

Problem Statement 1

Automated Attendance System for Rural Schools (Software)

Need to Know

An “Automated Attendance System” uses technology like facial recognition, RFID, or biometrics to record student presence, moving beyond traditional manual registers. “Rural Schools” often have limited resources and infrastructure, making the solution’s design critical for their specific context.

Description

Rural schools struggle with inefficient and inaccurate manual attendance tracking, leading to increased teacher workload, delayed data, and challenges in student monitoring and resource allocation. This impacts effective educational management.

Idea

Our idea is to implement a robust, cost-effective automated attendance system for rural schools. It will leverage readily available technology to streamline attendance recording, enhance data accuracy, and provide real-time insights for improved school administration.

Problem Resolution

The system eliminates manual attendance, significantly reduces human error, and provides instant, accurate data. This empowers rural schools with reliable student presence information, aiding in better student support and administrative decision-making.

How It Works

The system primarily utilizes a low-cost, durable device, such as a ruggedized tablet or a custom Raspberry Pi unit, equipped with an integrated camera. Upon a student’s arrival, they simply stand in front of the camera. The system employs computer vision and facial recognition algorithms to identify the student by comparing their live image against a secure, pre-enrolled database of student faces. Once a match is confirmed, their attendance is marked instantly. In situations where internet connectivity is unstable or absent, all attendance data is securely stored locally on the device. As soon as an internet connection becomes available—either through a periodic connection or a dedicated sync point—the locally stored data is automatically and seamlessly uploaded to a centralized cloud server. This cloud platform hosts a comprehensive dashboard, accessible via web or mobile application, which allows school administrators, teachers, and relevant education authorities to view real-time attendance reports, analyze student presence trends, and generate custom insights. Key technologies involved include: Computer Vision and Facial Recognition for accurate student identification, Edge Computing (e.g., Raspberry Pi, robust tablets) for local processing and offline data storage, Cloud Computing (e.g., AWS, Azure, GCP) for scalable data management and centralized reporting, and Secure Data Synchronization Protocols to ensure data integrity and reliable transfer between edge devices and the cloud.

Unique Selling Points

- Cost-effective hardware and software solution tailored for budget-constrained rural school environments.
- User-friendly interface requiring minimal training, ensuring quick adoption by teachers and staff.

- Offline functionality guarantees attendance recording even in areas with limited or no internet connectivity.
- Robust system designed to withstand challenging environmental conditions common in rural settings.
- Provides actionable data analytics for tracking student trends and improving resource planning effectively.

Feasibility and Viability

- Utilizes affordable and accessible hardware like Raspberry Pi and off-the-shelf cameras.
- Open-source facial recognition libraries are mature and adaptable for accurate student identification.
- Scalable cloud infrastructure allows for easy expansion to numerous schools with minimal overhead.
- Reduces teacher administrative workload, allowing them to focus more on teaching and student engagement.
- Attracts potential funding from government bodies and NGOs due to its significant social impact.
- Generates valuable data for policy-making, demonstrating long-term educational improvement and resource optimization.

Impact and Beneficiaries

- Significantly enhances attendance accuracy, leading to improved student monitoring, retention, and academic outcomes.
- Empowers data-driven decision-making for resource allocation, curriculum development, and targeted interventions.
- Teachers, by automating attendance, freeing up valuable time, and providing immediate access to student records.
- School administrators and education authorities, gaining reliable data for planning, funding, and policy implementation.

Problem Statement 2

Renewable Energy Monitoring System for Microgrids (Hardware)

Need to Know

Microgrids are localized energy grids that can operate autonomously or connected to a main grid. A Renewable Energy Monitoring System tracks performance, generation, and consumption of renewable sources within these grids.

Description

Managing fluctuating renewable energy in microgrids is challenging without effective monitoring. Operators struggle with real-time data, predictive insights, and optimizing energy flow, leading to inefficiencies and potential instability.

Idea

Develop an intelligent, real-time monitoring and control system for microgrids leveraging IoT and AI. It optimizes renewable energy integration, enhances grid stability, and reduces operational costs for sustainable energy management.

Problem Resolution

This system provides real-time data, predictive analytics, and automated control, enabling efficient management of renewable sources. It ensures grid stability, optimizes energy distribution, and reduces manual intervention for operators.

How It Works

The system utilizes IoT sensors deployed across renewable energy assets (solar panels, wind turbines) and storage units within the microgrid to collect real-time data on generation, consumption, battery levels, and environmental conditions. This data is transmitted via secure network protocols (e.g., MQTT, LoRaWAN) to a cloud-based platform. The cloud platform uses AI and Machine Learning algorithms to process, analyze, and visualize the data. Predictive models forecast energy generation and demand, identify anomalies, and optimize energy dispatch strategies. A user-friendly dashboard provides operators with real-time insights, alerts, and control capabilities. Key technologies involved include IoT devices, cloud computing (e.g., AWS, Azure), AI/ML frameworks (e.g., TensorFlow, PyTorch), and data visualization tools.

Unique Selling Points

- Real-time, granular data insights from all renewable sources within the microgrid.
- AI-driven predictive analytics for forecasting energy generation and demand.
- Automated fault detection and diagnostic capabilities to minimize downtime.
- Optimized energy dispatch and storage management for maximum efficiency.
- Scalable and modular architecture, easily adaptable to various microgrid sizes.

Feasibility and Viability

- Existing IoT sensor technology and cloud computing infrastructure are mature and widely available.
- Open-source AI/ML libraries and frameworks make development efficient and cost-effective.
- Modular system design allows for phased implementation and easy integration with existing microgrid components.

- Growing global demand for microgrids and renewable energy integration drives market opportunity.
- Potential for significant operational cost savings through optimized energy management and reduced downtime.
- Scalable solution adaptable for various microgrid sizes and applications, from campuses to remote communities.

Impact and Beneficiaries

- Enhances energy independence and resilience for communities and critical infrastructure.
- Contributes to carbon emission reduction by maximizing the use of clean, renewable energy.
- Microgrid operators and utility companies gain improved control, efficiency, and predictive maintenance capabilities.
- Communities and businesses benefit from reliable, stable, and cost-effective renewable energy supply.

Problem Statement 3

AI-Based Internship Recommendation Engine for PM Internship Scheme (Software)

Need to Know

The 'PM Internship Scheme' refers to a program designed for students seeking internships in Product Management. An 'AI-Based Recommendation Engine' utilizes artificial intelligence to suggest suitable matches by analyzing data.

Description

Students struggle to find relevant Product Management internships, and companies face challenges identifying suitable candidates. Manual matching is inefficient, leading to suboptimal placements and lost opportunities for both sides.

Idea

An AI-powered recommendation engine specifically designed to intelligently match students with Product Management internships, considering skills, interests, and company requirements for optimal placements.

Problem Resolution

This engine leverages AI to analyze student profiles and internship descriptions, providing highly personalized recommendations. It streamlines the matching process, ensuring better fit for students and efficient talent acquisition for companies.

How It Works

The system employs Machine Learning (ML) algorithms, Natural Language Processing (NLP), and Collaborative Filtering techniques. Student data, including resumes, skills, academic background, and preferences, is collected. Internship data, such as job descriptions, required skills, and company culture, is also ingested. NLP processes textual data to extract key features and understand nuances. ML models, like content-based filtering (matching student skills to job requirements) and collaborative filtering (recommending based on similar users/jobs), analyze these features. A ranking algorithm then generates personalized recommendations for students and suitable candidate lists for companies. Technologies involved would include Python for backend development, libraries such as TensorFlow or PyTorch for ML model training, and potentially a web framework like React or Angular for the user interface.

Unique Selling Points

- Delivers highly personalized recommendations based on detailed student profiles and role requirements, enhancing fit.
- Significantly reduces manual screening and application processes for both students and recruiters.
- Improves internship satisfaction and retention rates by ensuring a better match between intern and company.
- Provides data-driven insights to program administrators for continuous improvement and talent pipeline analysis.
- Scalable solution capable of efficiently handling a large volume of applicants and diverse internship opportunities.

Feasibility and Viability

- Mature AI and ML technologies are readily available, making implementation technically feasible.
- Access to relevant data, like anonymized resumes and job descriptions, can facilitate model training.
- A minimum viable product (MVP) with core recommendation features can be built relatively quickly.
- Addresses a clear market need for efficient, personalized internship matching in a competitive sector.
- Potential for diverse revenue streams, including premium features for companies or students.
- Scalable architecture allows for expansion to other internship categories or career development services.

