand Service:** Farmers can easily reserve a drone for targeted organic pesticide spraying on their land.
- » **Automated Field Identification:** Using a combination of survey numbers and satellite imagery, drones can autonomously locate a farmer's field for efficient service.
- » **Proactive Crop Monitoring:** Drones conduct regular flights over designated regions, analyzing crop health through imagery.
- » **Mobility Kit for Easy Deployment:** A portable mobility kit facilitates drone operation and maintenance in remote locations.

Concept and Objectives

This system leverages automated drones and machine learning to revolutionize crop health management. Key objectives include:

- » **Real-time Crop Monitoring:** Drones equipped with advanced sensors and machine learning algorithms continuously track crop health throughout the growing cycle.
- » **Early Disease Detection and Yield Optimization:** Through image analysis and data processing, the system identifies potential problems and offers recommendations to maximize yield.
- » **Sustainable Pest Control:** The system prioritizes organic pesticides sourced locally, minimizing environmental impact.
- » **Automated Spraying with Geo-fencing:** Within designated areas (geo-fences), the system autonomously deploys drones to spray organic pesticides, ensuring targeted application.

Potential Application Areas

This innovation holds significant potential in the agricultural sector, particularly for:

- » **Small and Medium-Scale Farms:** The on-demand service model and mobility kit cater to the needs of farmers with diverse land sizes and locations.
- » **Organic Farming:** The system aligns with organic farming practices by prioritizing organic pest control solutions.
- » **Precision Agriculture:** Automated monitoring and targeted spraying optimize resource utilization and minimize environmental impact.

Market Potential

The Indian agricultural sector presents a vast market opportunity for this innovation. Here's why:

- » **Large Agricultural Workforce:** With a significant portion of the population relying on agriculture, solutions that enhance yield and efficiency are highly sought-after.
- » **Growing Demand for Sustainability:** Consumers are increasingly conscious of environmental concerns, driving demand for sustainable farming practices.
- » **Benefits Beyond Pest Control:** This system offers additional value by providing insights for crop management and disease prediction.

6. H₂O: A Sustainable Water Management System

Uniqueness of the Technology

This proposal outlines a comprehensive water management system promoting responsible water use and resource conservation. It focuses on:

- » **Runoff Water Harvesting:** Encouraging the capture and storage of rainwater to reduce dependence on strained freshwater sources.
- » **Lake and Pond Restoration:** Regularly removing sediment from lakes and ponds increases their water holding capacity, preventing runoff water loss.
- » **Sustainable Sediment Use:** Selling the removed sediment as soil can benefit farmers and generate revenue for restoration efforts.
- » **Smart Irrigation Systems:** Promoting the adoption of water-efficient irrigation methods to optimize water use in agriculture.
- » **Groundwater Protection:** Implementing stricter regulations to minimize industrial and agricultural pollution, safeguarding groundwater quality.
- » **Water Redistribution:** Developing infrastructure to transfer water from surplus areas to regions facing scarcity.

Concept and Objectives

The core concept of H2O is to raise public awareness about water conservation through various initiatives:

- » **Educational Campaigns:** Educating the public on the importance of water conservation and practical methods for saving water in daily life.
- » **Lake Restoration:** Regularly restoring lakes and ponds to increase their water storage capacity for capturing and storing rainwater.
- » **Smart Irrigation Practices:** Promoting the use of smart irrigation systems that deliver the optimal amount of water to crops, minimizing waste.
- » **Water Recycling Programs:** Encouraging the implementation of water recycling initiatives to reduce reliance on freshwater sources.
- » **Water Redistribution Infrastructure:** Developing water transfer systems to redirect water from areas with abundance to regions experiencing scarcity.

Potential Application Areas

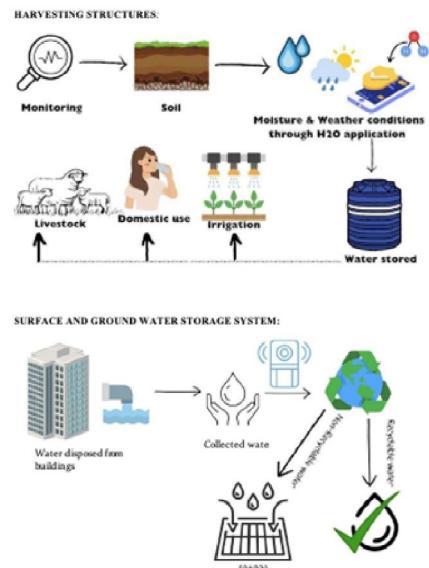
This system offers benefits across various sectors:

- » **Government:** Generates revenue from selling sediment obtained from lake restoration projects.
- » **Agriculture:** Provides a reliable source of water for irrigation, enhancing agricultural productivity.
- » **Domestic Use:** Ensures sufficient water availability for households, improving living standards.
- » **Industry:** Contributes to sustainable industrial practices by promoting responsible water use and reducing groundwater pollution.

Market Potential

The H2O system addresses a critical need in India, where water scarcity is a growing concern. Here's why it has significant market potential:

- » **Addressing Water Scarcity:** With over 9 million people in Tamil Nadu alone affected by water scarcity, solutions for efficient water management are highly sought after.



7. Integrated Agricultural Surveillance System

Uniqueness of the Technology

This proposal presents a novel approach to agricultural surveillance through an integrated system. Here's what sets it apart:

- » **Holistic Approach:** This system goes beyond traditional surveillance, aiming to optimize agricultural processes while promoting environmental sustainability and food security.
- » **Complete System Integration:** Our innovation offers a comprehensive IoT-based technology, ensuring compatibility and seamless use of various sensors and devices.

Concept and Objectives

Concept

We propose a comprehensive agricultural surveillance system specifically designed for hilly areas, leveraging the power of the Internet of Things (IoT).

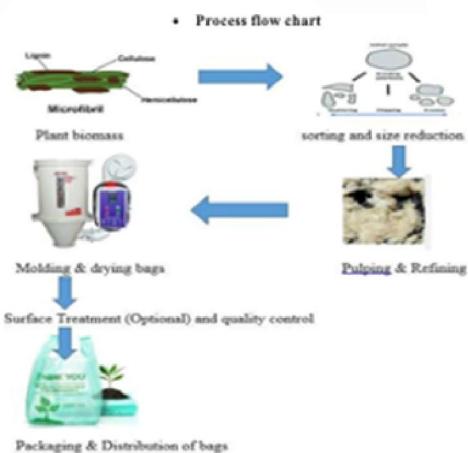
Objectives

- » **Affordable & Accessible:** Develop an integrated surveillance system that is financially viable for farmers, promoting wider adoption.
- » **Sustainable Productivity:** Drive continuous innovation in agricultural practices to enhance crop yields while minimizing environmental impact.
- » **Minimal Manpower:** Minimize reliance on manual labor by automating surveillance tasks.
- » **Animal Repellent:** Implement automated animal deterrent measures to protect crops.
- » **Timely Irrigation:** Ensure optimal crop health through efficient and timely irrigation based on real-time data.

Potential Application Areas

This system holds significant potential in the agricultural sector, particularly for:

- » **Hilly Terrain Farming:** Traditional surveillance methods in hilly areas are often labor-intensive and ineffective. This integrated system offers a tailored solution.
- » **Labor Reduction:** Automating tasks like animal detection and irrigation monitoring reduces manpower requirements.
- » **Improved Crop Health:** Real-time data on various parameters allows for proactive measures to protect crops and optimize growth conditions.



8. Commercializing Biodegradable Water-Holding Bags from Plant Biomass

Uniqueness of the Technology

This innovation introduces a novel type of water-holding bag made from plant-based biomass, offering several unique advantages:

- » **Sustainable Materials:** Produced from renewable and biodegradable plant-based materials, reducing dependence on non-renewable resources.
- » **High Performance:** These bags exhibit high tensile strength, making them suitable for carrying up to 2 Kg of weight in both hot (60°C) and cold conditions.

- » **Rapid Biodegradation:** Unlike traditional plastic bags, these bags biodegrade within 45-60 days, minimizing environmental impact.
- » **Waste Utilization:** The production process utilizes waste materials like coconut leaves, wood pulp, and waste paper, promoting waste reduction.

Concept and Objectives

The core concept is to develop and commercialize eco-friendly water-holding bags as a sustainable alternative to conventional plastic bags.

Objectives

- » **Environmental Sustainability:** Reduce reliance on non-biodegradable plastic bags and promote a cleaner environment.
- » **Waste Reduction:** Utilize waste plant biomass for bag production, diverting waste from landfills.
- » **Biodegradability and Sustainability:** Develop highly biodegradable bags made from renewable resources.
- » **Performance and Functionality:** Ensure the bags have sufficient strength and functionality for carrying liquids or solids.
- » **Market Penetration:** Increase adoption by consumers, retailers, and industries seeking environmentally responsible solutions.
- » **Consumer Awareness:** Educate consumers about the benefits of eco-friendly alternatives.
- » **Cost-Effectiveness:** Optimize production costs to ensure affordability for widespread adoption

Potential Application Areas

These biodegradable water-holding bags have a broad range of potential applications:

- » **Replacing Traditional Bags:** A viable alternative to plastic shopping bags, grocery bags, and other single-use plastic bags.
- » **Waste Management:** Suitable for waste collection in households and commercial settings.
- » **Liquid Transportation:** Can be used for carrying water, beverages, or other liquid products.
- » **Sustainable Packaging:** Potential applications in eco-friendly packaging solutions for various industries.

Market Potential

The market potential for these innovative bags is promising due to several factors:

- » **Growing Environmental Concerns:** Rising public awareness of environmental issues creates a strong demand for sustainable products.
- » **Regulatory Push:** Governments around the world are implementing stricter regulations on plastic bags, creating a market gap for eco-friendly alternatives.
- » **Consumer Demand:** Consumers are increasingly seeking eco-friendly options, and these bags cater to this growing demand.
- » **Cost Competitiveness:** By optimizing production costs, these bags can compete effectively with traditional plastic bags in terms of affordability.

9. In-vitro Inhibitory Effect of Yaimadhu Krapka on Epithelial-Mesenchymal Transition in Barrett's Esophagus Cell Lines

Uniqueness of the Technology

This research explores the potential of Yaimadhu Krapka, an Ayurvedic medicine, in treating Barrett's Esophagus (BE), a precursor to esophageal adenocarcinoma (EAC). Here's what makes it unique:

- » **Focus on Mechanism:** The study aims to understand the specific mechanism by which Yaimadhu Krapka inhibits Epithelial-Mesenchymal Transition (EMT), a critical step in BE progression to EAC.
- » **Clinical Data Foundation:** Clinical observations suggest Yaimadhu Krapka's effectiveness in managing BE symptoms. This study seeks scientific evidence for these observations.
- » **Addressing Limitations:** Large-scale clinical trials for BE are challenging due to patient discomfort with repeated endoscopies. This in-vitro model offers a reliable alternative for studying Yaimadhu Krapka's effects.

Concept and Objectives

Concept

This research proposes using an in-vitro model to evaluate the ability of Yaimadhu Krapka to inhibit EMT in BE cell lines.

Objectives

- » **Investigate Acid-Induced Changes:** Assess how simulated gastric acid (relevant to GERD) triggers the transformation of esophageal squamous cells into BE cells, using biomarkers like TGF- β and NF- κ B.
- » **Evaluate EMT Progression:** Analyze the progression of BE to EAC using biomarkers like Vimentin (associated with EMT) and E-Cadherin (associated with the epithelial state).
- » **Test Yaimadhu Krapka's Effect:** Evaluate the efficacy of Yaimadhu Krapka in inhibiting EMT in BE cells.

Potential Application Areas

This research has the potential to significantly impact the field of Ayurveda:

- » **Improved BE Management:** Scientific evidence supporting Yaimadhu Krapka's effectiveness could revolutionize BE treatment within Ayurvedic medicine.
- » **EAC Prevention:** If this study demonstrates Yaimadhu Krapka's ability to inhibit EMT, it could lead to potential applications in preventing EAC development.

Market Potential

The market potential lies in:

- » **Large Patient Base:** Barrett's Esophagus and GERD are prevalent conditions, creating a significant market for effective treatment solutions.
- » **Ayurvedic Medicine Integration:** Scientific validation of Yaimadhu Krapka's efficacy can increase its acceptance and use within mainstream medicine alongside conventional treatments.

- » **Improved Patient Convenience:** The research could pave the way for developing user-friendly formulations (e.g., sachets) of Yaimadhu Krapka, improving patient compliance.

10. Ved-Dent: The Ayurvedic Toothbrush for Complete Oral Care

Uniqueness of the Technology

Ved-Dent offers a unique blend of traditional Ayurvedic wisdom and modern convenience for oral hygiene:

- » **Ayurvedic Properties:** The brush incorporates natural bristles and potentially medicinal components based on Ayurvedic principles, promoting overall oral health.
- » **Biodegradable Design:** Ved-Dent prioritizes sustainability with a fully biodegradable bamboo handle, minimizing environmental impact.
- » **Removable and Replaceable Brush Head:** The brush head, containing the bristles and potentially medicinal elements, can be replaced regularly, ensuring hygiene and potentially extending the lifespan of the handle.
- » **Customizable Options:** Customers can choose a package with multiple brush heads, catering to individual usage preferences.

Concept and Objectives

Ved-Dent draws inspiration from the ancient Ayurvedic practice of "dhantadhavana" mentioned in Ashtanga Hridayam. The brush design combines:

- » **Bamboo Handle:** A sustainable and eco-friendly choice for the handle.
- » **Ayurvedic Brush Head:** Natural bristles potentially infused with beneficial Ayurvedic herbs or extracts for enhanced oral care.
- » **Removable Brush Head:** Enables easy replacement and promotes hygiene.

Objectives

- » **Promote Healthy Brushing Habits:** Encourage consistent oral hygiene practices with a convenient and potentially therapeutic solution.
- » **Offer Ayurvedic Benefits:** Leverage the potential of Ayurveda to support healthy teeth and gums.
- » **Provide Sustainable Choice:** Minimize environmental impact with a biodegradable design.

Potential Application Areas

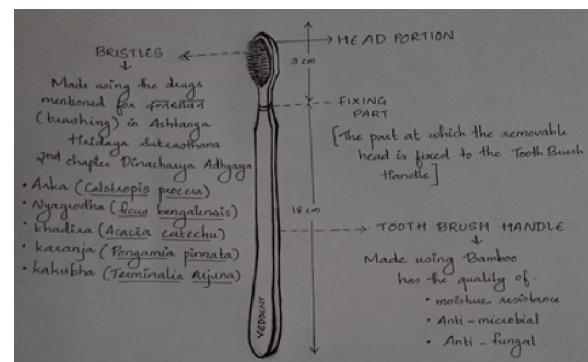
Ved-Dent caters to a diverse market segment:

- » **Health-Conscious Consumers:** Appeals to individuals seeking natural and potentially therapeutic oral care solutions.
- » **Busy Individuals:** The replaceable brush head design offers convenience for those with limited time for daily routines.
- » **Environmentally Conscious Users:** The biodegradable design aligns with the growing preference for sustainable products.

Market Potential

The market potential for Ved-Dent is promising due to several factors:

- » **Rising Demand for Natural Products:** Consumers are increasingly drawn towards natural and organic options in personal care products.
- » **Growing Interest in Ayurveda:** Ayurvedic medicine is gaining global recognition, creating a market for innovative products based on these principles.
- » **Convenience and Sustainability:** Ved-Dent combines potential therapeutic benefits with a user-friendly design and eco-friendliness, addressing multiple consumer needs.



11. Development and Commercialization of Low-Cost, Palatable Pellets for Early Diabetic Retinopathy Prevention

Uniqueness of the Technology

This project offers a novel approach to preventing early Diabetic Retinopathy (DR) progression:

- » **Unique Ayurvedic Formulation:** It focuses on a specific Ayurvedic formulation, Chakshushya Rasayana (CR), with potential benefits for DR.
- » **In-vitro and Clinical Evaluation:** The project employs a two-pronged approach – in-vitro studies to understand CR's mechanism of action and clinical trials to assess its effectiveness in patients.
- » **Novel Parameters in Clinical Study:** The study incorporates advanced blood markers like Lymphocyte/Neutrophil Ratio and VEGF factors, providing a deeper understanding of CR's influence.
- » **Palatable Pellet Form:** The project aims to develop a user-friendly pellet format for CR, improving patient compliance compared to traditional formulations.

Concept and Objectives

Concept

This project explores the potential of CR, an Ayurvedic formulation, in preventing early DR. It combines traditional Ayurvedic wisdom with modern scientific methods for evaluation.

Objectives

- » **Scientific Validation:** Establish the scientific basis for CR's effectiveness in managing early DR through in-vitro and clinical studies.
- » **Palatable Pellet Development:** Develop a low-cost, palatable pellet formulation of CR to enhance patient acceptance.
- » **Commercialization:** Make CR commercially available, improving accessibility for diabetic patients.

Potential Application Areas

This innovation has significant potential in various sectors:

- » **Diabetic Care:** Offers a potentially valuable tool for ophthalmologists and diabetologists managing diabetic patients.
- » **Ayurvedic Medicine:** Strengthens the credibility of Ayurveda by providing scientific evidence for the efficacy of CR in DR prevention.
- » **Public Health:** Reduces the burden of diabetic blindness by providing a potentially effective preventive measure.

Market Potential

The market potential for CR pellets is substantial:

- » **Large Diabetic Population:** Diabetes is a global health concern, and DR is a leading cause of blindness among diabetics.
- » **Limited Treatment Options:** Currently, there are limited options for preventing early DR progression. A safe and effective Ayurvedic solution can be highly sought-after.
- » **Improved Patient Compliance:** The user-friendly pellet format can increase patient adherence compared to traditional Ayurvedic preparations.
- » **Growing Interest in Ayurveda:** The rising popularity of Ayurveda creates a receptive market for clinically validated Ayurvedic products.

TABLE 1. NDPR Classification

Mild NPDR	<ul style="list-style-type: none"> • At least one microaneurysm or dot-blot hemorrhage • 5% progression to PDR in 1 year • Follow-up in 6 to 12 months based on the extent of glycemic control and other systemic comorbidities
Moderate NPDR	<ul style="list-style-type: none"> • "3-2-1" rule • At least one microaneurysm or dot-blot hemorrhage in one to three quadrants with at least one of the following: hard exudate, cotton wool spots, or venous beading • 25% progression to PDR in 1 year • Follow-up in 6 to 8 months based on the extent of glycemic control and other systemic comorbidities
Severe NPDR	<ul style="list-style-type: none"> • "4-2-1" rule • Microaneurysms and dot-blot hemorrhages in all four quadrants with at least two quadrants of venous beading and one or more quadrant of IRMA *with the absence of neovascularization or vitreous/preretinal hemorrhage* • 52% progression to PDR in 1 year • Follow-up in 2 to 4 months based on the extent of glycemic control and other systemic comorbidities
Very Severe NPDR	<ul style="list-style-type: none"> • Two or more characteristics of NPDR in the absence of neovascularization • 75% progression to PDR in 1 year • Follow-up in 2 to 3 months based on the extent of glycemic control and other systemic comorbidities

Abbreviations: IRMA, intraretinal microvascular abnormality; NPDR, nonproliferative diabetic retinopathy; PDR, proliferative diabetic retinopathy

12. CozyWave Pain Relief Belt: Personalized Comfort and Targeted Relief

Uniqueness of the Technology

The CozyWave Pain Relief Belt offers a distinctive approach to pain management:

- » **Multi-Therapy Combination:** Combines warmth therapy, massage therapy, and potentially other features (details lacking) for a more holistic pain relief experience.
- » **Customizable Settings:** Allows users to personalize temperature and massage settings through a user-friendly app, catering to individual preferences.
- » **Educational Component:** Provides educational value for students in healthcare and engineering fields by showcasing therapeutic technology applications.

Concept and Objectives

The CozyWave Belt aims to revolutionize pain management by:

- » **Individualized Relief:** Empowering users to personalize their pain relief experience through customizable settings.
- » **Technological Innovation:** Utilizing advanced temperature control and silent massage technology for enhanced comfort and effectiveness.
- » **Broader Applications:** Extending its use beyond pain relief to potentially include education and stress management in corporate settings.

Potential Application Areas

CozyWave has the potential to impact various sectors:

- » **Healthcare:** Aiding post-surgical recovery, managing chronic pain conditions (arthritis), and promoting patient-centered care.
- » **Sports Medicine:** Offering targeted muscle therapy for faster recovery and improved athletic performance.
- » **Women's Health:** Providing natural pain relief for menstrual cramps through controlled warmth and massage.
- » **Elderly Care:** Enhancing quality of life by alleviating joint pain and stiffness experienced by seniors.
- » **Workplace Wellness:** Promoting employee comfort and reducing stress in modern work environments.
- » **Retail Market:** Catering to health-conscious consumers seeking non-invasive pain management solutions.

Market Potential

The CozyWave Belt has promising market potential due to several factors:

- » Multifaceted Approach: Appeals to users seeking a more comprehensive pain relief experience than traditional methods.
- » Personalization: Caters to individual needs and preferences, increasing user satisfaction and compliance.
- » Diverse Applications: The belt's versatility extends its reach to a broader consumer base across various industries.
- » Trend Towards Wellness: Aligns with the growing interest in natural and holistic pain management solutions.

13. Nanofiber Skin Patches for Controlled Delivery of Herbal Pain Relief Medications

Uniqueness of the Technology

This innovation addresses limitations of traditional topical pain relief methods:

- » **Improved Convenience:** Nanofiber patches allow for on-the-go pain relief compared to messy oils requiring static positioning.
- » **Targeted Delivery:** Patches deliver medication directly to the affected area, minimizing waste and potential side effects.
- » **Controlled Release:** Nanofiber technology enables sustained and controlled release of herbal remedies for extended pain relief.
- » **Potential for Natural Solutions:** The patch design can be adapted to deliver various pain-relieving herbal formulations.

Concept and Objectives

Concept

This project leverages nanofiber technology to create skin patches for controlled delivery of herbal pain relief medications.

Objectives

- » **Develop Biocompatible Patches:** Fabricate skin patches using safe and biocompatible materials like nanofibers blended with gelatin and PCL.
- » **Enhance Drug Delivery:** Optimize the nanofiber structure to facilitate sustained and controlled release of herbal oils.
- » **Clinical Evaluation:** Conduct clinical trials to assess the efficacy and safety of the patches for pain relief.

Preliminary Work:

The proposal mentions successful integration of phytochemicals with nanofibers, demonstrating enhanced cell growth. This is a promising initial step.

Future Work:

- » **Evaluate Drug Release:** Investigate the release profile of various herbal formulations within the patches.
- » **Skin Irritation Studies:** Ensure the patches are safe for long-term use by conducting skin irritation tests.
- » **Clinical Trials:** Conduct clinical trials to evaluate the effectiveness of the patches for pain relief in different conditions.

Potential Application Areas

This innovation has the potential to disrupt the pain management market in various sectors:

- » **Pain Relief Medications:** Offers a potentially superior alternative to traditional topical pain relief methods.
- » **Herbal Remedies:** Provides a platform for controlled and targeted delivery of various herbal pain-relieving formulations.
- » **Chronic Pain Management:** Can be beneficial for individuals suffering from chronic pain conditions like arthritis and neuropathy.
- » **Sports Medicine:** Athletes can potentially use the patches for targeted pain relief during recovery.

Market Potential

The market potential for these patches is significant due to several factors:

- » **Growing Pain Management Market:** The demand for pain relief solutions is steadily increasing due to the aging population and rising incidence of chronic pain.
- » **Shift towards Natural Remedies:** Consumers are increasingly seeking natural alternatives to conventional pain medications.
- » **Convenience and Targeted Delivery:** The patch design offers advantages in convenience and targeted drug delivery compared to traditional methods.
- » **Global Market Expansion:** The transdermal patch market is expected to grow significantly, particularly in the Asia Pacific region.

14. Valorization of Hostel Food Waste for Bioplastic (PLA) Production

Uniqueness of the Technology

This project offers a novel approach to bioplastic production:

- » **Waste Stream Utilization:** It leverages hostel food waste, a readily available resource, to produce PLA, a biodegradable alternative to traditional plastics.
- » **Microbial Fermentation:** The project utilizes lactic acid bacteria (LAB) to ferment food waste into lactic acid, a precursor for PLA production.
- » **Potential Cost-Effectiveness:** By using waste materials and a potentially efficient process, this method has the potential to produce PLA at a lower cost.
- » **Target Applications:** The project focuses on PLA applications in the medical and food packaging industries, promoting sustainability in these sectors.

Concept and Objectives

Concept

This project explores converting hostel food waste into bioplastic (PLA) through fermentation and subsequent processes. It aims to utilize LAB for efficient lactic acid production and evaluate the resulting PLA's properties for industrial use.

Objectives

- » **Waste Collection and Segregation:** Develop a system to collect and segregate food waste from hostels effectively.
- » **LAB Isolation and Identification:** Isolate and identify suitable LAB strains from the food waste for optimal fermentation.
- » **Microbial Fermentation and Esterification:** Optimize the fermentation process using LAB to convert food waste into lactic acid and perform subsequent processes to produce PLA.
- » **PLA Characterization:** Evaluate the properties (stability, durability) of the PLA produced to ensure it meets industry standards.

Potential Application Areas

This innovation has significant potential applications in various industries:

- » **Bioplastics Production:** Provides a sustainable alternative feedstock for PLA production, reducing reliance on conventional resources.
- » **Waste Management:** Offers a valuable method for diverting food waste from landfills and converting it into a useful product.
- » **Medical and Food Packaging:** The produced PLA can be used for packaging materials in these sectors, promoting sustainable practices.

Market Potential

The market potential for PLA derived from food waste is promising due to several factors:

- » **Growing Demand for Bioplastics:** The increasing environmental concerns are driving demand for eco-friendly alternatives like PLA.
- » **Cost-Competitive Production:** The utilization of waste materials has the potential to make PLA production more cost-effective.

- » **Regulatory Environment:** Supportive government regulations promoting bioplastics can further increase market demand.
- » **Focus on Sustainability:** Many industries, particularly medical and food packaging, are actively seeking sustainable solutions, creating a receptive market for this innovation

15. Digital Observation System for Supporting and Protecting Migrant Children

Uniqueness of the Technology

This project proposes a cloud-based system for monitoring the well-being of migrant children:

- » **Parental Biometric Access:** Utilizes parental biometrics for secure data access and potentially reduces reliance on traditional identification documents, which migrants may lack.
- » **Vaccination Tracking and Reminders:** Tracks vaccination records and sends alerts for upcoming vaccinations, ensuring children receive timely immunizations.
- » **Real-Time Emergency Response:** Provides a real-time emergency response system connecting children and families with local authorities and support services.
- » **Culturally Sensitive Support:** Offers language learning tools and connects families with culturally sensitive support organizations.

Concept and Objectives

Concept

This project leverages digital tools to enhance understanding, safety, and support for migrating children. It aims to:

- » **Collect and Analyze Data:** Gather data on migrant children's demographics, migration patterns, and potential challenges.
- » **Track Location and Ensure Safety:** Monitor children's movements (with appropriate consent) to ensure their safety during migration and enable rapid responses to emergencies.
- » **Provide Support Services:** Offer a platform for delivering information, resources, and targeted assistance to migrant children and families.
- » **Raise Awareness and Advocate for Change:** Utilize collected data to raise awareness about the challenges faced by migrant children and advocate for improved policies and interventions.

Ethical Considerations:

- » **Data Privacy and Security:** The project must prioritize data privacy and security, complying with regulations like GDPR and ensuring parental consent for data collection and use.
- » **Transparency and Accountability:** Clear communication regarding data usage and transparency in operations are crucial for building trust with migrant communities.

Potential Application Areas

While the primary focus is child well-being, this system has broader potential applications:

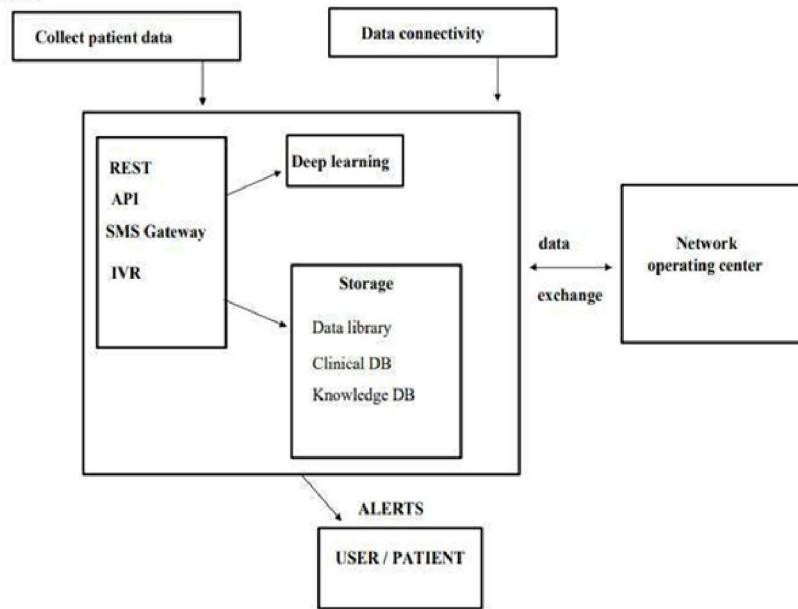
- » **Data Management and Analysis:** Organizations can leverage data management expertise to analyze migration patterns and identify areas of need.
- » **Logistics and Aid Distribution:** Collaboration with logistics companies can optimize the delivery of aid and resources to migrant children.
- » **Communication and Connectivity:** Tech companies can provide solutions to ensure connectivity for migrant children, facilitating communication with families and access to essential services.
- » **Medical and Healthcare Support:** The healthcare sector can develop telemedicine platforms or mobile clinics to deliver medical care in remote areas.
- » **Education and Skill Development:** Educational institutions can offer online learning opportunities or collaborate with migrant support organizations for skill development programs.
- » **Collaboration Platforms:** Secure online platforms can be created for communication and collaboration among various stakeholders involved in supporting migrant children.
- » **Ethical Tech Development:** The development of this system can prioritize ethical considerations, setting a benchmark for responsible technology use in humanitarian efforts.

Market Potential

The market potential for this system lies in its ability to address critical needs in child safety and well-being during migration. Potential stakeholders include:

- » **Educational Institutions:** Can utilize the system to provide educational resources and support services to migrant children.
- » **Migrant Support Organizations:** Can leverage the platform for data collection, communication, and targeted service delivery.
- » **Government Agencies:** Can utilize the system for policy development, resource allocation, and ensuring migrant children's well-being.
- » **Parents/Guardians:** Can benefit from features like vaccination tracking, emergency response, and access to support services.

FLOW CHART:



16. Smart Healthwatch: Empowering Wellness through Technology

Uniqueness of the Technology

This smartwatch innovation goes beyond basic health tracking by offering a holistic wellness solution:

- » **Comprehensive Tracking:** Monitors a wider range of vital signs (heart rate, blood pressure, sleep patterns) alongside lifestyle data, providing a more complete picture of health.
- » **Real-Time Insights and Alerts:** Provides immediate notifications for concerning health events, allowing users to take timely action.
- » **AI-Powered Personalization:** Utilizes advanced AI to analyze individual health data and preferences, generating personalized recommendations for behavior changes.
- » **Seamless Integration:** Integrates with existing fitness and health apps, creating a centralized platform for health management.
- » **Motivational Design:** Gamifies the experience with badges and progress tracking to keep users engaged and motivated on their wellness journeys.
- » **User-Friendly Interface:** Ensures accessibility with intuitive interfaces on both the smartwatch and mobile app.

Concept and Objectives

Concept

This project combines a sophisticated smartwatch with a mobile app to create a revolutionary health management system. It offers real-time health tracking, personalized recommendations powered by AI, and a comprehensive view of health data, empowering users to take charge of their well-being.

Objectives:

- » **Real-Time Tracking:** Develop a smartwatch that accurately monitors key health indicators, providing users with immediate access to their health data.
- » **AI-Powered Insights:** Implement AI algorithms that analyze health data to generate personalized recommendations for lifestyle improvements.
- » **Proactive Health Management:** Enable real-time alerts for critical health events, promoting proactive healthcare decisions.
- » **User Engagement:** Design a user-friendly interface and incorporate gamification elements to keep users motivated and engaged in their wellness journey.

Potential Application Areas

This innovation has far-reaching applications across various sectors:

- » **Healthcare and Wellness:** Hospitals, clinics, and wellness centers can utilize this for remote patient monitoring and personalized health programs.
- » **Corporate Wellness:** Companies can integrate the system into wellness initiatives, promoting employee health through personalized recommendations and stress management.
- » **Fitness and Sports:** Athletes and fitness enthusiasts can use it to monitor performance, recovery, and overall well-being, optimizing training regimens.
- » **Aging Population:** The elderly can benefit from continuous health monitoring and personalized recommendations to maintain active lifestyles.

- » **Health Insurance:** Insurance providers can incentivize healthy habits through this technology, potentially reducing healthcare costs.
- » **Consumer Electronics:** The general market will be drawn to the convenience of a single device offering health tracking, personalized coaching, and data integration with existing apps.
- » **Wellness Apps:** Developers can integrate with this system to enhance their offerings by providing accurate user health data for personalized suggestions.

Market Potential

The market potential for this smartwatch and mobile app combination is significant due to the growing emphasis on personalized health management.

- » **Comprehensive Approach:** This solution caters to the rising demand for a holistic view of health, combining data tracking with actionable insights.
- » **Improved Healthcare:** The potential for remote patient monitoring and proactive interventions in the healthcare industry is highly attractive.
- » **Employee Wellness:** Companies seeking to improve employee health and reduce healthcare costs will find value in this innovation.
- » **Tech-Savvy Consumers:** The user-friendly interface and gamified experience will resonate with the growing health-conscious population.

17. Novel Biocompatible Hydrogel for Diabetic Wound Healing: A Promising Approach

Title of Idea/Innovation

Biocompatible Seaweed-based Hydrogel with Herbal Extracts for Faster Diabetic Wound Healing

Uniqueness of the Technology

This innovation offers a novel approach to diabetic wound healing:

- » **Unexplored Herb:** The project utilizes a specific, unreported herb for its potential therapeutic benefits in a hydrogel formulation.
- » **Seasonal Availability:** The chosen herb offers the advantage of being available throughout the year, ensuring consistent supply.
- » **Synergistic Action:** The combination of seaweed biopolymer extract, phytochemicals from the herb, and biopolymers promotes wound closure due to their combined effects.
- » **Enhanced Wound Healing:** The hydrogel aims to accelerate diabetic wound healing and mimic the properties of the extracellular matrix, surpassing existing treatments like ointments.
- » **Biocompatible and Safe:** The seaweed biopolymer and herbal extracts offer biocompatibility and potentially reduce side effects compared to traditional medications.
- » **Improved Hydrogel Properties:** The herbal extracts enhance moisture retention, exudate absorption, pliability, and biodegradability of the hydrogel.

Concept and Objectives

Concept

This project explores the development of a biocompatible hydrogel containing a specific herbal extract and seaweed biopolymer extract. This formulation will be tested for its ability to promote faster wound healing in diabetic animal models.

Objectives

- » **Hydrogel Formulation:** Develop a hydrogel using the chosen herbal extract and seaweed biopolymer extract.
- » **Hydrogel Characterization:** Evaluate the hydrogel's visual appearance, pH, spreadability, viscosity, rheology, skin irritation, stability, and blood clotting properties.
- » **In-depth Analysis:** Analyze the hydrogel's composition using Fourier Transform Infrared Spectroscopy (FTIR) and Scanning Electron Microscopy (SEM).
- » **Efficacy Testing:** Assess the in vitro antioxidant and antimicrobial activity of the hydrogel.
- » **Wound Healing Potential:** Evaluate the in vivo wound healing efficacy of the hydrogel in diabetic rats.

Potential Application Areas

This innovation has significant potential in the diabetic wound care market:

- » **Diabetic Wound Treatment:** Offers a potentially more effective and faster-acting treatment option for diabetic wounds, a major complication for diabetic patients.
- » **Improved Patient Outcomes:** Can contribute to improved patient outcomes by reducing healing time, infection risk, and the need for limb amputations.
- » **Market Demand:** Addresses a growing market need due to the rising prevalence of diabetes worldwide.
- » **Hydrogel Advantages:** The hydrogel form offers advantages like enhanced moisture retention, exudate absorption, and biocompatibility compared to traditional wound dressings.

Market Potential

The market potential for this innovation is substantial due to several factors:

- » **High Disease Burden:** Diabetes is a major global health concern with a rapidly increasing number of patients.
- » **Diabetic Wound Complications:** Diabetic wounds are a serious complication with significant healthcare costs associated with treatment and potential amputations.
- » **Limited Treatment Options:** Existing treatments for diabetic wounds may have limitations in effectiveness or side effects.