Impact and Beneficiaries

- Empowers students to discover career-defining Product Management internships that align with their aspirations.
- Enables companies to efficiently recruit top-tier PM talent, fostering innovation and future leadership.
- University students seeking highly relevant and impactful Product Management internship opportunities.
- Companies aiming to efficiently recruit high-quality, well-matched interns for their Product Management teams.

Problem Statement 4

Development of an AI-driven ChatBOT for INGRES as a virtual assistant (Software)

Need to Know

INGRES refers to an internal system or platform for which the AI-driven chatbot will serve as a virtual assistant, streamlining user interaction and support.

Description

Users need efficient, immediate assistance with the INGRES system. Current support might be slow or require human intervention, leading to productivity bottlenecks and user frustration.

Idea

Develop an AI-driven virtual assistant chatbot for INGRES. This bot will provide instant support, answer queries, and guide users through system functionalities using natural language processing.

Problem Resolution

The AI chatbot provides 24/7 instant support, automating responses to common INGRES queries and tasks. This reduces reliance on human support, improves response times, and enhances overall user experience.

How It Works

The AI-driven chatbot will use Natural Language Processing (NLP) to understand user queries in natural language. Machine Learning (ML) models will be trained on INGRES documentation and common user questions to provide accurate and relevant answers. The bot will integrate with the INGRES system via APIs to retrieve data, perform actions, and guide users through workflows. A conversational AI framework (e.g., Rasa, Google Dialogflow) will manage dialogue flow and context. Technologies involved include NLP libraries (e.g., spaCy, NLTK), ML frameworks (e.g., TensorFlow, PyTorch), and cloud platforms for deployment and scalability.

Unique Selling Points

- Provides instant, 24/7 support for all INGRES-related queries, eliminating wait times and boosting user productivity significantly.
- Utilizes Natural Language Processing (NLP) for intuitive, human-like conversations, making system interaction effortless and user-friendly.
- Automates routine tasks and data retrieval within INGRES, freeing up human staff to focus on more complex, high-value issues.
- Scales easily to handle a large volume of concurrent user requests without compromising on response quality or speed.
- Gathers valuable insights from user interactions, enabling continuous improvement of both the chatbot and the INGRES system itself.

Feasibility and Viability

- Leverages mature AI, NLP, and ML technologies readily available for rapid development and deployment.
- Existing INGRES APIs or custom integrations can facilitate seamless communication between the bot and the system.

- Cloud infrastructure provides scalable computing power and storage required to host the chatbot efficiently.
- Significantly reduces operational costs by automating support functions and decreasing human intervention.
- Enhances user satisfaction and productivity by providing immediate, accurate assistance anytime, anywhere.
- Collects valuable data on user queries, identifying common issues and areas for INGRES system improvement.

Impact and Beneficiaries

- Revolutionizes how users interact with INGRES, making the system more accessible and user-friendly for everyone.
- Frees up IT support teams to focus on strategic initiatives and complex problems, increasing overall efficiency.
- INGRES System Users: Gain instant, reliable support, improving their productivity and overall experience with the platform.
- INGRES Support Teams: Experience reduced workload from routine queries, allowing focus on critical technical issues.

Problem Statement 5

Implementation of Smart Agriculture for Efficient Cultivation in Hilly Regions (Hardware)

Need to Know

Smart Agriculture refers to using IoT, AI, and data analytics to optimize farming. Hilly regions pose challenges like uneven terrain, soil erosion, and irrigation difficulties for cultivation.

Description

Hilly regions face significant challenges in agriculture due to uneven terrain, soil erosion, and water management. This leads to inefficient cultivation, lower yields, and reduced farmer income.

Idea

Implement an integrated Smart Agriculture system utilizing IoT sensors, drone technology, and AI-driven analytics to optimize crop management and resource utilization in challenging hilly terrains.

Problem Resolution

This system addresses inefficiency by providing real-time data for precision irrigation, nutrient management, and pest control, tailored for hilly conditions, boosting yield and sustainability.

How It Works

The system involves IoT sensors (soil moisture, pH, temperature) deployed across various farm plots in hilly areas, transmitting real-time data. Drones with multispectral cameras conduct aerial surveys for crop health, disease detection, and terrain mapping. This data is fed into an AI-driven analytics platform that processes information to provide actionable insights. Machine learning algorithms predict optimal planting times, irrigation schedules, and nutrient requirements based on terrain, weather, and crop type. Automated drip irrigation systems, controlled by the platform, deliver water precisely. Robotic devices or automated sprayers, guided by GPS and sensor data, can apply pesticides or fertilizers accurately. Farmers access a user-friendly dashboard via mobile or web, receiving alerts and recommendations. Technologies involved include IoT, AI/ML, drone technology, cloud computing for data storage and processing, and precision irrigation hardware.

Unique Selling Points

- Optimized resource use, minimizing water and fertilizer waste on slopes.
- Early detection of crop diseases and pests, preventing widespread damage.
- Automated monitoring adapted for difficult, sloped terrains via drones.
- Increased crop yield and quality through precision farming techniques.
- Enhanced farmer decision-making with AI-powered predictive analytics.

Feasibility and Viability

- Existing IoT sensors and drone technology are mature and widely available.
- Cloud computing platforms offer scalable data storage and AI processing power.
- Pilot projects can be implemented on small scales to demonstrate effectiveness.
- Increased crop yields lead to higher farmer incomes and market competitiveness.
- Reduced input costs (water, fertilizers) enhance profitability and sustainability.
- Government initiatives support smart farming, offering potential subsidies.

Impact and Beneficiaries

- Boosts food security by maximizing agricultural output in challenging regions.
- Promotes environmental sustainability through reduced resource consumption.
- Farmers in hilly regions gain higher yields, income, and efficient operations.
- Consumers benefit from a more stable and affordable supply of produce.

Problem Statement 6

**Students are tasked with designing a 4-story commercial office building using Revit Architecture and Revit Structure , ensuring effective integration between architectural and structural models in a BIM environment.(The size of the plot can be assumed by the students, all the dimensions wherever necessary can be assumed by students in mm units.)
(Software)**

Need to Know

Revit Architecture is Autodesk software for architectural design. Revit Structure is for structural engineering design. BIM (Building Information Modeling) is a process for creating and managing building information throughout its lifecycle. Model integration refers to combining different disciplinary models (e.g., architectural and structural) into a unified, coordinated model to detect clashes and improve collaboration.

Description

Students must design a 4-story commercial office building using Revit Architecture and Revit Structure. The core challenge is achieving effective integration and coordination between these architectural and structural models within a BIM environment, ensuring seamless collaboration and minimizing design conflicts for efficient project delivery.

Idea

Our idea proposes a comprehensive BIM-centric workflow for integrating Revit architectural and structural models. This structured approach leverages shared parameters, linked models, and regular clash detection to ensure a coordinated, error-free design, optimizing collaboration and project efficiency.

Problem Resolution

This structured BIM workflow directly addresses integration issues by establishing clear communication protocols and automated clash detection. It ensures real-time coordination between architectural and structural models, minimizing design conflicts and rework, leading to a cohesive and efficient final design.

How It Works

The idea involves a systematic approach to integrating architectural and structural models using Autodesk Revit software within a collaborative BIM environment. The process typically unfolds in several stages:

1. **Individual Model Development:** The architectural team uses Revit Architecture to create the architectural model, including walls, floors, roofs, windows, doors, and interior layouts. Simultaneously, the structural team uses Revit Structure to develop the structural model, comprising columns, beams, slabs, foundations, bracing, and other load-bearing elements.
2. **Model Linking and Coordination:** The core of integration involves linking the architectural model into the structural model, and vice-versa. Revit's built-in 'Link Revit' functionality allows referencing models from different disciplines. To maintain coordination, tools like 'Copy/Monitor' are crucial. This feature enables the structural engineer to monitor architectural grids, levels, and columns, and 'copy' them into the structural model. Any changes made in the architectural model to these monitored elements will trigger warnings in the structural model, prompting review and coordination.
3. **Establishing Shared Coordinates:** Both models must operate under a common coordinate system to ensure accurate positioning and alignment when linked or exported. This is established early in the project setup.
4. **Clash Detection:** Regular interference checks are performed to identify any overlaps or conflicts between elements from the architectural and structural models. Revit has a basic 'Interference Check' tool. For more advanced and comprehensive clash detection, software like Autodesk Navisworks Manage is often used. Navisworks can aggregate models from various disciplines and formats, run clash tests, and generate reports, allowing teams to visualize conflicts and assign them for resolution.
5. **Collaboration and Issue Resolution:** Identified clashes or coordination issues are documented and communicated between the architectural and structural teams. This often involves exporting clash reports, using cloud-based BIM collaboration platforms (e.g., Autodesk BIM 360/ACC) to share models and manage issues, or direct communication. Teams then adjust their respective models to resolve the conflicts.
6. **Work-sharing (Optional but Recommended):** For large projects or multiple team members working on the same model, Revit's work-sharing feature allows multiple users to simultaneously work on a central model, enhancing real-time collaboration.