18. Simple Yet Smart: A Reliable Elderly Care Solution with Smartwatch and Calling Bell

Uniqueness of the Technology

This solution combines familiar technology with innovation:

- » **Simple Calling Bell:** Leverages the universally recognized calling bell for easy alert notification, eliminating reliance on complex technology.
- » **Solar-Powered Smartwatch:** Provides essential health monitoring with a solar-powered smartwatch, ensuring uninterrupted operation without frequent charging.
- » **Offline Functionality:** Bypasses the need for internet connectivity, making it accessible in areas with limited internet infrastructure.

Concept and Objectives

Concept

This system combines a user-friendly smartwatch for health monitoring with a familiar calling bell for immediate assistance. It prioritizes simplicity and reliability to ensure elderly well-being.

Objectives

- » **Promote Independence:** Empower elderly individuals to maintain independence while providing a safety net through health monitoring and easy alert functions.
- » **Enhanced Safety:** Offer immediate assistance through the calling bell, ensuring timely care during emergencies or falls.
- » **Reduced Reliance on Caregivers:** Minimize the burden on caregivers by providing a reliable system for monitoring and alerting.
- » **Offline Functionality:** Ensure the system's functionality regardless of internet availability, offering peace of mind in any location.

Potential Application Areas

This innovation has applications in various sectors:

- » **Home Care:** Provides a reliable and user-friendly solution for families caring for elderly loved ones at home.
- » **Assisted Living Facilities:** Enhances safety and independence for residents in assisted living environments.
- » **Hospitals and Senior Care Centers:** Offers additional monitoring and communication tools for healthcare professionals.
- » **Technology Industry:** Bell companies can create advanced features like text-to-speech and medication reminders.
- » **Solar Energy Industry:** Increases demand for solar cells to power the smartwatches.
- » **Healthcare and Wellness Industry:** Hospitals can monitor health data through the app and suggest relevant therapies or medications.
- » **Nutrition Industry:** Food companies can develop specialized meal plans based on user health data collected through the app.

Market Potential

The growing elderly population creates significant market potential:

- » **Increased Demand for Care Solutions:** Families are increasingly seeking reliable and user-friendly care solutions for their aging loved ones.
- » **Focus on Independent Living:** This innovation promotes independent living for seniors, aligning with a growing trend.
- » **Improved Safety and Communication:** The system addresses safety concerns and facilitates communication between caregivers and elderly individuals.
- » **Adaptable Technology:** The modular design allows for future integration with additional features and functionalities.

19. GuardianCrib: Smart Crib for Enhanced Infant Safety and Parental Peace of Mind

Uniqueness of the Technology

GuardianCrib offers a unique blend of features for unparalleled infant safety:

- » **Advanced Sensor Technology:** Discreetly embedded sensors provide comprehensive monitoring, including weight sensing and advanced motion detection.
- » **Real-Time Alerts and Notifications:** Parents receive instant alerts on their smartphones or smart devices in case of potential threats, unauthorized lifting, or unusual crib activity.
- » **Encrypted Communication:** Ensures data security and privacy while transmitting information between the crib and the monitoring app.
- » **Remote Monitoring:** Optional live video feed allows parents to check on their baby remotely, fostering peace of mind.
- » **Adaptable Design:** Designed for easy integration with various crib and bassinet models, offering flexibility for existing baby furniture.
- » **Safety-First Approach:** Utilizes baby-safe materials and adheres to the highest safety standards, prioritizing the infant's well-being.

Concept and Objectives

Concept

GuardianCrib leverages cutting-edge sensor technology to transform a crib or bassinet into a smart safety system. It continuously monitors the baby's presence and movements, providing real-time alerts and remote monitoring options for parents.

Objectives

- » **Enhanced Infant Safety:** Detect potential threats like SIDS (Sudden Infant Death Syndrome) risk factors or unauthorized movement of the crib.
- » **Immediate Parental Notification:** Send instant alerts via a user-friendly app, allowing parents to take prompt action if needed.
- » **Remote Monitoring:** Offer optional live video feed for parents to check on their baby remotely, reducing anxiety and promoting peace of mind.
- » **Flexible Design:** Ensure compatibility with existing cribs and bassinets for wider adoption.
- » **Unwavering Safety:** Prioritize infant safety by using baby-safe materials and adhering to strict safety regulations.

Potential Application Areas

- » **Home Safety:** Provides a valuable tool for parents and caregivers to ensure their infant's safety in the home environment.
- » **Smart Nursery Integration:** Can be seamlessly integrated into smart nursery setups for a comprehensive monitoring ecosystem.
- » **Travel and On-the-Go Monitoring:** Offers peace of mind even while traveling with the baby through remote monitoring capabilities.

Market Potential

GuardianCrib addresses a critical concern for parents - their baby's safety. This, combined with the following factors, suggests promising market potential:

- » **Growing Demand for Smart Baby Products:** The market for smart baby monitors and safety solutions is steadily increasing.
- » **Enhanced Features:** GuardianCrib's advanced sensor technology and remote monitoring capabilities offer a competitive edge.
- » **Peace of Mind for Parents:** This solution caters to the constant concern parents have for their baby's well-being.
- » **Adaptability and Safety:** The flexible design and commitment to child safety make it appealing to a broad audience.

20. Automated Fish Disease Detection using Machine Learning and Laser Marking

Uniqueness of the Technology

This innovation offers a novel approach to fish disease detection in aquaculture:

- » **Machine Learning for Accuracy:** Employs machine learning algorithms to analyze fish for signs of disease, minimizing human error and improving detection accuracy.
- » **Rapid Disease Identification:** Enables faster detection of diseased fish, allowing for prompt isolation and treatment, minimizing disease spread.
- » **Laser Marking for Precision Removal:** Utilizes laser marking to precisely identify and remove only the infected fish, reducing waste and preserving healthy stock.
- » **Focus on Public Health:** Contributes to public health by preventing contaminated fish from entering the food chain

Concept and Objectives

Concept

This project proposes an automated system that combines machine learning with laser marking for efficient fish disease detection. The system will analyze fish for signs of disease and precisely mark infected individuals for removal.

Objectives

- » **Reduced Disease Transmission:** Prevent the spread of contagious diseases among fish populations within aquaculture facilities.
- » **Enhanced Fish Farm Profitability:** Minimize fish mortality rates, leading to increased revenue for fish farmers.
- » **Improved Food Safety:** Ensure that only healthy fish reach consumers, minimizing the risk of foodborne illnesses.
- » **Automated Disease Detection:** Develop a hardware system powered by a Raspberry Pi to automate fish disease identification.

Potential Application Areas

This innovation has significant potential in the aquaculture industry:

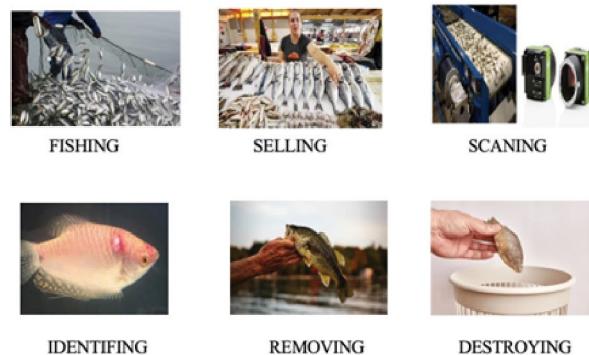
- » **Fish Farming:** Offers a valuable tool for fish farms to improve fish health, leading to higher yields and economic benefits.
- » **Food Safety Regulation:** Can be used to implement stricter quality control measures in the fish supply chain.
- » **Environmental Sustainability:** By minimizing disease outbreaks, this system can contribute to more sustainable aquaculture practices.

Market Potential

The market potential for this innovation is substantial due to several factors:

- » **Global Aquaculture Growth:** The aquaculture industry is experiencing significant growth worldwide.
- » **Economic Impact of Fish Diseases:** Fish diseases cause substantial economic losses in the aquaculture sector.
- » **Focus on Food Safety:** Increasing consumer concerns about food safety create a demand for better quality control measures.
- » **Machine Learning Adoption:** The growing adoption of machine learning in various industries positions it well for aquaculture applications.

ARCHITECTURE DIAGRAM:



21. Fresh Breath Naturally: Plant-Based Mouth Freshener with Mentha Piperita

Uniqueness of the Technology

This mouth freshener offers a natural alternative to chemical-laden options:

- » **Herbal Power:** Leverages the well-established medicinal properties of *Mentha piperita* (peppermint) for effective breath freshening.
- » **Safe and Gentle:** Provides a chemical-free, non-irritating, and less toxic option for oral hygiene, minimizing side effects.
- » **Antibacterial and Antiviral Properties:** *Mentha piperita*'s natural antibacterial and antiviral properties combat odor-causing bacteria and may offer additional oral health benefits.
- » **Freshness and Oral Care:** Promotes good oral hygiene by encouraging saliva production, which neutralizes acids and maintains a healthy oral environment.

Concept and Objectives

Concept

Develop a plant-based mouth freshener using readily available *Mentha piperita* to promote oral hygiene and combat bad breath.

Objectives

- » **Natural and Safe Option:** Offer a natural and safe alternative to conventional chemical mouthwashes.
- » **Fresh Breath and Oral Health:** Promote fresh breath and contribute to improved oral health by supporting a healthy oral environment.
- » **Reduced Dental Issues:** Help prevent dental problems like bad breath, plaque buildup, and gingivitis by encouraging good oral hygiene practices.
- » **Cooling Sensation:** Provide a refreshing and cooling sensation, enhancing the user experience.

Potential Application Areas

This innovation has promising applications in the oral care market:

- » **Meeting Consumer Demand:** Appeals to consumers seeking natural and safe alternatives for oral hygiene.
- » **Growing Oral Care Awareness:** Aligns with the increasing global focus on oral health and preventive care.
- » **Combating Bad Breath:** Provides a convenient solution for combating bad breath caused by food, tobacco, or alcohol consumption.
- » **Diverse Market Appeal:** Caters to a broad audience concerned about oral health and fresh breath.

Market Potential

The mouth freshener market offers significant potential due to several factors:

- » **Large and Growing Market:** The global mouth freshener market is substantial and projected for continued growth.
- » **Shift Towards Natural Products:** Consumers are increasingly opting for natural and organic personal care products.
- » **Addressing Oral Health Concerns:** Rising awareness of oral health issues fuels the demand for effective oral care solutions.
- » **Convenience and Accessibility:** Mouth fresheners offer a convenient and readily available solution for maintaining fresh breath.

22. Empowering Amputees: A Feature-Rich, AI-Powered 3D Printed Prosthetic Arm

Uniqueness of the Technology

This project focuses on creating a revolutionary 3D printed prosthetic arm with these key features:

- » **Advanced Functionality:** Integration of Artificial Intelligence (AI) technology to enhance functionality and user experience.
- » **Accessibility for All:** Emphasis on cost-effective production using 3D printing, making the prosthetic arm accessible to a wider population.
- » **Speech Recognition Control:** Exploration of speech recognition for intuitive control of the prosthetic arm through voice commands.
- » **Neural Network Integration (Potential):** Long-term vision of incorporating a neural network system for more natural and seamless control.
- » **SCADA and AI Integration (To be Clarified):** Further research is needed to explore the specific application of SCADA (Supervisory Control and Data Acquisition) technology within the AI framework.

Concept and Objectives

Concept

This project aims to develop a feature-rich prosthetic arm using 3D printing technology. The arm will be equipped with AI to improve functionality and potentially incorporate speech recognition and future neural network integration for intuitive control.

Objectives

- » **Improve Functionality:** Enhance the capabilities of prosthetic arms through AI integration.
- » **Reduce Costs:** Leverage 3D printing for cost-effective production, making the arms more accessible.
- » **Promote Independence:** Empower amputees with user-friendly controls like voice recognition for increased independence.
- » **Future Advancements:** Explore the potential of integrating neural networks for a more natural user experience.

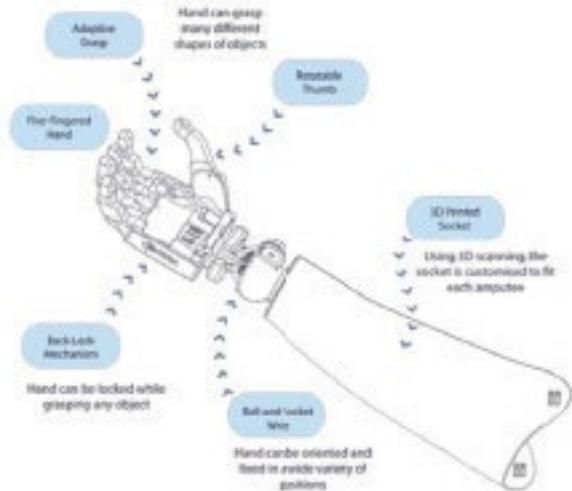
Potential Application Areas

- » **Prosthetics Market:** This innovation has the potential to disrupt the prosthetics market by offering a feature-rich and affordable option.
- » **Amputee Rehabilitation:** The improved functionality and ease of use can significantly benefit amputee rehabilitation programs.
- » **Assistive Technology:** This arm can contribute to the advancement of assistive technology for individuals with upper limb amputations.

Market Potential

The market potential for this innovation is significant due to several factors:

- » **Large Target Audience:** A considerable number of people around the world live with amputations.
- » **Limited Accessibility:** Current prosthetic arms can be expensive, limiting access for many amputees.
- » **Technological Advancements:** The integration of AI and speech recognition offers a competitive edge.
- » **Focus on Rehabilitation:** The growing emphasis on improving amputee rehabilitation creates a demand for advanced prosthetics.



23. Carbon Aware Smart Workspace: Personalized Carbon Footprint Monitoring and Reduction Strategies

Uniqueness of the Technology

This innovation goes beyond traditional carbon footprint tracking by offering a personalized approach:

- » **Individualized Monitoring:** Tracks and analyzes energy consumption data to provide personalized carbon footprint insights for each employee within a building.
- » **Actionable Recommendations:** Recommends personalized carbon offset strategies to empower individuals to reduce their environmental impact.
- » **Data-Driven Approach:** Leverages data analysis to deliver targeted recommendations and track progress towards carbon neutrality.

Concept and Objectives

Concept

This project proposes a “Carbon Aware Smart Workspace” system that monitors individual energy consumption within a building. It translates this data into personalized carbon footprint assessments and suggests actionable steps for reduction and offsetting.

Objectives

- » **Empower Individuals:** Equip each employee with personalized data and recommendations to actively participate in sustainability efforts.
- » **Reduce Building Footprint:** Minimize the overall carbon footprint of the building by promoting individual accountability for energy consumption.
- » **Data-Driven Sustainability:** Utilize data analysis to identify areas for improvement and track progress towards carbon neutrality goals.
- » **Promote Transparency:** Raise awareness of individual energy consumption and its environmental impact.

Potential Application Areas

This innovation has a wide range of applications across various sectors:

- » **Educational Institutions:** Promote environmental awareness among students and staff while reducing operational carbon footprints.
- » **Office Buildings:** Empower employees to make sustainable choices within the workplace and contribute to corporate social responsibility goals.
- » **Industries:** Implement data-driven strategies for energy conservation and carbon footprint reduction across facilities.

Market Potential

The market potential for this innovation is significant due to several factors:

- » **Growing Sustainability Focus:** Businesses and organizations are increasingly prioritizing sustainability initiatives and carbon footprint reduction.
- » **Personalized Approach:** The individual-centric design caters to the growing demand for personalized data and actionable insights.
- » **Data-Driven Decision Making:** Organizations value data-driven solutions for tracking progress and optimizing sustainability efforts.
- » **Regulatory Pressures:** Stringent environmental regulations are driving the adoption of carbon footprint monitoring systems.



24. Adaptable Speed Charging Dock

Uniqueness of the Technology

This innovation tackles key challenges in EV charging:

- » **Fast and Wireless Charging:** Leverages dynamic wireless power transfer for faster charging without the hassle of cables.
- » **Renewable Energy Integration:** Emphasizes the use of solar power and the grid for a sustainable charging solution.
- » **Supercapacitor Integration:** Incorporates supercapacitors in the EV to enable faster battery charging and improve efficiency.
- » **Smart Features:** Includes RFID tags and ultrasonic sensors for automatic identification and collision avoidance during charging.

Concept and Objectives

Concept

This project proposes an “Adaptable Speed Charging Dock” system for EVs. It utilizes dynamic wireless power transfer for fast and convenient charging. The system integrates with renewable energy sources and incorporates supercapacitors for enhanced charging efficiency. Additionally, RFID tags and ultrasonic sensors are employed for secure identification and safety measures.

Objectives

- » **Reduced Charging Time:** Enable significantly faster charging times compared to conventional wired charging.
- » **Sustainable Power Source:** Promote the use of renewable energy sources like solar power for EV charging.
- » **Improved Charging Efficiency:** Utilize supercapacitors to optimize charging efficiency and reduce battery wear.
- » **Enhanced Safety and Security:** Implement RFID tags for secure identification and ultrasonic sensors for collision avoidance.

Potential Application Areas

This innovation has significant potential in various sectors:

- » **Public Charging Stations:** Fast-charging infrastructure can be deployed in public locations, reducing range anxiety and encouraging EV adoption.
- » **Urban Transportation:** Electric buses and shuttles can benefit from fast-charging stations at depots or along routes for improved efficiency.
- » **Electric Taxis:** Strategic placement of fast-charging stations can support electric taxi operations by enabling quick charging during breaks.
- » **Electric Vehicle Rentals:** Fast-charging EVs can enhance rental services by allowing customers to quickly charge before returning vehicles.
- » **Workplace Charging:** Companies can offer fast-charging infrastructure for employee EVs, encouraging sustainable commuting practices.

Market Potential

The market potential for this innovation is substantial due to several factors:

- » **Increased EV Adoption:** The growing popularity of EVs creates a demand for faster and more convenient charging solutions.
- » **Convenience and Accessibility:** Fast-charging infrastructure makes EV ownership more practical and reduces reliance on home charging.
- » **Infrastructure Investment:** Development of a robust fast-charging network presents a significant market opportunity.
- » **Government Support:** Government policies and incentives promoting fast-charging infrastructure further fuel market growth.
- » **Global Market Expansion:** The demand for fast-charging EVs is expected to rise globally as countries prioritize sustainability goals.

25. Integrated Solar Panel Management System: Boosting Efficiency with IoT and Machine Learning

Uniqueness of the Technology

This innovation goes beyond traditional solar panel monitoring by offering a comprehensive solution:

- » **Multi-faceted Monitoring:** Combines dust monitoring, real-time data transmission, and user-directed cleaning prompts for optimal panel care.
- » **Dual-Axis Solar Tracking:** Maximizes energy generation by dynamically adjusting panel orientation to track the sun's position.
- » **Machine Learning-Powered Fault Detection:** Proactively identifies potential issues like micro-cracks and dust buildup for efficient maintenance.
- » **IoT Platform Integration:** Enables seamless data transmission, real-time notifications, and remote monitoring capabilities.

Concept and Objectives

Concept

This project proposes an integrated solar panel management system leveraging IoT and machine learning. It incorporates features like dust monitoring, user-directed cleaning prompts, dual-axis solar tracking, and machine learning-based fault detection.

Objectives

- » **Enhance Energy Generation:** Increase electricity production by 40% compared to static panels through dual-axis tracking and optimized cleaning.
- » **Improve Efficiency and Performance:** Utilize machine learning for proactive fault detection and real-time monitoring to maintain optimal performance.
- » **Streamline Maintenance:** Facilitate remote monitoring and user-directed cleaning prompts for efficient maintenance practices.
- » **Maximize System Longevity:** Promote early detection of potential issues to extend the lifespan of solar panels.

Potential Application Areas

This innovation has a wide range of applications across various sectors:

- » **Solar Energy Industry:** Optimize solar panel performance in solar farms and commercial installations.
- » **Facility Management:** Effectively manage solar panel systems for buildings, campuses, and industrial facilities.
- » **Renewable Energy Monitoring Services:** Provide comprehensive monitoring and maintenance solutions for renewable energy providers.
- » **Smart Cities & Sustainable Infrastructure:** Integrate solar power management into smart city initiatives and sustainable infrastructure projects.
- » **Agricultural Sector:** Optimize solar energy use in precision agriculture and sustainable farming practices.
- » **Remote & Off-Grid Installations:** Ensure efficient operation and maintenance of solar power systems in remote locations.

Market Potential

The market potential for this innovation is significant due to several factors:

- » **Growing Solar Energy Adoption:** The increasing demand for renewable energy sources fuels the need for solutions that maximize solar panel output.
- » **Focus on Maintenance and Performance:** This system addresses critical challenges in maintaining and optimizing solar panel performance.
- » **Cost Savings and ROI Improvement:** Enhanced energy generation, proactive maintenance, and extended system life lead to cost savings and improved return on investment for solar panel owners.
- » **Remote Monitoring and Automation:** The IoT integration allows for remote monitoring and control, simplifying management.
- » **Sustainability and Environmental Benefits:** This innovation aligns with the growing focus on sustainability and environmental responsibility.
- » **Market Versatility:** The system can be adapted to various industries and sectors, offering a broad market reach.

26. Highway Wind Energy Harvester

Uniqueness of the Technology

This concept focuses on capturing wind energy from passing vehicles on highways. While traditional wind turbines rely on natural wind variations, this innovation aims to utilize the consistent wind generated by highway traffic.

Concept and Objectives

Concept

The project proposes installing wind turbines along highways to harness the kinetic energy from moving vehicles. This would contribute to renewable energy generation and reduce dependence on fossil fuels.

Objectives

- » **Harness Traffic-Generated Wind:** Utilize the consistent wind created by highway traffic as a source of clean energy.
- » **Promote Renewable Energy:** Contribute to the global trend towards renewable energy sources for a sustainable future.
- » **Reduce Environmental Impact:** Generate clean electricity, potentially reducing dependence on fossil fuels and their associated environmental consequences.

Potential Application Areas

Market Potential

While the concept is innovative, there are significant challenges to overcome before widespread application:

- » **Technical Feasibility:** Extensive research and development are needed to determine the efficiency of capturing wind energy from highway traffic and the optimal turbine design for this specific application.
- » **Safety Considerations:** The placement and design of turbines must ensure safety for both vehicles and pedestrians.
- » **Environmental Impact Assessment:** Potential noise pollution and visual impact on the surrounding environment need to be evaluated.
- » **Cost-Effectiveness:** The high cost of installation, maintenance, and potential infrastructure modifications might outweigh the benefits.

Briefly Provide the Market Potential

The market potential for this innovation hinges on overcoming the technical and logistical hurdles. While the idea of harvesting wind energy from highways is original, significant research and development are required to assess its viability and ensure efficient, safe, and cost-effective implementation.

Alternative Considerations

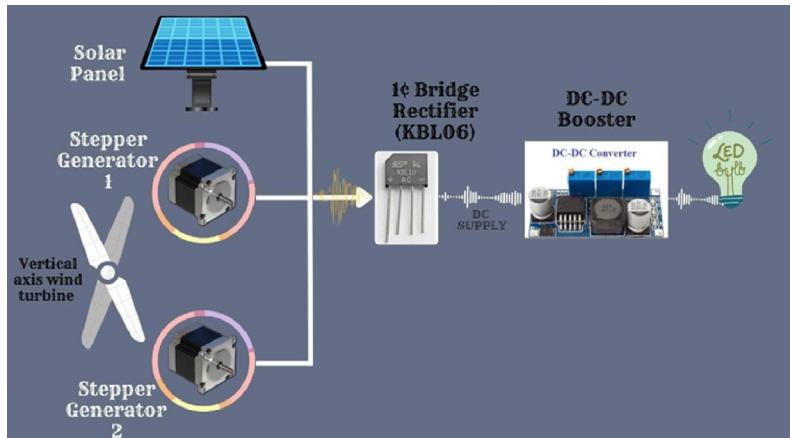
The market potential for this innovation hinges on overcoming the technical and logistical hurdles. While the idea of harvesting wind energy from highways is original, significant research and development are required to assess its viability and ensure efficient, safe, and cost-effective implementation.

Hybrid Wind and Solar Systems

Future advancements might lead to hybrid systems that combine wind turbines with solar panels for a more reliable and efficient energy source along highways.

Improved Energy Storage and Distribution:

Effective energy storage and distribution systems are crucial to manage the potentially erratic wind energy generated from traffic flow.



27. Advanced Footstep Power Generation Shoes: A Promising Step Towards Sustainable Energy

Title of Idea/Innovation

Advanced Footstep Power Generation Shoes

Uniqueness of the Technology

This innovation integrates footstep power generation technology directly into shoes. It utilizes piezo sensors to convert walking pressure into electricity, stored in supercapacitors for charging low-power devices like phones.

Concept and Objectives

Concept

The project proposes self-charging shoes equipped with piezo sensors in the soles. These sensors convert the pressure from each step into electricity. The generated electricity is stored in supercapacitors for later use.

Objectives

- » **Portable Power Generation:** Generate electricity from everyday walking to power low-power devices like mobile phones.
- » **Sustainable Energy Source:** Harness wasted kinetic energy from walking, promoting a more eco-friendly approach to personal power generation.
- » **Cost-Effective Charging:** Reduce reliance on traditional charging methods and potentially save on electricity bills.
- » **Promote Health and Wellness:** The concept encourages walking, potentially leading to a healthier lifestyle.

Potential Application Areas

This innovation has the potential to appeal to a broad audience:

- » **Environmentally Conscious Consumers:** Individuals seeking sustainable solutions for portable device charging.
- » **Health and Fitness Enthusiasts:** People who prioritize both exercise and eco-friendly practices.
- » **Travelers and Hikers:** Those who need to charge devices without access to traditional power outlets.

Market Potential

The market potential for these shoes depends on addressing several challenges:

- » **Power Generation Efficiency:** Research is needed to optimize piezo sensors and supercapacitors for sufficient energy generation to meet charging needs.
- » **Comfort and Durability:** The integration of energy harvesting components must ensure user comfort and withstand daily wear and tear.
- » **Cost Competitiveness:** Production costs need to be balanced with functionality to make the shoes affordable for a wider audience.

Marketing Strategies:

- » **Highlight Sustainability Benefits:** Emphasize the eco-friendly nature of the shoes and their contribution to a sustainable future.
- » **Target Fitness and Health Enthusiasts:** Promote the shoes as a way to combine exercise with personal power generation.
- » **Partner with Tech and Outdoor Brands:** Collaborate with relevant brands to reach a wider audience and enhance product credibility.

Future Considerations

- » **Advancements in Piezoelectric Materials:** More efficient energy conversion materials could improve power generation output.
- » **Wireless Charging Integration:** The shoes could potentially charge devices wirelessly through compatible charging pads.

28. Solar-Powered Smart Irrigation System with IoT

Uniqueness of the Technology

This innovation combines solar power, DC motors, IoT sensors, and machine learning to create a smart irrigation system. It offers several unique advantages:

- » **Renewable Energy Source:** Utilizes solar power, reducing dependence on traditional electricity and its costs.
- » **Sensor-Based Automation:** Employs IoT sensors to monitor soil moisture, weather conditions, and rain/freeze events, enabling data-driven irrigation.
- » **Machine Learning Integration:** Leverages machine learning to analyze sensor data and predict optimal irrigation schedules, considering weather forecasts and crop needs.
- » **Remote Monitoring and Control:** Allows farmers to monitor field conditions and control irrigation pumps remotely through mobile notifications.
- » **Scalability:** Suitable for various farm sizes, from small plots to large fields.

Concept and Objectives

Concept

This project proposes an irrigation system powered by solar panels and controlled through IoT technology. Sensors collect real-time data on soil moisture, weather, and rainfall. Machine learning algorithms analyze this data to determine optimal irrigation schedules, promoting efficient water usage and healthy plant growth. Farmers can monitor field conditions and control irrigation pumps remotely using mobile devices.

Objectives

- » **Promote Sustainable Practices:** Reduce reliance on non-renewable energy sources and conserve water through efficient irrigation.
- » **Optimize Crop Yield:** Ensure proper hydration for crops, leading to increased yield and improved crop quality.
- » **Reduce Water Wastage:** Prevent overwatering and under-watering by delivering the right amount of water at the right time.
- » **Minimize Labor Requirements:** Automate irrigation processes, freeing up farmers' time for other tasks.
- » **Enhance Decision-Making:** Provide data-driven insights to farmers for informed irrigation management.

Potential Application Areas

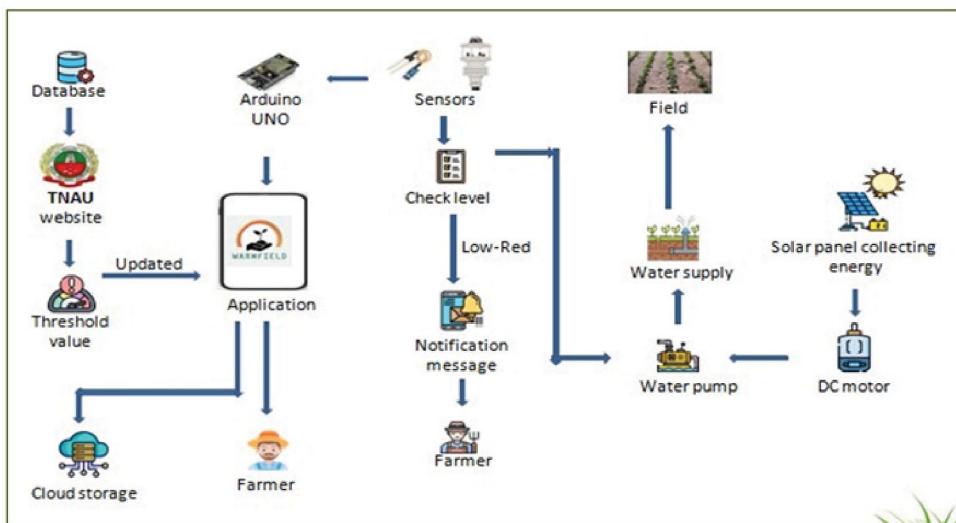
This innovation has significant potential in various agricultural sectors:

- » **Arable Farming:** Optimize irrigation for crops like wheat, rice, corn, and soybeans.
- » **Horticulture:** Ensure proper watering for fruits, vegetables, and flowers.
- » **Precision Agriculture:** Integrate the system with other precision farming techniques for data-driven agricultural management.

Market Potential

The market potential for this innovation is substantial due to several factors:

- » **Growing Focus on Sustainability:** The increasing demand for sustainable agricultural practices creates a need for water-saving solutions.
- » **Water Scarcity Concerns:** Rising concerns about water scarcity make efficient irrigation a priority for farmers globally.
- » **Technological Advancements:** Advancements in IoT, sensor technology, and machine learning make this system more feasible and cost-effective.
- » **Improved Productivity and Profitability:** The potential for increased crop yield and reduced water costs can incentivize farmers to adopt this technology.



29. Hello AI - Smart Console

Uniqueness of the Technology

Hello AI - Smart Console is an AI-powered educational platform that personalizes the learning experience for students. Here's how it stands out:

- » **Personalized Learning:** Recommends content, provides AI-powered tutoring, and delivers AI-generated content tailored to individual needs and learning styles.
- » **Inclusive Education:** Caters to diverse learning styles, abilities, and preferences, making education accessible to all.
- » **Empowered Teachers:** Offers real-time insights and personalized recommendations to educators for better instructional practices and targeted interventions.
- » **Student Choice and Ownership:** Allows students to choose subjects, topics, and learning pathways, fostering engagement and a sense of control over their education.
- » **Holistic Development:** Promotes critical thinking, problem-solving skills, and responsible AI use with explainable AI features.

Concept and Objectives

Concept

Hello AI - Smart Console leverages AI to personalize and enhance the learning experience.

Objectives

- » **Empower Students:** Provide students with personalized learning experiences that cater to their individual needs and learning styles.
- » **Develop Critical Thinking:** Nurture critical thinking and problem-solving skills through interactive learning activities.
- » **Promote Inclusivity:** Make education accessible and engaging for all students, regardless of background or ability.
- » **Support Educators:** Equip educators with real-time data and AI-powered insights to improve instruction and student support.
- » **Foster Responsible AI Use:** Introduce students to AI responsibly through explainable AI features that promote transparency and ethical decision-making.

Potential Application Areas

Target Market

Educational Institutions:

K-12 schools, higher education institutions, and vocational training providers.

Alignment with Educational Goals

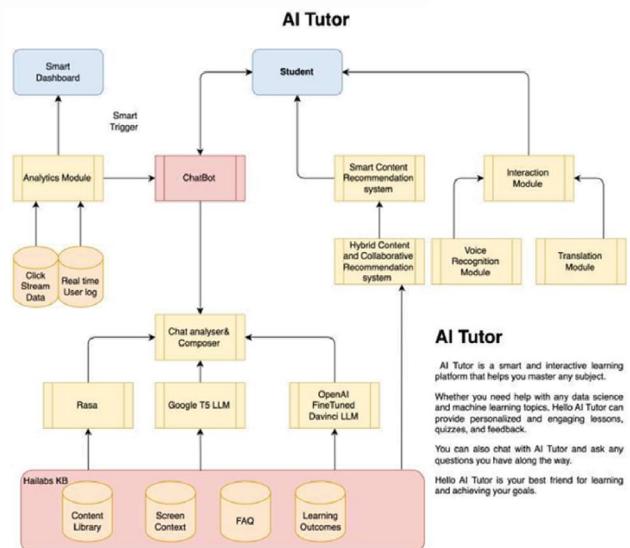
NEP 2020 (India):

Supports goals of practical learning, inclusive education, teacher empowerment, and student choice-based learning.

Market Potential

The market potential for Hello AI - Smart Console is significant due to several factors:

- » **Growing Demand for Personalized Learning:** Students increasingly seek learning experiences tailored to their needs. Hello AI - Smart Console addresses this demand with its personalized recommendations and AI-powered tutoring.
- » **Rise of AI in Education:** The education sector is embracing AI for various purposes. This platform leverages AI effectively to create a more engaging and effective learning environment.
- » **Focus on Inclusive Education:** There's a growing need for inclusive educational platforms. Hello AI - Smart Console caters to diverse learning styles and abilities, making it a valuable tool for promoting equitable education.



30. Kudumbashree Shakti: Empowering Women through Mobile Technology

Uniqueness of the Innovation

This Android application specifically targets the Kudumbashree network in India, empowering rural women through:

- » **Skilled Service Matching:** Connects NHC members with local job opportunities beyond the 100-Day program offered by the government.
- » **Micro-marketplace:** Provides a platform for NHC members to sell homemade products and local goods directly to consumers.
- » **Legal Resources:** Offers readily-available legal information and connects users with free legal aid services.

Concept and Objectives

Concept

Kudumbashree Shakti is an Android application designed to bridge the gap between rural women and resources for financial stability, entrepreneurship, and legal awareness.

Objectives

- » **Increase Employability:** Connect NHC members with job opportunities beyond government programs, maximizing their earning potential.
- » **Promote Entrepreneurship:** Facilitate the sale of homemade products and local goods, fostering a spirit of entrepreneurship among NHC members.
- » **Enhance Legal Literacy:** Provide easy access to legal information and connect users with free legal aid services, empowering women to protect their rights.
- » **Strengthen Networks:** Leverage the existing Kudumbashree network for wider reach and community support.

Potential Application Areas

1) Skilled Service Matching

- » NHC members can advertise their services (cooking, cleaning, childcare etc.) on the app for local hiring.
- » Verified profiles and ratings ensure user safety and trust.
- » The app can connect NHC members with Area Development Societies (ADS) for additional employment opportunities.

2) Micro-marketplace

- » NHC members can showcase and sell homemade products (food items, crafts, etc.) directly to consumers.
- » The app can handle basic transactions or integrate with existing mobile payment solutions.

3) Legal Resources

- » The app can provide downloadable PDFs on common legal topics relevant to rural women.
- » A directory of free legal aid services can connect users with appropriate legal support.

Market Potential

- » **Growing Smartphone Penetration:** Increasing smartphone usage among NHC members creates a ready user base for the app.
- » **Financial Inclusion Alignment:** The app's focus on financial empowerment aligns with government initiatives, potentially attracting support and funding.
- » **Network Leverage:** Integration with the existing Kudumbashree network ensures wider reach and community buy-in.

Title of Idea/Innovation

HaKsh-E: The Interactive Buddy Robot for Digital Wellness

Uniqueness of the Innovation

Teenagers today face unique challenges in the digital age. HaKsh-E, the Interactive Buddy Robot, is a novel solution that tackles these challenges by:

- » **Integrating Mindfulness Practices:** Teaches adolescents mindfulness techniques to manage screen time and promote overall well-being.
- » **Promoting Critical Thinking Skills:** Helps them critically evaluate online information and avoid cyberbullying.
- » **Nurturing Healthy Online Relationships:** Encourages positive online interactions and responsible digital citizenship.
- » **Encouraging a Balanced Lifestyle:** Guides teens towards a healthy balance between digital and real-world activities.

HaKsh-E offers a unique and engaging approach to digital wellness education.

Concept and Objectives

Concept

HaKsh-E is a social robot designed to be a supportive companion for teenagers navigating the digital world. Through interactive activities and engaging conversations, HaKsh-E promotes

- » **Productive Technology Use:** Teaches teens to utilize technology for learning, creativity, and personal growth.

Objectives

- » **Digital Wellness Assessment:** Assists teens in understanding their digital habits and identifying areas for improvement.
- » **Balanced Digital Lifestyle:** Encourages a healthy balance between screen time and offline activities like hobbies and social interaction.
- » **Online Safety and Resilience:** Equips teens with critical thinking skills to navigate online dangers and build resilience against cyberbullying.

Potential Application Areas

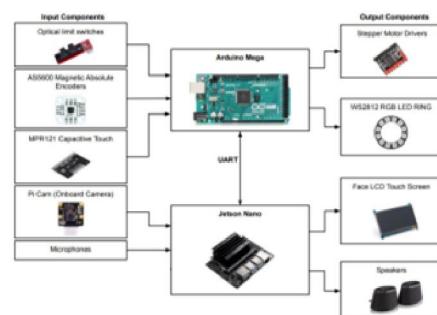
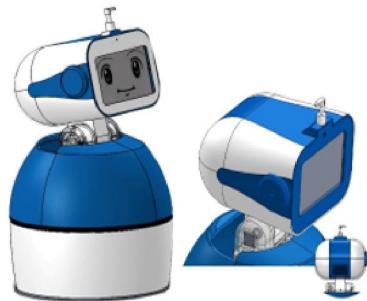
HaKsh-E's versatility makes it applicable across various sectors:

- » **Education:** Integrates with academic curriculum to promote balanced digital behavior alongside academic training.
- » **Social Initiatives:** Contributes to cybersecurity awareness programs, especially in underserved areas.
- » **Mental Health Counseling:** Provides a non-threatening platform for discussing sensitive issues and offering emotional support to teenagers.
- » **Parental Guidance:** Assists parents in guiding their children's digital habits and establishing healthy boundaries.
- » **Therapeutic Settings:** Collaborates with professionals to provide support during interventions for teenagers struggling with digital dependence.

Market Potential

The market for digital wellness education is rapidly growing as technology becomes increasingly integrated into our lives.

- » **Large Target Audience:** In India alone, there are over 250 million adolescents who can benefit from HaKsh-E's guidance.
- » **Multilingual Accessibility:** Configuring HaKsh-E for local languages expands its reach significantly.



31. Title of Idea/Innovation

EdgeAI4Education: A Multimodal Assessment Analyzer for Personalized Learning

Uniqueness of the Innovation

The Indian education system faces challenges like high dropout rates and low student engagement in online learning. EdgeAI4Education addresses these issues by:

- » **Multimodal Assessment:** Analyzes student behavior (eye gaze, audio, video, mouse interaction) during online exams.
- » **Cognitive and Emotional Insights:** Provides teachers with valuable insights into student engagement, cognitive processes, and emotional state while taking exams.
- » **Personalized Learning:** Enables targeted interventions based on individual student needs and learning gaps.
- » **Data Privacy:** Employs a federated learning approach to ensure student data privacy.

Concept and Objectives

Concept

EdgeAI4Education is an innovative edge-based AI system that monitors student behavior during online exams. It analyzes multimodal data to provide teachers with a holistic understanding of student learning and engagement.

Objectives

- » **Develop Cost-Effective Multimodal Sensors:** Capture student data through eye tracking, video, audio, and mouse interaction during online exams.
- » **Multimodal Data Analytics:** Analyze data using cloud and federated learning to understand student behavior and learning patterns.
- » **Validate EdgeAI Agent Efficacy:** Demonstrate the effectiveness of the AI system in providing targeted interventions for student improvement.
- » **Facilitate Collaborative Decisions:** Empower teachers with data-driven insights to make collaborative decisions for better learning outcomes.

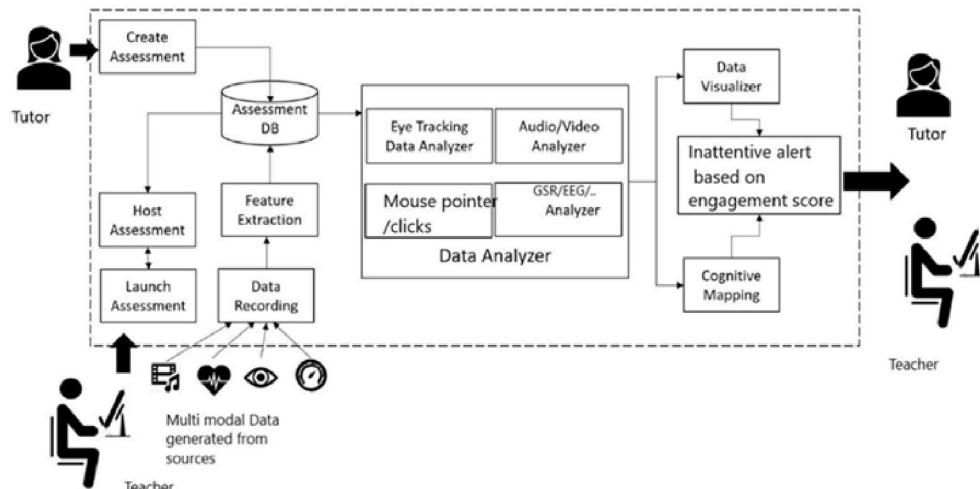
Potential Application Areas

EdgeAI4Education has vast potential in the booming online learning market:

- » **Addresses Changing Learning Preferences:** Caters to the growing demand for flexible and engaging online learning experiences.
- » **Personalized Learning Approach:** Offers a personalized learning experience by identifying individual student needs.
- » **Improves Learning Outcomes:** Enables teachers to tailor their approach based on student behavior and cognitive processes.

Market Potential

- » **Assistive Learning Device:** EdgeAI4Education serves as a valuable tool to support and enhance online learning.
- » **Personalized Learning Market:** The growing personalized learning market creates a significant opportunity for EdgeAI4Education.



Multimodal Assessment Analyzer for Online

32. Textile Connect: An Android App for Sustainable Textile Production

Uniqueness of the Innovation

Existing textile industry apps focus on basic functionalities like availability checks and price updates. Textile Connect goes beyond by:

- » **Eliminating Middlemen:** Connecting businesses directly for smoother transactions and reduced costs.
- » **Work Delegation and Order Distribution:** Enabling businesses to outsource work and find suitable partners.
- » **Equipment Service Locator:** Helping businesses easily locate nearby equipment service providers.
- » **Emphasis on Sustainability:** Encouraging local sourcing and reduced transportation costs.

Concept and Objectives

Textile Connect is an Android application designed to create a unified platform for the Indian textile industry. By connecting various stakeholders, it aims to:

- » **Increase Efficiency:** Streamline work processes, reduce delays, and improve overall production flow.
- » **Reduce Costs:** Eliminate intermediaries, minimize transportation expenses, and optimize resource utilization.
- » **Empower Businesses:** Provide small and medium-sized businesses with better access to resources and opportunities.
- » **Promote Sustainability:** Encourage local sourcing and environmentally conscious practices.

How it Works

- 1) **Businesses (units) register with the app using verified credentials.**
- 2) **Module 1: Accessories & Raw Materials:**
 - » Vendors update availability and pricing of accessories and raw materials.
 - » Businesses search for needed items and connect directly with local vendors.
 - » The app facilitates online transactions and generates GST-compliant bills.
- 3) **Module 2: Work Delegation:**
 - » Businesses post work orders on the platform.
 - » Other businesses can accept the order based on their capacity and expertise.
 - » The app facilitates communication and order management between parties.
- 4) **Module 3: Equipment Service:**
 - » Businesses locate nearby equipment service providers for maintenance and repairs.

Potential Application Areas

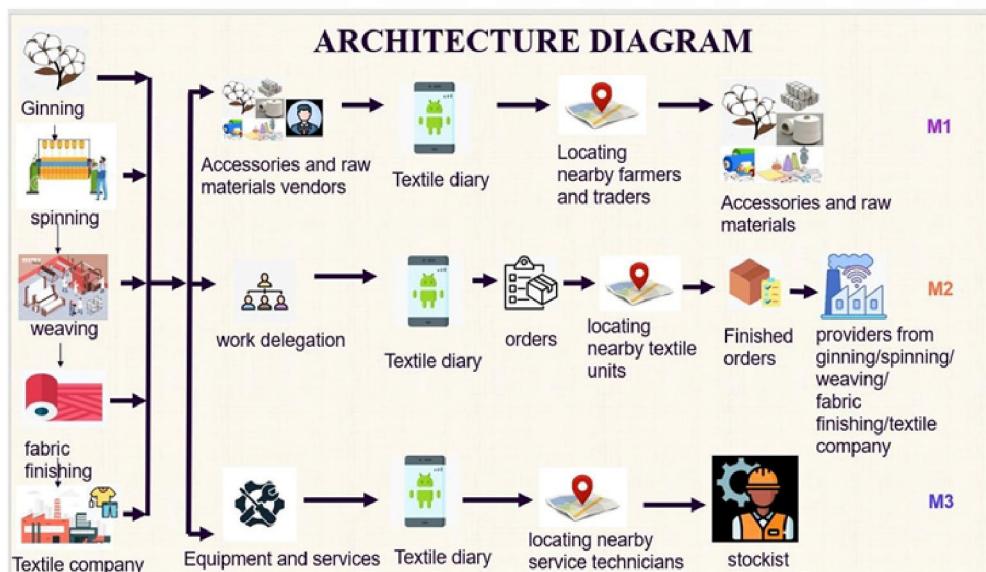
Textile Connect has applications across various segments of the textile industry:

- » **Garment Manufacturers:** Streamline sourcing, production planning, and order fulfillment.
- » **Accessory & Raw Material Vendors:** Increase market reach and connect directly with buyers.
- » **Labor Providers:** Find work opportunities and connect with businesses seeking assistance.
- » **Equipment Service Providers:** Improve service visibility and attract new clients.

Market Potential

The Indian textile industry is a significant employer and contributor to the GDP. Textile Connect offers benefits for all stakeholders:

- » **Increased Employment:** Creates new job opportunities within the textile sector.
- » **Reduced Costs:** Saves businesses money by eliminating intermediaries and optimizing operations.
- » **Faster Production:** Streamlines processes and reduces delays in order fulfillment.
- » **Sustainability:** Encourages local sourcing and environmentally conscious practices.
- » **Economic Growth:** Promotes overall growth of the textile industry and contributes to the Indian economy.



33. Unlocking Potential: An Inclusive Edu-Tech Platform for Children with Special Needs

Uniqueness of the Technology

Existing educational resources often overlook the needs of children with autism. Unlocking Potential offers a unique approach by:

- » **Personalized Learning:** Utilizing AI and machine learning to tailor content to individual learning styles and interests.
- » **Focus on Strengths:** Identifying and nurturing a child's unique talents, not just academic skills.
- » **Sign Language Integration:** Making educational content and communication accessible through regional sign language integration.
- » **Free and Accessible:** Providing free, high-quality educational resources in a child's native language.

Concept and Objectives

Concept

Unlocking Potential is an innovative edu-tech platform designed to empower children with special needs, particularly those on the autism spectrum. It leverages technology to create a personalized and inclusive learning experience.

Objectives

- » **Empowering Children:** Identify and nurture a child's talents and interests, fostering a sense of accomplishment and self-confidence.
- » **Bridging the Gap:** Connect children with resources and professionals to support their individual needs.
- » **Promoting Inclusion:** Break down communication barriers by integrating regional sign language into the platform.
- » **Enhancing Education:** Provide free, accessible, and engaging educational content tailored to each child's learning style.

How it Works

- » **Personalized Learning:** AI analyzes a child's interactions and preferences to suggest relevant activities and learning materials.
- » **Skill Development:** Interactive modules focus on building strengths and exploring areas of interest, like art, music, or technology.
- » **Sign Language Integration:** Educational content and communication options are available in regional sign languages.
- » **Connecting Resources:** The platform connects children with relevant professionals and support groups.

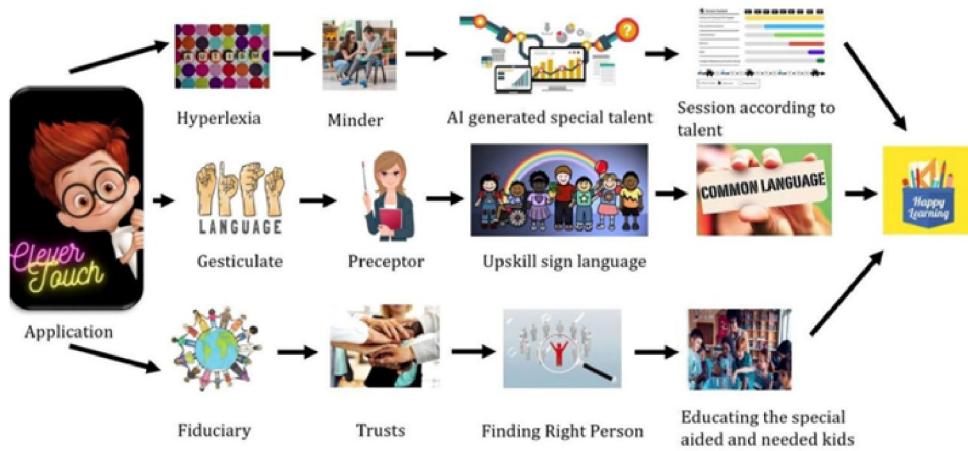
Potential Application Areas

Unlocking Potential has vast applications in the special needs education sector:

- » **Schools and Institutions:** Can integrate the platform as a supplementary learning tool for children with autism.
- » **Therapists and Educators:** Can utilize the platform's resources to personalize lesson plans and cater to individual needs.
- » **Parents and Caregivers:** Can access educational materials and connect with a supportive community.

Market Potential

- » **Large Target Audience:** With an estimated 45% of the population having special needs, the market reach is significant.
- » **Improved Educational Outcomes:** Increased access to education can empower children with special needs and contribute to the economy.
- » **Freemium Model:** A free basic version with a premium option for additional features can create a sustainable revenue stream.



34. SheSafe Guardian Web: Empowering Women's Safety Through Web Technology

Uniqueness of the Technology

SheSafe Guardian Web is a unique web application offering a comprehensive suite of safety features accessible from any device with a web browser. It goes beyond existing solutions by:

- » **Cross-Device Accessibility:** Works seamlessly on smartphones, laptops, and tablets for ultimate convenience.
- » **Guardian Alerts:** Features automated check-ins to ensure user safety, prompting action if a response is missed.
- » **Virtual Escort Mode:** Provides an extra layer of security during walks with alerts triggered by user inactivity.
- » **Discreet Recording:** Allows for discreet audio and video recording of incidents for evidence collection.

Concept and Objectives

Concept

SheSafe Guardian Web empowers women by providing a user-friendly web application packed with safety features.

Objectives

- » **Empowerment:** Equip women with tools for personal safety and informed decision-making.
- » **Enhanced Safety:** Encourage community participation in creating a safer environment.
- » **Accessibility:** Offer a web-based solution accessible across various devices.
- » **Confidence Building:** Promote confidence and autonomy among women through technology.

Potential Application Areas

SheSafe Guardian Web has vast potential for:

- » **Individual Users:** Women of all ages and backgrounds can benefit from the safety features.
- » **Organizations:** NGOs and women's safety groups can promote the app to their communities.
- » **Educational Institutions:** Colleges and universities can encourage students to use the app for personal safety.

35. SafeCircle: A Smart Wearable and Mobile App for Women's Security

Uniqueness of the Innovation

SafeCircle combines a discreet wearable device with a user-friendly mobile app to offer a comprehensive women's safety solution. Here's what sets it apart:

- » **Dual System:** Provides security both when carrying the wearable and when not (through the app).
- » **Multi-functionality:** Offers features beyond emergency alerts, like fake call functionality and location sharing.
- » **Social Alerting:** Sends alerts and location information to pre-selected contacts and designated social media circles.
- » **Discreet Design:** The wearable is designed to be compact and easily concealed for everyday use.

Concept and Objectives

SafeCircle is an innovative system designed to empower women and enhance their sense of security.

Concept

- » A discreet wearable device equipped with a panic button and GPS functionality.
- » A user-friendly mobile app that syncs with the wearable and offers additional safety features.

Objectives

- » **Provide Immediate Assistance:** Enable women to quickly call for help during emergencies.
- » **Increase Situational Awareness:** Allow users to share location information with trusted contacts in real-time.
- » **Deter Potential Threats:** Discourage harassment or assault through features like fake calls and social alerts.
- » **Promote Peace of Mind:** Empower women to feel safer when traveling alone or in unfamiliar environments.

Potential Application Areas

SafeCircle has vast potential to be used by:

- » **Individual Women:** Offers a personal safety solution for women of all ages and backgrounds.
- » **Educational Institutions:** Can be promoted among students to enhance campus safety.
- » **Workplaces: Companies,** especially those with night shifts or lone worker situations, can encourage its use for employee safety.

Market Potential

- » **Universal Need:** Women's safety is a global concern, making SafeCircle a highly relevant product.
- » **Technological Advancement:** Leverages advancements in wearables and mobile technology for a user-friendly solution.
- » **Scalability:** The system can be easily adapted to different regions and languages.

36. SMARTSERVE Rations: A Technology-Driven Solution for Efficient and Transparent Ration Distribution

Uniqueness of the Technology

SMARTSERVE Rations modernizes ration distribution through a unique combination of hardware and software components:

- » **Biometric Authentication:** Ensures rations reach intended beneficiaries through fingerprint, iris, or facial recognition.
- » **Real-Time Data Synchronization:** Enables centralized monitoring of stock levels and distribution patterns across ration shops.
- » **Integrated Hardware:** Barcode scanners and IoT sensors streamline operations and minimize errors.
- » **User-Friendly Interface:** A user-friendly app caters to both shop owners and beneficiaries.
- » **Detailed Reporting & Analytics:** Provides valuable insights for informed decision-making by government agencies.

Concept and Objectives

Concept

SMARTSERVE Rations leverages technology to transform traditional ration shops. Biometric authentication, real-time data, and user-friendly interfaces enhance efficiency, transparency, and accountability in ration distribution.

Objectives

- » **Streamlined Operations:** Automate inventory management, sales transactions, and beneficiary identification for quicker and more accurate distribution.
- » **Enhanced Transparency:** Real-time data and detailed reports provide clear insights into distribution patterns, stock levels, and transaction history.
- » **Prevent Fraud:** Biometric authentication ensures only eligible beneficiaries receive rations, eliminating identity theft.
- » **Modernization:** Transforms ration shops with contemporary technology, improving accessibility and efficiency.

Potential Application Areas

SMARTSERVE Rations has vast potential beyond ration distribution:

- » **Government Welfare Programs:** Manage subsidies, pensions, and essential supplies efficiently and transparently.
- » **Retail Operations:** Modernize inventory management, minimize errors, and enhance customer experience.
- » **Healthcare Settings:** Manage patient records, prescriptions, and medicine distribution accurately.
- » **Essential Commodities Distribution:** Ensure equitable allocation of fuel, fertilizers, and food grains.
- » **Supply Chain Management:** Enhance real-time data synchronization and analytics for timely restocking and optimized distribution.
- » **E-commerce:** Facilitate smooth order processing, improve user experience, and reduce errors through product identification and billing technology.
- » **Agricultural Produce Distribution:** Manage distribution networks for farmers, ensuring fair pricing and reducing intermediaries.

Market Potential

SMARTSERVE Rations addresses critical needs across various industries:

- » **Increased Efficiency:** Reduces manual errors and streamlines processes.
- » **Improved Governance:** Ensures fair and efficient distribution of essential goods and reduces leakages in social programs.
- » **Digital Transformation:** Aligns with the growing adoption of technology for improved services.
- » **Secure Identification:** Biometric authentication caters to the need for secure and convenient identification methods.
- » **Enhanced Supply Chains:** Real-time data and analytics improve efficiency across various sectors.
- » **Adaptability:** The system's versatile components can be tailored to diverse industries.
- » **Social Impact:** Efficient aid and essential supply distribution during emergencies.

37. Automated contactless attendance system with motion sensor and RFID reader.

Uniqueness and Benefits

This attendance system offers a novel approach by combining motion sensors with RFID card readers. This innovative blend provides:

- » **Enhanced Security:** Motion sensors deter unauthorized entries, adding an extra layer of protection.
- » **Improved Accuracy:** Combining motion detection with RFID verification ensures a person is physically present, not just waving a card.
- » **Streamlined Attendance Tracking:** Automatic data collection eliminates manual errors and saves time.
- » **Real-Time Insights:** Provides valuable data for informed decisions on areas like staff scheduling or resource allocation.
- » **Contactless Attendance:** Reduces the risk of germs spreading, especially valuable in a post-pandemic world.

Concept and Objectives

The concept revolves around integrating motion sensors and RFID card readers to revolutionize attendance management. Motion sensors detect movement within a designated area, while RFID readers verify individual identities. This combined technology automates attendance tracking, enhances data accuracy, and allows real-time monitoring of entry and exit events.

The primary objectives are

- » **Increased Efficiency and Data Accuracy:** Create a streamlined and contactless system to eliminate manual recording and improve data reliability.
- » **Reduced Administrative Burden:** Automate attendance processes, freeing up time for other tasks.
- » **Enhanced Security:** Provide an additional layer of security through motion detection.
- » **Versatility:** Offer a comprehensive solution applicable across various sectors, including education, corporate, healthcare, and events.

Potential Applications

This system has vast potential for application in diverse fields:

- » **Education:** Track student attendance in classrooms, libraries, and other areas.
- » **Corporates:** Efficiently manage employee attendance, access control, and time tracking.
- » **Events:** Monitor participant attendance at conferences, workshops, and seminars.
- » **Healthcare:** Optimize staff scheduling and improve patient care coordination.
- » **Retail:** Improve staff attendance management and customer service tracking.
- » **Hospitality:** Enhance employee attendance tracking and security in hotels, resorts, and restaurants.
- » **Manufacturing:** Monitor workforce presence for safety and operational efficiency.
- » **Security:** Provide an extra layer of security by promptly detecting unauthorized entries in secure areas.
- » **Public Facilities:** Manage access and occupancy in offices, libraries, and public spaces.
- » **Sports and Entertainment:** Monitor attendee presence at sports venues, theaters, and cultural events.

Market Potential

The market potential for this innovation is significant due to several factors:

- » **Addresses Widespread Need:** Organizations across various industries seek efficient and accurate attendance management solutions.
- » **Data-Driven Approach:** Provides valuable data for better decision-making.
- » **Improved Security:** Motion sensors add an extra layer of security.
- » **Contactless Attendance:** Addresses hygiene concerns in the post-pandemic era.

38. BioShield: Sustainable Packaging with UV Protection

Uniqueness of the Innovation

This innovation introduces a novel biomaterial for packaging film. It utilizes a blend of Polyvinyl Alcohol (PVA) and Gelatin, but with a unique twist:

- » Hybrid Filler System: Unlike existing PVA-Gelatin blends, this one incorporates a first-time combination of Tannic Acid and Lignin as a hybrid filler.
- » Multifunctional Properties: This hybrid filler system introduces numerous functionalities to the final film, potentially enhancing:
 - ◊ Biodegradability (inherent to PVA and Gelatin)
 - ◊ UV Protection (introduced by Tannic Acid and Lignin)
 - ◊ Strength and Stability (potentially improved by the filler system)

Concept and Objectives

Traditional plastic packaging raises environmental concerns due to its non-biodegradable nature. BioShield addresses this by offering a sustainable alternative.

Concept

BioShield utilizes a blend of PVA and Gelatin, biomaterials known for their biodegradability. The addition of the Tannic Acid-Lignin hybrid filler system aims to create a multifunctional film ideal for packaging.

Objectives

- » Develop a cost-effective and eco-friendly packaging material.
- » Achieve biodegradability through the use of PVA and Gelatin.
- » Introduce UV protection properties through the Tannic Acid-Lignin filler.

Potential Application Areas

BioShield has the potential to revolutionize packaging across various industries:

- » **Food Packaging:** Provides excellent UV protection and potential antibacterial properties, extending shelf life and preserving food quality.
- » **Biomedical Field:** Offers a sustainable and potentially biocompatible solution for packaging medical supplies.
- » **Cosmetics and Drug Delivery:** BioShield's biodegradability and potential functionalities make it suitable for these applications.

Market Potential

BioShield offers a compelling value proposition:

- » **Cost-Effective:** Utilizes readily available biomaterials.
- » **Biodegradable:** Reduces plastic waste and environmental impact.
- » **UV Protection:** Extends product shelf life and maintains quality.
- » **Multifunctional Potential:** Offers additional functionalities beyond biodegradability.

39. Innovative Water Tank Design with Self-Cleaning and Smart Monitoring

This proposal outlines a novel water tank design that simplifies sediment removal and incorporates smart monitoring technology.

Uniqueness and Benefits

- » **Sloped Tank Bottom:** A 10-degree inclination at the tank's bottom creates a natural collection point for sediments, facilitating easier removal.
- » **Sediment Removal Outlet:** An exit pipe positioned at the tank's lowest point allows for efficient flushing of accumulated sediment.
- » **Smart Monitoring App (optional):** Integration of an app with a sediment level sensor allows for real-time monitoring and alerts when cleaning is necessary. This eliminates manual checking and streamlines maintenance.

Concept and Objectives

The core concept involves modifying a conventional water tank design by incorporating a sloped bottom and a dedicated sediment removal outlet. Additionally, an optional smart monitoring app can be integrated for automated sediment level tracking.

Objectives

- » **Effortless Sediment Removal:** The tilted base and dedicated outlet enable easy sediment removal, minimizing manual cleaning efforts and time.
- » **Improved Water Quality:** Efficient sediment removal helps maintain clean water quality within the tank.
- » **Enhanced Maintenance Efficiency:** The optional app simplifies maintenance scheduling by providing real-time data on sediment levels.

Potential Applications

This innovative water tank design has vast applicability across various sectors:

- » **Residential Homes:** Ideal for domestic water storage, ensuring clean water for household use.
- » **Commercial Buildings:** Suitable for office buildings, hotels, hospitals, and educational institutions, promoting clean water supply and reducing maintenance burden.
- » **Industrial Facilities:** Manufacturing plants, food processing units, and power plants can benefit from efficient sediment removal for clean water in industrial processes.
- » **Rural and Remote Areas:** In areas with limited access to clean water, this design can improve water quality and reduce contamination risks.
- » **Agriculture:** Farms can leverage this design for clean water storage used for irrigation, livestock, and other agricultural needs.
- » **Disaster Relief:** Temporary water storage solutions in emergencies can benefit from this design's quick setup and clean water provision.

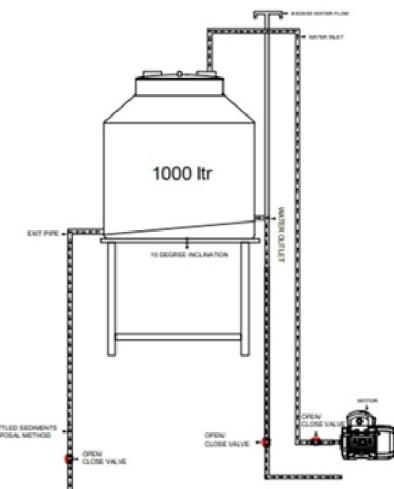
Market Potential

The global water tank market is projected for significant growth, driven by factors like:

- » **Rising Construction Activities:** Increased residential and commercial construction creates a demand for water storage solutions.
- » **Focus on Water Management:** Growing awareness of water conservation necessitates efficient storage and treatment systems.
- » **Water Scarcity:** Regions with water scarcity require reliable storage solutions for clean water access.

This innovative tank design caters to this growing market by offering:

- » **Cost-Effectiveness:** A simple modification to existing designs minimizes additional costs.
- » **Improved Efficiency:** Simplifies sediment removal and maintenance.
- » **Enhanced Water Quality:** Ensures clean water storage, reducing health risks and maintenance need.



40. Scooter Accidental Throttle Cut-Off System (SATCOS)

Newness and Benefits

SATCOS addresses a common issue with scooters (gearless two-wheelers) - accidental acceleration while stationary. This can lead to loss of control, injuries, and property damage. SATCOS offers a novel approach to prevent such accidents:

- » **Sensor Integration:** Combines a weight sensor (on the seat) and a touch sensor (on the handlebar) to ensure rider presence and proper grip.
- » **Accidental Throttle Cut-Off:** If the throttle is raised while the sensor conditions aren't met (rider not seated or improper grip), the system cuts off engine power, preventing accidental acceleration.

Concept and Objectives

Traditional plastic packaging raises environmental concerns due to its non-biodegradable nature. BioShield addresses this by offering a sustainable alternative.

Concept

SATCOS utilizes sensors to create a safety mechanism that automatically disables the engine in case of accidental throttle activation when the rider is not properly positioned or gripping the handlebars.

Objectives

- » Enhance rider safety by preventing accidents caused by accidental throttle increases.
- » Reduce injuries and property damage associated with such accidents.
- » Provide peace of mind for scooter riders, especially beginners or those carrying passengers.

Potential Applications

- » **Standard Feature in New Scooters:** Can be integrated as a mandatory safety feature in all new scooters manufactured.
- » **Retrofit Option for Existing Scooters:** Offered as an aftermarket add-on kit for existing scooters, allowing broader application.

Market Potential

- » **Addresses Widespread Safety Concern:** Accidents due to accidental throttle rise are a significant concern for scooter riders.
- » **Large Existing Scooter Market:** The global scooter market is vast, with millions of scooters on the road.
- » **Retrofitting Potential:** SATCOS can cater to both new and existing scooters, maximizing its reach.
- » **Enhanced Safety Image:** Scooter manufacturers can leverage SATCOS as a unique selling proposition, promoting rider safety.

Market Potential Summary:

SATCOS has the potential to become a widely adopted safety feature in the scooter market. Its ability to prevent accidents, improve rider safety, and offer a retrofit option for existing vehicles positions it as a valuable innovation.

41. Phage-Shield: Bioengineered Urinal Mats for Lasting Odor Control

Uniqueness and Benefits

Phage-Shield introduces a revolutionary approach to urinal odor control using immobilized bacteriophages within the screen mat itself. Here's what sets it apart:

- » **Targeted Bacteria Elimination:** Utilizes bacteriophages (viruses that specifically target and kill bacteria).
- » **Focuses on Odor-Causing Bacteria:** Targets bacteria responsible for ammonia and other unpleasant odors in urinals.
- » **Immobilized Phages:** Ensures sustained presence of active phages within the mat for continuous odor control.
- » **Eco-Friendly Solution:** Eliminates the need for harsh chemicals like hydrochloric acid or chlorine, promoting environmental safety.

Concept and Objectives

Public restrooms often battle persistent odors due to ureolytic bacteria. Phage-Shield tackles this challenge with a bioengineered approach:

Concept

Incorporates immobilized phages within urinal screen mats. These phages target and eliminate odor-causing bacteria, effectively controlling unpleasant smells.

Objectives

- » Develop a sustainable and eco-friendly solution for urinal odor control.
- » Identify and target specific bacteria responsible for malodorous compounds.
- » Design and test urinal screen mats containing immobilized phages for long-lasting odor reduction.

Potential Applications

Phage-Shield has vast applicability across various locations with public restrooms:

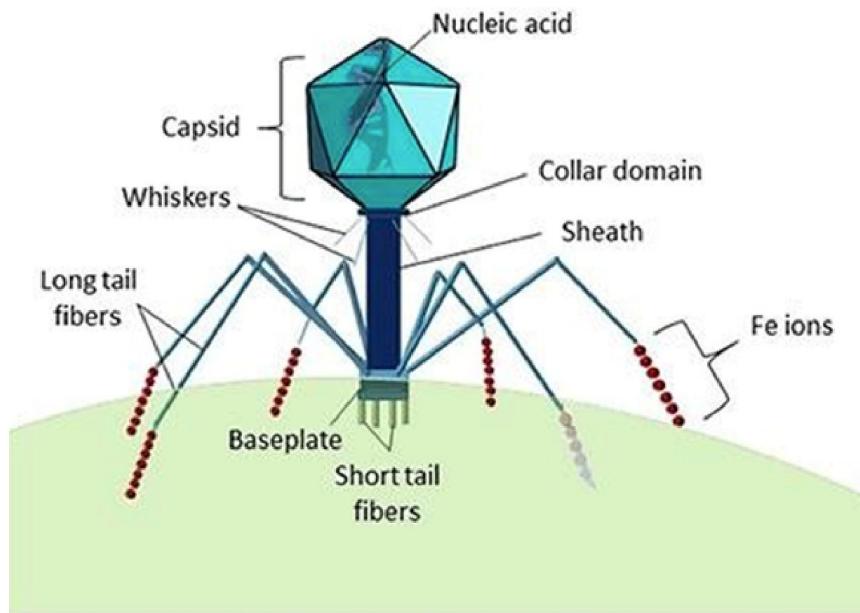
- » **Commercial Buildings:** Offices, shopping malls, and other commercial establishments.
- » **Public Restrooms:** Train stations, airports, bus terminals, and public facilities.
- » **Educational Institutions:** Schools, colleges, and universities.
- » **Hospitality Sector:** Hotels, restaurants, and other hospitality businesses.

Market Potential

- » **Government Initiatives:** Aligns with government programs like Swachh Bharat Mission for improved sanitation.
- » **Cost-Effectiveness:** Offers a long-lasting solution compared to frequent chemical applications.
- » **Sustainability:** Appeals to environmentally conscious businesses and consumers.
- » **Unique Selling Proposition:** Provides differentiation in the odor control market.
- » **Growing Market:** The phage-based product market is experiencing significant growth.

Market Summary

Phage-Shield addresses a critical need for effective and eco-friendly odor control in public restrooms. Its targeted approach, sustainability benefits, and long-lasting effectiveness position it for success in a growing market. By focusing on hygiene-conscious consumers and businesses seeking innovative solutions, Phage-Shield has the potential to become a widely adopted product.



42. KFarms: Fresh, Local, Trusted - High-Quality Chicken

Uniqueness and Value Proposition:

KFarms goes beyond just selling chicken; it offers a complete farm-to-table experience focused on quality, hygiene, and customer satisfaction:

- » **Modern Technology-Driven Retail Chain:** Provides a convenient and modern way to purchase fresh chicken.
- » **Pure Organic Chickens:** Raises chickens using sustainable practices, potentially appealing to health-conscious consumers (although “organic” needs to be certified).
- » **High-Quality, Hygienic Chicken:** Maintains strict quality control measures throughout the production process, ensuring the freshest and safest chicken products.
- » **Wide Range of Products:** Offers diverse cuts and minced options to cater to various cooking preferences.
- » **Customer-Centric Approach:** Focuses on understanding customer needs and providing a personalized buying experience.
- » **Affordable Prices:** Makes high-quality chicken accessible to a broader customer base.

Concept and Objectives

KFarms prioritizes quality and responsible practices:

- » **Sustainable Farming:** Emphasize humane treatment and a healthy environment for their chickens.
- » **Biosecurity Measures:** Implement strict protocols to safeguard chicken health and minimize contamination.
- » **Commitment to Freshness:** Deliver farm-fresh chicken directly to consumers.

Objectives

- » Provide a reliable source of high-quality, hygienic chicken.
- » Offer a diverse range of chicken products to meet various needs.
- » Create a customer-centric experience focused on convenience and satisfaction.
- » Promote sustainable and responsible poultry farming practices.

Potential Applications

KFarms caters to a wide range of chicken consumers:

- » **Home Cooks and Families:** Seeking fresh, hygienic chicken for everyday meals.
- » **Food Enthusiasts:** Looking for diverse cuts and options to explore culinary creativity.
- » **Health-Conscious Consumers:** Prioritizing reliable and hygienically raised protein sources.
- » **Restaurants and Food Businesses:** Needing a trusted supplier for consistent quality chicken.

Market Potential

The Indian poultry market is experiencing significant growth, driven by rising protein consumption. KFarms capitalizes on this trend by:

- » **Focus on Quality and Hygiene:** Providing a premium offering in a growing market.
- » **Convenience:** Offering a modern retail experience with online options.
- » **Transparency:** Potentially highlighting sustainable practices to attract environmentally conscious consumers.

43. FungaSol: Sustainable Dishwashing Solution Powered by Aspergillus Niger

Uniqueness and Value Proposition:

FungaSol offers a revolutionary approach to dishwashing by harnessing the power of a novel *Aspergillus niger* strain. Here's what sets it apart:

- » **Citrate-Based Cleaning:** Utilizes bio-derived citric acid produced by *A. niger*, a more eco-friendly alternative to harsh chemicals in traditional detergents.
- » **High-Yielding *A. niger* Strain:** A proprietary strain efficiently produces large amounts of citric acid from simple and inexpensive domestic waste.
- » **Waste Upcycling:** Transforms household food scraps into a valuable cleaning agent, promoting sustainability and reducing waste.
- » **Domestically Fermented:** Empowers households with a decentralized process for creating their own cleaning solution, potentially lowering reliance on commercially produced detergents.
- » **Future Applications:** This technology has the potential to expand into biofertilizers and animal feed production.