Technologies Involved: Autodesk Revit Architecture: **For architectural design and modeling.** Autodesk Revit Structure: **For structural design and modeling.** Autodesk Navisworks Manage: **For advanced model aggregation, clash detection, and 4D (scheduling) and 5D (cost) simulations.** Autodesk BIM 360 / Autodesk Construction Cloud (ACC): **Cloud-based platform for model hosting, document management, issue tracking, and real-time collaboration across project teams.**

Unique Selling Points

- Automated clash detection proactively identifies conflicts, significantly reducing manual errors and costly rework during construction phases.
- Real-time data synchronization between architectural and structural models ensures all team members work with the most current information.
- Enhanced visualization capabilities improve communication of design intent, fostering better understanding among stakeholders and teams.
- Streamlined documentation and accurate quantity take-offs are generated directly from the integrated, cohesive building information model.
- Facilitates improved decision-making through a unified, comprehensive digital twin of the building, enhancing project outcomes.

Feasibility and Viability

- Revit software is readily available and widely adopted as an industry standard for BIM workflows.
- Extensive educational resources and community support exist for mastering Revit's integration features.
- Built-in tools within Revit, like Copy/Monitor and interference check, directly support model coordination.
- High industry demand for professionals skilled in integrated BIM processes ensures relevance.
- Optimizing design workflows through integration significantly reduces project time and costs.
- The approach is scalable and applicable to various project complexities beyond a 4-story building.

Impact and Beneficiaries

- Significantly reduces on-site construction errors, leading to safer, more sustainable, and efficient buildings.
- Fosters stronger interdisciplinary collaboration and understanding among architectural and structural design teams.
- Architecture and engineering students gain essential practical skills highly valued in the modern AEC industry.
- Construction companies benefit from fewer design conflicts, leading to smoother project execution and cost savings.

Problem Statement 7

Digital Learning Platform for Rural School Students in Nabha (Software)

Need to Know

Nabha is a city in Punjab, India, with many rural areas. Rural school students often lack access to quality digital education resources due to infrastructure and economic challenges.

Description

Rural school students in Nabha face significant barriers to accessing quality digital learning resources. This limits their educational opportunities and widens the urban-rural learning gap, hindering overall development.

Idea

Our idea is to develop an accessible, localized digital learning platform tailored for rural school students in Nabha. It will provide engaging educational content, bridging the digital divide and enhancing learning outcomes effectively.

Problem Resolution

The platform will deliver curated, local curriculum-aligned content via low-bandwidth interfaces, accessible on basic devices. This addresses the lack of resources and connectivity, democratizing education for rural students.

How It Works

The platform will be a web-based application, potentially with a companion Android app for broader accessibility. It will feature a content management system (CMS) for educators to upload videos, interactive quizzes, and e-books. Students can access lessons, complete assignments, and track their progress. Key technologies involved include: HTML, CSS, JavaScript for frontend; Python/Django or Node.js/Express for backend; PostgreSQL for database. For offline capabilities, Progressive Web App (PWA) features or local storage mechanisms will be utilized. Content can be pre-cached or downloaded for later viewing, minimizing internet dependency. User authentication ensures secure access and personalized learning experiences. Analytics tools will track student engagement and performance, providing insights to teachers and administrators.

Unique Selling Points

- Localized content specifically designed for the curriculum and cultural context of Nabha's rural schools.
- Offline access capabilities allowing students to download and learn without constant internet connectivity.
- Gamified learning modules to increase engagement and make education fun and interactive for students.
- Multilingual support, including local languages, to ensure better comprehension and inclusivity for all students.
- Teacher-centric tools for progress tracking and personalized learning path recommendations.

Feasibility and Viability

- Leverages existing low-cost smartphones and internet access points prevalent even in rural areas.

- Open-source technologies can reduce development costs, making the platform economically viable.
- Partnerships with local schools and NGOs can facilitate content creation and distribution.
- Sustainable through government educational grants, CSR initiatives, and community funding models.
- Scalable content delivery ensures long-term relevance and adaptability to changing curriculum needs.
- Strong community engagement will foster platform adoption and continuous improvement over time.

Impact and Beneficiaries

- Significantly improves educational outcomes and digital literacy for rural students, reducing disparity.
- Empowers students with knowledge and skills, opening doors to higher education and better career prospects.
- Rural school students in Nabha, gaining access to quality, engaging, and relevant educational content.
- Teachers and school administrators, benefiting from improved teaching tools and student performance tracking.

Problem Statement 8

Design and Implementation of Solar-Powered Dewatering in Mining Operations. (Hardware)

Need to Know

Dewatering in mining involves removing water from mine sites to ensure safety, stability, and access to ore. It often uses energy-intensive pumps, leading to high operational costs and environmental impact.

Description

Mining operations face significant challenges with dewatering, requiring substantial energy and incurring high costs. Conventional methods contribute to carbon emissions, demanding a sustainable, cost-effective solution for water management.

Idea

Our idea is to implement a solar-powered dewatering system for mining operations. This solution aims to reduce energy consumption, operational costs, and environmental impact by utilizing renewable energy for water removal.

Problem Resolution

By harnessing solar energy, our system eliminates reliance on fossil fuels for dewatering, drastically cutting energy costs and carbon emissions. It provides an autonomous, sustainable, and reliable solution for mine water management.

How It Works

The system comprises solar photovoltaic (PV) panels that convert sunlight into electricity. This electricity powers submersible or surface pumps to remove water from mine pits or tailings dams. An energy storage system, typically lithium-ion batteries, stores excess solar energy for continuous operation during non-sunlight hours or peak demand. A smart control unit monitors water levels, solar power generation, battery status, and pump operation, optimizing energy use and ensuring efficient dewatering. Technologies involved include high-efficiency solar panels, robust industrial-grade pumps, advanced battery energy storage systems (BESS), and IoT-enabled monitoring and control systems for remote management.

Unique Selling Points

- Significantly reduces energy costs by utilizing free, renewable solar power for pumping operations.
- Lowers the carbon footprint of mining operations, aligning with environmental sustainability goals and regulations.
- Provides an autonomous and reliable dewatering solution, especially in remote mining locations.
- Decreases operational expenses by reducing fuel consumption and grid electricity dependence.
- Enhances mine safety and operational efficiency through consistent water level management.

Feasibility and Viability

- Solar PV technology is mature, widely available, and increasingly cost-effective for industrial applications.

- Modern pumping systems can be directly integrated with DC power from solar or AC via inverters.
- Energy storage solutions are advanced enough to provide reliable power during off-peak sun hours.
- Substantial long-term cost savings from reduced electricity bills and fuel consumption.
- Improved environmental compliance and enhanced corporate social responsibility (CSR) profile.
- Potential for carbon credit generation, adding an additional revenue stream.

Impact and Beneficiaries

- Significantly reduces greenhouse gas emissions, contributing to global climate change mitigation.
- Enhances operational independence and resilience for mining sites, especially in remote areas.
- Mining companies will benefit from lower operational costs, improved sustainability, and enhanced public image.
- The environment will benefit from reduced carbon emissions and decreased reliance on fossil fuels.

Problem Statement 9

Remote classroom for rural colleges (Software)

Need to Know

Rural colleges often lack resources, skilled faculty, and modern infrastructure. A remote classroom enables distance learning, providing access to educational content and instructors from anywhere, overcoming geographical barriers.