Concept and Objectives

FungaSol tackles environmental concerns associated with traditional dishwashing detergents by introducing a bio-based solution:

Concept

Leverages a unique *A. niger* strain to ferment domestic waste into citric acid, a natural cleaning agent, for dishwashing liquid production.

Objectives

- » Develop a sustainable dishwashing solution using a bio-fermentation process.
- » Reduce reliance on chemical-based detergents and promote eco-friendly cleaning.
- » Empower households to manage waste and produce their own cleaning solutions.
- » Lay the foundation for future bio-based product development.

Potential Applications:

FungaSol caters to a broad market seeking eco-friendly cleaning solutions:

- » **Environmentally Conscious Consumers:** Appeals to those seeking sustainable alternatives for everyday cleaning needs.
- » **Urban Households:** Offers a convenient and potentially cost-effective option for managing waste and dishwashing.
- » **Globally:** Applicable in regions with rising environmental concerns and interest in bio-based products.

Market Potential

The market for eco-friendly cleaning products is experiencing significant growth. FungaSol capitalizes on this trend by:

- » **Sustainable Solution:** Provides an eco-friendly alternative to conventional detergents.
- » **Waste Reduction:** Promotes waste management and resource recovery within households.
- » **Cost-Effectiveness:** Has the potential to be a cost-competitive option in the long run.
- » **Domestic Production:** Empowers households with a potentially cost-saving cleaning solution.



44. Friction Stir Welding: The Future of Strong, Clean Brass Joining

Summary of Innovation:

Friction Stir Welding (FSW) offers a revolutionary approach to joining brass components. Unlike traditional welding methods, FSW creates a solid-state bond without melting the metal, resulting in several advantages:

- » **Superior Joint Strength:** Friction stir welding produces strong, defect-free joints with excellent mechanical properties.
- » **Preserved Material Properties:** The low-heat process minimizes alterations to the base material, retaining brass's desirable qualities like conductivity and corrosion resistance.
- » **Minimal Heat Distortion:** Reduces warping and shrinkage compared to traditional welding methods.
- » **Environmentally Friendly:** Eliminates fumes, gases, and arc emissions, making it a cleaner and safer process.
- » **Reduced Heat-Affected Zone (HAZ):** Minimizes material degradation in the weld area.
- » **Versatility:** Effectively joins brass components of different thicknesses.
- » **No Filler Material Required:** Simplifies the process and reduces material costs.

Concept and Objectives

FSW offers significant benefits for joining brass in various applications. This technology can address key challenges

- » **Maintaining Material Properties:** FSW optimizes parameters to ensure strong welds while preserving the unique characteristics of brass.
- » **Joint Integrity:** The focus lies on achieving high-quality, defect-free welds with sufficient strength for demanding applications.
- » **Process Optimization:** Understanding how welding parameters like speed, tool design, and force impact the joint quality is crucial.

Potential Applications

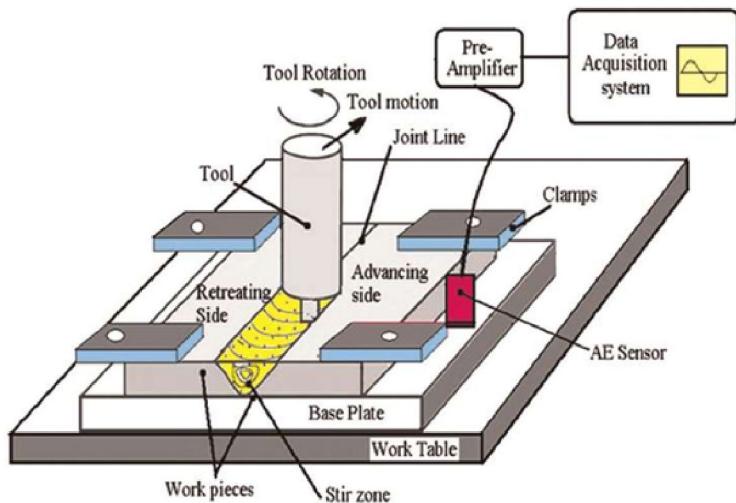
FSW for brass-to-brass joints has vast potential across various industries:

- » **Automotive:** Engine parts, heat exchangers, fuel tanks, exhaust systems.
- » **Aerospace and Aviation:** Heat exchangers, fuel tanks, hydraulic systems, structural elements.
- » **Electrical and Electronics:** Heat sinks, connectors, terminals, circuit board components.
- » **Plumbing and HVAC:** Pipes, valves, fittings, other components for leak-free connections.
- » **Marine and Shipbuilding:** Valves, pumps, heat exchangers, marine plumbing systems in seawater environments.
- » **Renewable Energy:** Components in solar water heaters, geothermal systems, biomass or waste-to-energy plants.

Market Potential

The market outlook for FSW of brass joints is promising due to several factors:

- » **Growing Industrial Demand:** Industries continuously seek reliable brass joining methods. FSW's advantages make it a compelling choice.
- » **Material Compatibility:** Brass's widespread use and desirable properties make FSW a valuable tool for manufacturers.
- » **Technological Advancements:** Improvements in FSW technology, like automation and better tooling, lead to higher quality, faster production, and cost-efficiency, further expanding the market.
- » **Shift from Traditional Welding:** FSW's advantages over traditional techniques like reduced distortion and improved aesthetics make it a strong alternative.



45. NumberShield: Secure Your Mobile Number, Safeguard Your IdentityUniqueness

Uniqueness and Value Proposition:

NumberShield offers a comprehensive mobile number security solution, addressing critical concerns:

- » **Real-time Alerts:** Instantly notifies you of suspicious activity like SIM swaps, porting attempts, or unauthorized changes.
- » **Location Tracking:** Provides real-time location updates of your mobile number, enhancing security awareness.
- » **Mobile Number Backup:** Creates a secure backup of your mobile number, including contacts and messages, for disaster recovery.

- » **User-Friendly Interface:** Ensures easy setup and navigation for users of all technical backgrounds.
- » **Comprehensive Protection:** Provides a holistic approach to mobile number security, encompassing alerts, tracking, backup, and potential future features like anti-spam filters.

Concept and Objectives

NumberShield tackles the growing challenge of mobile number misuse by empowering users with a secure platform:

Concept

Provides a user-friendly app to safeguard mobile numbers from unauthorized access and fraudulent activities.

Objectives

- » Safeguard user privacy and prevent identity theft through real-time monitoring and alerts.
- » Empower users with location tracking to identify potential misuse of their mobile number.
- » Offer a secure backup solution for critical mobile number data in case of device loss or damage.
- » Continuously develop features to stay ahead of evolving mobile security threats.

Potential Applications

NumberShield caters to a wide range of users and industries seeking robust mobile number security:

- » **Individuals:** Protects personal mobile numbers from spam, unauthorized access, and potential data breaches.
- » **Businesses:** Secures employee contact information and safeguards sensitive data, particularly relevant for finance and healthcare sectors.
- » **E-commerce Platforms:** Enhances buyer and seller privacy, reducing fraud risks.
- » **Telecom Providers:** Offered as an optional service to strengthen customer trust and provide an extra layer of security.
- » **Government Agencies:** Protects sensitive contact details of officials and personnel.
- » **Educational Institutions:** Safeguards student and staff contact information.
- » **Dating and Social Media Apps:** Promotes user safety and privacy by potentially integrating NumberShield's core features.

Market Potential:

NumberShield addresses a critical and ever-growing need in today's digital world:

- » **Rising Privacy Concerns:** NumberShield caters directly to the increasing demand for mobile number protection and data breach notification.
- » **Data Protection Regulations:** Compliance assistance for organizations struggling with complex regulations.
- » **Global Mobile Phone Usage:** A massive user base exists for mobile number security solutions.
- » **Spam and Unsolicited Calls:** NumberShield can significantly reduce unwanted communication.
- » **Enterprise Security Needs:** Businesses prioritizing data security and customer trust find NumberShield valuable.
- » **Integration Opportunities:** Seamless integration with existing communication apps and platforms broadens market reach.

46.Drones for Essential Medicines in Hilly Areas

Title: Reaching New Heights: Drone Delivery of Essential Medicines in Hilly Regions

Innovation Highlights

This project focuses on utilizing drones for essential medicine delivery in challenging hilly terrains. Here's what sets it apart:

- » **Durable Bakelite Body:** A lightweight yet robust bakelite composite frame enhances the drone's resilience against harsh weather and potential impacts during mountain flights.
- » **Advanced Propeller Design:** Optimized propellers promote efficiency, stability, and agility, enabling faster speeds, extended flight times, and maneuverability for precise deliveries in complex environments.
- » **Intelligent Flight Control:** An AI-powered flight control system ensures precise navigation and safety, allowing for smooth operation even in strong winds or turbulent air.
- » **Extended Range and Battery Life:** The lightweight body and efficient propellers translate to a larger operational range and longer flight times, covering greater distances without frequent recharging.

Concept and Objectives

This project tackles the challenge of timely medical access in remote, hilly areas by leveraging drone technology:

Concept

Develop and deploy drones specifically designed for delivering essential medicines in hard-to-reach mountainous regions.

Objectives

- » **Speed and Efficiency:** Provide a faster and more reliable solution compared to traditional ground transportation.
- » **Reduced Costs:** Offer a cost-effective alternative to establishing new medical facilities in remote locations.
- » **Accessibility and Reach:** Deliver critical medical supplies directly to communities with limited healthcare infrastructure.
- » **Disaster Relief:** Enable rapid delivery of medical aid during emergencies and natural disasters in isolated areas.

Potential Applications in Hilly Areas

These innovative drones hold immense potential for various applications beyond medical delivery:

- » **Search and Rescue:** Drones can be rapidly deployed for search and rescue operations in difficult terrain, saving valuable time.
- » **Infrastructure Inspection:** They can efficiently inspect hard-to-reach infrastructure like power lines and bridges, reducing risks and improving maintenance strategies.
- » **Environmental Monitoring:** Equipped with sensors, drones can monitor ecosystems, wildlife populations, and environmental changes in remote areas.
- » **Geographical Mapping:** Drones can create detailed maps of hilly regions, aiding in resource exploration, disaster planning, and infrastructure development.

Market Potential:

This drone-based delivery system offers a compelling solution with significant market potential:

- » **Addresses Critical Need:** Fulfills the crucial need for timely access to essential medicines in geographically isolated regions.
- » **Cost-Effective Solution:** Provides a cost-effective alternative to traditional healthcare delivery methods in remote areas.
- » **Versatile Applications:** The drone's functionalities extend beyond medical delivery, catering to various needs in hilly regions.
- » **Scalable Technology:** The technology can be adapted and scaled to serve diverse communities across the globe.
- » **Growing Demand:** The increasing demand for efficient and reliable drone solutions in remote areas creates a thriving market

47. Innovation Title: Eco-Friendly Paver Blocks from Foundry Sand, Coconut Shells, and Recycled Plastic

Thematic Areas

- » Waste Management/Waste to Wealth Creation
- » Sustainable Environment
- » Manufacturing

Problem and Societal Relevance

Discarded foundry sand (WFS) contaminates soil and groundwater. This project investigates the viability of using WFS in paver blocks to reduce environmental impact.

Proposed Solution

This project explores using WFS as a partial replacement for fine aggregate, coconut shells as coarse aggregate, and shredded single-use plastic in paver block manufacturing. This reduces reliance on natural resources and lessens the environmental burden from WFS and plastic waste.

Unique Features and Value Proposition

- » Reduces environmental impact of WFS, coconut shells, and single-use plastic by incorporating them into paver blocks.
- » Lowers reliance on natural resources for paver block production, promoting sustainability.
- » Addresses the growing challenge of plastic waste management.

Competitive Differentiation

- » Existing paver blocks use readily available materials. This project utilizes waste materials, reducing environmental impact and natural resource consumption.

48.Innovation Title: Energy Harvesting Using Contactless Twin Disc Implanted Magnets and Belted Pulley

Thematic Areas

- » Renewable and Affordable Energy
- » Sustainable Environment

Problem and Societal Relevance

Industries face high electricity bills, particularly for lighting. This innovation explores a feasible way to harvest energy from underutilized resources to reduce reliance on grid power and electricity costs.

Proposed Solution

This invention utilizes a contactless twin-disc system with magnets implanted on opposing faces. The discs are separated by an air gap and fixed to a shaft with a gear mechanism. Industrial machinery often has rotating components like drums. This innovation harnesses the rotational motion of these drums as a free energy source.

The system works as follows

- » The rotation of the existing industrial drive shaft is used as the input.
- » Repulsive forces between the magnets on the contactless discs cause them to rotate.
- » A generator setup converts this rotational motion into electricity.
- » A gear arrangement increases the voltage output.

The harvested electricity can then be used to power lighting within the industrial facility.

Unique Features and Value Proposition

- » Provides an alternative energy source for industrial lighting, reducing reliance on the grid and electricity bills.
- » Low-cost energy harvesting technique with a simple design using contactless discs and gears.
- » Does not interfere with the normal operation of existing machinery; efficiently utilizes existing rotational forces for electricity generation.

Competitive Differentiation

- » Existing solutions for energy harvesting in industrial settings may not utilize contactless magnetic systems for electricity production.

49. Innovation Title: Automatic Hygiene Sanitation in Public Lavatory for Physically Challenged Persons

Thematic Areas

- » IoT-based Technologies (e.g., Security & Surveillance Systems)
- » Smart Cities

Problem and Societal Relevance

Public lavatories, especially in train stations, often lack proper hygiene and sanitation, posing health risks to users, particularly those with physical challenges. This innovation addresses the critical need for improved hygiene in public restrooms, specifically catering to the needs of physically disabled individuals.

Proposed Solution

This automatic hygiene sanitation system utilizes various sensors to enhance accessibility and hygiene in public restrooms for physically challenged persons:

- » **IR Sensor:** Detects user entry, triggering automatic flush activation upon exit (via load sensor).
- » **Load Sensor:** Confirms user exit and initiates automatic flushing.
- » **Ammonia Sensor:** Measures odor levels and activates a room freshener system when necessary.
- » **Vibration Sensor:** Detects falls within the restroom, sending an alert to nearby janitorial staff for immediate assistance.
- » **Water Management System:** Optimizes water usage by automating flushing.
- » **Door Management System:** (Details not provided)

Unique Features and Value Proposition:

- » **Improved Accessibility:** Enables physically challenged individuals to use public restrooms independently.
- » **Enhanced Hygiene:** Automatic flushing and deodorization ensure a cleaner and more sanitary environment.
- » **Reduced Water Waste:** Water management system optimizes water usage.
- » **Improved Public Perception:** Promotes a more positive perception of public restrooms.
- » **Safety Feature:** Vibration sensor safeguards against falls within the restroom.

Competitive Differentiation:

This system prioritizes the needs of physically challenged individuals by incorporating fall detection and automatic flushing functionalities.

50. Innovation Title: IoT Enabled Smart Ambu-Bag for Low-Cost Breathing Aid Devices

Thematic Areas

- » Healthcare & Biomedical Devices
- » IoT-based Technologies (e.g., Security & Surveillance Systems)

Problem and Societal Relevance

The COVID-19 pandemic highlighted the critical shortage of ventilators, essential equipment for keeping severely ill patients alive. This innovation addresses the need for affordable and accessible breathing aids, particularly in regions facing ventilator scarcity.

Proposed Solution

This project proposes a low-cost, portable, and smart Ambu-bag compressor designed as an alternative or supplement to traditional ventilators. Here's a breakdown of the key features:

- » **Automated Ambu-Bag Compression:** A wiper motor controlled by an Arduino board automates Ambu-bag squeezing, eliminating the need for manual operation.
- » **Solar and Mains Power:** The device can be powered by a 15-watt solar panel for remote use or a mains connection for reliable operation.
- » **Real-Time Patient Monitoring:**
 - ◊ Wi-Fi connectivity allows for sending real-time patient data to the cloud.
 - ◊ User-friendly Android application provides healthcare professionals with remote access to patient vitals.
 - ◊ Heartbeat sensor and pulse oximeter integrated into the system track vital signs.

Unique Features and Value Proposition:

- » **Cost-Effective Alternative:** Provides a more affordable option compared to traditional ventilators.
- » **Portable Design:** Facilitates easy transportation for use in emergency situations or quarantine facilities.
- » **Automated Operation:** Reduces reliance on trained medical personnel for manual bag squeezing.
- » **Remote Patient Monitoring:** Enables healthcare professionals to track patient vitals remotely via a user-friendly app.
- » **Non-invasive Design:** Offers a patient-friendly experience with minimal discomfort.

Competitive Differentiation

This solution focuses on simplicity and affordability, making it a viable option for resource-constrained settings. Additionally, the cloud-based patient monitoring system and dual power source (solar and mains) enhance its functionality compared to some existing alternatives.

51. Innovation Title: Semi-Circular Duct Jet Impingement Solar Air Heater for Drying of Agricultural Products

Thematic Areas

- » Agriculture & Rural Development
- » Sustainable Environment

Problem and Societal Relevance

India grapples with significant post-harvest losses (20-30%) of its massive agricultural produce (fruits and vegetables). Drying offers a viable solution for value addition, but existing dryers lack efficiency. This innovation aims to address this challenge by improving solar air heater technology, a key component in drying processes.

Proposed Solution

This project proposes a novel semi-circular duct jet impingement solar air heater to enhance the overall drying performance.

- » **Solar Drying:** Utilizes solar energy for a sustainable and cost-effective drying process.
- » **Enhanced Efficiency:** Aims to improve the efficiency of solar air heaters beyond the existing range of 20-27%.

Unique Features and Value Proposition

- » **Semi-Circular Design:** The semi-circular absorber plate with jet impingement facilitates better heat transfer and absorption.
- » **Optimized Jet Plate:** Optimally placed jet holes ensure efficient air distribution and minimize pumping power consumption.
- » **Increased Efficiency:** This design boasts a 22% improvement in efficiency compared to conventional collectors.
- » **Reduced Drying Time:** Offers a 50% reduction in drying time compared to open sun drying.

Competitive Differentiation

- » Unlike conventional flat plate solar air heaters where air flows parallel to the absorber plate, this design utilizes a perpendicular air flow across the semi-circular plate, leading to improved heat transfer and reduced energy consumption.

52. Innovation Title: IoT Employed Flood Alerting System for Ground Bridges

Thematic Areas

- » IoT-based Technologies (e.g., Security & Surveillance Systems)
- » Smart Cities
- » Infrastructure

Problem and Societal Relevance

Climate change has led to an increase in extreme weather events, including floods. Ground bridges are particularly vulnerable during floods, posing a risk to people who attempt to cross them while unaware of the water level. This innovation addresses the need for a real-time flood warning system specifically designed for ground bridges.

Proposed Solution

This project proposes an IoT-based flood alerting system for ground bridges. Here's an overview of its functionalities:

- » **Continuous Water Level Monitoring:** Sensors constantly monitor the water level near the ground bridge.
- » **Flood Alerts:** When the water level rises above a critical threshold, the system triggers:
 - ◊ Warning signals to alert people about the danger of crossing the bridge.
 - ◊ Automatic closure of gates to physically block access to the bridge.
 - ◊ Alert messages sent to relevant authorities (flood management department, public works department, and rescue teams) to facilitate a coordinated response.

Unique Features and Value Proposition

- » **Enhanced Public Safety:** Real-time flood warnings prevent people from unknowingly entering a dangerous situation.
- » **Improved Flood Management:** Alerts authorities to take necessary actions during flood events.
- » **Low-Cost Design:** Utilizes Raspberry Pi for cost-effective hardware and software integration.

Competitive Differentiation

While existing flood warning systems often focus on broader flood management in urban areas, this solution specifically targets ground bridges with a low-cost, Raspberry Pi-based design.

53. Jet Impingement Evacuated Tube Solar Air Heater

Problem Addressed

- » **Low efficiency of existing solar thermal systems** leads to high initial investment and slow payback periods for industries using solar air heaters for drying processes (up to 120°C).

Proposed Solution

- » A novel **slot jet impingement technique** to improve the performance of evacuated tube solar air heaters, allowing them to deliver the required heat energy.

Unique Features

- » Achieves **21% higher efficiency** compared to conventional systems.
- » Potentially reduces collector area needed by **15%**.
- » Offers a **simple manufacturing process**.

Competitive Differentiation

- » Focuses on industrial applications with higher temperature requirements.
- » Utilizes a unique jet impingement technique (potentially patentable).

Market Potential

- » Large potential market in India, estimated to require 6.2 million m² of solar collectors for industries like paper, dairy, leather, and automobile.
- » Targeting 15-20% of the solar air heater market within these industries.

Competitive Advantages

- » Higher efficiency and potentially reduced collector area.
- » Simpler manufacturing process compared to some alternatives.

54. Innovation Title: Internet of Things (IoT) and Machine Learning Based Universal Predictive Maintenance Tool

Thematic Areas

- » Manufacturing

Problem and Societal Relevance

- » Unforeseen failures of critical industrial equipment like machine tools disrupt production lines and impact product quality.
- » Existing solutions for predictive maintenance may not be readily available or affordable.

Proposed Solution

This project proposes an IoT and Machine Learning-based predictive maintenance tool with the following features:

- » **Sensors:** Speed and current sensors are installed on the machine tool (e.g., drilling machine) to collect real-time data on spindle motor performance.
- » **Machine Learning:** The collected data is fed into a machine learning algorithm (using WEKA, an open-source software) to identify normal and abnormal operational patterns.
- » **Predictive Maintenance:** The system analyzes the data to predict potential breakdowns and alert operators before failures occur.

Unique Features and Value Proposition

- » **Cost-Effectiveness:** Utilizes affordable and readily available sensors.
- » **Early Warning System:** Provides timely notifications to prevent catastrophic failures.
- » **Improved Efficiency:** Reduces downtime and maintenance costs by optimizing maintenance schedules.
- » **Portability:** Can be easily adapted for various industrial equipment.

Competitive Differentiation

- » This solution focuses on affordability and user-friendliness compared to potentially expensive existing options.
- » It leverages open-source software (WEKA) for broader accessibility.

55. Innovation Title: A Gesture-Based Tool for Sterile Browsing of Radiology Images

Thematic Area

Healthcare & Biomedical Devices

Problem and Societal Relevance

- » **Growing demand for touchless technologies:** Healthcare environments require improved infection control measures. Traditional methods of interacting with medical images (keyboard and mouse) pose a risk of cross-contamination.
- » **Improved efficiency for radiologists:** This tool aims to streamline radiology workflows by enabling touchless image browsing and manipulation.

Proposed Solution

This project proposes a novel tool for radiologists to interact with medical images using hand gestures:

- » **Camera and Computer Vision:** Utilizes a camera to track hand movements.
- » **Gesture Recognition:** Computer vision algorithms interpret hand gestures as commands to browse and manipulate radiology images.
- » **Touchless and Sterile Interaction:** Enables radiologists to interact with images without physical contact with contaminated surfaces.
- » **Machine Learning Integration:**
 - » Adapts to individual user gestures for improved accuracy.
 - » Reduces the risk of errors in image navigation and manipulation.

Unique Features and Value Proposition

- » **Enhanced Infection Control:** Reduces the risk of cross-contamination by eliminating the need to touch a keyboard or mouse.
- » **Improved Efficiency:** Streamlines radiology workflows by facilitating touchless image browsing and manipulation.
- » **User-Centric Design:** Machine learning tailors the system to individual user gestures for intuitive interaction.

Competitive Differentiation:

- » Addresses a specific need in radiology workflows compared to broader touchless technologies (voice recognition, eye-tracking).
- » Integrates machine learning for personalized gesture recognition, enhancing accuracy and user experience.

56. Innovation Title: Shredding of Areca Powder from Disposal Areca Leaf for Manure and Cattle Food

Thematic Areas

- » Agriculture & Rural Development
- » Food Processing/Nutrition/Biotech
- » Waste Management/Waste to Wealth Creation

Problem and Societal Relevance

- » Traditional disposal of used areca plates (burning) leads to environmental pollution and wasted resources.
- » This innovation addresses the need for sustainable waste management by converting used areca leaves into a valuable resource.

Proposed Solution

This project proposes an efficient shredder machine designed to convert discarded areca leaves into powder form. The resulting powder has two main applications:

- » **Manure:** Areca powder can be used as a natural fertilizer, potentially reducing reliance on artificial fertilizers.
- » **Cattle Feed:** The powder can be mixed with cattle feed, potentially enriching the nutritional content and boosting milk production.

Unique Features and Value Proposition

- » **Waste Reduction:** Converts waste areca leaves into a valuable resource.
- » **Reduced Reliance on Artificial Products:** Offers a natural alternative to artificial fertilizers and cattle feed supplements.
- » **Improved Sustainability:** Promotes environmentally friendly waste management practices.

Competitive Differentiation

- » The design incorporates replaceable cutting tools within the rotating hob, reducing overall maintenance costs compared to competitors who might require replacing the entire hob assembly.

57. Nanocellulose Biodegradable Film for Packaging Application

Background

Nowadays our environment is fully dumped with plastics like polythene covers and plastic bags, which significantly impact environmental pollution. Eg: LDPE(Low-Density Polythene). It is a thermoplastic from monomer ethylene and first-grade polyethylene. To reduce the usage of LDPE, single-use plastics, etc bioplastic is used as an alternative and it helps to achieve the goal. Deriving bioplastic by adding nanocellulose to the polymer PVA(polyvinyl alcohol) adds extra strength to the biofilm than the routine one. The coir fibers from a palm tree (Arecaceae), considered to be waste are used as a source of our biofilm.

Novelty

Currently chemical based strengthening materials are used. They are not environmentally friendly. Palm coir is not used but can give the desired strength to the material. It is also environmentally friendly.



CHARACTERISTIC	LDPE	BIOPLASTIC	CELLULOSE BASED BIOPLASTIC
THICKNESS	51 microns	16 micron	10.5-11 micron
DEGRADATION RATE	500-1000 years	3-5 months	1 month max
SOLUBILITY	Insoluble	3-6 months	2-4 months
WEIGHT	6-7g	<5g	3-5g
ABILITY	2 kg	0.5-1 kg	1.5-2 kg
RIGIDITY	0.00007025 MPa	0.22-18.49 MPa	Not yet determined
CALORIFIC VALUE	43000-46000 KJ/Kg	19 MJ/Kg (PLA)	Not yet determined
POLLUTION RATE	300 million tonnes/year	23 times potent than CO ₂	Not yet determined
PRICE/KG	Rs.71.90/kg	Rs.250/kg	Not yet determined

NANOCELLULOSE BIODEGRADABLE FILM

Advantages

- » Degrades faster
- » Water soluble
- » High strength
- » High elasticity

58. Development of Fortified Sauce using Moringa and Food Agar Grade E406 as Emulsifier.

Background

Nowadays pseudo sauce from the vegetables or fruits like tomato, chillies etc are more toxic to consume due to added chemical preservatives present for making colloidal/texture causes various problems to the consumers like indigestion, malnutrition and obesity. Use of seaweeds (food grade Agar E406) are natural sources -colloidal/texture and give Nutritional benefits. The process





The following test have been taken with the sample taken in the process

- » Molisch test
- » Fehling test
- » Benedict test
- » Tollen test
- » Iodine test

The tests have given favorable results and further the technology can be enhanced for larger scale and real time testing with necessary certifications.

59. Detecting Covid-19 (using face recognition) suspects in crowd, at the school/office Building entrance along with their attendance and other alerts

Features

- » Facial recognition based attendance system
- » Suspect searching through live feeds and stored videos
- » Mask detection with Alerts
- » Thermal scanning

Field Trials



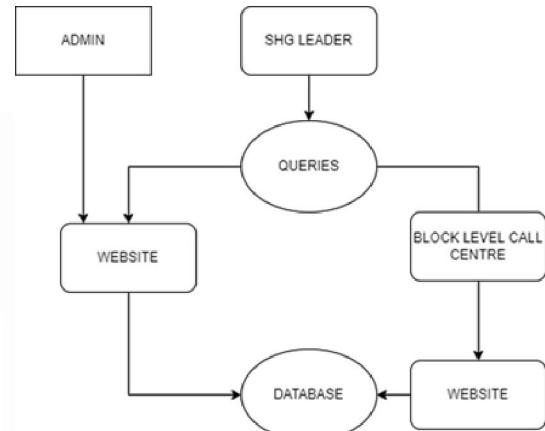
ATTENDANCE DATABASE				
SL No.	Name	Date	Time	Action
1	reshma	2020-09-26	09:17:10 AM	
2	anil	2020-09-26	09:20:20 AM	
3	anika	2020-09-26	09:20:20 AM	
4	nandana	2020-09-26	09:20:20 AM	

- » The system generates automatic attendance report with time stamping of
- » Camera generating live report on unmasked person. The intimation to give alerts to the associated person can be triggered as per requirements.
- » The system automatically identifies and captures video of the suspect as entered by the controlling authorities.

60. Maintaining and updating the records for SHG in real time where network connectivity is low.

Features

- » All SHG members are connected through a call center or website.
- » Designing a lightweight website - so that the page loads quickly
- » Designing a responsive website -the website can be used in any device
- » All Internal financial transaction of SHGs is captured
- » All Minutes of Meetings are captured
- » When the network connectivity is very poor, the SHG can make use of Call Centre (can be established in block level - skilling up the local)
- » Call centers can also be used by the SHG who doesn't have any prior knowledge



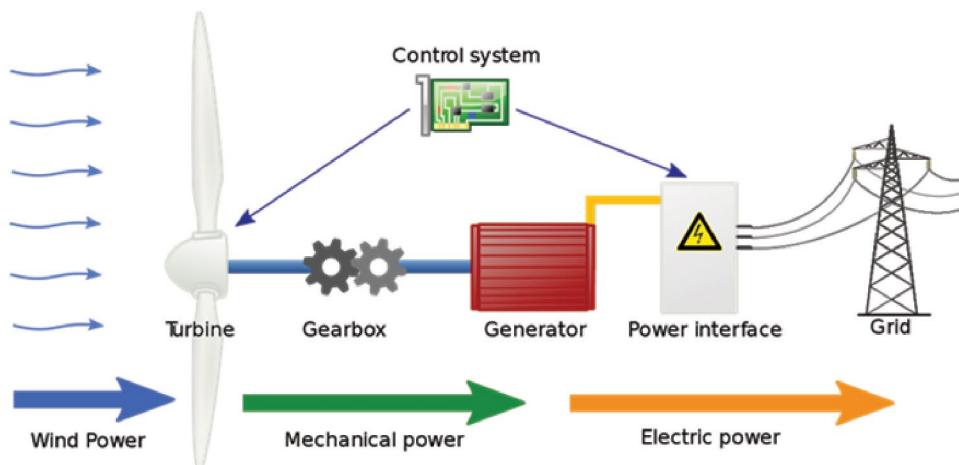
61. AirBorne Wind Turbine

Objective

The main objective of our idea is to harness the strong high-altitude winds, for the purpose of generating electricity.

To develop an airborne wind turbine to float on top of the buildings with the help of Inflatable balloons.

The key factors are wind speed, angle moment of blades, force on blades, RPM and air density are analyzed for designing a suitable airborne wind turbine.



Wind farms which have an impact on the landscape, as typically they need to be spread over more land than other power stations. In order to avoid the usage of consumption large land areas, we are working on our idea to promote the wind turbines by making it float on the above the surface of the ground which avoids the utilization of land area.

Innovation/Novelty

- » The remote towns and cities can be satisfied with benefits by the installation of Airborne wind turbines rather than the other sources of electricity generators.
- » The study is to make the AWT to utilize the high altitude winds, light weight fabricated blades are used to generate electricity.

62. Energy Monitoring System

Objective

- » Monitoring residential energy utilization could create awareness among the consumers.
- » This method would potentially decrease the overall energy utilization of every household which in turn reduces the exploitation of natural resources for energy generation.
- » A device is required to monitor each appliance connected to the device, which monitors the power consumption of every appliance over a period of time to calculate the energy consumption.
- » To audit the energy consumption over a month to analyze the energy utilization of each device and suggest possible solutions to reduce the usage of energy.

Methodology

- » The current sensor is connected in series with the load (Appliance) to calculate the current consumption.
- » The Voltage Sensor is connected in parallel with the load (Appliance) to calculate the phase angle.
- » This phase angle is used to calculate the power factor for each device.
- » The analog data from the sensors is fed to the ESP 32 to process and find the rms value of the current and voltage.
- » The processed data is sent to the firebase realtime database.



Features

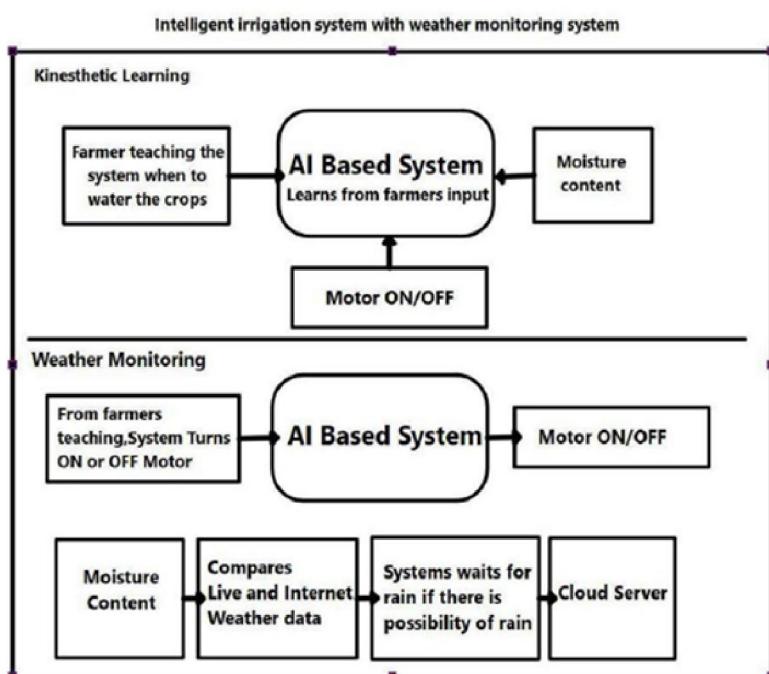
- » The data from firebase is used for analytics and acts as a data feed to the dynamic webpage for Realtime display of energy consumption.
- » This data is also used to monitor the tariff that is to be paid to the utility.
- » This process is updated in the webpage every 5 seconds.

63. Intelligent Irrigation System

Background

According to agricultural experts, excessive irrigation wastes water and is unhealthy for the soil and also reduces the uptake efficiency of nutrients resulting in decreased yield. In this research, the behavior cloning concept is applied in replacement of programming an irrigation system which reduces programming time and makes the system more efficient and simple for farmers. Additionally, this device effectively performs irrigation by forecasting rain also, which makes the system more intelligent. This system collects data from farmers experience in agriculture that will be incredibly beneficial for subsequent farming specially to train the AI based irrigation system in future. For smart irrigation a programmer or a educated person is need to set the moisture content for different crops. Need a simple method to set the moisture content for different crops. We need more data from an experienced farmer to do agriculture effectively in future. Unfortunately there is no device or system currently available to collect the data

Workflow



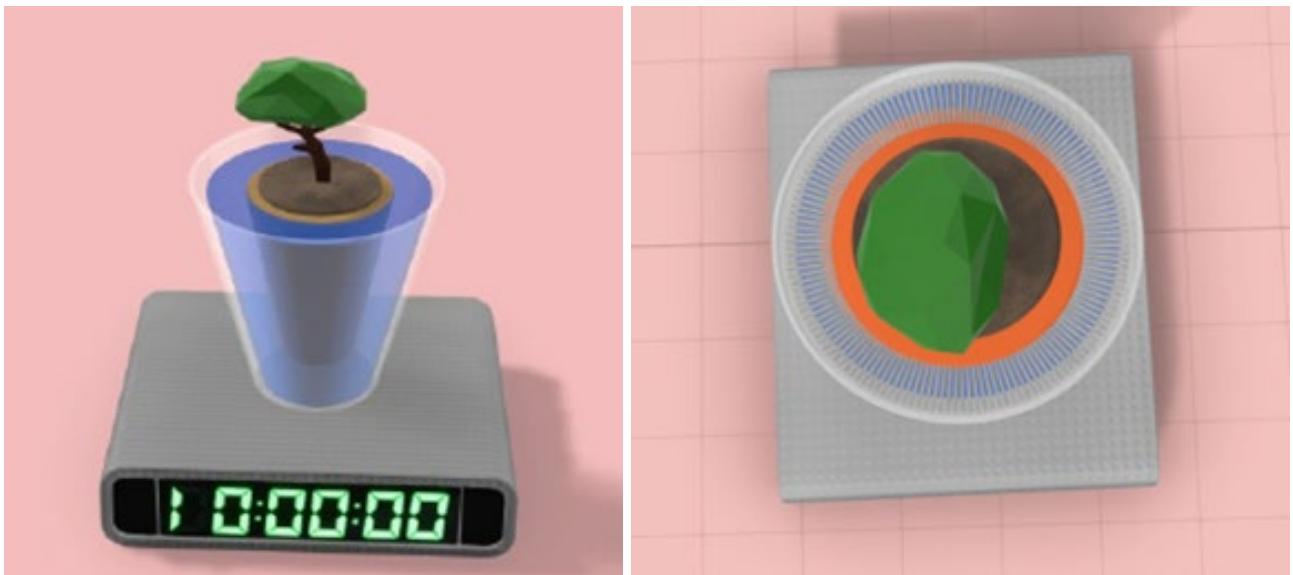
Features

- » This irrigation system learns irrigation through behavior cloning methodology trained by the farmers.
- » Farmers train the system physically by simply switching ON and OFF the irrigation system based on the experiences or by sense.
- » This KT system also collects experienced farmer's knowledge and converts it into data which can be used as training data for future AI based farming.

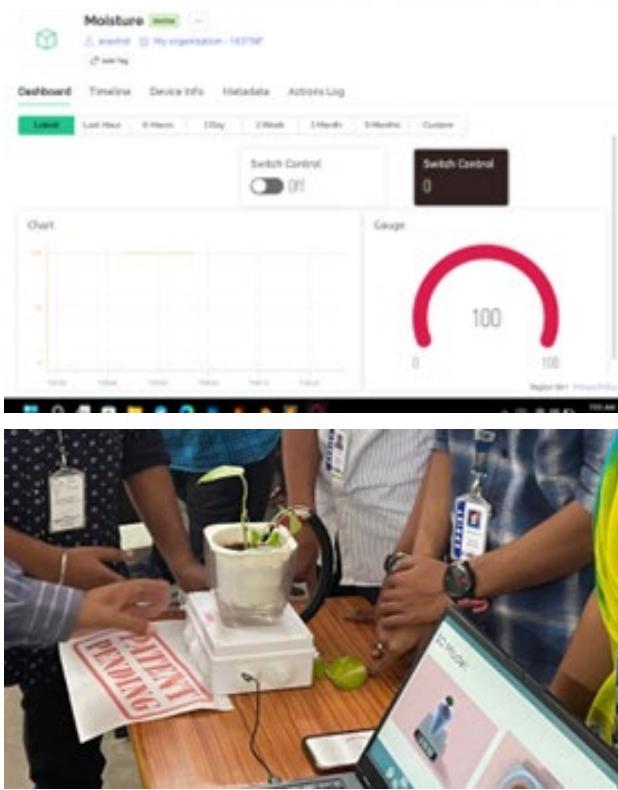
64. Portable Plantation System

Technology involved

- » Portable plantation is a system that detects the soil moisture of the plant and transfers the data into cloud servers and controls the irrigation.
- » Web app blynk is used to retrieve the data from cloud servers and water Pump is controlled remotely across existing internet environments.
- » Portable plantation has an alert system which sends alert messages to user mail and notifies the user in mobile devices.
- » The system is purely developed in c language on the arduino ide version (1.8.19).
- » Blynk and IFTT cloud servers are used to communicate between the user and System.



Product Design



User Interface

Features

- » Voice control
- » Remote monitoring and control
- » Portable design
- » Data analysis
- » Alert system

65. Pushup Counter using Machine Learning

Background

A large-scale survey from 2019 found that 70 percent of Indian women and 59 percent Indian men were unhealthy based on their diet and lifestyle. Heart disease has been one of the leading causes of death in India for over two decades, along with an increasing propensity for cancer and diabetes.

"Leading diseases in India - heart diseases" Heart disease has remained the leading cause of death in India for more than two decades fuelled by unhealthy diets leading to high blood pressure and the buildup up blood fats (plaque) inside the walls of the arteries, inactivity, obesity, and smoking

Features & Demonstrations

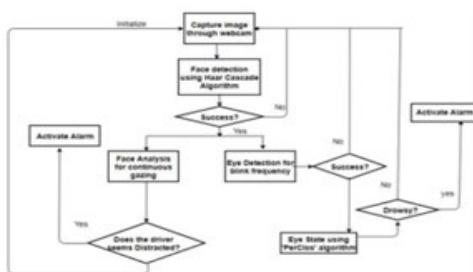
- » The prototype encourage people to perform physical tasks like pushups, pullups, and other exercises to get everyone to voluntarily do them.
- » Those tasks are monitored by using raspberry pi and open cv. Motivating them a machine to generate coupons for the one who completed the task.



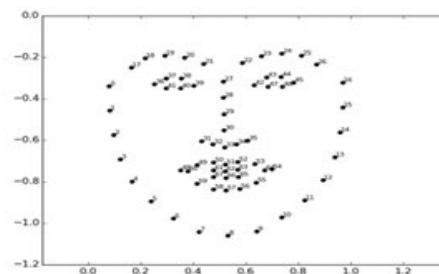
66. Detection of Drowsiness Driver using Image processing technology.

Background

Drowsiness is one of the reasons for road accidents and alert systems may help to reduce accidents. Drowsiness detection is a safety technology that can prevent accidents that are caused by drivers who fell asleep while driving. According to a survey 30% of the road accidents are caused due to drowsiness of the driver. This turns out to be a big problem not only for the driver but also for other people who use the road. This drowsy alarm system is a safety alarm system that alerts the driver whenever he feels drowsy. Driver's attention might be the result of a lack of alertness when driving due to driver drowsiness and distraction. Driver distraction occurs when the object or event draws a person's attention away from the driving task. Unlike driver distraction, driver drowsiness involves no triggering event but instead is characterized by progressive withdrawal of attention from the road and traffic demands. Both driver drowsiness and distraction however might have the same effects that is decreased driving performance, longer reaction time and an increased risk of crash involvement.



Algorithm & Working



Facial Point Recognition

- » The main component of the braking system is the servomotor. Servomotor is mounted onto the pedal of the brake.
- » The main advantage of the servo motor to stepper motor is that it can change the rotation at desired angle and can also maintain a constant position without any movement unlike a stepper motor.

67. Smart Automated Universal Vending Machine

Abstract

A solution to deliver sustainable medicine vending machine in specific location such as highway, institution, railways, and airport with a convenient, reliable product in order to meet the changing demands of the customer. A low maintenance vending machine to make sure stocks is refilled on regular basis. To give location awareness for ease of access during emergencies.

Working

Each individual will have their own identification card, in which personal information regarding the candidate will stored. There was 12 volt solar panel with 4.6Ah battery, controller with indicated the battery status, charging and battery backup to 8 hours. By using Infra-Red thermometer, we can see our body temperature measurements in the range of 2cm. This identification card contains R.F.I.D (Radio Frequency Identification). Machine will have an LCD display, which shows all the medicine available in the vendor. Customers will have to scan their RFID in the vendor machine. Scanner reads and displays the medicine that is inside the vending machine. LDR-light dependent resistor is used to detect the presence of light by measuring the intensity of light. Customers have to pay the amount by scanning the QR code provided in the vendor machine. By using IOT information regarding the buyer and number of medicines taken will be sent to the local medical director.

Prototype



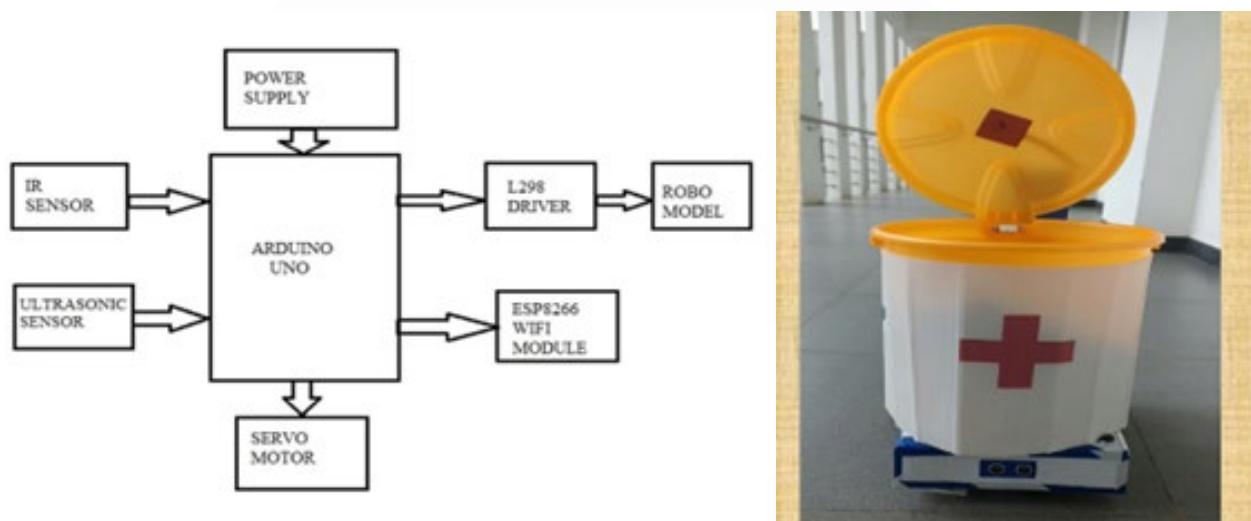
Benefits

- » Low overheads. Vending machines require no staff, which means no extra wages to pay.
- » Vending machines are easy to manage. Once installed, a vending machine needs little to no maintenance.
- » Body temperature measurement
- » LDR can detect ambient brightness and light intensity.
- » Useful for rural areas.
- » For emergency areas.
- » Vending machines can make money.

68. Smart Bio Waste Collector

Abstract

Biomedical waste poses a threat to common people and environmental health. It has been estimated that at least 52 lakh people across the world. As there are so many diseases spreading due to improper disposal of the hospital waste by workers manually, I provide solutions in order to reduce the direct exposure to wastes by implementing the IOT based to waste disposal method augmented with Arduino. In this process the manual workers who are easily exposed to wide spreading diseases are not involved instead of which the smart dustbin which are benevolent and self-configuring robotic life forms perform all the functions. This smart trash bin will open automatically when a person comes near it.



Working

The working of the smart trash bin is described in detail below :

Ultrasonic sensor module:

Step 1: When a person comes near the dustbin within 5cm distance, the ultrasonic sensor fitted near the lid of the dustbin detects the hand of them and sends an input signal to the rduino.

Wireless motion control

Step 1: The Blynk application in the android mobile of the operator is connected to the smart dustbin by using the ESP8266 Wi-Fi module.

Step 2: Controls such as LEFT, RIGHT, FRONT, BACK, START, STOP are created in the blynk app.

Step 3: The commands from the android mobile are given to the L298 motor driver which drives the wheel motor thus moving the smart trash bin for the disposal of the waste inside it.

69. Smart Buffer Stock Solution

Abstract

An integrated structure which comprises a two layered platform. It contains a Storage system and ventilation space. In the storage section the onions are stacked in a traditional way, where the onions are suspended freely enabling more space and providing sufficient ventilation from the side vents. The temperature and humidity is monitored by a sensor. These parameters are regulated by exhaust fans present both on the side and bottom. The top of the storage is enclosed by a dome and insulated to prevent the influence of external conditions.



Problems Solved

The constructional structure differs in different regions of India. A cost effective standard construction material is proposed to be used and a simple constructional work is employed. The storage system has both traditional and technical parts. The maintenance of the technical components are minimal. Hoarding by the traders can be avoided by implementing this storage system.

70. Organo-metallic electrolyte additive for regulating hydrogen evolution and self-discharge in Mg-air aqueous batteries

Abstract

Quest for power electronics and electrical transportation promotes high-energy-density batteries with advanced and synergic materials to upgrade the current energy storage capabilities. Besides, exhaustion of fossil combustibles wrecks the environment by pollution. Hence driving to sustainable and reliable energy storage technology is a critical necessity for the modern-day society. Magnesium (Mg) alloy and Aluminium alloy as anode for Metal-Air batteries have their own distinct features, formulating them as inherent reservoirs of electrical power. Mg and Al - air batteries possess relatively better safety, economic viability, modest construction, material abundance. Self-Discharge in Aluminium and Magnesium is a serious issue for halting them from commercialization. An inhibitor to increase the lifetime of Mg-Air Battery by reducing the self-discharge is synthesized.

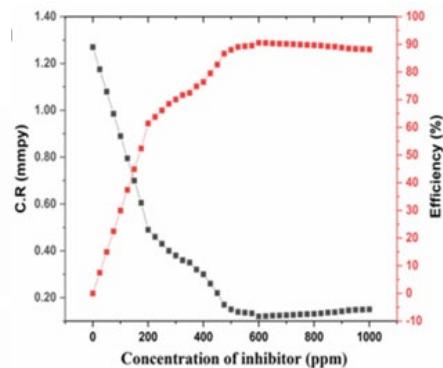
Preparation

- » A solution comprising equal amounts of NaHCO₃ and pyridine in 250 ml of ethyl lactate and labelled it as NP.

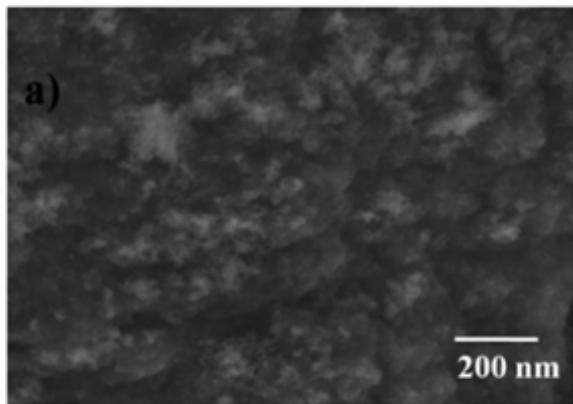
- » Subsequently, 0.5 mM of dimethyldichlorosilane was added drop wise to NP and left to constant stirring until the next day.
- » After stirring, the collected solution was ultrasonicated for 20 min to reduce agglomeration.
- » Finally, the sonicated solution was precisely separated from the solid debris through high-quality Whatman filter paper and dried at 80 for 12 hours.

Testing

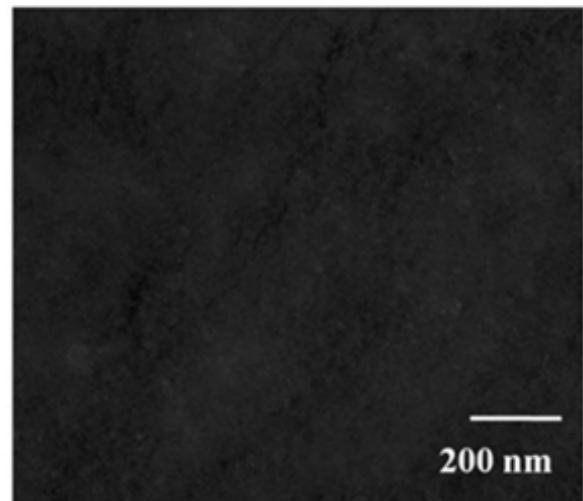
- » The inhibitor was tried with varying concentration (25 ppm interval).
- » The Efficiency was also calculated and plotted for corresponding concentration
- » 600 ppm shows the highest inhibition at room temperature



Plain

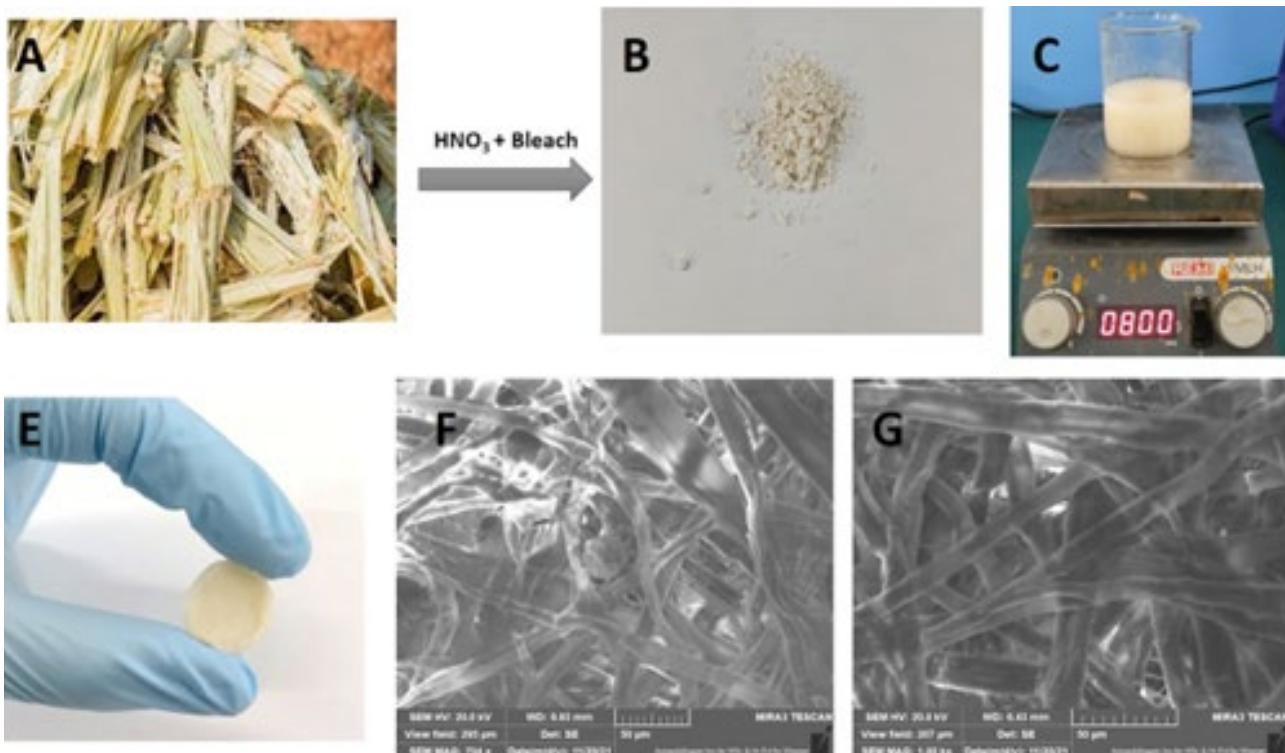


600 ppm



SEM Images showing corrosion stage with and without inhibitors

The SEM images of Mg bare anode and inhibitor (600 ppm) deposited anode after corrosion studies are shown in figures. It is visible that Fig. 6 c at 600 ppm inhibitor concentration has lesser surface degradation with enclosure of an additional passive layer, which may be D3.



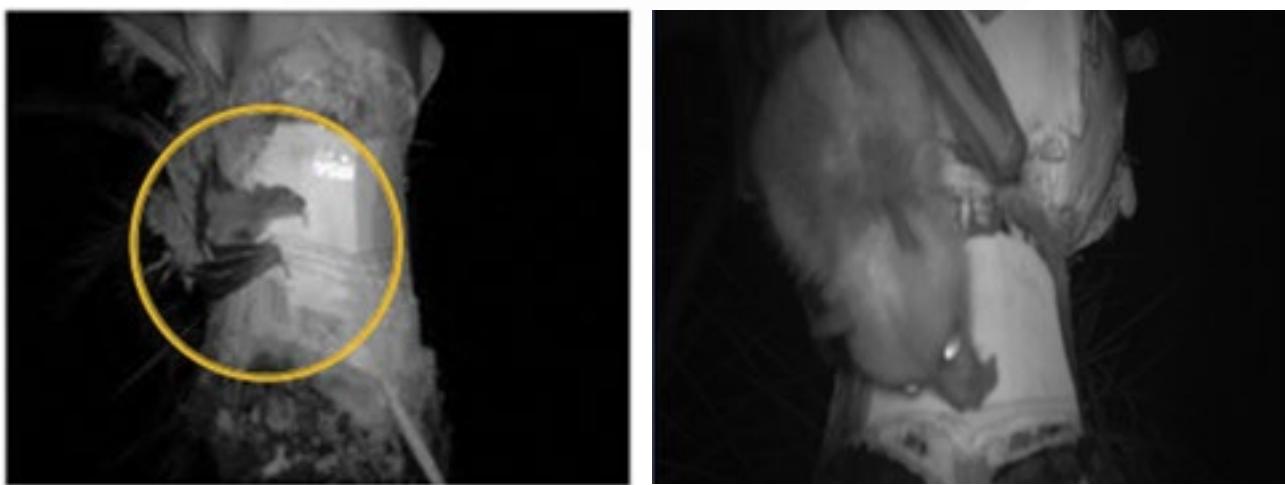
Electrolyte Development

- » An inhibitor to increase the lifetime of Mg-Air Battery by reducing the self-discharge.
- » Patent (202241054507 Dated 23-09-2022).

71. An novel apparatus for collecting tree sap

Problem Statement

The current method deployed for the collection of tree sap can be contaminated by scavengers, bats, insects, dust etc. Also its collection method and distribution is unhygienic. There is a huge risk of transmission of diseases such as Nipah Viral Infection (NiV) and an Economic crisis can be caused during Nipah outbreaks. The industry based out of Palm and coconut will suffer a huge loss. A scientific and hygienic method to collect the tree sap is deployed.



Bat Contaminating the Palm Tree

Uniqueness of the Innovation

- » Universal setup – Compatible with any tree type and sap of any texture
- » Saves time and effort of filtration – contaminant free
- » Can withstand unpleasant weather conditions
- » Sap can be collected from multiple spadices at the same time.
- » Durable than traditional sap collecting vessels such as clay pots, coconut shells etc.



Current Method of Tree Sap Collection and the proposed alternative

The Complete Setup Comprises

- » Collection reservoir
- » Belts
- » Caps
- » Insert Tube
- » Spadix Holder/Sap Collector
- » Meter Scale
- » Pipes/tubes
- » Tap
- » Gripper/Support Stand

The collected sap is taken out from the tap provided at the right bottom of the body which is seen in the side view diagram.

Patent Details

APPLICATION NO. : 202141035618

DATE OF APPLICATION : 06/08/2021

DATE OF PUBLICATION : 27/08/2021

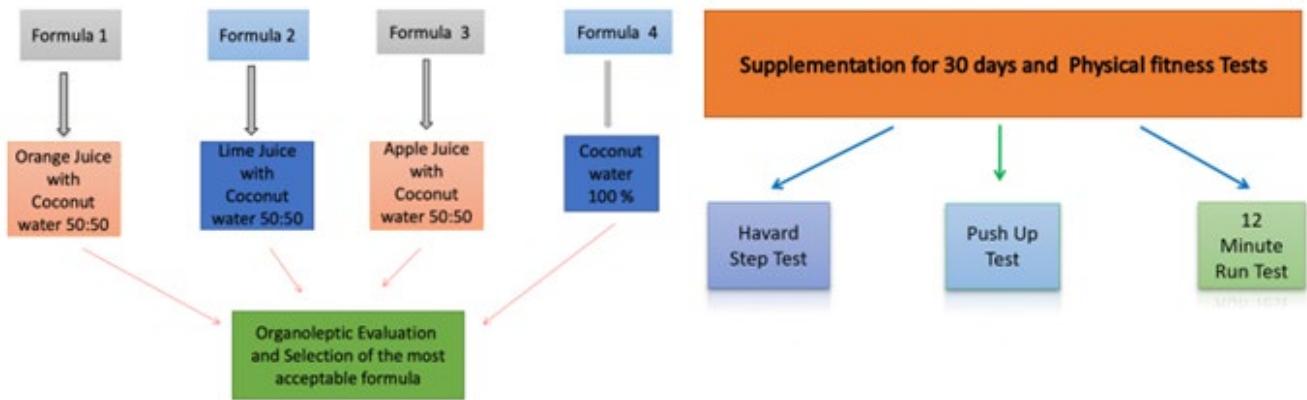
JOURNAL NO. : 35/2021

F.E.R RESPONSE ON. : 27/9/2022

72. Sport Drink Using Coconut Water

Details of Technology

For endurance athletes, it is recommended to drink beverages containing electrolytes and carbohydrates during and after training (or competition) to enhance performance. Proper hydration will avoid thermal stress, delay fatigue, and prevent injuries related to dehydration and sweat loss. Commercial sports drinks in the market is made from synthetic ingredients but we have replaced the synthetic hydrating fluids with that of freshly prepared natural sports drink can hydrate the body well and also provide the required amount of electrolytes to the body.



Uniqueness of the Idea

Coconut water is used as a solution for oral hydration, as part of the daily diet and as a protein supplement when nutritional deficits are intense. Coconut water was also used instead of saline solution during emergency surgeries. Coconut water can be used for electrolyte replacement in a wide range of situations. Sports drinks developed using coconut water are devoid of any additive (artificial color or preservative) and can be safely recommended. Novel sports drinks using coconut water helps to unlock the hidden values of our local food source.

Current Status of Technology

- » Recipe and Process defined
- » Sampled in laboratory scale
- » Benefits in Physical fitness recorded

73. Method and Apparatus for Harvesting Produce

Abstract

A system for harvesting produce from a tree has a drone capable of hovering, a video camera gathering visual data of movement, a cutting implement, a remote control station with a display screen, wireless circuitry, and input mechanisms to control movement of the drone and operation of the cutting implement, and circuitry in the body of the drone enabling two-way communication with the remote control station, transmission of video data from the video camera, and response to commands from the remote control station. The video data from the camera on the drone is displayed on the display screen of the remote control station, and an operator viewing the display screen operates the input mechanisms, maneuvering the drone to position the cutting implement relative to produce in the tree, and triggers the cutting implement by command, severing a stem to separate the produce, causing the produce to fall from the tree.

Details of Technology

The Apparatus for Harvesting Produce has a system for harvesting produce from a tree, comprising:

a drone having a body, and capable of hovering flight;
a video camera on the body of the drone gathering visual data of drone movement;
a cutting implement carried by the body of the drone;
a remote control station having a display screen, wireless communication circuitry, and input mechanisms enabling commands to control movement of the drone and operation of the cutting implement; and
circuitry in the body of the drone enabling two-way communication with the remote control station, transmission of video data from the video camera, and response to commands from the remote control station;
wherein the video data from the camera on the drone is displayed on the display screen of the remote control station, and an operator viewing the display screen operates the input mechanisms, maneuvering the drone to position the cutting implement relative to produce in the tree, and triggers the cutting implement by command, severing a stem to separate the produce, causing the produce to fall from the tree.

74. Smart Helmet: IoT Based

Abstract

Nowadays, the most prominent industry is Automobile. These industries are now implementing IOT based systems. It is used for monitoring and data transmission purposes. There was a survey till 31 Dec 2021, Which clear tells that there are total of 15.3 million two wheelers are there in India, considering only the registered and renewed vehicle in to consideration, as the density of the two wheelers increases, there the main risk factor is to provide the safety to the riders. 70% of the accidents reported are subjected to two wheelers and out 3 accidents in India 2 accidents involve two wheelers as a victims, accidents of two wheelers are because of high density roads, heavy traffic, rash or negligent driving, drunk & drive many times even after the accidents. By implementing an IOT based product called Smart helmet, which comprises two units, motor unit and helmet unit. Helmet unit consists of the alcohol sensor. Alcohol Sensors will not allow riders to take on bikes after drinking alcohol. Motor unit sensor works when a rider wears a helmet.

Architecture

Server

Server model will be installed in the bike and it consists of following parts:

- » NodeMCU
- » OLED
- » Relay

The server module controls the bike using a relay and it triggers the relay when it receives instructions from the client.

Client

Client model will be installed in the helmet and it consists of following parts:

- » Capacitive Touch Sensor
- » NodeMCU
- » Buzzer

The client module detects whether the rider is wearing a helmet or not using a capacitive touch sensor and connects with the server on successful recognition and passes the instruction to the server.

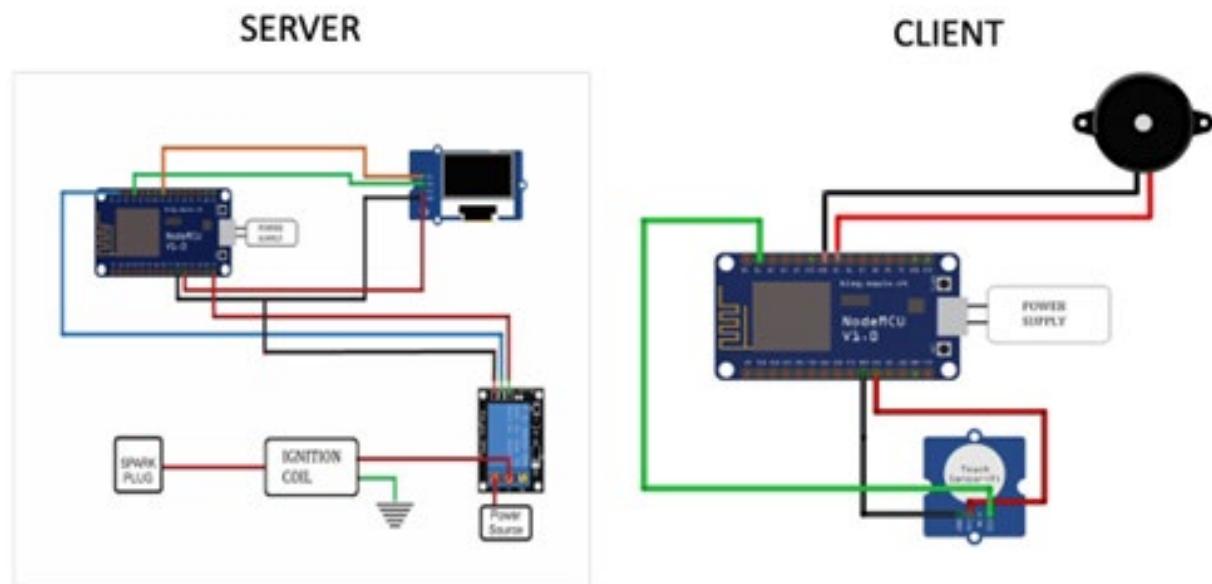
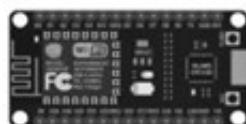


Fig: Client and Server Architecture



NodeMCU:

It is a micro controller which is used to implement client-server communication.



OLED:

It is used to display the connectivity status of modules and messages.



Capacitive Touch Sensor:

It is used to ensure that the helmet is worn by none other than a human being.



Relay:

It is installed with the ignition coil, and it is used to control motor vehicle functioning.

Fig: Showing details of Components

Advantage

- » NodeMCU [ESP8266] make the system robust as it uses 2 level security
- » The system is feasible so it is accessible for everyone
- » Developed using latest technologies like NodeMCU and OLED display
- » The system can be installed in every two-wheeler
- » The system has a wide range of future advancements including license detection and accidental detection etc.

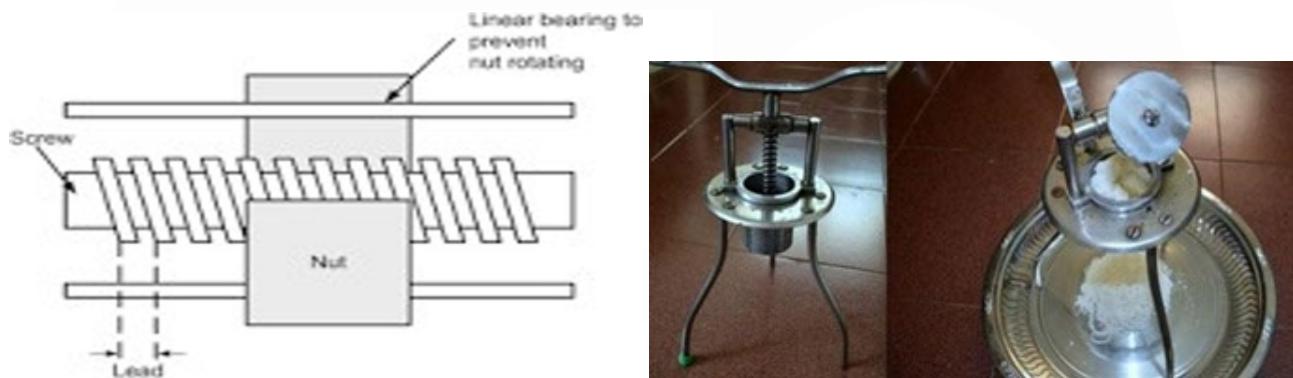
75. SEMI-AUTOMATED STRING HOOPER

Abstract

Old people struggle to do string hopper as It is hard to press the string hopper flour. A modern machine and easy method, time saving and cost efficient and user friendly semi automatic machine is developed.



Solidworks Model



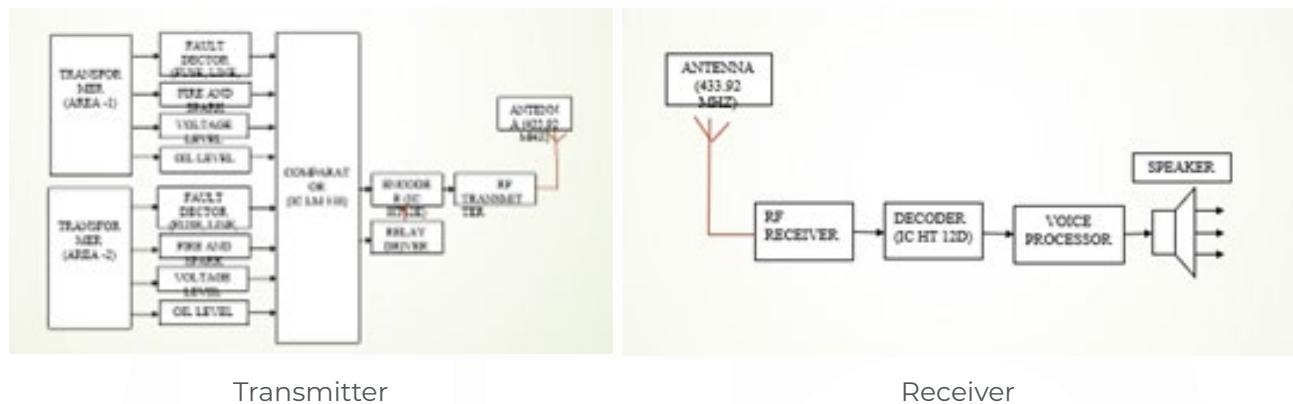
Test

Sl.no	Function	Result
1	Power Supply	Positive Response
2	Motor Rotating	Positive Response
3	Plate Oscillating	Positive Response
4	Making Idiyappam	Positive Response

76. Automatic Power Failure/ Fault Information for EB

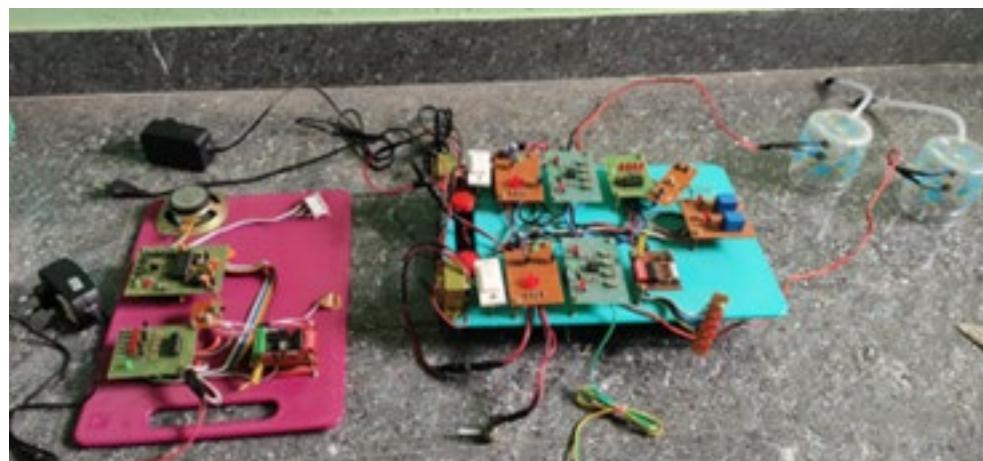
The power failure may occur due to scheduled maintenance or due to fault in the transformer. However in case of fault there is a need for the end user to register a complaint or a need to manually diagnose in case of remote area. The proposed system will automatically send fault information to the EB in case of Fire and spark detector, Low voltage detector, Oil level monitor and low-level indicator.

Advantage



Transmitter

Receiver



Hardware

Novelty

If any problem occurs, APFIES communicate the problem to the EB substation. APFIES reduce the manual error. Any problem of the transformer will be communicated directly to the EB substation and necessary action to rectify the fault can be done immediately.