Description

Rural colleges face challenges like limited access to quality educators, diverse courses, and modern learning resources. This creates an educational gap, impacting student development and future opportunities for rural youth.

Idea

Develop an accessible, interactive remote classroom platform specifically tailored for rural colleges, bridging the gap in educational resources and instructor availability through digital means and technology.

Problem Resolution

Our platform connects rural students with expert educators and diverse course materials globally. It provides a flexible, high-quality learning environment, overcoming geographical and resource limitations effectively.

How It Works

The platform will utilize a web-based portal and a mobile application for accessibility. Live sessions will use video conferencing tools (e.g., WebRTC, Zoom SDK integration) for real-time lectures, screen sharing, polls, and chat. On-demand content, including pre-recorded lectures (MP4), reading materials (PDFs), and assignments, will be stored in a Content Management System (CMS) and delivered via a Content Delivery Network (CDN). For offline access, content can be downloaded to the mobile app using local storage and background data synchronization, with progress syncing when online. Interactive tools will include virtual whiteboards (HTML5 Canvas, WebSockets), discussion forums, and integrated quizzes/assessments. A robust Learning Management System (LMS) backend (e.g., Python/Django, Node.js/Express with PostgreSQL/MongoDB) will manage user authentication, course enrollment, progress tracking, and grading. The entire system will be hosted on scalable cloud infrastructure (AWS, Azure, Google Cloud) for reliability and varying user loads, with end-to-end encryption for security.

Unique Selling Points

- Cost-effective access to premium educational content and expert instructors for rural institutions.
- Interactive features like live Q&A, virtual labs, and collaborative projects enhance student engagement.
- Offline content synchronization ensures continuous learning even with limited internet connectivity in remote areas.
- Multilingual support to cater to diverse regional languages, improving comprehension and inclusivity.

- Customizable curriculum modules allowing colleges to adapt content to local needs and industry demands.

Feasibility and Viability

- Leverages existing cloud infrastructure and open-source learning technologies for rapid development.
- Widespread smartphone penetration in rural areas enables easy access to the mobile application for students.
- Partnerships with telecom providers can ensure affordable data plans for students and colleges.
- Addresses a critical, underserved market, offering a sustainable model through subscription fees or grants.
- Reduces operational costs for colleges by minimizing the need for physical infrastructure and faculty relocation.
- Continuously updated content and features will maintain relevance and user engagement over time.

Impact and Beneficiaries

- Elevates educational standards and provides equitable learning opportunities for rural students.
- Empowers local communities by fostering skilled talent, leading to regional development and innovation.
- Students in rural colleges gain access to high-quality education, diverse courses, and expert faculty.
- Rural colleges can attract more students, enhance their reputation, and offer competitive programs.

Problem Statement 10

Development of a Digital Mental Health and Psychological Support System for Students in Higher Education (Software)

Need to Know

Digital Mental Health System refers to technology-enabled tools for mental well-being. Higher Education Students are individuals pursuing university degrees, often facing unique stressors.

Description

Higher education students face significant mental health challenges, often hindered by stigma, cost, and limited access to traditional support. This impacts well-being and academic success, requiring an accessible solution.

Idea

Develop an integrated digital platform offering confidential mental health resources, personalized support, and professional psychological services tailored specifically for university students.

Problem Resolution

Our platform provides accessible, confidential, and destigmatized mental health support directly to students' devices, overcoming barriers of traditional services and promoting early intervention and well-being.

How It Works

The system uses a mobile and web application interface. Students create anonymous profiles, complete an initial AI/ML-driven assessment for personalized resource recommendations. It offers CBT/DBT-informed modules, mindfulness exercises, and journaling tools. Telehealth video/chat conferencing (WebRTC) connects students securely with licensed counselors. A robust cloud-based backend (AWS/Azure/GCP) handles encrypted data storage (PostgreSQL/MongoDB) and user authentication (OAuth). Frontend developed with React/Vue (web) and React Native/Flutter (mobile). AI/ML algorithms continuously analyze user engagement to refine content and detect early risk indicators, while gamification encourages consistent use.

Unique Selling Points

- 24/7 confidential access to a range of mental health resources and professional support from any location.
- Personalized content and interventions adapt to individual student needs, ensuring relevant and effective guidance.
- Direct, secure connection to licensed university counselors via integrated telehealth video and chat features.
- Moderated peer support forums foster a sense of community and shared experiences among students.
- Seamless integration with existing university student information systems for easy access and resource discovery.

Feasibility and Viability

- Existing, mature telehealth and secure cloud infrastructure are readily available for implementation.
- Abundant open-source mental health resources and development frameworks can be leveraged.
- High demand for digital, accessible mental health support among students validates the need.
- Universities can integrate the system into student welfare budgets, ensuring sustained funding.
- Partnerships with mental health organizations can provide valuable content, expertise, and credibility.
- Potential for subscription models or direct university contracts to generate consistent revenue streams.

Impact and Beneficiaries

- Significantly improves student well-being, leading to better academic performance and retention rates.
- Reduces the stigma associated with mental health issues, fostering a more open campus culture.
- Higher education students gain immediate, confidential, and convenient access to crucial mental health support.
- Universities benefit from healthier, more engaged student bodies and an enhanced institutional reputation.

Problem Statement 11

Enhancing Student Awareness on difference between Aadhaar linked and Direct Beneficiary Transfer(DBT) enabled Aadhaar seeded bank account. (Software)

Need to Know

Aadhaar is a 12-digit unique identity number. DBT (Direct Beneficiary Transfer) is a system for transferring government benefits directly to bank accounts. An 'Aadhaar linked' bank account simply has Aadhaar associated for KYC. A 'DBT enabled Aadhaar seeded' bank account is specifically designated to receive government benefits via DBT.

Description

Students struggle to differentiate between 'Aadhaar linked' and 'DBT enabled Aadhaar seeded' bank accounts. This confusion often leads to incorrect bank account details for benefit transfers, causing students to miss out on crucial government scholarships and subsidies.

Idea

An interactive digital platform, 'AadhaarPath,' designed to simplify and educate students on the critical distinction between Aadhaar-linked and DBT-enabled Aadhaar seeded bank accounts, ensuring seamless benefit reception.

Problem Resolution

AadhaarPath offers clear, concise explanations, interactive quizzes, and guides to check account status. It empowers students to correctly identify their DBT-ready account, preventing misdirected funds and ensuring timely access to financial aid.

How It Works

AadhaarPath will be a progressive web application (PWA) accessible via web browsers and potentially as a native mobile app. The frontend will be built using a modern JavaScript framework like React, providing an intuitive and responsive user interface. The backend will utilize Node.js with Express.js for robust API management and data handling, storing educational content and user progress in a PostgreSQL database. Key features include: interactive educational modules with quizzes and videos (HTML5, CSS3, JavaScript), an AI-powered chatbot (integrating with Dialogflow or a similar NLP service) for instant query resolution, a step-by-step guide for checking DBT seeding status (linking to NPCI's Aadhaar Mapper or bank portals without direct data access), and a personalized dashboard for tracking learning progress. User authentication will be secured using JWT (JSON Web Tokens) or OAuth2. Analytics tools will track user engagement to continuously improve content.

Unique Selling Points

- Personalized Account Status Checker: Guides students to verify if their Aadhaar is correctly seeded for DBT.
- Interactive Learning Modules: Gamified content and visual aids make complex financial concepts easy to grasp for students.

- **Multilingual Support:** Provides information in multiple regional languages to cater to diverse student populations.
- **Direct Access & Resource Hub:** Links to official government and bank portals for updates and information.
- **Simplified Explanations:** Breaks down technical jargon into easily understandable language with clear examples.

Feasibility and Viability

- Leverages publicly available government APIs and information, minimizing complex data integration requirements.
- Can be developed using widely supported web and mobile technologies, with abundant developer resources.
- Content accuracy can be ensured through collaboration with financial literacy experts and government agencies.
- Potential for partnerships with educational institutions and government bodies for widespread adoption and endorsement.
- Subscription models for premium features like personalized financial advisory or advanced scholarship matching.
- Scalable architecture allows expansion to cover other financial literacy topics and a larger user base.

Impact and Beneficiaries

- Empowers students to confidently access their rightful government benefits, significantly reducing financial hardships.
- Enhances the efficiency of government DBT schemes by minimizing errors and failed transactions, saving resources.
- **Students:** Gain clarity and confidence in receiving their government scholarships, subsidies, and financial aid.
- **Government Agencies:** Benefit from streamlined DBT processes, reduced grievances, and improved scheme delivery.

Problem Statement 12

Intelligent Pesticide Sprinkling System Determined by the Infection Level of a Plant (Hardware)

Need to Know

“Infection Level” refers to the severity of disease or pest infestation on a plant. A “Pesticide Sprinkling System” is used to apply chemical agents to protect plants from pests/diseases, often uniformly.

Description

Farmers currently apply pesticides uniformly, leading to overuse, environmental harm, and increased costs. A targeted approach based on actual plant health is urgently needed to optimize application.

Idea

Develop an intelligent system that precisely applies pesticides only where and when needed, determined by real-time plant infection levels. This optimizes usage and minimizes waste.

Problem Resolution

This system tackles pesticide overuse and environmental pollution by enabling precise, data-driven application. It reduces costs for farmers and promotes sustainable agricultural practices by targeting only infected areas.

How It Works

The system uses a combination of technologies. Drones or robotic platforms equipped with hyperspectral cameras and IoT sensors (e.g., for moisture, temperature) collect real-time data on plant health. Image recognition and AI/ML algorithms analyze this data to detect and quantify plant infection levels, generating precise infection maps. Based on these maps, an integrated precision sprinkling mechanism applies pesticides only to the affected areas, optimizing dosage and coverage. Cloud computing handles large-scale data processing and storage, while a user-friendly interface allows farmers to monitor and control the entire operation.

Unique Selling Points

- Precision application significantly reduces pesticide waste, cutting operational costs for farmers.
- Minimizes environmental impact by preventing chemical runoff and soil contamination.
- Improves crop yield and quality by effectively targeting infected areas with appropriate treatment.
- Provides data-driven insights into plant health, enabling proactive disease management and timely intervention.
- Automated system reduces manual labor and exposure risks for agricultural workers, improving safety.

Feasibility and Viability

- AI/ML for image analysis and plant disease detection is a mature and well-established technology.
- Drone technology and precision spraying hardware are readily available and widely used in modern agriculture.

- IoT sensors provide real-time environmental and plant health data efficiently, supporting data-driven decisions.
- Offers significant cost savings for farmers by drastically reducing pesticide consumption and labor.
- Addresses growing consumer and regulatory demand for sustainably farmed produce with less chemical input.
- Potential to increase crop yields and quality, directly boosting farmer profitability and market competitiveness.

Impact and Beneficiaries

- Reduces environmental pollution from chemical runoff, preserving biodiversity and water quality in agricultural areas.
- Enhances food safety by minimizing pesticide residues on crops, leading to healthier food for consumers.
- Farmers benefit from increased efficiency, reduced operational costs, and healthier, more productive crops.
- The environment benefits from reduced chemical usage, leading to cleaner soil, water, and ecosystems.

Problem Statement 13

Development of Sensor for Detection Of Microplastics (Hardware)

Need to Know

Microplastics are tiny plastic particles, less than 5mm in size, resulting from the degradation of larger plastic items. They are ubiquitous in the environment (water, soil, air) and pose significant threats to ecosystems and potentially human health due to their persistent nature and ability to accumulate toxins.

Description

The widespread presence of microplastics poses severe environmental and health risks. Current detection methods are often lab-intensive, time-consuming, and expensive, making real-time, on-site monitoring challenging and hindering effective pollution management strategies.

Idea

To develop a portable, cost-effective, and highly sensitive sensor for rapid, real-time, and on-site detection and quantification of microplastics across various environmental samples, improving monitoring capabilities significantly.

Problem Resolution

This innovative sensor will offer a swift, accurate, and accessible solution for microplastic detection, overcoming the limitations of traditional lab methods. It will enable proactive environmental monitoring and provide crucial data for informed decision-making and remediation efforts.

How It Works

The sensor will utilize a combination of advanced spectroscopic techniques, primarily Raman Spectroscopy, for the molecular identification of plastic polymers. Samples will undergo a preparatory stage using microfluidics, which allows for precise particle isolation and concentration before analysis. A miniaturized optical system, integrated with the spectrometer, will capture spectral signatures from individual microplastic particles. These raw spectral data will then be processed and analyzed by embedded machine learning algorithms, trained to identify different plastic types (e.g., PET, PP, PE) and estimate their sizes. The system will feature IoT connectivity for real-time data transmission to a cloud-based platform for further analysis, visualization, and reporting.

Unique Selling Points

- Provides real-time, on-site detection, drastically reducing data acquisition time and improving response.
- Offers high sensitivity and specificity for accurate identification of diverse microplastic types and sizes.
- Designed to be portable and user-friendly, allowing for widespread deployment by various stakeholders.
- Represents a cost-effective solution, making advanced microplastic monitoring accessible to more users.
- Compatible with multiple environmental matrices, including water, soil, and air, for versatile application.

Feasibility and Viability

- Advancements in miniaturized spectroscopy and microfluidics enable the creation of compact, efficient sensors.
- Machine learning algorithms are well-suited for processing complex spectral data to identify microplastics accurately.
- Leveraging existing optical components and fabrication techniques reduces development complexity and cost.
- Existing sensor components and fabrication techniques can be adapted for this specific application.
- There is a growing global demand for effective microplastic monitoring due to environmental concerns and regulations.
- The portable and user-friendly design opens up a broad market, from environmental agencies to industries.
- Potential for cost-effective mass production through scalable manufacturing processes ensures commercial success.

Impact and Beneficiaries

- Enables early detection and mitigation of microplastic pollution, safeguarding ecosystems and human health.
- Provides essential data for policymakers to develop informed strategies against plastic waste.
- Offers crucial data to policymakers for developing effective strategies against plastic waste.
- Environmental agencies and researchers will gain a powerful tool for efficient pollution assessment and study.
- Water treatment plants and food packaging industries can monitor and ensure the safety of their products and processes.

Problem Statement 14

Smart Community Health Monitoring and Early Warning System for Water-Borne Diseases in Rural Northeast India (Software)

Need to Know

Water-borne diseases spread via contaminated water, common in areas with poor sanitation. Rural Northeast India faces unique challenges due to terrain, limited infrastructure, and accessibility. A smart community system uses technology for local, real-time health data collection and alerts.

Description

Rural Northeast India suffers from prevalent water-borne diseases due to inadequate infrastructure and delayed detection. There's a critical need for a localized, real-time monitoring and early warning system to safeguard community health.

Idea

Develop an IoT-based Smart Community Health Monitoring and Early Warning System. It will use sensors for water quality, track disease symptoms, and leverage AI for predictive analysis to prevent water-borne disease outbreaks in rural Northeast India.

Problem Resolution

This system provides real-time water quality data and health trends, enabling early detection and rapid response to potential outbreaks. It empowers local health workers and informs communities, significantly reducing disease incidence and improving public health outcomes.

How It Works

IoT sensors deployed in community water sources continuously monitor parameters like pH, turbidity, and pathogen indicators. Local health workers and trained community members use a mobile app to report symptoms (e.g., diarrhea, fever) anonymously. All data is sent to a central cloud platform. An AI/ML model analyzes water quality, symptom data, and historical patterns to identify potential outbreaks and predict risks. When thresholds are breached, the system automatically triggers early warnings via SMS, app notifications, and local digital displays to community members, health officials, and local authorities. Technologies involved include: IoT sensors (ESP32/Raspberry Pi based for data collection), Mobile Application (Android/iOS for symptom reporting and alerts), Cloud Platform (AWS/Azure/GCP for data storage and processing), AI/ML Models (Python, TensorFlow/PyTorch for predictive analytics), and Communication Protocols (LoRaWAN/GSM for data transmission, SMS/WhatsApp APIs for alerts).

Unique Selling Points

- Real-time, localized water quality monitoring using IoT sensors.
- AI-driven predictive analytics for early outbreak warnings.
- Community-led data collection via mobile apps for symptom tracking.
- Integrated communication system for rapid alerts to health officials.
- Sustainable, low-cost solution tailored for rural infrastructure.

Feasibility and Viability

- Affordable IoT sensors and mobile technology are readily available.
- Existing community health worker networks can facilitate data collection.
- Cloud computing platforms offer scalable, accessible infrastructure.
- Reduces healthcare costs by preventing widespread outbreaks.
- Improves community productivity by reducing illness burden.
- Potential for government or NGO funding for public health initiatives.