Keywords: Power Failure Detection, Transformer, Power Distribution

- » **Novelty:** Currently the system used is manual communication. This system sends the communication immediately to the power distribution companies.
- » **Target Audience/ User:** Power distribution companies and transformer companies will be highly benefited by implementing this technology.

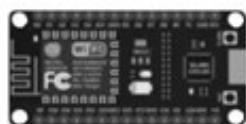
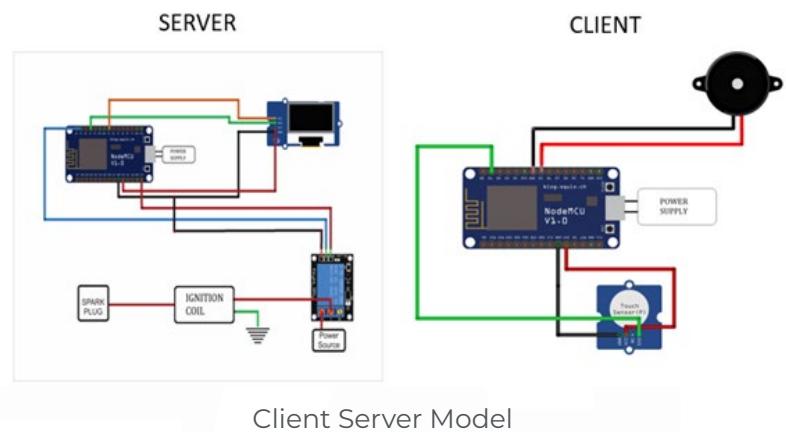
77. Smart Helmet

Background

Automobile industries are now implementing IOT based systems. It is used for monitoring and data transmission. The density of the two wheelers is increasing, and the main risk factor is to provide the safety to the riders. 70% of the accidents reported are subjected to two wheelers. Out of 3 accidents in India 2 accidents involve two wheelers as victims, accidents of two wheelers are because of high density roads, heavy traffic, rash or negligence driving, drunk & drive many times even after the accidents. By implementing a IOT based product called Smart helmet the risk of death and heavy injury can be reduced.

Details of Technology

Smart Helmet is based on the client-server model. It consists of two modules: One of the modules will be installed in motor vehicles. The other one will be installed in the helmet. Both of these modules would be connected via Wi-Fi. These two modules will work as a single system and will make ensure that the motorbike won't function unless the rider wear helmet.



NodeMCU:

It is a micro controller which is used to implement client-server communication.



OLED:

It is used to display the connectivity status of modules and messages.



Capacitive Touch Sensor:

It is used to ensure that the helmet is worn by none other than a human being.



Relay:

It is installed with the ignition coil, and it is used to control motor vehicle functioning.

Components Used

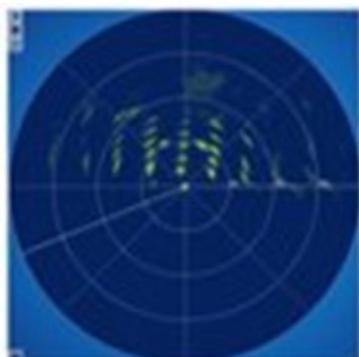
Server

- » Server model will be installed in the bike and it consists of following parts:
 - ◊ Capacitive Touch Sensor
 - ◊ NodeMCU
 - ◊ Buzzer

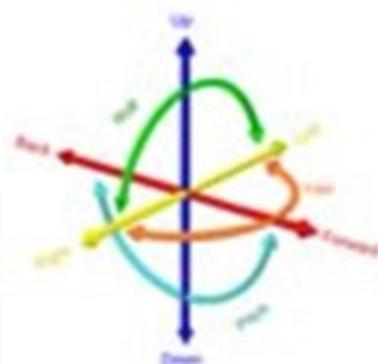
- » The client module detects whether the rider is wearing helmet or not using a capacitive touch sensor and connects with the server on successful recognition and pass the instruction to the server.
- » **Novelty:** NodeMCU [ESP8266] makes the system robust as it uses 2 level security. It can be installed in any two-wheeler. It can have future advancements such as license detection and accidental detection etc.
- » **Target Audience:** Electric Vehicle Manufacturers, Helmet Manufacturers, Two Wheeler User highly benefited by implementing this technology.

78. Underwater ROV

'ROV' stands for Remotely Operated Vehicle and almost always refers to an underwater ROV vehicle. An underwater ROV is a robotic vehicle that can go anywhere from the water surface to full ocean depth and is used to observe and complete tasks by the ROV user.



SONAR Imaging



6 DOF

Idea Description

- » The idea is formulated in such a manner that it will be able to carry out underwater inspections in an effective, safe, and timely manner with high precision and manoeuvrability
- » Low frequency sensors are used to reduce noise and High definition camera is used for clear visibility in murky water

- » The Underwater positioning system uses USBL (Ultra-Short Base Line) technique and through Data analytics, from SONAR imaging and Underwater positioning system, Intelligent navigation like Return to Home function is possible
- » With the help of SONAR and using USBL technique and with a set of transducers in the mother ship immersed inside water the relative position of the ROV can be detected and overlaid on maps for navigation. The ROV is designed with Hydrodynamic design which will help in reducing drag
- » 6 Degrees Of Freedom (DOF) manoeuvrability is provided

- » Low frequency sensors are used to reduce noise and High definition camera is used for clear visibility in murky water
- » It has been equipped with temperature and pressure sensor to tackle the varying velocity of the sound underwater
- » With the help of SONAR and using USBL technique and with a set of transducers in the mother ship immersed inside water the relative position of the ROV can be detected and overlaid on maps for navigation

Solution Architecture

- » The Hydrodynamic design of the prototype has been Bio-Mimicked from Sea turtle for better efficiency underwater
- » The material used for the body is Kevlar
- » Kevlar is the lightest and the strongest synthetic fiber so that it can withstand higher pressure and the ROV can even 100m depth
- » Comparatively low frequency sensors produces less noise comparing to higher frequency sensors. So, low frequency Ultrasonic sensors are preferred
- » High definition camera with polarized filters helps to get clear visual even under murky water
- » Set of SONAR sensors used for Underwater positioning system to overlay its position on map for navigation



79. Automated UV Sanitizer- PRABHA

Need

A strong source of UV light could help reduce harmful germs and bacteria on surfaces according to the FDA, and help disinfect high-touch items, like your cell phone, wallet and keys. An automated UV sanitizer is essential in case of highly transmissible germs to eliminate the risk involved in manual sanitization.

Innovation & Competitive Advantage

Prabha, a robot that cleans rooms by systematically disinfecting the area with UV light. It can clean a 12'X12' room, killing any COVID virus that may be lurking, in 30 minutes to one hour depending upon how many lamps are connected to it. Prabha also cleans restrooms and medical equipment. The operator manipulates the robot remotely via Bluetooth.



Features:

- » IOT wireless control of the Robot with an Android based mobile application.
- » Uses 254 nm wavelength UV rays called germicidal UV-C
- » Effective in destroying and deactivating all kinds of pathogens including COVID.
- » Switched on/off from a safe distance.
- » Handle provided to move the robot comfortably from one room to another.
- » IOT wireless control of the Robot with an Android based mobile application.
- » IOT wireless control of the Robot with an Android based mobile application.

80. Powered Air Purifier Respirator (PAPR)

Need

purified air to medical professionals working in infection-prone areas such as COVID wards, to prevent infection and disease from the aerosolized virus particles. PAPRs in the country were imported and they cost more than one lakh rupees. The problem was acute during the pandemic when the availability of protection equipment became scarce. We designed and developed a complete PAPR kit from scratch – a small but sure step towards Atmanirbhar Bharat for its healthcare needs.



Features:

- » Exceeds National Institute of Occupational Safety and Health (NIOSH) standards.
- » Design Features.
- » 99.995% virus filtration efficiency.
- » Weighs < 1.5kg.
- » Battery Life > 10 hours.
- » Airflow > 10 CFM.
- » IOT wireless control of the Robot with an Android based mobile application.

Impact

PAPRs are generally safer, more comfortable to use, and reusable as compared to normal PPEs with N95 masks. But because of their exorbitant cost, they haven't been widely used in developing countries like India. We have developed a low-cost solution that meets all the National Institute of Occupational Safety and Health (NIOSH) standards.

81. SELF-E: Self Driving Wheelchair

Need

The Self-E wheelchair addresses a critical need. In a hospital or airport, people with mobility issues depend on a manual wheelchair along with wheelchair pushers, which hinders their freedom of movement. If they use a powered wheelchair with joystick control, they need to manipulate the joystick and steer the wheelchair all the way to the destination. Self-E, in contrast, maps the surrounding environment, including dynamic and static obstacles such as people, walls, pillars, tables, chairs, etc. using a laser sensor called LiDAR. The map is automatically loaded onto an Android smartphone or tablet through a specially developed app. Self-E's autonomous operation allows users to relax and sip a cup of coffee, read a newspaper or chat with friends as the wheelchair takes them to the desired destination point on its own. The Self-E wheelchair can also be used at homes, retirement communities, assisted living communities, restaurants, washrooms, etc.



Features:

- » Autonomous navigation with obstacle avoidance.
- » Self-Driving.
- » Map creation & path planning.
- » LiDAR based navigation.
- » Multi-Mode control.
- » Already tested with 50+ patients, 20+ doctors/physiotherapists at AIMS Hospital

82. N 96 Nano- Mask

Need

Nano masks are face masks made with nanoparticle fabric, and they have been gaining popularity over the past year. Nanoparticles are ultra-small. Their size is comparable to that of SARS-CoV-2. These particles range in size from 1 to 100 nanometres, which is about ten thousand times smaller than the width of a strand of hair. Researchers have been using nanotechnology for years because of its unique characteristics, including tiny size, adaptability, and multifunctional uses. In recent years, nanomaterials have been used in the prevention, treatment, and diagnosis of diseases. It can help stop the spread of COVID-19. Also, the potential for nanoparticles in protective gear like face masks is exciting but their safety and efficacy profiles have not been established.



Features:

- » Mask is a research innovation of Amrita Center for Nanosciences and Molecular Medicine (ACNSMM).
- » For the first time, a mask with both high breathability and high filtration is designed by the creative use of designed nanofiber architectures within polymer textile.
- » The simple but effective product is built on the long-standing experience of the Center in nanofiber design through its many contributions in nanotechnology in medicine.
- » The N96 mask embodies: "breathe pure and breathe free with nano", and symbolizes the simple and creative use of nanotechnology for societal benefit.

83. BLE Operated UV Disinfectant Box

Need



During these troubled times, everything needs to be disinfected to keep one's away from Bacteria and Viruses to keep any kind of cross-contamination away. Disinfection Box is an advanced way of disinfecting daily use items by killing bacteria, viruses and pathogens using UV sterilizer. During a pandemic it is very important to disinfect items like Cotton Gloves, Cotton Masks, Credit Card Machine, Currency, Mobile Phones, Doctor's Accessories like a Stethoscope, Baby Items like Milk Bottles etc.

Features:

- » Box has UV-C lamps which use the UV- band to disinfect the products exposed to it.
- » The UV Lamps based disinfection unit can be used in Homes/ Retail/ Offices conveniently within 20 minutes.
- » It kills 99.99% Germs when used for the recommended time.
- » Special material used in the unit reflects light ensuring almost uniform disinfection over the objects.
- » Auto cut off the UV Lamps if the door is opened while the unit is functioning make it safe for human use.

84. Sanitizer Dispenser 2L & 8L

Need

Our initial point of contact with germs is often from the hands. Unfortunately, not many people wash or maintain basic hygiene of their hands. Over time people have started emphasizing more and more on maintaining personal cleanliness and hygiene. And the best way to keep viruses and bacteria at bay is, of course, by frequent hand washing. Using a sanitizer dispenser for this reduces your chances of getting sick in your inevitable daily interactions with people and germs. Hand sanitizer dispensers also are handy in water-scarce areas.



Features:

- » The touchless hand disinfection machine is designed to nebulize hand sanitizer (liquid type) and provide an automatic dosage of the drop, which enables a quick and easy hand disinfection and eliminates cross contamination, achieving optimal hand hygiene.
- » Contactless dispensers optimize the sanitizer consumption using advanced Ultrasonic sensor control technique. Automatic Dispensers use innovative ultrasonic technology to detect your hands under the dispenser and release the right amount of sanitizer.

85. Oceannet

Need

Internet connectivity in the ocean for the fishing boat is very much needed to help save the lives of fishermen. It also strengthens national security by allowing them to inform the authorities about any suspicious activity in the sea. Hence extending the affordable and reliable internet services leveraging the existing communication system will make the service available to all. OceanNet is a unique innovation and this technology addresses the above need.



Features:

- » Oceannet is a low-cost marine communication system that provides reliable internet connection over the ocean covering up to 60 kms.
- » Reliable fast broadband connectivity up to 10mbps and 60 km coverage from shore.

- » Unlimited upload and download.
- » Low latency voice and video calls over marine internet connectivity.
- » Stream YouTube videos or other OTT contents from the ocean without buffering.
- » Track your boat in real time.
- » Pass weather information or emergency messages to fishermen.

86. Amrita Kripa App

Need

Natural disasters have become a commonplace occurrence across the globe. Floods occupy the top most place among all the natural disasters in terms of number of occurrences and extent of damage to lives, property and infrastructure worldwide. Landslides triggered in turn by floods are also quite common. Governments have become better at preparing for most of the disasters. Many central and local government bodies have gained a lot of experience in alerting the citizens, setting up the relief centers, evacuating citizens at the onset of an impending disaster etc. In addition to the preparedness, governments do a fairly good job with immediate relief efforts towards providing food, shelter and clothing. Many NGOs also play an active role in such relief efforts, either by supplementing the governments' efforts or running their own operations such as collection centers, relief centers, and medical camps. Crowdsourcing methodology goes a long way in providing, on the ground, real -time, and accurate information about a disaster and its victims. An effective crowdsourcing platform is required to effectively manage the relief activity during a disaster.



Features

- » Amrita Kripa has been developed for the end-users, victims, and relief providers.
- » Ability to request for rescue, medical help, supplies such as food, clothing, medicines, etc., shelter, and services such as water, electricity, telephone services, etc. This will be used by the disaster victims.
- » Ability to offer rescue, medical help, supplies such as food, clothing, medicines, etc., services, and shelter.
- » This will be used by the relief providers, both individuals, organizations, and government.
- » Ability to report people missing and people found orphaned either conscious or unconscious.
- » All these features will be offered through a set of high-performance, user-friendly mobile and web applications in multiple languages.

87. IOT Enabled Smart Energy Meter

A meter is required to be connected to several of the machines to get real-time streaming information on the idle time, job run and shutdowns.

Details of Technology

Energy meter is an energy reading and data transmission device to be used in 3 phase or 1 phase environments. The device consists of two modules which could be placed easily at sites to be measured. The hardware design is done such to ensure that the device will be very modular when used in installation and could be accommodated in various configurations without having to cost space inside the Mains MCB as with various other units

The Smart meter is divided into two modules consisting of a current sensing unit and a module housing all the power calculation parameters. T shaped smaller module make up as the current sensing unit consisting of three current sensing devices. It just needs a simple wired setup to be powered in order to transfer readings to the second module fitted outside. Current sensing is done non-invasively through Hall Effect technique capable of handling current up to 50A.



The second module consists of elements like the measurement unit, switching unit, communication unit and SMPS. The module does not require outside adapters as it has a built in SMPS to power itself and power the current sensing unit as well. Smart meter uses isolated technique to make its reading so as to make it less risky for the user as possible. In order to attain it device is powered by isolated SMPS. To add to this, device is constructed to measure isolated voltage and current readings with the specification of Short term isolation voltage (2s) for 4.6kVrms, 6.5 kVDC and basic isolation voltage of 4000V for each unit respectively. Energy measurement device could calculate the following parameters including Real power, Reactive power, PF, Voltage and current per each phase. The device could be easily configured to be refreshing data at user designated time period expressed in milliseconds with the minimum stipulated time to be 500ms. The data that has been generated will be transferred wirelessly through various zigbee modules. The device also has wired connectivity options like I2C and UART. The communication protocol to extract the data from the energy module can be extracted using any other protocol to individual specific requirements as and when specified by the user.

Features

- » Small size
- » Easy installation
- » Retrofittable
- » Data can be accessed and analyzed via smart phones
- » Encrypted wireless transmission

88. Solar Electric Auto Rickshaw and Electric Car

Need

A new transition of technology has started to take place in the Indian EV industry i.e. solar electric vehicles. This technology or Idea can change the face of the whole electric vehicle industry. It can reduce the dependency of EVs on charging. Solar energy is the most abundant as well as a cheap source of energy, this energy is almost free and the amount of energy is also unlimited. There are already many users who have completely shifted their household electricity usage to solar energy and waive their high electricity bills. This technology is to be extended to the electric vehicle and we have developed a model.



Features

- » C7 the solar auto rickshaw, weighing 320 kg, is fully driven by solar energy and can carry three people, including the driver, with a maximum speed of 50km/hr.
- » Each efficient semi-flexible solar panel weighs just 3kg and a total of 12 panels provide up to 1200 W of power.
- » The auto houses a battery and BLDC motor, powered by solar panels, to maintain the cruising speed with the help of battery management and control systems.
- » It has both mechanical and regenerative braking systems.
- » It travels a distance of about 100 to 120 km at a cruising speed of 40km/hr with full charging of the battery.
- » The battery charging time under the sun is about 5 hrs.
- » In contrast, there are single seater racing cars, made in various universities which are very costly and used mainly for sporting purposes, developed as a part of world solar challenge.

89. EV Charging Station

Need

Estimates suggest the country will need more than 400,000 charging stations for the 20 lakh-plus EVs that could be on its roads by 2026. The government directed all commercial and institutional buildings – shopping malls, hospitals, hotels, offices, educational institutions and movie theaters – with a parking capacity of more than 100 vehicles to set aside 5% of their parking spaces for EV charging. An advanced and customizable charging station technology is to be developed to optimize the charging time and life of the battery.

90. Prosthetic Hand



Features

- » The prosthetic hand is a multi-fingered hand.
- » Each finger is made of two asymmetric rubber below joints operated by pneumatics.
- » The hand can also be made using 3D printers which are either controlled by EMG or EEG sensor.
- » Universally compatible wrist unit
- » 3-D printable, low cost and impact resistance
- » Contact reflex through pressure sensors
- » Can be used with existing sockets.
- » The functionality and controllability of the device are effortless so that even ordinary people can adapt to technology efficiently.
- » All the parts used are readily available and less expensive so, it can be easily replaceable.

Targeted Customers

- » The proposed prosthetic is mainly aimed for amputees from rural areas.
- » The hand can be trained and customized according to the requirement of the amputee.
- » The service will be provided through NGOs and clinics, and Training will be provided to them so that they can provide customer service.

91. Home Assistant Robot

Need

A self-governing and multi-tasking home assistance robot to support the old, crippled and impaired individuals to do their daily life activities or regular tasks at home and hospital environments.

Features

- » For serving elderly people at homes and hospitals.
- » For visually impaired people to find an object or a person and also serve them.
- » For disabled and physically challenged people in serving them drinks, fruits etc.
- » Enabled with Object Vision, Speech Recognition, Autonomous Navigation with Obstacle Avoidance.



92. Universal Measuring Machine

Features

- » Incorporated camera for non contact measurement
- » Easy centering using visual images.
- » Automatic measuring of form and location tolerances.
- » Use in production or measuring rooms.
- » Measuring accuracy 0.0001mm.
- » Improves production efficiency.
- » Fast and easy operation.
- » Maintenance-free, high-precision air bearings.



93. Early Forest Fire Detection



Primary Area of Application

Forestry and Environmental Management

Uniqueness of the Technology

The Early Forest Fire Detection system utilizes UAVs (Unmanned Aerial Vehicles) integrated with advanced sensors and high-resolution cameras to continuously monitor forest areas.

These UAVs are capable of detecting early signs of fire, such as smoke and heat signatures, in real-time. Unlike traditional satellite-based systems that often suffer from delays due to data processing and transmission, this technology ensures immediate alerts to relevant authorities through a centralized system.

What Problem Does the Technology Solve?

Forest fires are devastating events that cause significant environmental damage, loss of wildlife, and economic losses. Traditional fire detection methods, including satellite imagery and ground patrols, often result in delayed responses due to the time required for data analysis and reporting. This delay can allow fires to spread uncontrollably. The UAV-based early detection system addresses this problem by providing real-time monitoring and instant alerts, enabling rapid response to contain and extinguish fires before they spread widely.

Target Industries for the Technology

- » Forestry Departments
- » Environmental Conservation Organizations
- » Disaster Management Agencies

Expected Positive Impact/Outcome

The primary positive impact of this technology is the reduction in the area affected by forest fires, which preserves wildlife habitats, reduces carbon emissions, and protects human lives and property. Early detection and rapid response can save vast expanses of forest land and minimize the economic and environmental costs associated with forest fires.



94. Electric Vehicle Chargers



Primary Area of Application

Electric Vehicle Infrastructure

Uniqueness of the Technology

This technology provides a range of charging solutions for electric vehicles, including both Level 1 and Level 2 AC charging stations. Level 1 chargers are designed for residential use, providing a slower charging rate suitable for overnight charging. Level 2 chargers offer faster charging speeds and are ideal for commercial and public charging stations. These chargers are user-friendly, easy to install, and can be integrated into various settings, including homes, workplaces, and public areas.

What Problem Does the Technology Solve?

One of the major barriers to the widespread adoption of electric vehicles is the lack of accessible and reliable charging infrastructure. This technology addresses this issue by offering scalable charging solutions that can be easily deployed across different environments. By providing convenient and efficient charging options, it encourages more people to switch to electric vehicles, reducing dependence on fossil fuels and lowering greenhouse gas emissions.

Target Industries for the Technology

- » Electric Vehicle Manufacturers
- » Commercial Real Estate
- » Residential Complexes
- » Public Charging Station Providers

Expected Positive Impact/Outcome

The enhanced availability and convenience of charging infrastructure support the broader adoption of electric vehicles. This contributes to environmental sustainability by reducing greenhouse gas emissions and decreasing the reliance on fossil fuels. Additionally, it can stimulate economic growth through the development of new markets and job creation in the electric vehicle and charging infrastructure sectors.

95. REMOTE PATIENT MONITORING SYSTEM (5-IN-1 DEVICE)



Primary Area of Application

Healthcare and Telemedicine

Uniqueness of the Technology

This remote patient monitoring system is a compact, non-invasive device that can monitor multiple vital health parameters, including blood pressure, blood sugar, and SpO₂ levels. The device is designed for ease of use, with data wirelessly transmitted to healthcare providers, enabling real-time monitoring and remote consultations. It integrates seamlessly with telemedicine platforms, allowing for continuous health tracking and timely medical interventions.

What Problem Does the Technology Solve?

Access to healthcare services is often limited in rural and remote areas, where medical facilities are scarce, and traveling to healthcare centers is challenging. This technology bridges the gap by allowing patients to receive continuous health monitoring without the need to visit healthcare facilities. It also enables healthcare providers to monitor patients' conditions remotely, facilitating early detection of health issues and prompt medical intervention.

Target Industries for the Technology

- » Healthcare Providers
- » Telemedicine Platforms
- » Wearable Technology Manufacturers

Expected Positive Impact/Outcome

Improving healthcare outcomes by ensuring continuous monitoring and early detection of health issues, reducing the burden on healthcare facilities, and providing patients with timely medical interventions. It enhances patient care, especially in underserved areas, and supports the shift towards more preventive and personalized healthcare.

96. BANANA FIBER COMBING MACHINE

Primary Area of Application

Sustainable Products Manufacturing

Uniqueness of the Technology

The Banana Fiber Combing Machine is designed to process banana plant fibers mechanically. It removes impurities and aligns the strands to produce high-quality textile materials. This process transforms agricultural waste, specifically banana plant stems, into valuable resources for the value addition. The machine is efficient, eco-friendly, and promotes sustainable manufacturing practices.



What Problem Does the Technology Solve?

The traditional disposal of banana plant waste contributes to environmental pollution and is often a financial burden for farmers. This technology mitigates these problems by converting waste into a marketable product. It provides an additional revenue stream for farmers and reduces the environmental impact of agricultural waste.

Target Industries for the Technology

- » Textile Industry
- » Sustainable Manufacturing
- » Agricultural Waste Management

Expected Positive Impact/Outcome

Promotes sustainability by reducing agricultural waste and producing eco-friendly textile materials. It benefits farmers economically by providing an additional income source and supports the textile industry in developing sustainable products. The technology also contributes to environmental conservation by minimizing pollution and promoting the use of renewable resources.

97. NURSING ROBOT

Primary Area of Application

Healthcare and Elderly Care

Uniqueness of the Technology

The Nursing Robot features 3D-printed arms, a touch display, a depth camera, and intelligent operations designed to assist healthcare providers. It can perform tasks such as medication delivery, patient monitoring, and other routine caregiving activities. The robot is equipped with advanced sensors and AI capabilities, enabling it to interact with patients and respond to their needs effectively



What Problem Does the Technology Solve?

The healthcare sector, especially in elderly care facilities and hospitals, faces a significant shortage of staff. This shortage can lead to burnout among healthcare workers and a decrease in the quality of patient care. The Nursing Robot assists in performing repetitive and time-consuming tasks, allowing healthcare workers to focus on more critical aspects of patient care and reducing their workload.

Target Industries for the Technology

- » Hospitals
- » Elderly Care Facilities
- » Healthcare Robotics

Expected Positive Impact/Outcome

Enhances the quality of patient care by reducing the workload on healthcare staff, increasing efficiency, and ensuring consistent care delivery. The technology supports healthcare workers, improving their job satisfaction and reducing burnout. It also contributes to better patient outcomes by providing timely and consistent care.

98. HAPTIC BAR BENDING MACHINE

Primary Area of Application

Construction and Training

Uniqueness of the Technology

The Haptic Bar Bending Machine integrates virtual reality with tactile feedback to simulate the process of bending steel reinforcing bars. Trainees can practice in a virtual environment that provides realistic haptic feedback, enhancing their skills without the risk of injury or material wastage. The machine offers an immersive training experience, replicating real-world scenarios accurately.



What Problem Does the Technology Solve?

Traditional training methods for bar bending can be unsafe and expensive due to the physical materials and equipment required. There is also a risk of injury during training. This technology provides a safe, cost-effective, and efficient training solution. It allows trainees to gain practical experience without the associated risks and costs of traditional training methods.

Target Industries for the Technology

- » Construction Industry
- » Vocational Training Centers
- » Safety Training Providers

Expected Positive Impact/Outcome

Improves the proficiency and safety of construction workers by providing a realistic and immersive training environment. Reduces training costs and minimizes the risk of accidents on construction sites. The technology also supports workforce development by enhancing the skills and competencies of trainees.

99. BIOMETHANE FROM RICE MILL EFFLUENT

Primary Area of Application

Wastewater Treatment and Renewable Energy

Uniqueness of the Technology

This technology combines aerobic and anaerobic processes, electrocoagulation, and biogas production to treat the effluent from rice mills and produce biomethane. The process efficiently handles the high-volume, high-strength wastewater typical of rice mills. It transforms wastewater into a valuable resource by generating renewable energy in the form of biomethane.



What Problem Does the Technology Solve?

Rice mills generate large volumes of wastewater that are difficult to treat and often lead to environmental pollution. This technology addresses this problem by providing an effective wastewater treatment solution that meets pollution control norms. Additionally, it produces renewable energy, contributing to sustainable industrial practices.

Target Industries for the Technology

- » Rice Milling Industry
- » Wastewater Treatment Plants
- » Renewable Energy Providers

Expected Positive Impact/Outcome

Reduces environmental pollution by treating rice mill effluent effectively. Generates renewable energy, contributing to energy sustainability and reducing dependence on fossil fuels. The technology supports sustainable industrial practices and provides an additional revenue stream through biomethane production.

100. COIR PACKAGING

Primary Area of Application

Packaging and Sustainable Materials

Uniqueness of the Technology

Coir packaging boxes are crafted from natural coir fibers, making them durable, eco-friendly, and biodegradable.

These boxes offer moisture resistance and insulation, making them suitable for various packaging needs. The technology promotes the use of natural materials, reducing reliance on synthetic packaging.

What Problem Does the Technology Solve?

The widespread use of plastic packaging has significant environmental impacts, including pollution and non-biodegradability. Coir packaging provides a sustainable alternative, reducing the reliance on plastic and minimizing environmental damage. It also supports the agricultural industry by utilizing coir, a byproduct of coconut processing.

Target Industries for the Technology

- » Packaging Industry
- » Sustainable Manufacturing
- » Agricultural Byproducts Utilization

Expected Positive Impact/Outcome

Promotes sustainability by reducing plastic waste and encouraging the use of biodegradable materials. Supports the agricultural industry by providing a market for coir, a byproduct of coconut processing. Contributes to environmental conservation and resource efficiency by reducing pollution and promoting the use of renewable resources.



101. IOT-ENABLED SMART FLOOD MONITORING SYSTEM

Primary Area of Application

Disaster Management and Environmental Monitoring

Uniqueness of the Technology

This compact device is equipped with sensors to detect water levels and weather conditions, transmitting real-time flood alerts through IoT connectivity. It provides immediate notifications to rural and flood-prone areas, enhancing preparedness and response. The system is designed to be user-friendly and reliable, ensuring timely alerts to mitigate the impact of floods.



What Problem Does the Technology Solve?

Floods cause significant damage and loss of life, particularly in rural areas where early warning systems are often lacking. Traditional flood monitoring systems may not provide timely alerts, leading to inadequate preparedness and response. This technology enables early detection and warning, allowing communities to take preventive measures and evacuate if necessary.

Target Industries for the Technology

- » Disaster Management Agencies
- » Rural Development Programs
- » Environmental Monitoring Organizations

Expected Positive Impact/Outcome

Enhances community resilience and disaster preparedness by providing timely flood alerts. Saves lives and minimizes property damage in flood-prone areas. The technology supports effective disaster management and reduces the economic and social impact of floods.

102. Haksh-E Robotics Social Robot

Primary Area of Application

Public Health and Education

Uniqueness of the Technology

These AI-powered social robots are designed to engage children in promoting positive behavioral changes, such as hand hygiene. The robots use interactive and user-friendly methods to educate children about healthy habits and public health practices. They are equipped with sensors and AI capabilities to interact effectively with children, making learning fun and engaging.



What Problem Does the Technology Solve?

Children are often the most susceptible to infectious diseases due to poor hygiene practices. Traditional methods of teaching hygiene may not be engaging or effective. This technology provides an engaging and effective way to teach children about the importance of hand hygiene and other healthy behaviors, reducing the spread of infectious diseases.

Target Industries for the Technology

- » Educational Institutions
- » Public Health Organizations
- » Robotics and AI Development

Expected Positive Impact/Outcome

Improves public health outcomes by fostering healthy habits in children, reducing the spread of infectious diseases. Promotes long-term behavioral changes by making learning about hygiene fun and engaging. The technology supports public health education and contributes to a healthier society.

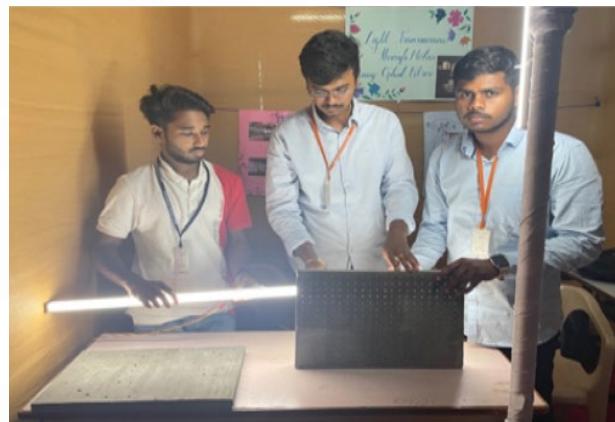
103. LIGHT TRANSMITTING CONCRETE

Primary Area of Application

Construction and Architecture

Uniqueness of the Technology

This concrete material incorporates optical fibers that allow light to pass through while maintaining the material's structural integrity. It can be used for both aesthetic and functional purposes in building design, providing natural lighting and reducing the need for artificial lighting. The technology offers innovative design solutions for architects and builders.



What Problem Does the Technology Solve?

Traditional building materials often require extensive artificial lighting, which increases energy consumption and costs. Light transmitting concrete allows for innovative design solutions that enhance natural lighting and improve energy efficiency in buildings. It also provides aesthetic benefits, creating visually appealing structures.

Target Industries for the Technology

- » Construction Industry
- » Architectural Firms
- » Sustainable Building Design

Expected Positive Impact/Outcome

Enhances energy efficiency in buildings by reducing the need for artificial lighting. Promotes innovative architectural designs that integrate natural lighting, improving the aesthetic appeal and functionality of buildings. The technology supports sustainable building practices and contributes to environmental conservation by reducing energy consumption.

Each of these technologies offers unique solutions to pressing problems in their respective fields, promoting sustainability, efficiency, and improved quality of life.

104. NETRAVAAD

Primary Area of Application

Assistive Technology and Accessibility

Uniqueness of the Technology

Netravaad is an eye sign-to-speech device that translates eye movements into words and vocal communication. It uses camera technology for portability and supports multiple languages, enhancing inclusivity and accessibility for individuals with speech impairments.



What Problem Does the Technology Solve?

Individuals with speech impairments often struggle with communication, limiting their ability to express themselves and interact with others. Netravaad empowers these individuals by providing a reliable and portable means of communication through eye movements.

Target Industries for the Technology

- » Assistive Technology Providers
- » Healthcare
- » Rehabilitation Centers

Expected Positive Impact/Outcome

Improves communication abilities for individuals with speech impairments, fostering greater independence and inclusion. It also enhances the quality of life and social interactions for users.

105. SAFENET

Primary Area of Application

Assistive Technology and Accessibility

Uniqueness of the Technology

SafeNet is an online guidance platform designed to enhance children's digital safety and well-being. It features advanced web filtering, YouTube insights, live location tracking, app management, screen time oversight, call monitoring, and content filtering. The platform also offers live interactive sessions to promote healthy digital habits.



What Problem Does the Technology Solve?

Children are increasingly exposed to online risks, including inappropriate content, cyberbullying, and excessive screen time. SafeNet addresses these issues by providing comprehensive monitoring and guidance tools to ensure a safer and healthier digital experience for children.

Target Industries for the Technology

- » Educational Institutions
- » Parental Control Technology Providers
- » Child Safety Organizations

Expected Positive Impact/Outcome

Enhances online safety and digital well-being for children, reducing exposure to harmful content and promoting healthier digital habits. Supports parents and educators in monitoring and guiding children's online activities

106. SALT BATH HARDENING FURNACE

Primary Area of Application

Metalworking and Small-Scale Manufacturing

Uniqueness of the Technology

The Saltbath Hardening Furnace is specifically designed for small-scale knife manufacturers. It operates on a low connected load of less than 20kW, eliminating the need for expensive transformers, thus providing an efficient and economical solution for hardening metal.



What Problem Does the Technology Solve?

Small-scale knife manufacturers often face challenges related to the high costs and energy requirements of traditional hardening furnaces. This technology offers a cost-effective and energy-efficient alternative, enabling manufacturers to achieve consistent quality without incurring high operational costs.

Target Industries for the Technology

- » Knife Manufacturing
- » Metalworking Shops
- » Small-Scale Manufacturing

Expected Positive Impact/Outcome

Reduces energy costs and operational expenses for small-scale knife manufacturers, while ensuring high-quality hardening of metal products. This supports the growth and sustainability of small manufacturing businesses.

107. PRANAVAYU

Primary Area of Application

Healthcare and Emergency Response

Uniqueness of the Technology

Amrita Pranavayu is a portable oxygen generator capable of producing 12-15 liters per minute of 95% pure oxygen. It is designed to work with any zeolite materials, making it suitable for use in hospitals and high-altitude areas where oxygen supply may be limited.



What Problem Does the Technology Solve?

Patients with respiratory issues and those in high-altitude areas often struggle with insufficient oxygen supply. Pranavayu provides a reliable source of oxygen, enhancing patient care and emergency response capabilities in these regions.

Target Industries for the Technology

- » Healthcare Facilities
- » Emergency Medical Services
- » High-Altitude Operations

Expected Positive Impact/Outcome

Improves patient outcomes by providing a reliable source of high-purity oxygen. Enhances emergency response capabilities and supports healthcare delivery in remote or high-altitudes.

108. ROBOTIC COCONUT TREE CLIMBER (AMARAN)

Primary Area of Application

Agriculture and Robotics

Uniqueness of the Technology

Amaran is a robotic coconut tree climber available in wired and wireless versions. The advanced wireless model, controlled via smartphone, features three cutting arms and a camera for precise harvesting, eliminating the risks associated with manual climbing.



What Problem Does the Technology Solve?

Manual coconut tree climbing is dangerous and labor-intensive. Amaran addresses these challenges by providing a safe and efficient robotic solution for harvesting coconuts, thereby reducing labor risks and increasing productivity.