Impact and Beneficiaries

- Significantly reduces morbidity and mortality from water-borne diseases.
- Empowers communities with information, fostering proactive health management.
- Rural communities in Northeast India gain improved health and safety.
- Local health departments and NGOs enhance disease surveillance and response.

Problem Statement 15

Image based Animal Type Classification for cattle and buffaloes (Software)

Need to Know

Image based Animal Type Classification refers to using computer vision and machine learning techniques to automatically identify the species of an animal (e.g., cattle or buffalo) from an image or video feed.

Description

Accurately classifying cattle and buffaloes based solely on images is challenging due to their visual similarities. Manual identification is time-consuming and prone to human error, leading to inefficiencies in livestock management.

Idea

Our idea is an AI-powered image classification system specifically designed to accurately distinguish between cattle and buffaloes using advanced computer vision algorithms. This will streamline livestock identification processes.

Problem Resolution

This system will automate the accurate identification of cattle and buffaloes from images, reducing manual effort and errors. It provides a quick, reliable, and scalable solution for improved livestock management and data collection.

How It Works

The system leverages deep learning, specifically Convolutional Neural Networks (CNNs). Images of animals are fed into the model. First, image preprocessing techniques enhance image quality and normalize features. Then, the CNN, trained on a large dataset of labeled cattle and buffalo images, extracts hierarchical features. The final layers classify the animal as either cattle or buffalo based on these learned features. Technologies involved include Python for programming, TensorFlow/PyTorch for deep learning framework, OpenCV for image processing, and cloud-based GPU instances for training and deployment.

Unique Selling Points

- High accuracy in distinguishing subtle visual differences between cattle and buffaloes.
- Automated and real-time classification, saving significant time and labor costs.
- Scalable solution applicable to large herds and diverse agricultural settings.
- Reduces human error, ensuring consistent and reliable animal type identification.
- Provides valuable data for better inventory management and animal tracking.

Feasibility and Viability

- Availability of robust deep learning frameworks and pre-trained models.
- Existing image datasets can be augmented and fine-tuned for specific species.
- Modern computing power and cloud services make training and deployment practical.
- Significant demand for automated livestock management in agriculture.
- Potential for integration with existing farm management software systems.
- Cost savings from reduced manual labor and improved data accuracy drive adoption.

Impact and Beneficiaries

- Enhances efficiency in livestock inventory, breeding programs, and health monitoring.
- Contributes to smarter agriculture practices and data-driven decision making.
- Farmers and ranchers, for improved herd management and accurate record-keeping.
- Veterinarians and agricultural researchers, for better disease tracking and studies.

Problem Statement 16

Crowdsourced Civic Issue Reporting and Resolution System (Software)

Need to Know

Crowdsourced refers to obtaining input from a large group of people. Civic issues are problems affecting public welfare, like potholes, waste, or broken streetlights, within a community.

Description

Currently, reporting civic issues is often slow and inefficient, leading to delayed resolutions and citizen frustration. Lack of a centralized, transparent system hinders effective municipal response.

Idea

Our idea is a 'CivicConnect' platform: a crowdsourced mobile and web application for seamless reporting, tracking, and resolution of local civic issues, fostering community engagement.

Problem Resolution

This platform offers a centralized, real-time mechanism for citizens to report issues, improving communication and accountability between residents and local authorities for faster problem-solving.

How It Works

Citizens use a mobile app (iOS/Android) or web portal to report issues, including descriptions, photos, and GPS coordinates. This data is stored in a cloud database (e.g., AWS, Azure). A Geographic Information System (GIS) maps issues visually. Backend APIs (e.g., Node.js, Python) process reports, categorize them using AI/ML for automatic routing to relevant city departments. Authorities access a dashboard to view, assign, and update issue statuses. Notifications (push, email) keep users informed. Technologies involved: Mobile Development (React Native, Flutter), Cloud Computing (AWS/Azure/GCP), GIS (OpenStreetMap, Mapbox API), Database (PostgreSQL/MongoDB), Backend Frameworks (Django/Flask/Node.js Express), AI/ML for classification, and Notification Services.

Unique Selling Points

- Real-time Issue Reporting: Instantly report problems with photos and location data via mobile.
- Community-Driven Prioritization: Users can upvote issues, helping authorities identify critical concerns.
- Transparent Resolution Tracking: Monitor issue status from report to resolution, enhancing trust.
- Gamified Citizen Engagement: Incentivizes active participation with points, badges, and leaderboards.
- Direct Authority Communication: Enables direct messaging with relevant municipal departments.

Feasibility and Viability

- Leverages existing smartphone penetration and GPS capabilities for easy reporting.
- Utilizes mature cloud infrastructure and open-source GIS technologies, reducing development costs.
- Public willingness to contribute data for community improvement is already proven.
- Reduces operational costs for municipalities by streamlining issue identification and management.

- Increases citizen satisfaction and trust in local government through transparency and responsiveness.
- Generates valuable data for urban planning and resource allocation for cities.

Impact and Beneficiaries

- Creates cleaner, safer, and more efficient urban environments, enhancing quality of life.
- Empowers citizens, fostering active participation and a stronger sense of community ownership.
- Citizens: Experience improved living conditions and a direct channel for their concerns.
- Local Government: Gains an efficient tool for issue management, data insights, and public trust.

Problem Statement 17

Automated Specimen Preparation System for testing of Cable samples as per IS 10810 and IS 7098. (Hardware)

Need to Know

IS 10810 and IS 7098 are Indian Standards specifying test methods for electrical cables, including specimen preparation. Specimen preparation involves precisely cutting, stripping, and preparing cable samples for various mechanical and electrical tests according to these standards.

Description

Manual preparation of cable samples for testing as per IS 10810 and IS 7098 is time-consuming, prone to errors, and lacks consistency, hindering efficient quality control and product development.

Idea

Develop an automated robotic system for precise and consistent preparation of cable specimens, streamlining the testing process for electrical cables according to Indian Standards IS 10810 and IS 7098.

Problem Resolution

This system eliminates manual inconsistencies, reduces human error, and significantly accelerates the preparation phase, ensuring high accuracy and compliance with stringent IS standards for cable testing.

How It Works

The system would involve a robotic arm with specialized end-effectors for gripping and manipulating cable samples. An input mechanism feeds raw cable. Computer vision systems would identify cable type and dimensions. Precision cutting and stripping modules, possibly laser-based or mechanical, would prepare specimens to exact lengths and expose conductors/insulation as required by IS 10810 and IS 7098. Integrated sensors (e.g., optical, force) ensure accuracy. A central control unit, likely an embedded system or industrial PC, would orchestrate all operations, communicating with actuators, motors, and vision systems. Data logging ensures traceability.

Unique Selling Points

- Achieves high precision and repeatability in specimen dimensions, crucial for accurate test results.
- Significantly reduces human intervention, minimizing labor costs and potential for manual errors.
- Accelerates the sample preparation workflow, enabling faster testing cycles and product time-to-market.
- Guarantees strict adherence to specified Indian Standards for cable testing, ensuring regulatory compliance.
- Enhances laboratory safety by automating hazardous cutting and stripping tasks, protecting personnel.

Feasibility and Viability

- Robotics and precision cutting technologies are mature and widely available for industrial applications.
- The test methods defined in IS standards provide clear, quantifiable parameters for automation.

- Modular design allows for easy integration into existing lab setups and future upgrades.
- Significant operational cost savings due to reduced labor, faster throughput, and minimized material waste.
- Growing demand for certified, high-quality electrical cables drives the need for efficient testing.
- Ensures regulatory compliance, which is a critical factor for manufacturers in the cable industry.

Impact and Beneficiaries

- Elevates the overall quality and reliability of electrical cables by enabling more rigorous testing.
- Accelerates R&D cycles for new cable materials and designs, fostering innovation in the industry.
- Cable manufacturers' quality control and research and development departments.
- Independent and in-house testing laboratories conducting cable certification and validation.

Problem Statement 18

Automated Compliance Checker for Legal Metrology Declarations on E-Commerce Platforms (Hardware)

Need to Know

Legal Metrology refers to laws governing measurements and weighing instruments. Declarations require specific information (e.g., net quantity, MRP) on product labels for consumer protection. E-commerce platforms are online marketplaces.