Target Industries for the Technology

- » Coconut Farming
- » Agricultural Robotics
- » Agritech Solutions

Expected Positive Impact/Outcome

Enhances safety and efficiency in coconut harvesting, reduces labor risks, and addresses labor shortages in the agricultural sector. This technology supports the sustainability and productivity of the coconut farming industry.

109. WASTE PLASTIC TO TILES

Primary Area of Application

Recycling and Sustainable Manufacturing

Uniqueness of the Technology

This technology utilizes a patented, cost-effective method to transform low-value plastic waste into valuable products such as tiles. The recycling process produces items with properties comparable to virgin plastics, providing an environmentally friendly solution to plastic waste.



What Problem Does the Technology Solve?

Plastic waste is a major environmental concern, contributing to pollution and landfill overuse. This technology addresses the problem by converting waste plastic into useful products, thereby reducing environmental impact and promoting recycling.

Target Industries for the Technology

- » Recycling Industry
- » Sustainable Manufacturing
- » Construction Materials

Expected Positive Impact/Outcome

Reduces plastic waste and environmental pollution, promotes recycling, and produces sustainable products with practical applications in construction and other industries.

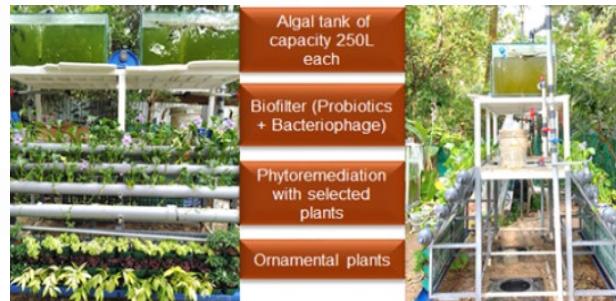
110. Bio Filter Technology

Primary Area of Application

Wastewater Treatment and Environmental Management

Uniqueness of the Technology

The Bio Filter Technology uses bacteriophages, specific algae, bacterial consortia, biological control agents, and aquatic plants to treat toilet wastewater. This innovative solution purifies wastewater for reuse in agriculture and fisheries, promoting sustainable wastewater management.



What Problem Does the Technology Solve?

Untreated toilet wastewater poses significant environmental and health risks. This technology provides an efficient and sustainable solution for treating wastewater, making it safe for reuse in agricultural and fisheries applications.

Target Industries for the Technology

- » Wastewater Treatment Plants
- » Agriculture
- » Aquaculture

Expected Positive Impact/Outcome

Enhances wastewater management, reduces environmental pollution, and promotes the reuse of treated water in agriculture and fisheries. This supports sustainable water management practices and environmental conservation.

111. Amrita Dynamic Regional Landslide Early Warning Platform

Primary Area of Application

Disaster Management and Environmental Monitoring

Uniqueness of the Technology

This platform uses wireless sensor networks to provide real-time landslide alerts, facilitating timely evacuation efforts. It features biological system mimicry for network accuracy, self-healing capability, online signal availability, and globally optimal decision-making without central data transmission.



What Problem Does the Technology Solve?

Landslides cause significant damage and loss of life, especially in vulnerable regions. Traditional warning systems often fail to provide timely alerts. This technology ensures real-time monitoring and early warning, enhancing disaster preparedness and response.

Target Industries for the Technology

- » Disaster Management Agencies
- » Environmental Monitoring Organizations
- » Urban Planning and Development

Expected Positive Impact/Outcome

Improves community resilience to landslides by providing timely alerts, reducing loss of life and property damage. Enhances disaster management and preparedness efforts through advanced monitoring and early warning capabilities.

112. AYURSIM

Primary Area of Application

Education and Healthcare Training

Uniqueness of the Technology

Ayursim is the first-ever virtual simulation tool for Ayurvedic clinical training. It offers 54 simulated cases across 9 specialties, allowing students to practice and receive feedback in a safe, interactive environment.

The screenshot shows the AyurSIM software interface. At the top, there's a navigation bar with icons for Help, Notifications, and User Profile. Below the navigation bar, there's a sidebar on the left with a tree view of symptoms: Listening to the Patient, History Taking, Location/Radiation, Onset, Chronology/Timing, Quality, Severity/Activities of Daily Living, Modifying Factor, Associated Symptoms, Treatment, Personal History-Agni, Personal History-Koshta, Personal History-Ahara, Personal History-Vrutha, Personal History-Nidra, and Personal History-Vagadharana. The main area has a title "Listening to the Patient" and a video player showing a doctor in a blue coat and a patient in a pink shirt. The video player has a progress bar at 0.00 / 0.09 and a caption "Pain and difficulty in swallowing". To the right of the video player is a "Patient Details" section with a table:

Name	Patient3
Age	22
Chief Complaint	He has Pain and difficulty in swallowing.
Complaint	In swallowing.

At the bottom right of the main area is a button labeled "Objective/Observation".

What Problem Does the Technology Solve?

Traditional clinical training can be limited by access to real cases and the potential risks to patients. AyurSIM provides a safe and comprehensive training environment for Ayurveda students, enhancing their skills and knowledge without risking patient safety.

Target Industries for the Technology

- » Ayurvedic Educational Institutions
- » Healthcare Training Providers
- » Virtual Learning Platforms

Expected Positive Impact/Outcome

Enhances the quality and effectiveness of Ayurvedic clinical training, improving student competencies and patient care. Supports the growth and development of Ayurvedic education through innovative training methods.

113. Bhuja - Low Cost Six Degrees of Freedom Collaborative Robotic ARM

Primary Area of Application

Bhuja is designed as a low-cost robotic arm with six degrees of freedom, suitable for various industries including chip manufacturing, medical robotics, heavy industry, service robotics, and disaster management.

Uniqueness

The uniqueness of Bhuja lies in its affordability and versatility across multiple applications. It offers robust capabilities typically found in higher-cost robotic systems but at a fraction of the price, making it accessible for a wide range of industries, including those in developing economies.



Problem Solved

Bhuja addresses the need for cost-effective robotic solutions that can perform intricate tasks requiring precise movement and flexibility. It enables automation in industries where labor costs are high or where human workers face hazardous conditions, thereby enhancing productivity and safety.

Target Industries

Industries targeted include semiconductor manufacturing for precision handling, medical robotics for surgical assistance, heavy industry for assembly and lifting tasks, service robotics for customer interaction, and disaster management for handling hazardous materials or debris.

Impact

The technology is expected to democratize access to advanced robotics, particularly in sectors where cost has been a barrier to adoption. By improving efficiency, reducing labor costs, and enhancing safety in various industrial settings, Bhuja has the potential to drive economic growth, improve operational outcomes, and contribute to technological advancement globally.

114. AMRITA ABSORF - ORAL SORAFENIB NANOMEDICINE FOR CANCER TREATMENT

Primary Area of Application

Amrita ABSORF is a novel oral sorafenib nanomedicine primarily developed for treating Hepatocellular carcinoma (liver cancer) and FLT-3 ITD AML (acute myeloid leukemia with internal tandem duplication mutation).

Uniqueness

It utilizes protein nanoparticles loaded with sorafenibtosylate, formulated with mucoadhesive/mucopenetrating excipients into oral capsules. ABSORF demonstrates significantly enhanced oral bioavailability (2-3 fold) compared to current clinical formulations, thereby improving drug efficacy and patient outcomes.



Problem Solved

Traditional chemotherapy for cancers like Hepatocellular carcinoma and AML often faces challenges of low bioavailability and systemic toxicity. ABSORF addresses these issues by delivering sorafenib more effectively to cancer cells, reducing side effects and improving treatment efficacy.

Target Industries

Pharmaceutical companies involved in oncology, biotechnology firms focusing on nanomedicine, and healthcare providers specializing in cancer treatment.

Impact

The technology promises to enhance the standard of care for cancer patients by offering a more effective and tolerable treatment option. It could potentially reduce healthcare costs associated with cancer care, improve patient quality of life through fewer side effects, and extend survival rates for those affected by these aggressive forms of cancer.

115. GLIOCURE WAFER - DRUG ELUTING IMPLANT FOR BRAIN TUMOR TREATMENT

Primary Area of Application

Gliocure wafer is designed for the treatment of brain tumors, specifically to release the chemotherapeutic agent BCNU (Carmustine) in the brain over a sustained period of up to 30 days.

Uniqueness

The wafer is a polymeric implant made of biocompatible materials, ensuring localized drug delivery directly to the tumor site without systemic leakage. This controlled release mechanism minimizes systemic side effects associated with chemotherapy.



Problem Solved

Current treatments for brain tumors often involve systemic chemotherapy or invasive procedures. Gliocure wafer offers a targeted approach by delivering chemotherapy directly to the tumor bed, thereby improving therapeutic efficacy and minimizing damage to healthy brain tissue.

Target Industries

Neurosurgery departments in hospitals, pharmaceutical companies specializing in neuro-oncology, and research institutions focused on brain tumor treatments.

Impact

The technology is expected to improve outcomes for patients with brain tumors by enhancing local drug delivery, reducing treatment-related complications, and potentially extending survival rates. It represents a significant advancement in neuro-oncology, offering new hope for effective treatment strategies.

116. PHOTO-ACTIVATED INJECTABLE NANOPARTICLE GEL FOR BRAIN TUMOR TREATMENT

Primary Area of Application

Amrita-LI Glio-Gel is an injectable nanoparticle gel designed for the treatment of recurrent glioma (a type of brain tumor).

Uniqueness

The gel utilizes nano-Photo Dynamic Therapy (PDT), where drug-loaded nanoparticles are injected into the tumor cavity and activated by laser light. This targeted approach aims to kill residual tumor cells after surgical resection, improving treatment efficacy.



Problem Solved

Recurrent gliomas are challenging to treat due to their invasive nature and resistance to conventional therapies. The photo-activated nanoparticle gel offers a precise, localized treatment option that targets remaining cancer cells post-surgery, potentially improving patient outcomes.

Target Industries

Biopharmaceutical companies focusing on oncology, medical device manufacturers developing advanced therapeutic delivery systems, and neurosurgical departments in hospitals.

Expected Impact

The technology is expected to enhance survival rates and quality of life for patients with recurrent glioma by improving tumor control and reducing the need for repeated surgeries or systemic treatments. It represents a promising advancement in personalized medicine for neuro-oncology.

117. NANO-TEXTILE SMALL DIAMETER VASCULAR GRAFT

Primary Area of Application

Nano-textile small diameter vascular grafts are designed for use in vascular surgery, specifically for replacing or bypassing small diameter blood vessels (3-5 mm).

Uniqueness

Nano-textile small diameter vascular grafts are designed for use in vascular surgery, specifically for replacing or bypassing small diameter blood vessels (3-5 mm).



Problem Solved

Traditional vascular grafts often face challenges such as thrombosis (blood clotting) and rejection. Nano-textile grafts address these issues by offering improved mechanical strength, reduced risk of clot formation, and enhanced biocompatibility, thereby improving long-term graft patency and patient outcomes.

Target Industries

Medical device manufacturers specializing in vascular implants, cardiovascular surgery departments in hospitals, and research institutions focused on biomaterials and tissue engineering.

Impact

The technology is expected to reduce complications associated with small diameter vascular grafts, such as thrombosis and graft failure. By providing a more durable and biocompatible solution, it could improve patient survival rates, reduce healthcare costs related to repeat surgeries, and enhance overall quality of life for patients requiring vascular interventions.

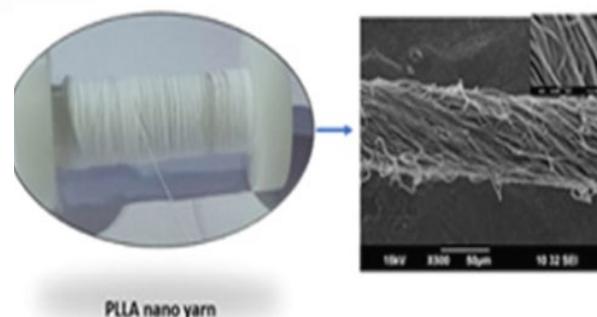
118. POLYMERIC NANOYARNS

Primary Area of Application

Polymeric nanoyarns made from PLLA (Poly L-lactic acid) are used as a raw material in biomedical applications, particularly in developing nanocomposite bone implants.

Uniqueness

These nanoyarns exhibit mechanical strengths ranging from 10-20 MPa and diameters of 150-350 μm , with individual fibers measuring 800-1500 nm in diameter. They enhance the mechanical properties of composite materials used in bone implants, improving overall implant stability and biocompatibility.



Problem Solved

Bone implants often require materials with specific mechanical properties and biocompatibility to promote integration with natural bone tissue. Polymeric nanoyarns address these requirements by offering tailored mechanical strength and enhanced tissue compatibility, facilitating better implant performance and patient recovery.

Target Industries

Biomedical engineering firms specializing in orthopedic implants, biomaterials research laboratories, and orthopedic surgery departments in hospitals.

Impact

The technology is expected to advance the field of orthopedic implants by offering stronger, more biocompatible materials. This could lead to improved implant longevity, reduced risk of complications such as implant loosening or rejection, and enhanced patient mobility and quality of life post-surgery.

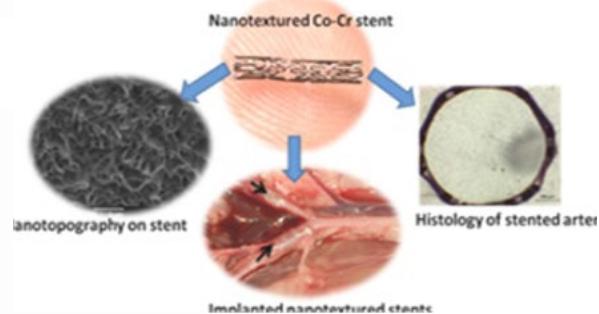
119. NANOTEXTURED CORONARY STENTS

Primary Area of Application

Nanotextured coronary stents are used in interventional cardiology for treating coronary artery disease (CAD) by implanting them in narrowed coronary arteries to restore blood flow to the heart.

Uniqueness

These stents are made from Cobalt Chromium or Stainless Steel and feature a surface with titania nanotopography. This unique texture enhances in vivo response by reducing intimal hyperplasia without compromising mechanical or handling characteristics.



Problem Solved

Traditional coronary stents can lead to complications such as restenosis (re-narrowing of arteries). Nanotextured stents address this issue by promoting better endothelial cell adhesion and reducing inflammation post-implantation, thereby improving long-term patency and reducing the need for repeat interventions.

Target Industries

Medical device manufacturers specializing in cardiology, interventional cardiology departments in hospitals, and cardiovascular research institutions.

Impact

The technology is expected to improve patient outcomes by reducing complications associated with coronary stents, such as restenosis. This could lead to fewer hospital readmissions, lower healthcare costs related to repeat procedures, and better quality of life for patients undergoing coronary artery interventions.

120. MANDIBULAR AUGMENTATION BONE GRAFT

Primary Area of Application

Mandibular augmentation bone grafts are used in maxillofacial and dental surgery to reconstruct and restore the mandible (lower jaw) following trauma or surgical removal of tumors.

Uniqueness

This technology involves a fibrous composite material consisting of a silica-coated HA (Hydroxyapatite)-Gelatin matrix reinforced with PLLA (Poly L-lactic acid) fibrous yarns. It is porous, mechanically stable, and biodegradable, promoting bone regeneration and osseointegration with dental implants.



Problem Solved

Critical size defects in the mandible due to trauma or tumor excision pose challenges for functional and aesthetic restoration. Mandibular augmentation bone grafts address these issues by providing a scaffold that supports new bone growth, integrates with existing bone tissue, and enhances the stability of dental implants.

Target Industries

Maxillofacial surgery departments in hospitals, dental implant manufacturers, biomaterials research laboratories focusing on bone regeneration, and craniofacial reconstruction specialists.

Impact

The technology is expected to improve outcomes for patients requiring mandibular reconstruction by facilitating better aesthetic and functional restoration. It promotes bone healing, reduces the risk of complications such as graft rejection, and supports long-term dental implant success. Overall, it enhances patient quality of life by restoring oral function and facial symmetry.

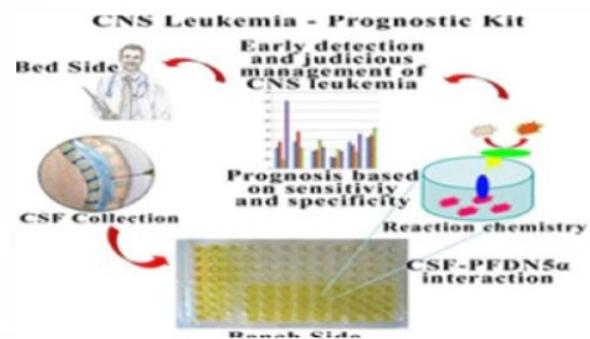
121. A PROGNOSTIC KIT FOR CNS LEUKEMIA PREDICTION IN B-ALL PATIENTS

Primary Area of Application

The prognostic kit is designed for predicting central nervous system (CNS) leukemia in patients with B-cell acute lymphoblastic leukemia (B-ALL), a type of blood cancer.

Uniqueness

Utilizing ELISA platform technology, the prognostic kit identifies biomarkers associated with CNS leukemia onset in B-ALL patients. It enables early prediction and targeted intervention, potentially sparing patients unnecessary prophylactic chemotherapy with toxic effects on the CNS.



Problem Solved

Current clinical practice involves prophylactic intrathecal chemotherapy for all B-ALL patients, irrespective of CNS involvement, to prevent CNS leukemia. This approach leads to unnecessary exposure to toxic chemodrugs and associated side effects. The prognostic kit addresses this issue by providing clinicians with a tool to identify patients at risk of CNS leukemia, enabling personalized treatment decisions.

Target Industries

Biotechnology companies specializing in diagnostic assays, oncology clinics and hospitals treating leukemia patients, and research institutions focused on cancer biomarkers and personalized medicine.

Impact

The technology is expected to reduce the burden of unnecessary chemotherapy on B-ALL patients, particularly children, by minimizing toxic effects on CNS development. It improves patient outcomes by enabling early detection of CNS leukemia, facilitating timely interventions, and optimizing the use of chemotherapy to enhance efficacy and minimize harm.

122. MEDSIM 2.0 - ADVANCED MEDICAL EDUCATION PLATFORM

Primary Area of Application

MedSIM 2.0 is an interactive e-learning platform designed to enhance medical education across three primary modules: Preclinical, Paraclinical online skills lab, and Clinical Virtual Patient Cases.

Uniqueness

The platform integrates 2D and 3D animations, case-based learning scenarios, deliberate practice exercises, and feedback mechanisms tailored for medical students. It offers a comprehensive, immersive learning experience that simulates real-world medical situations and promotes skills development.

Problem Solved

Traditional medical education often relies on didactic lectures and limited hands-on training opportunities. MedSIM 2.0 addresses these limitations by providing interactive modules that enhance understanding, retention, and practical application of medical knowledge and skills in a controlled, virtual environment.

Target Industries

Medical schools, universities offering medical education programs, healthcare training institutions, and continuing medical education providers.

Impact

The technology is expected to improve the quality of medical education by preparing students more effectively for clinical practice. It enhances diagnostic and procedural skills, promotes evidence-based decision-making, and fosters collaboration among healthcare professionals. Ultimately, MedSIM 2.0 contributes to better patient care outcomes and supports the continuous professional development of healthcare providers.

123. AI-POWERED OCULAR DIAGNOSTICS

Primary Area of Application

AI-powered ocular diagnostics revolutionize ophthalmology by leveraging artificial intelligence to analyze high-resolution digital images of the eye's structures (cornea, lens, retina, optic nerve).

Uniqueness

Using AI algorithms, the technology provides rapid, accurate diagnoses of ocular conditions with minimal expertise required from primary care physicians. It enhances diagnostic precision, supports timely treatment decisions, and improves patient outcomes.



Problem Solved

Ophthalmic conditions often require specialized expertise for accurate diagnosis and management. AI-powered ocular diagnostics address this challenge by enabling reliable, automated analysis of ocular images, facilitating early detection, and optimizing treatment strategies.

Target Industries

Ophthalmology clinics and hospitals, primary care practices, telemedicine platforms offering remote ophthalmic consultations, and AI technology firms focusing on healthcare applications.

Impact

The technology is expected to democratize access to quality eye care by extending diagnostic capabilities to underserved regions and reducing diagnostic delays. It enhances healthcare efficiency, lowers healthcare costs associated with ophthalmic consultations, and improves patient outcomes through timely intervention and personalized treatment approaches.

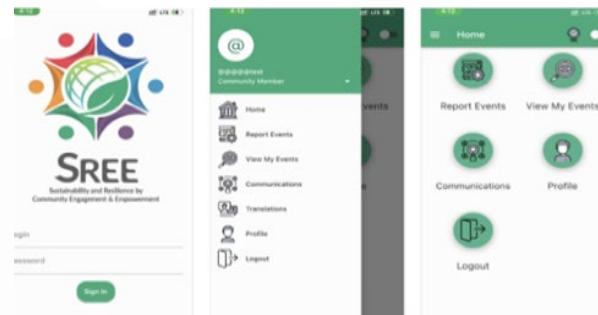
124. SREE - SUSTAINABILITY AND RESILIENCE BY COMMUNITY ENGAGEMENT & EMPOWERMENT

Primary Area of Application

SREE is a geo-enabled platform designed to assess sustainability and resilience across various domains including Agriculture, Skills & Livelihood, Education, Health, and Water.

Uniqueness

It harnesses crowd-sourced data and employs a bottom-up approach to evaluate spatio-temporal variability and derive actionable insights. SREE fosters collaboration among stakeholders, promotes inclusivity, and supports informed decision-making at multiple levels—from local communities to national authorities.



Problem Solved

Assessing sustainability and resilience requires comprehensive data and stakeholder engagement. SREE addresses these challenges by providing a dynamic platform for data collection, analysis, and visualization, enabling evidence-based interventions and policies.

Target Industries

Government agencies responsible for sustainable development, NGOs focusing on community empowerment, research institutions studying resilience, and corporations aiming for sustainable practices.

Impact

The technology is expected to facilitate sustainable development goals by enhancing community resilience and promoting equitable resource management. It empowers local communities to participate in decision-making processes, fosters knowledge sharing, and supports adaptive strategies to mitigate environmental and socio-economic challenges.

These technologies represent significant advancements across various sectors, each addressing specific challenges and offering innovative solutions that contribute to societal well-being and economic development.

125. Data analytics and Automation tools for all your Autonomous Unmanned Vehicle

Technology Description

The technology has two components. A drone with an onboard companion computer that will provide minimal latency video feedback and a digital platform where we can extract insights from drone images/videos. On the product side, they have a drone payload that can autonomously collect and transmit data to the ground station/server. Post which the collected data will be processed with AI/ML models to gain deeper insights into the infrastructure and generate intuitive health reports to assist the operators in taking swift actions. With the solution, they will be able to bring the current project turnaround time of 3-7 days to just under an hour without compromising the quality of the results, hence enabling them to take rapid actions to fix any issues in the firms.

Target Users / Application Areas

There exist two types of customers in the market - private or government corporations who own these installations and the drone operators who currently provide drone video footage of the installations

Novelty / Innovation

The innovation lies in both the hardware and software aspects of the solution. In the hardware section, a drone with low latency video transmission is the key innovation. Pairing that with the automated process of inference which is done by the AI/ML models hosted on the cloud completes the solution.

Advantage Over Existing Methods

The innovation benefits lie in letting the client use the whole system at their comfort, since the entire solution is built on the cloud, our services can be consumed at different price brackets. This helps in enabling any drone operator to utilize AI for their needs with minimal expense from their side. Moreover, a complete product of drone with AI capabilities will not only make smart decisions, but it will also be able to undertake faster decisions compared to conventional methods.

Market Potential, Competition, Risk Envisaged

They envision a product that will give deeper insights into the health of the firm from the sky and enable us to take rapid actionable to secure it. A hybrid of hardware and software capabilities is paramount to developing an end-to-end package for asset inspection-related activities in Green energy Firms.

Our competitive advantage lies in the fact that we do things the smart way rather than the hard way (manually watching the videos). As most of their AI models are trained and hosted on the cloud the production cycles are much faster. It has the capability to add more use cases in less time than other competitors. The advantage lies in our business model, where they serve clients at all levels of the food chain. From corporations to individuals their platform has the same ease of use and multiple cost brackets.

126. Eco-friendly, electricity free, reusable oxygen generator (Oxy-DealTM) for everyone without any technical, geographical and economical limitation for individual and societal benefits

Technology Description

To address the urgent need during the current and future pandemics, there is a need to develop oxygen generators that can produce medical grade oxygen (purity > 99%) to save valuable lives. The applicant has developed an indigenous electricity free oxygen generator (Oxy-DealTM) to save valuable lives and further interestingly, Oxy-DealTM can be used and/or handled by anyone without having any prior technical knowledge.

The main oxygen generating raw material, sodium percarbonate (SPC) is very economical (Rs. 50-70/kg) and easily available in Indian markets. One kg of SPC can produce 100 (hundred) liters of fresh oxygen in the presence of catalysts within 3-4 minutes at ambient temperature. Oxy-DealTM is confirming the viability of a novel means of producing medical grade oxygen without any electricity in rural and urban areas within a very short time. Oxy-DealTM system has been designed to meet the criteria for successful oxygen delivery in small and also large health facilities and also for every household across the country without any economical and geographical limitation.

Target Users / Application Areas

The indigenous Oxy-dealTM, an Indian medical grade oxygen generator has been developed through R&D at DSIR certified lab. The Oxygen-generator (Oxy-DealTM) that can be used by anyone at any geographical location without any limitation. There will have several models that includes 20L, 50L, 100L, 500L and 100L and till 100L oxygen generator can be carried out in the backpack by anyone. It is interesting to know that the system can be used by any hospital, primary health care units in district level where there no electricity. It can also be used for emergency purposes that include in ambulance, car, train, coal mine, military and more. In addition, the person who is affected by respiratory diseases can use our product on a daily basis and the cost is less than one rupee/liter.

Novelty / Innovation

It can be used by health care units in places where there is no electricity.

Advantage Over Existing Methods

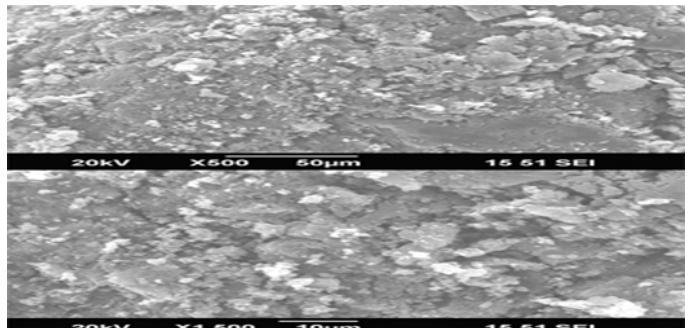
This is a portable model that have several models that includes 20L, 50L, 100L, 500L and 100L and till 100 L oxygen generator snf can be carried out in a backpack

Market Potential, Competition, Risk Envisaged

Oxygen gas and its therapy, the essential medicine is unavailable in limited-resource settings health centres in India. However, the high cost of bottled oxygen and logistical difficulties in its distribution mean that oxygen is not readily available in many district and sub-district health facilities in rural areas of India and causing unprecedented death those can be saved.

127. Effective EMI shielding materials

The technology focuses on the production of flexible shielding materials aimed at addressing electromagnetic interference (EMI) pollution, which has become a significant concern due to the widespread use of electronic devices. This innovative solution comprises two main components:



Polymer Nanocomposites

- » **Materials Used:** The primary materials are rubber-based nanocomposites with magnetic nanofillers.
- » **Advantages:** These composites offer superior properties compared to traditional metal screens, including lightweight, corrosion resistance, tailored thermal expansion, and ease of processing.
- » **Specific Components:**
 - » Polyaniline (PAni): Known for its economic viability, stability, and high-frequency application suitability.
 - » Ferrites: Ferromagnetic materials favored for their cost-effectiveness, ease of fabrication into complex shapes, and broad application range.

Hybrid Fillers

- » **Combinations:** Various combinations of PAni and ferrites are used to enhance both shielding effectiveness and mechanical properties.
- » **Mechanism:** The combination leads to both magnetic and dielectric losses, enhancing EMI shielding.

Product and Process: The flexible shielding material is created by incorporating conductive fillers into a polymer matrix. This process results in a material that effectively absorbs EMI while maintaining desirable physical properties such as impact resistance and durability.

Target Users / Application Areas

The technology is aimed at industries and applications where EMI shielding is crucial. Key target users include:

- » **Electronics Manufacturers:** Companies that produce electronic devices requiring protection from electromagnetic interference.
- » **Automotive Industry:** For shielding sensitive electronic components in vehicles.
- » **Telecommunications:** Protecting communication equipment from EMI.
- » **Aerospace and Defense:** Ensuring the functionality of critical electronic systems.

Novelty / Innovation

Innovative Aspects

- » **Material Innovation:** The use of rubber-based polymer nanocomposites with magnetic nanofillers represents a significant advancement over traditional metal-based EMI shielding.
- » **Hybrid Fillers:** The combination of PAni and ferrites provides a unique solution that enhances both the shielding effectiveness and mechanical properties of the material.
- » **Processing and Application:** The ease of processing these materials into complex shapes allows for a wide range of applications.

Advantage Over Existing Methods

Benefits

- » **Lightweight and Durable:** Compared to metal screens, the nanocomposites are lighter and more resistant to impact and corrosion.
- » **Cost-Effective:** The use of PAni and ferrites is economically viable, making the technology accessible for various industries.
- » **Enhanced Performance:** The hybrid fillers improve the shielding effectiveness significantly, ensuring better protection for electronic devices.

Scalability: The technology can be scaled to meet the needs of different users, from small-scale applications to large industrial uses. Its flexibility and ease of processing make it adaptable to various requirements.

Market Potential, Competition, Risk Envisaged

Market Potential

- » **Growing Demand:** With the increasing number of electronic devices and the associated EMI pollution, there is a substantial market for effective shielding materials.
- » **Diverse Applications:** The technology's applicability across multiple industries, including electronics, automotive, telecommunications, and aerospace, indicates a broad market potential.

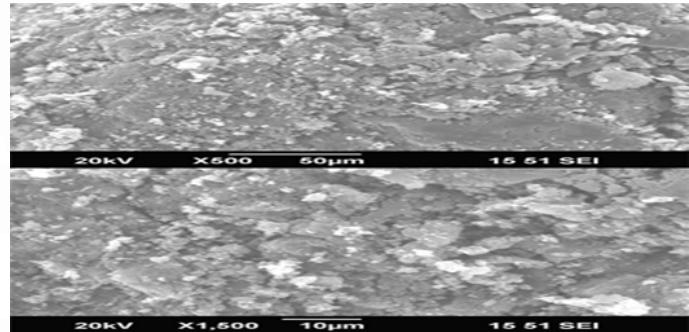
Competitive Advantage

- » **Innovative Material Use:** The unique combination of PAni and ferrites offers superior performance over traditional materials.
- » **Ease of Fabrication:** The technology's ability to be processed into complex shapes provides a significant advantage in manufacturing and application.
- » **Economic and Effective:** The cost-effectiveness and high performance of the material make it a competitive choice for EMI shielding solutions.

128. Advanced Auxetic Structures

Introduction

Auxetic structures, a captivating subset of mechanical metamaterials, are gaining significant attention due to their distinctive geometries and remarkable mechanical properties. Defined by their negative Poisson's ratio, these structures exhibit unconventional characteristics such as negative thermal expansion, enhanced energy harvesting capabilities, and superior load-bearing capacities. Recent advancements in this field have unlocked new potential for diverse applications across various industries.



Innovative Advancements

Our research has led to groundbreaking developments in high-strength engineering load-bearing auxetic members. By strategically organizing auxetic clusters within a confined structural frame, we have achieved a 65% reduction in material usage compared to conventional beams while maintaining remarkable load-bearing capacities. This innovation results in an outstanding load-to-weight ratio, making these auxetic structures highly efficient and practical for numerous applications.

Key Attributes

- » **Negative Poisson's Ratio:** Enables unique deformation characteristics, leading to enhanced material properties.
- » **Negative Thermal Expansion:** Offers stability under varying temperature conditions, crucial for precision applications.
- » **Enhanced Energy Harvesting:** Improves efficiency in converting mechanical energy into electrical energy.
- » **Superior Load-Bearing Capacities:** Allows for lightweight yet strong structural components.

Applications

Aerospace and Automotive

- » **Shape-Morphing Skins:** Adaptive surfaces that can change shape for improved aerodynamics.
- » **Programmable Auxetics:** Materials that can be tuned for specific mechanical responses.
- » **Crash Protection Systems:** Enhanced impact absorption and energy dissipation.

Communication Systems and Stealth Technologies

- » **Acoustic and Optical Wave Guidance:** Improved control of sound and light waves for advanced communication.
- » **Cloaking Devices:** Materials that can bend waves around objects for stealth applications.

Protective Gear

- » **Impact Attenuation:** Superior energy absorption for helmets, body armor, and sports equipment.

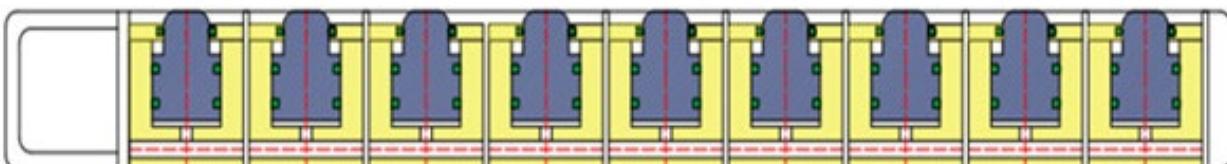
Textiles

- » **Auxetic Textiles:** Improved flexibility, durability, and comfort, ideal for sportswear and high-performance clothing.

Biomedical Field

- » **Nano-Scale Devices:** Enhanced bio-mechanical properties for advanced medical devices.
- » **Bone Implants:** Sustainable implantation with easier post-operative recovery, owing to improved mechanical compatibility with biological tissues.

129. Vibrating Frequency Granite Breaker



Hydraulic Splitter 10 Piston Model
Size 110 x 1000

Technical Description

The present invention is a vibrating frequency granite breaker powered by hydraulic energy and a variable frequency generator. It provides a massive splitting force of up to 600 tons with minimal noise, dust, and vibration. The breaker allows for adjustable splitting direction, making it ideal for confined spaces. Its user-friendly design, ease of transportation, and versatility for various environments make it an excellent tool for controlled demolition application.

The vibrating frequency granite breaker offers a revolutionary solution for controlled demolition of granite and similar materials. Key features and functionalities include:

- » **Drilling Specifications:** Diameter: 110 mm, Depth: 1000 mm, Number of Pistons: 10, Split Force: 600 tons.
- » **Hydraulic Power and Variable Frequency Generator:** Provides reliable force and precise control over the vibrating frequency.
- » **Enormous Splitting Force:** Generates up to 600 tons of splitting force for efficient granite breaking.
- » **Nearly Noise-Free Operation:** Minimal noise, ensuring a disturbance-free environment.
- » Low Dust and Vibration: Produces minimal dust and low vibration, enhancing safety and comfort.
- » **Adjustable Splitting Direction:** Suitable for confined spaces and complex scenarios.
- » User-Friendly Design: Intuitive controls and ergonomic features for operator comfort and efficiency.
- » **Easy to Transport:** Compact and portable design for flexibility and convenience.
- » Versatile Application: Suitable for both indoor and outdoor demolition projects, capable of splitting granite in seconds.
- » **Controlled Demolition:** Precise control with the variable frequency generator ensures minimal collateral damage and safety.

Advantages Over Other Systems

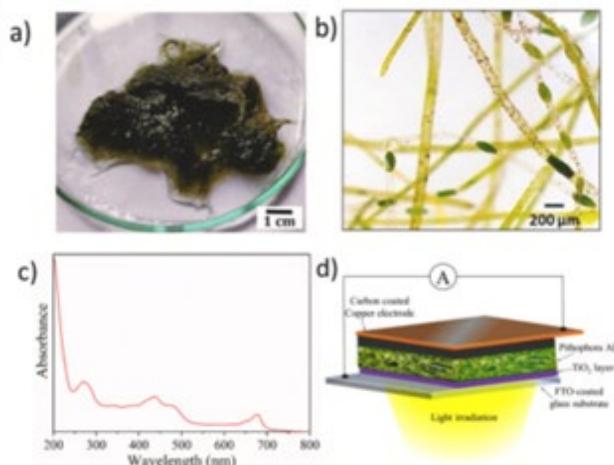
- » **No Vibration, Impact, Noise, Dust:** Operates without affecting the surrounding environment.
- » **Usable in Densely Populated Areas:** Can work near precision equipment and in indoor settings without interference.
- » **Flexible Splitting:** Can split granite in any size and direction in mines.

Commercial Application

The splitter is customized for granite breaking and is ideal for granite mines, the granite stone processing industry, and granite quarries.

130. Bio-Photovoltaic Cell Utilizing Freshwater Macroalgae

A novel bio-photovoltaic device has been developed using the filamentous macroalgae *Pithophora roettleri* as the photoactive material. *Pithophora*, a member of the green algae family, typically thrives at the bottom of aquatic habitats or forms dense mats on water surfaces. This innovative approach leverages the natural photosynthetic properties of algae to generate electrical power, representing a sustainable and eco-friendly energy solution.



Fabrication Process

The bio-photovoltaic device was meticulously fabricated by sandwiching an algal biofilm between two specially coated substrates:

- » **Activated Carbon-Coated Copper (Cu) Slide:** Serves as the bottom electrode.
- » **Titanium Oxide (TiO₂) Coated Fluorine-Doped Tin Oxide (FTO) Glass Slide:** Acts as the top electrode.

This configuration creates an efficient platform for capturing light and converting it into electrical energy.

Device Performance

The optimized device, with a surface area of 1 cm², demonstrated significant photo-generated current and voltage under both white and UV light irradiation:

- » **Under White Light (100 mW/cm²)**
 - ◊ Short Circuit Photocurrent: 10.19 µA
 - ◊ Open Circuit Photovoltage: 0.35 V
- » **Under UV Light (365 nm LED with 20 mW/cm² intensity)**
 - ◊ Short Circuit Photocurrent: 1.25 mA
 - ◊ Open Circuit Photovoltage: 0.5 V

To assess its practical application, 10 devices were connected in series, resulting in a cumulative output of 5.53 V under natural sunlight with 0.6 Sun intensity.

Key Attributes

- » **Eco-Friendly and Sustainable:** Utilizes naturally occurring algae, reducing reliance on synthetic materials.
- » **High Efficiency:** Exhibits notable electrical output under both artificial and natural light sources.
- » **Scalability:** Demonstrates potential for larger-scale applications through series connections of multiple devices.

Applications

- » **Renewable Energy Generation:**
 - ◊ Suitable for small-scale energy harvesting applications, especially in eco-sensitive areas.
- » **Environmental Monitoring:**
 - ◊ Can be used in remote sensing and environmental monitoring equipment powered by bio-photovoltaic devices.
- » **Sustainable Electronics:**
 - ◊ Integration into low-power electronic devices, contributing to the development of green technology.

Future Prospects

The success of this bio-photovoltaic device opens avenues for further research and development. Future studies will focus on:

- » **Optimizing Algal Strains:** Identifying and cultivating algae with superior photoactive properties.
- » **Enhancing Device Efficiency:** Improving material coatings and device architecture to maximize energy output.
- » **Scaling Up:** Developing larger, more powerful systems for broader applications in renewable energy sectors.

131. Intrusion Countermeasure System

Technology Description

The Intrusion Countermeasure System leverages advanced technologies, such as Machine Learning (ML) and the Internet of Things (IoT), to enhance border defense strategies. This innovative solution is designed to provide robust security for confined spaces and borders, aiming to reduce fatalities in harsh climates and prevent unauthorized access.

Key Features

Image Capture and Analysis:

- » Utilizes OpenCV to capture images.
- » Incorporates a Deep Neural Network (DNN) model to analyze and recognize human presence by marking pixel coordinates.
- » Enables the system to monitor and control access to restricted areas efficiently.

Autonomous Navigation:

- » Planned integration of autonomous navigation technologies.
- » Allows the system to navigate complex environments independently.
- » Enhances the system's ability to patrol and monitor large or intricate areas without human intervention.

Thermal Imaging:

- » Incorporation of thermal imaging cameras to improve human detection.
- » Ensures accurate monitoring even in low-visibility conditions, such as at night or in adverse weather.

Real-Time Alerts:

- » Robots equipped with the system can alert authorities about intruders in real-time.
- » Provides immediate notifications, enabling quick response to potential threats.

Applications of Technology

- » **Defense:** Enhances border defense mechanisms by providing real-time surveillance and intruder detection.
- » **Confined Space Guarding:** Monitors and protects confined spaces from unauthorized access.

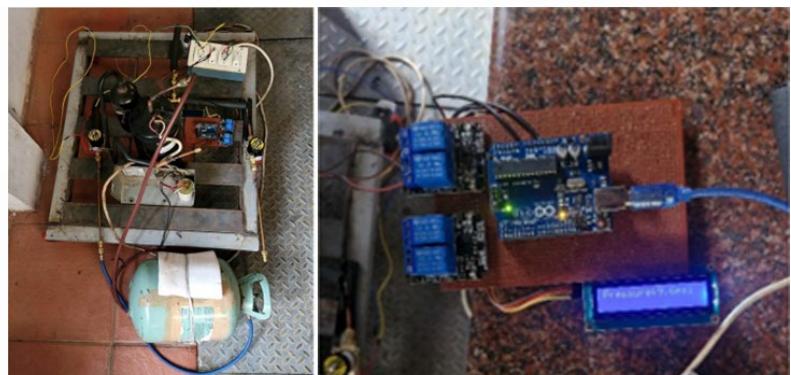
Advantages

- » **Enhanced Security:** By combining ML, IoT, and thermal imaging, the system offers a comprehensive and reliable security solution.
- » **Reduced Human Risk:** Minimizes the need for human patrols in dangerous or harsh climates, reducing the risk of fatalities.
- » **Autonomous Operation:** Capable of independent navigation and monitoring, reducing the need for constant human oversight.
- » **Real-Time Response:** Immediate alerts ensure quick response times to potential security breaches.

132. Integrated Refrigerant Gas Leakage Detection & Automatic Gas Refilling System for Condensers in A/C & Refrigerators

Technology Description:

The Integrated Refrigerant Gas Leakage Detection & Automatic Gas Refilling System is a cutting-edge technology designed to enhance the efficiency and safety of air conditioning and refrigeration systems. This innovative system addresses the common and critical issue of refrigerant gas leaks, which can significantly impair the performance of cooling systems, increase energy consumption, and pose environmental hazards.



Key Features

Precise Leakage Detection:

- » Utilizes the AMG8833 camera module to identify the presence of refrigerant gases in condensers.
- » Highly sensitive sensor capable of detecting minute quantities of gas, ensuring early detection of leaks.
- » Continuous monitoring of refrigerant levels within the system, providing real-time data for early issue diagnosis.

Automatic Gas Refilling:

- » Activated immediately upon leak detection.
- » Utilizes solenoid valves, pressure transducers, and operational controllers for automation.
- » Controlled by sophisticated algorithms to ensure precise refrigerant addition, maintaining optimal system performance.

Real-Time Monitoring and Data Collection:

- » Provides continuous monitoring and real-time data on refrigerant levels.
- » Facilitates early diagnosis and intervention, preventing escalation of minor leaks into major problems.

Efficiency and Safety Enhancements:

- » Reduces the downtime associated with manual refilling and maintenance.
- » Ensures consistent optimal performance of air conditioning and refrigeration systems.
- » Minimizes human error and reduces accidents related to manual refrigerant handling.

Applications

- » **HVAC Industries:** Enhances the maintenance processes of air conditioning and refrigeration systems.
- » **Commercialization and Consultancy:** Potential for commercial use in various HVAC applications, with opportunities for consultancy and mentoring services to implement and optimize the system.

Advantages

- » **Cost Savings:** Integration of leakage detection and automatic refilling functions reduces maintenance costs and extends equipment lifespan.
- » **Environmental Impact:** Mitigates the release of harmful refrigerants into the atmosphere, aligning with global efforts to reduce greenhouse gas emissions.
- » **Safety:** Reduces the risk associated with manual refrigerant handling and lowers the chances of refrigerant-related accidents.
- » **Efficiency:** Maintains optimal refrigerant levels, ensuring the cooling systems operate efficiently and reliably.

133. NaviGest Assistive Technology

Technology Description

NaviGest is a unique assistive technology leveraging gesture recognition and machine learning to facilitate seamless interaction for elderly and paralyzed patients, enhancing their autonomy in daily activities. This technology fosters greater independence, reduces caregiver burden, and improves the overall well-being of users.

Key Features

Gesture Recognition Module:

- » Utilizes machine learning algorithms to accurately interpret user gestures.
- » Ensures responsive and reliable interaction, adapting to individual user preferences and capabilities.

User Interface (UI) Module:

- » Provides an intuitive platform for configuring and personalizing gestures.
- » Allows users to easily set up and manage their gesture-based commands for various applications.

Gesture Integration Module:

- » Facilitates the incorporation of gesture commands into home automation systems and mobility devices.
- » Enables control of household appliances, communication devices, and navigation tools through simple hand gestures.

Health Monitoring Integration:

- » Explores potential integration with health metrics for a holistic approach to user well-being.
- » Monitors vital signs and other health parameters, providing data for better health management.

System Management Module:

- » Oversees the lifecycle of the machine learning model, ensuring continuous learning and adaptation.
- » Maintains system integrity by allowing independent updates to individual modules without disrupting the overall system.

Technical Specifications

- » **Hardware:** Utilizes ESP32 development boards, 4-channel relay modules, and various sensors for accurate gesture detection.
- » **Software:** Developed using Arduino IDE for initial programming and integrated with Flutter and Firebase for real-time interaction and data management.

Applications

- » **Healthcare:** Provides paralyzed individuals with a means to independently manage daily tasks.
- » **Home Automation:** Integrates with home appliances and systems for ease of control through gestures.
- » **Assistive Technology Manufacturers:** Offers a scalable solution for manufacturers to integrate into their assistive devices.

Advantages

- » **Enhanced Independence:** Empowers paralyzed individuals to perform daily tasks without relying on caregivers.
- » **Quality of Life Improvement:** Provides users with greater control over their environment, enhancing their overall well-being.
- » **Caregiver Burden Reduction:** Lessens the dependency on caregivers by enabling users to independently manage their needs.
- » **Modular Design:** Ensures maintainability and allows for independent updates to system modules.

134. Smart Waste Segregation System

Sector

Pubic Area, Waste Management

Introduction

The Smart Waste Segregation System combines deep learning for accurate waste classification with automated sorting and sensor monitoring. This system boosts efficiency and sustainability in waste management, providing real-time bin level and odor alerts via the Blynk app. It aims to promote a cleaner environment and support a circular economy.

Key Features

Deep Learning-Based Waste Classification:

- » Utilizes convolutional neural networks (CNNs) trained on extensive datasets of various waste categories.
- » Accurately identifies and classifies different types of waste items, including metal, organic, recyclable, and disposable waste, through image recognition.

Automated Sorting Mechanism:

- » Integrates the deep learning model into a smart sorting system.
- » Automatically sorts waste items into appropriate categories, reducing the need for manual sorting and enhancing operational efficiency.

Real-Time Monitoring:

- » Equipped with bin level detection sensors that monitor the fill levels of waste bins.
- » Includes smell detection sensors to identify and alert users about odors indicating potential issues with waste decomposition or overflow.

Blynk App Integration:

- » Allows users to monitor bin levels and receive odor alerts in real-time via the Blynk app.
- » Facilitates proactive waste management and ensures timely waste collection, preventing overflows and associated environmental hazards.

Applications

- » **Malls:** Enhances waste management efficiency in high-traffic commercial areas.
- » **Educational Institutions:** Promotes environmental awareness and sustainability on campuses.

Advantages

- » **Reduced Landfill Waste:** Enhances the segregation process, ensuring more waste is appropriately recycled or composted, thus reducing landfill use.
- » **Circular Economy Promotion:** Supports the reuse and recycling of materials, contributing to a sustainable circular economy.
- » **Improved Environmental Hygiene:** Minimizes pollution and maintains cleaner public areas by preventing waste overflow and reducing odors.
- » **Operational Efficiency:** Reduces the need for manual waste sorting and frequent waste collection trips.

Technical Specifications

- » **Deep Learning Model:** CNN trained on diverse waste images for accurate classification.
- » **Sensors:** Bin level detection and smell detection sensors for real-time monitoring.
- » **Control System:** Automated sorting mechanism controlled by the deep learning model.
- » **App Integration:** Real-time monitoring and alerts via the Blynk app.

135. Shock Stabilized Medicine Cooler

Technology Description

The Shock Stabilized Medicine Cooler integrates active cooling, motion stabilization, and shock absorption in a single compact unit. This holistic approach to protecting medicines from both thermal and mechanical stresses represents a significant advancement over conventional cold chain methods.

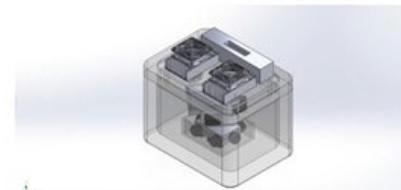


Fig. 1 Semi-transparent view

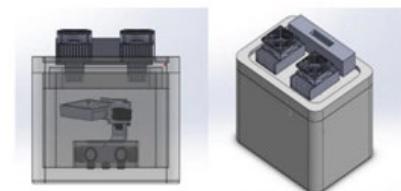


Fig. 2 Side and isometric views

Key Features

Active Cooling System:

- » Utilizes a Peltier module for precise temperature control.
- » The cold side of the Peltier module transfers cool air to the cooling chamber via a cold plate system.
- » Excess heat is efficiently dissipated using a heat sink.
- » Incorporates pre-cooled Phase Change Material (PCM) for enhanced temperature stability, especially below 10°C.

Motion Stabilization:

- » Employs an accelerometer and gyroscope to detect motion.
- » Real-time data processed by an Arduino microcontroller activates servo motors to counteract detected movements.
- » Ensures medicines remain steady, mitigating the risk of damage due to mechanical stresses.

Shock Absorption:

- » Includes a damping mechanism connecting the medicine holder to the cooler walls.
- » Absorbs and dissipates kinetic energy from external shocks and vibrations, providing additional protection.

Compact and Portable Design:

- » Self-contained unit acting as a thermoflask powered by a DC power supply for several hours.
- » Highly portable, easy to handle, and independent from bulky refrigeration units.

Applications

- » **Medical Industry:** Safe transportation and storage of temperature-sensitive medicines and vaccines.
- » **Organ Transport:** Ensures the viability of organs during transportation.
- » **Chemical Components:** Transport of highly reactive chemical components requiring stringent temperature control.
- » **Narcotic Drugs:** Safe and controlled transportation of sensitive narcotics.

Advantages

- » **Enhanced Reliability:** Consistent temperature control and mechanical stress protection ensure the efficacy of transported medicines.
- » **Portability:** Compact design allows for easy transportation, making it suitable for remote areas and emergency situations.
- » **Environmental Control:** Integrates cooling and shock stabilization in one unit, reducing the risk of damage due to environmental factors.
- » **Operational Flexibility:** DC power supply provides operational independence, crucial for areas with unreliable power sources.

Technical Specifications

- » **Cooling Mechanism:** Peltier module with Phase Change Material (PCM) integration.
- » **Stabilization System:** Accelerometer, gyroscope, Arduino microcontroller, and servo motors.
- » **Shock Absorption:** Damping mechanism for kinetic energy dissipation.
- » **Power Supply:** DC power, ensuring several hours of operation.

136. Portable Water Purifier

Technology Description

Multi-Layer Filtration System:

- » **Fabric Filter:** Acts as the first line of defense, removing visible particles and suspended solids. This initial filtration step helps in blocking pathogens and bacteria to some extent.
- » **Graphene Oxide Coated Sand Filter:** This innovative filter uses coastal sand coated with graphene oxide, known for its excellent filtration properties. It can remove heavy metals, dissolved salts, and harmful gases. However, the filter requires replacement every six months due to the gradual loss of the graphene oxide coating.
- » **Vetiver Grass Filter:** Utilizes the natural phytoremediation properties of Vetiver grass to absorb environmental pollutants, including heavy metals and pesticides.
- » **Ultraviolet (UV) Filtration:** Employs UV light to disinfect water by destroying the genetic core of harmful microorganisms. This stage ensures that the water is free from bacteria and viruses.

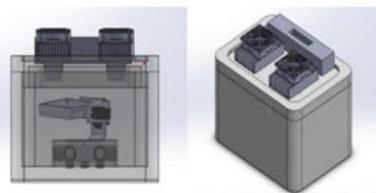
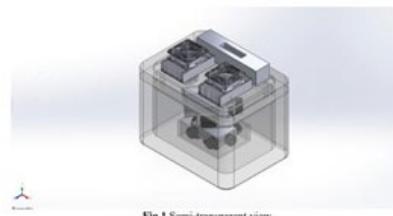


Fig. 2 Side and isometric views

Optional Water Heating Attachment:

- » For users requiring hot water, an additional heating coil can be integrated. This feature is useful for producing hot water directly from the purifier.

Design and Fabrication

- » **Design:** The Portable Water Purifier is designed using SolidWorks, a robust CAD software. The design includes detailed dimensions for all components, ensuring an efficient and compact setup. The purifier comprises a glass bottle with a filtration
- » **Dimensions:**
 - » Glass Bottle: 24 cm in height, 6.45 cm in diameter.
 - » Filtration Setup: 2.5 cm in height, 4 cm in diameter.
 - » Lids: 6.5 cm and 5.5 cm in height for the bottom and top lids, respectively.
 - » Glass Straw: 26 cm in height, 0.5 cm in diameter.

Filtration Process

- » **Initial Filtration:** The filtration process begins with water passing through the fabric filter, followed by the graphene oxide coated sand filter, and finally through the Vetiver grass filter. This sequence effectively removes both physical and chemical contaminants.
- » **UV Purification:** After the initial filtration, the UV light is activated for 2 minutes, providing a dosage of 30mJ/cm^2 to inactivate common waterborne microorganisms.
- » **Processing Time:** The filtration system is designed to fill a 450 ml bottle in approximately 58 seconds. The additional 2-minute UV purification ensures that the water is safe for consumption.

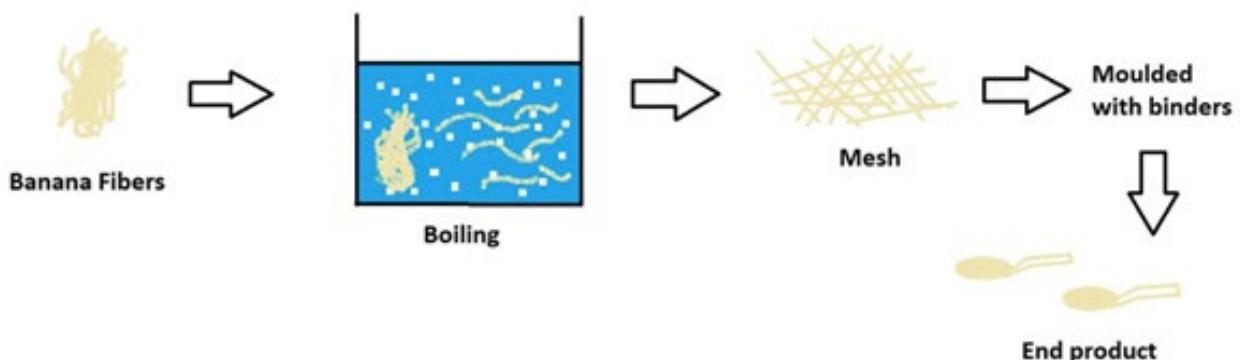
Applications

- » **Daily Use:** Suitable for daily use in households where access to clean water is limited.
- » **Travel:** The portable design makes it ideal for travelers, ensuring access to safe drinking water wherever they go.
- » **Emergency Situations:** Useful in disaster-stricken areas where clean water supply is disrupted.

Advantages

- » **Multi-Stage Filtration:** Combines various filtration methods to ensure comprehensive removal of contaminants.
- » **Portability:** Compact and lightweight design allows for easy transportation and use in different environments.

137. Biodegradable Spoons from Waste Banana Fibre - An Alternative to Single-Use Plastic Spoons



Uniqueness of the Innovation

- » **Innovation:** This innovation utilizes waste banana fibres, specifically from banana stems and sheaths, to create biodegradable spoons. The fibres are pulped and combined with natural binders such as Gum Arabic to form sturdy, heat-resistant spoons. This approach not only repurposes agricultural waste but also offers a sustainable, non-toxic alternative to plastic.
- » **Uniqueness:** The spoons made from banana fibre are biodegradable, decomposing naturally without polluting the environment. They are also cost-effective, leveraging abundant and low-cost raw materials available in regions like Coimbatore, where banana cultivation is prevalent. The spoons retain strength and durability comparable to, or better than, conventional plastic spoons, with the added benefit of being non-toxic and environmentally friendly.

Market Potential

- » **Environmental Impact:** By replacing plastic spoons with biodegradable alternatives, the innovation addresses the pressing issue of plastic waste, particularly in areas with high usage of disposable utensils.

- » **Cost-Effectiveness:** The raw materials (waste banana fibres) are inexpensive and readily available, making the production of these spoons economically viable. The manufacturing process also requires less energy than conventional plastic spoon production.

138. Fly Ash-Based Glazed Ceramic Tiles for Industrial and Household Applications

Overview

- » **Title:** Development of Fly Ash-Based Glazed Ceramic Tiles Using Liquid Phase Sintering Technology
- » **Objective:** To develop and commercialize glazed ceramic tiles composed primarily of fly ash (up to 95%) using liquid phase sintering technology, offering an eco-friendly solution to the significant waste management challenge posed by coal-powered thermal power plants in India.



Figure 2. Sintered specimen



Figure 3. Glazed–sintered specimen

Newness and Uniqueness of the Innovation

- » **Context:** Coal-powered thermal power plants generate large quantities of fly ash, a waste by-product traditionally considered of low value and often dumped near plant sites. This disposal method poses significant environmental risks, particularly groundwater contamination due to the presence of heavy metal oxides in the fly ash.
- » **Innovation:** This proposal introduces a novel approach to converting fly ash into valuable glazed ceramic tiles through powder metallurgy processing and liquid phase sintering. While previous research has focused on the use of fly ash in brick manufacturing and as a filler in cement, this project aims to utilize fly ash in a much higher proportion (up to 95%) to produce aesthetically pleasing and durable ceramic tiles suitable for industrial and household applications.
- » **Uniqueness:** The proposed innovation differs from existing research by focusing on large-scale production and commercialization of fly ash-based ceramic tiles, using a new method that integrates powder metallurgy with liquid phase sintering and glazing processes. The addition of commercially available oxides (red, blue, yellow) enhances the tiles' aesthetic appeal, making them a viable alternative to conventional ceramic tiles.

Concept and Objectives

Concept

The project aims to create a sustainable and commercially viable solution for the disposal of fly ash by transforming it into a valuable resource. The fly ash will be processed into ceramic tiles through powder metallurgy, followed by glazing using various oxides to achieve desirable colors and finishes.

Objectives:

- » **Utilize fly ash** as a major component (up to 95%) in the production of ceramic tiles.
- » **Develop and test** the powder metallurgy process combined with liquid phase sintering to create high-quality glazed tiles.
- » **Commercialize** the technology to produce fly ash-based ceramic tiles for both industrial and household applications, thereby reducing environmental impact and creating economic value.

Potential Areas of Application

- » **Primary Market:** The primary application of these tiles would be in the construction industry, for use in flooring, walls, and other structural elements in both residential and commercial buildings.
- » **Secondary Markets:** The tiles could also be utilized in industrial settings where durable and aesthetically pleasing surfaces are required, such as in factories, warehouses, and public infrastructure projects.

Market Potential

- » **Environmental Impact:** By converting fly ash, a significant waste product, into a commercially viable material, this innovation addresses a major environmental challenge faced by thermal power plants. It also reduces the need for traditional raw materials in tile manufacturing, contributing to resource conservation.
- » **Economic Viability:** The use of fly ash, an otherwise waste material, reduces the cost of raw materials in ceramic tile production. The commercialization of this technology has the potential to create a new market segment within the ceramics industry, providing a cost-effective alternative to traditional tiles.
- » **Scalability:** With the vast availability of fly ash from numerous thermal power plants across India, the production of fly ash-based ceramic tiles can be scaled up to meet significant market demand, both domestically and internationally. This also opens opportunities for export to countries with similar environmental challenges.

139. Geopolymer tiles and bricks from recycled Boiler ash waste

Boiler ash, a byproduct of thermal power plants, poses significant environmental challenges when dumped, particularly due to the contamination risks it presents to soil and water resources. This project aims to develop a sustainable and eco-friendly solution by converting boiler ash into geopolymers bricks. Unlike traditional methods that primarily focus on fly ash, this approach utilizes boiler ash, which has a high silica-to-alumina ratio, making it less suitable for conventional alkali activation.



The proposed technology employs a novel process to optimize the conversion of boiler ash into durable geopolymers. The process begins by refining coarse boiler ash into a fine powder, followed by a detailed morphological, chemical, and physical characterization. This characterization helps in understanding the constituents of boiler ash, crucial for tailoring the alkali activation process. The fine ash is then mixed with an alkali activator, typically NaOH, and supplementary materials such as lime to enhance binding and strength.

The geopolymers mixture is then molded and cured at 30°C, producing bricks that are comparable in strength and durability to traditional clay bricks. These geopolymers not only provide a sustainable alternative to fired clay bricks, reducing the depletion of natural resources, but also help in managing boiler ash waste, thereby mitigating environmental degradation.

This innovative approach not only offers a cost-effective solution for waste management but also promotes the development of green infrastructure products. By recycling boiler ash into valuable construction materials, the project aims to significantly reduce the environmental footprint of thermal power plants while contributing to the circular economy.

140. A Wearable Neuromuscular Electrical Stimulator for Treatment of Deep Vein Thrombosis (DVT) in Post-Stroke, Post-Operative, Elderly, and Disabled Patients

Newness/Uniqueness of the Innovation

The proposed device is a pioneering and affordable solution designed for the treatment of Deep Vein Thrombosis (DVT) in post-stroke, post-operative, elderly, and disabled patients, as well as those suffering from oedema. Unlike existing Neuromuscular Stimulation Devices, which are often non-wearable, bulky, expensive, or disposable after limited use (typically 24 hours), this innovation offers a small, wearable, and rechargeable device. This design significantly reduces the overall cost for patients and healthcare systems, offering extended usability and making it the first indigenously developed product of its kind.

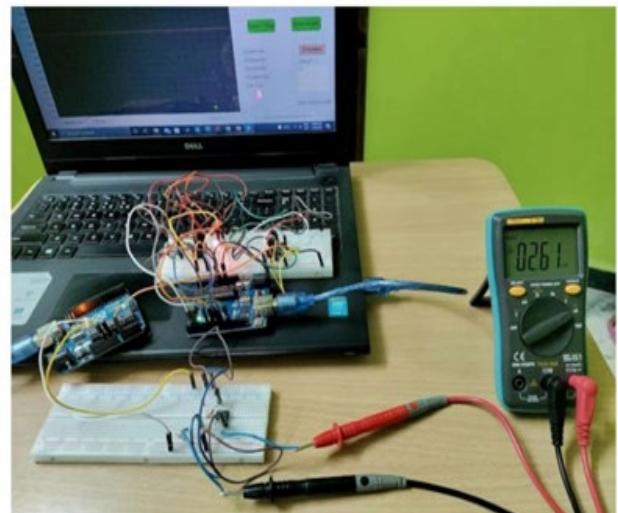


Figure 2: Proof-of-concept system of our proposed Neuromuscular Electrical Simulator.

Concept & Objective

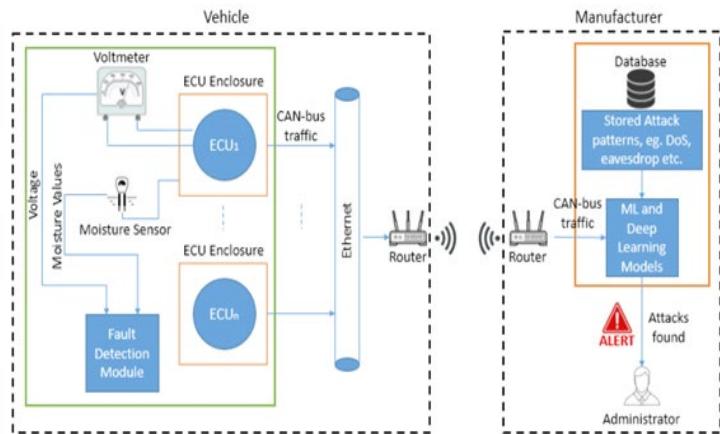
Deep Vein Thrombosis (DVT) is a serious condition characterized by the formation of blood clots in deep veins, primarily in the lower legs or thighs. It commonly affects patients who are bedridden after orthopedic surgery or those with limited lower limb movement, such as elderly or physically challenged individuals. If untreated, DVT can escalate into Venous Thromboembolism (VTE), a potentially fatal condition.

The objective of this project is to develop a wearable Neuromuscular Electrical Stimulator that provides targeted electrical stimulation to affected areas, improving blood flow and reducing blood clots, thereby preventing the progression of DVT. The device also aids in the rehabilitation of upper and lower limbs in post-stroke patients and helps reduce oedema. Unlike existing solutions, the proposed device is designed to be user-friendly, cost-effective, and accessible, making it a practical option for a broader population.

141. Intelligent System for Classification of Faults and Attacks in Automotive Electronic Components

Introduction

The automotive industry increasingly relies on Electronic Control Units (ECUs) to manage a wide array of vehicle functions, including engine control, braking, transmission, and vehicle-to-everything (V2X) communications. Modern vehicles contain hundreds of ECUs, interconnected via a Controller Area Network (CAN-bus) over Ethernet. However, the unencrypted nature of CAN-bus traffic makes ECUs vulnerable to cyberattacks, such as eavesdropping, data insertion, and Denial of Service (DoS) attacks, which can compromise vehicle safety and performance. Simultaneously, ECUs are prone to faults due to environmental and operational factors such as voltage variations and moisture, leading to system malfunctions. The challenge lies in distinguishing between these faults and cyberattacks to implement effective countermeasures.



Concept & Objective

This project aims to develop an intelligent system capable of distinguishing between faults and attacks in automotive ECUs. The proposed system integrates model-driven approaches for fault detection with data-driven methods for attack classification, ensuring comprehensive monitoring and protection of ECUs. By utilizing machine learning (ML) and deep learning (DL) models, such as k-NN, SVM, Random Forest, CNN, LSTM, RNN, and MLP, the system will classify faults and attacks based on parameters like voltage harmonics, moisture levels, and CAN-bus traffic patterns.

Fault Classification

Faults in ECUs often result from variations in voltage and moisture levels. The proposed model-driven approach monitors these parameters every 30 seconds using sensors. Key fault conditions include:

- » **Dead Battery:** Identified by increasing voltage harmonics leading to zero voltage.
- » **Corrosion:** Characterized by normal voltage but high moisture levels due to seal degradation.
- » **Low Voltage:** Continuous voltage decrease caused by loose connections.
- » **Bad Jump-Start:** Detected by voltage spikes due to improper polarity during jump-starts.
- » **Bad Starter:** Excess voltage flow or voltage harmonics caused by a malfunctioning starter.

Attack Classification

Cyberattacks on ECUs are detected using a data-driven approach by analyzing CAN-bus traffic patterns. Attacks such as eavesdropping, data insertion, and DoS are identified by comparing real-time packet flows with pre-recorded patterns stored in the manufacturer's database. ML and DL models are used to classify and predict these attacks based on network traffic anomalies, with performance metrics such as classification accuracy, energy consumption, and execution time guiding the choice of algorithms.

Implementation and Deployment

In the pre-deployment stage, ECUs are tested against various attack scenarios, and their network traffic patterns are recorded. During deployment, ECUs continuously monitor voltage and moisture levels, while CAN-bus traffic is analyzed in real-time. Any deviations from normal operation trigger alerts for potential faults or attacks, enabling timely intervention to prevent system failures or security breaches.

142. Early Warning Wireless Sensor System for Structural Health Monitoring

Objective

To develop an advanced early warning system to prevent catastrophic failures in engineering systems and civil structures, such as bridges and buildings. This system will monitor structural health by detecting deformations, strains, and potential damage using Radio Frequency (RF) sensors. The primary objectives are:

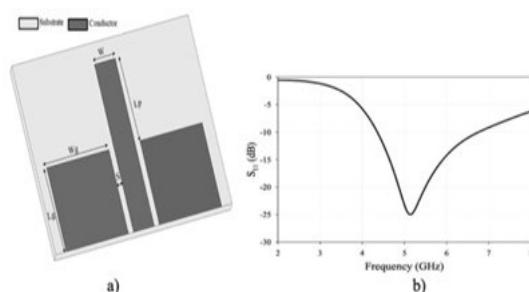


Figure 1 a)Schematic diagram of CPW fed resonator antenna (top view) b) Characteristics of the resonator

- » **Design and Development of RF Sensors for SHM:** Customize RF sensors for specific civil structures using simulation tools like HFSS and FEM to optimize sensor performance.
- » **Fabrication and Testing:** Fabricate the optimized sensor prototypes and benchmark their performance in a lab environment.
- » **Sensor Analysis:** Evaluate sensor characteristics under different strain levels to simulate real-world deformations and translate these into detectable changes in the structure.

Methodology

The project will employ a comprehensive methodology combining simulation, fabrication, and real-time testing:

Sensor Design and Simulation:

- » Utilize HFSS (High-Frequency Structure Simulator) and Finite Element Method (FEM) tools to design the RF sensor tailored to specific structural requirements.
- » Model the sensor in HFSS, embedding it with resonators, and analyze the reflection and transmission parameters to evaluate sensor performance.
- » Perform finite element simulations under various loading conditions to understand how the sensor's scattering properties change with deformations.

Fabrication and Lab Testing:

- » Fabricate the optimized sensor and subject it to controlled deformations to measure the resulting frequency shifts.
- » Use equipment like Vector Network Analyzers (VNA) and Impedance Analyzers to measure these frequency shifts and validate the sensor's performance.

Real-Time Deformation Analysis:

- » Measure the strain using digital image correlation and track the frequency shift using a Network Analyzer.
- » Implement a process flow that allows continuous monitoring of the sensor's performance in real-time, detecting structural damage and deformation.

Structural Health Monitoring (SHM) is critical for ensuring the safety and reliability of infrastructure like bridges, buildings, and tunnels. RF-based sensors, operating between 3 kHz and 300 GHz, have emerged as effective tools for SHM due to their sensitivity and ease of deployment. RF sensors, especially those based on patch antennas and coplanar waveguides (CPW), are sensitive to deformations that alter their resonance frequency, making them ideal for monitoring structural strain.

143. Web3.0-enabled e-waste management

Web3.0-enabled e-waste management platform that utilizes blockchain technology to track and manage e-waste from collection to recycling or refurbishment. The system aims to improve the efficiency and transparency of e-waste management while incentivizing users to participate in the process.

Key Features

- » **Blockchain-based tracking:** The system uses blockchain technology to track e-waste from its source until it is recycled or refurbished. This ensures transparency and accountability in the management process.

- » **AWS integration:** The system leverages AWS services, including EC2, Amazon Managed Blockchain, and Forecast, to provide scalable and secure infrastructure.
- » **DApps:** Users interact with the system through decentralized applications (DApps) that allow them to submit e-waste collection requests, track the status of their devices, and claim rewards.
- » **Predictive analytics:** The system uses Amazon Forecast to predict e-waste generation and recycling demand, enabling efficient resource allocation and collection planning.
- » **NFT rewards:** Users are incentivized to participate in e-waste reduction through the issuance of NFTs or digital tokens based on their recycling and refurbishment efforts.

Benefits

- » **Improved e-waste management:** The system helps reduce e-waste by promoting recycling and refurbishment.
- » **Increased transparency:** Blockchain technology ensures transparency and accountability in the e-waste management process.
- » **Enhanced efficiency:** Predictive analytics and automated workflows optimize resource allocation and collection operations.
- » **User engagement:** NFT rewards incentivize users to participate in e-waste reduction efforts.

Technology Stack

- » **Blockchain:** Amazon Managed Blockchain
- » **Cloud platform:** AWS
- » **Data analytics:** Amazon Forecast
- » **Decentralized applications (DApps):** Ethereum or other compatible blockchain platforms
- » **Mobile app development:** React Native or Flutter

Implementation Plan

- » **Develop blockchain infrastructure:** Set up the Amazon Managed Blockchain network and deploy smart contracts for e-waste tracking and NFT management.
- » **Build DApps:** Create user-friendly DApps for e-waste collection requests, status tracking, and reward claiming.
- » **Integrate AWS services:** Utilize EC2 for computing resources, Amazon Forecast for predictive analytics, and other AWS services as needed.
- » **Pilot testing:** Conduct a pilot program to test the system's functionality and gather user feedback.
- » **Scale and expand:** Based on the pilot results, scale the system to cover a wider area and expand its features.



DST- Technology Enabling Centre (TEC),
Amrita Vishwa Vidyapeetham, Amritapuri
Clappana P. O. , Kerala, India – 690 525.

 tec@amrita.edu