Description

E-commerce platforms struggle to ensure product listings comply with Legal Metrology (LM) declarations, leading to penalties and consumer distrust due to manual checks being inefficient.

Idea

An AI-powered Automated Compliance Checker that scans e-commerce product listings to ensure all mandatory Legal Metrology declarations are accurately displayed.

Problem Resolution

This tool automates verification of LM declarations on e-commerce, reducing manual effort, improving accuracy, and ensuring platforms avoid penalties while building consumer trust.

How It Works

The system uses web scraping to collect product data from e-commerce platforms. Natural Language Processing (NLP) algorithms extract key declarations (e.g., net quantity, MRP, manufacturer details) from product descriptions and images. A rules engine, based on Legal Metrology Act, validates extracted data against compliance requirements. AI/ML models can detect patterns of non-compliance and flag discrepancies. APIs integrate with platform dashboards for reporting and alerts, ensuring a continuous feedback loop and corrective actions.

Unique Selling Points

- Provides real-time, automated compliance monitoring.
- Significantly reduces manual auditing and human error.
- Ensures accurate and consistent product declarations.
- Minimizes legal risks and potential regulatory fines.
- Enhances consumer trust and market transparency.

Feasibility and Viability

- Existing web scraping and NLP technologies are mature for data extraction.
- Legal Metrology rules are well-defined, enabling clear rule-based system development.
- Abundant e-commerce product data provides ample material for training and testing.
- High market demand from e-commerce to avoid regulatory fines and build trust.
- Achieves significant cost savings by automating labor-intensive compliance checks.
- Addresses increasing regulatory pressure for transparency in online retail operations.

Impact and Beneficiaries

- Boosts consumer confidence by ensuring product information is accurate and trustworthy.

- Promotes fair trade practices among sellers, ensuring a level playing field.
- E-commerce platforms benefit from reduced legal risks, efficiency, and enhanced reputation.
- Consumers gain from accurate product info, preventing fraud and ensuring fair value.

Problem Statement 19

Gamified Learning Platform for Rural Education (Software)

Need to Know

Gamified Learning Platform combines game elements like points, badges, and leaderboards with educational content to boost engagement. Rural Education refers to schooling in remote or underserved areas, often facing resource constraints and limited access to modern teaching tools.

Description

Rural students often face limited access to quality educational resources and engaging learning methods. This leads to low motivation, high dropout rates, and a significant educational gap compared to urban counterparts.

Idea

Develop an interactive, gamified learning platform tailored for rural students. It will transform traditional curriculum into engaging, accessible, and culturally relevant educational experiences, fostering a love for learning.

Problem Resolution

This platform addresses disengagement by making learning fun and rewarding. It provides accessible, high-quality educational content, overcoming resource limitations in rural schools and encouraging continuous learning.

How It Works

The platform will be a mobile and web application. Students log in to access various subjects, presented as 'quests' or 'missions'. Each lesson involves interactive quizzes, puzzles, and mini-games. Successful completion earns points, badges, and virtual currency, which can be used to unlock new content or customize avatars. A leaderboard fosters healthy competition. For rural areas with limited connectivity, content can be pre-downloaded for offline access. Teachers can assign tasks, track individual student progress through a dashboard, and provide personalized feedback. The system uses a backend database to store user data, progress, and content, accessible via APIs. Frontend development would use frameworks like React Native (for mobile) or React/Vue (for web). Content delivery networks (CDNs) can help distribute educational materials efficiently. Analytics tools will track engagement and learning outcomes.

Unique Selling Points

- Localized content: Curriculum adapted to local languages, culture, and context for better relatability and understanding.
- Offline accessibility: Allows students to learn without constant internet access, crucial for remote areas.
- Parental involvement: Features for parents to track progress and engage in their child's learning journey.
- Teacher empowerment: Provides tools and data for teachers to monitor student performance and customize lessons.
- Community challenges: Integrates group activities and local problem-solving challenges for collaborative learning.

Feasibility and Viability

- Existing open-source educational content can be adapted and gamified, reducing initial content creation costs.
- Mobile technology penetration in rural areas is growing, making app-based delivery highly feasible.
- Modern cloud infrastructure and robust offline sync capabilities enable reliable service delivery.
- Partnerships with NGOs, government education departments, and local communities can ensure adoption and funding.
- Freemium model with premium content or advanced analytics for schools could generate revenue.
- Sponsorships from corporations as part of CSR initiatives can provide sustainable financial backing.

Impact and Beneficiaries

- Significantly improves educational outcomes and reduces dropout rates in underserved rural communities.
- Empowers children with essential skills, fostering critical thinking and problem-solving abilities for future success.
- Rural students gain access to engaging, high-quality education, boosting their motivation and academic performance.
- Teachers in rural schools get enhanced tools for effective teaching and student progress monitoring.

Problem Statement 20

Smart Curriculum Activity & Attendance App (Software)

Need to Know

A 'Smart Curriculum Activity & Attendance App' refers to a mobile/web application that intelligently personalizes learning activities and automates attendance tracking using advanced technologies. It aims to make education more efficient and engaging.

Description

Traditional curriculum delivery often lacks personalization and real-time adaptation, while manual attendance tracking is time-consuming and prone to errors. This leads to inefficient learning and administrative burdens.

Idea

An AI-powered Smart Curriculum Activity & Attendance App that personalizes learning paths, automates attendance tracking using advanced tech, and provides data-driven insights for improved educational outcomes and streamlined administration.

Problem Resolution

The app resolves these by offering AI-driven personalized learning, automating attendance via facial recognition or beacons, and providing real-time performance analytics to enhance engagement and administrative efficiency.

How It Works

The Smart Curriculum Activity & Attendance App operates through several integrated modules. The 'Curriculum Engine' leverages Artificial Intelligence (AI) and Machine Learning (ML) algorithms to analyze student performance data, learning styles, and progress. It uses Natural Language Processing (NLP) to understand educational content and recommend personalized activities, resources, and dynamically adjust the difficulty level of assignments. This ensures a tailored learning experience. The 'Attendance Module' employs computer vision for facial recognition or utilizes Bluetooth beacons to automatically log student attendance as they enter designated learning areas, ensuring accuracy and reducing manual intervention. It integrates with existing student information systems via APIs. The user interface is developed as cross-platform mobile applications using frameworks like React Native or Flutter, and a web application using React or Angular, providing seamless access for students, teachers, and administrators. The backend infrastructure is hosted on scalable cloud platforms such as AWS, Azure, or Google Cloud Platform, utilizing databases like PostgreSQL or MongoDB for data storage and API gateways for managing communication between modules. Data visualization tools and dashboards provide real-time analytics on student engagement, academic performance, and attendance trends, offering actionable insights to educators.

Unique Selling Points

- AI-driven personalized learning paths adapt to individual student needs and progress in real-time.
- Automated, secure attendance tracking using facial recognition or Bluetooth beacons reduces manual effort.

- Real-time performance analytics provide instant insights for students, teachers, and administrators.
- Dynamic content recommendations ensure students always engage with relevant and challenging material.
- Integrated communication and feedback loops foster better collaboration between all stakeholders.

Feasibility and Viability

- Existing AI/ML frameworks and cloud infrastructure are readily available for rapid development and deployment.
- Mature facial recognition and Bluetooth beacon technologies can be integrated effectively and affordably.
- Modern cross-platform mobile and web development tools allow for efficient building and iteration of the application.
- Addresses a clear market need for enhanced efficiency and personalization in educational institutions globally.
- A subscription-based model for schools and universities ensures a stable and recurring revenue stream.
- The scalable cloud-based architecture supports broad adoption and growth across multiple educational organizations.

Impact and Beneficiaries

- Significantly enhances student engagement, motivation, and academic performance through personalized learning experiences.
- Reduces administrative burden on educators, freeing up valuable time for teaching and student interaction.
- Students will benefit from highly personalized learning paths, improved engagement, and better academic outcomes tailored to their needs.
- Teachers and administrators will benefit from streamlined attendance processes, data-driven insights, and reduced manual workload.

Problem Statement 21

AI-Driven Public Health Chatbot for Disease Awareness (Software)

Need to Know

An “AI-Driven Public Health Chatbot” is an automated conversational agent utilizing artificial intelligence to deliver health information. “Disease Awareness” refers to educating the public about illnesses, their symptoms, prevention, and treatment.

Description

The public often lacks accessible, reliable, and personalized health information, leading to poor disease awareness and delayed health-seeking behaviors. Many struggle to find quick, trustworthy answers to their health questions.

Idea

Develop an AI-driven public health chatbot designed to provide readily accessible, personalized, and accurate information on various diseases, thereby enhancing public health literacy and outcomes.

Problem Resolution

The chatbot offers instant, reliable, and tailored health guidance, effectively bridging existing information gaps. It empowers individuals with the knowledge required to make informed decisions about their health and well-being.

How It Works

Users interact with the chatbot via text or voice interface. Natural Language Processing (NLP) interprets user queries. Machine Learning (ML) models, powered by a large language model (LLM), retrieve relevant, accurate information from a curated public health knowledge base (e.g., WHO, CDC data, academic research). The chatbot leverages cloud infrastructure (e.g., AWS, Azure, GCP) for scalable operation and real-time processing. It can integrate with APIs to provide official health alerts and local service information.

Unique Selling Points

- Delivers personalized health information, adapting to individual user queries and specific demographic details.
- Provides 24/7 accessibility across multiple platforms, effectively overcoming geographical and time barriers.
- Offers comprehensive multi-language support to effectively cater to diverse populations and ensure broad inclusivity.
- Ensures real-time updates regarding disease outbreaks, health advisories, and evolving public health guidelines.
- Generates data-driven insights for public health authorities, highlighting common concerns and emerging trends.

Feasibility and Viability

- Existing AI, NLP, and LLM technologies are mature enough to build a robust and highly effective chatbot.
- Abundant public health data is available from reputable sources for training AI and populating the knowledge base.

- Cloud computing platforms offer scalable, secure, and cost-effective deployment for widespread public access.
- There is a high and continuous public demand for accessible and reliable health information, especially during crises.
- Potential for strategic partnerships with public health agencies and NGOs to facilitate widespread adoption.
- Offers a cost-effective and scalable alternative to traditional methods of public health information dissemination.

Impact and Beneficiaries

- Significantly improves public disease awareness, leading to earlier detection, better prevention, and improved health outcomes.
- Reduces the burden on healthcare systems by efficiently answering common queries, decreasing unnecessary visits.
- The general public seeking quick, reliable, and personalized information regarding various health conditions.
- Public health organizations gaining valuable insights into community health concerns and prevalent information gaps.

Problem Statement 22

Improved Onion storage technology for enhancing shelf life of onions (Hardware)

Need to Know

Onion shelf life refers to the period onions remain suitable for consumption or sale after harvest, before spoilage. Extending this reduces post-harvest losses and waste.

Description

Current onion storage methods often lead to significant post-harvest losses due to spoilage, sprouting, and rotting. This impacts farmers' income, market supply, and consumer prices, creating food waste.

Idea

Our idea is an IoT-enabled 'Smart Onion Storage System' that maintains optimal environmental conditions (temperature, humidity, ventilation) and provides real-time monitoring and predictive analytics to significantly extend onion shelf life.

Problem Resolution

This system actively controls storage parameters to minimize spoilage factors like moisture, heat, and pathogens. Real-time data and alerts help intervene proactively, drastically reducing post-harvest losses for onions.

How It Works

The Smart Onion Storage System integrates a network of IoT sensors, microcontrollers, and cloud-based analytics. Temperature and humidity sensors continuously monitor the ambient conditions within the storage unit. Gas sensors detect early signs of ethylene or other spoilage gases. Data from these sensors is transmitted via Wi-Fi or cellular networks to a central cloud platform. An AI algorithm processes this real-time data to identify deviations from optimal conditions and predict potential spoilage events. Actuators, such as smart ventilation fans, automated cooling/heating units, and dehumidifiers, are then triggered by the microcontroller to adjust the environment. For example, if humidity rises, dehumidifiers activate; if temperature exceeds a threshold, cooling units or fans increase airflow. Farmers receive alerts and can view detailed reports through a mobile app or web dashboard, allowing remote control and insights into their onion stock's health. Technologies involved include: IoT sensors (temperature, humidity, gas), microcontrollers (e.g., Arduino, Raspberry Pi), cloud computing platforms (e.g., AWS, Azure) for data storage and processing, AI/Machine Learning for predictive analytics, and mobile/web development for user interfaces.

Unique Selling Points

- Precision environmental control using IoT sensors ensures ideal conditions for onion preservation, minimizing decay and sprouting effectively.
- AI-driven predictive analytics identify potential spoilage risks early, enabling timely intervention and preventing widespread losses.
- Remote monitoring and control via a user-friendly dashboard allow farmers to manage their storage from anywhere, anytime.
- Modular and scalable design makes the system adaptable for various storage capacities, from small farms to large warehouses.

- Significant reduction in post-harvest waste translates to higher profits for farmers and more stable market prices for consumers.

Feasibility and Viability

- Existing IoT sensor technology is mature and affordable, making hardware implementation straightforward and cost-effective.
- Cloud computing and AI platforms offer robust infrastructure for data processing and predictive analytics, readily available for integration.
- The system can be designed to integrate with existing storage structures, reducing initial setup costs and implementation complexity.
- High demand for reducing post-harvest losses from farmers and agricultural businesses creates a clear market opportunity.
- The cost savings from reduced spoilage and increased shelf life offer a strong return on investment for adopters.
- Potential for subscription-based services for data analytics and maintenance ensures recurring revenue streams.

Impact and Beneficiaries

- Significantly reduces food waste, contributing to global food security and environmental sustainability.
- Enhances farmer profitability by minimizing losses and allowing better market timing for sales, leading to economic stability.
- Farmers will benefit from increased income due to less spoilage and better control over their harvest, leading to greater financial security.
- Consumers will benefit from more stable onion prices, consistent availability, and higher quality produce in the market.

Problem Statement 23

Develop computer programs (in any language, preferably Python) to identify the design principles behind the Kolam designs and recreate the kolams. (Software)

Need to Know

Kolam designs are traditional South Indian geometric patterns drawn with rice flour. Design principles refer to underlying rules like symmetry, repetition, and dot grids that govern their creation.

Description

The challenge is to create programs, ideally in Python, to automatically identify the mathematical and artistic principles behind Kolam patterns and then use these principles to generate new, authentic Kolam designs.

Idea

An AI-powered Kolam analysis and generation engine that learns design rules from existing Kolams and synthesizes new ones based on identified principles and user parameters.

Problem Resolution

Our solution will automate the discovery of Kolam design principles using image processing and machine learning, then apply these learned rules to algorithmically recreate and generate novel Kolam patterns.

How It Works

The system will use Python, OpenCV for image preprocessing (edge detection, skeletonization). A Convolutional Neural Network (CNN) or a Generative Adversarial Network (GAN) like a conditional GAN will be trained on a dataset of Kolams to identify underlying design principles (e.g., dot arrangements, line symmetries, geometric motifs). For recreation, the identified principles will guide a generative algorithm (e.g., a rule-based system or the trained GAN's generator) to draw new Kolams. Users can input parameters like grid size, symmetry type, or motif preferences.

Unique Selling Points

- Automated principle extraction from diverse Kolam datasets.
- Generative AI for infinite, unique Kolam design creation.
- Interactive user interface for custom Kolam parameter input.
- Preservation and digitization of traditional art forms.
- Educational tool for learning Kolam design mechanics.

Feasibility and Viability

- Robust computer vision libraries (OpenCV) are readily available.
- Machine learning frameworks like TensorFlow/PyTorch support complex pattern recognition.
- Python offers extensive tools for rapid prototyping and development.
- Attracts cultural enthusiasts and artists for digital art creation.

- Educational tool for geometry, programming, and cultural heritage.
- Potential for customized product designs (textiles, digital art).

Impact and Beneficiaries

- Preserves and revitalizes an ancient art form for future generations.
- Fosters interdisciplinary learning between art, culture, and technology.
- Artists and designers seeking new inspiration and digital tools.
- Educators and students exploring cultural heritage and computational art.

Problem Statement 24

Gamified Environmental Education Platform for Schools and Colleges (Software)

Need to Know

Gamified Environmental Education integrates game elements (points, badges, leaderboards) into learning about environmental issues, sustainability, and conservation to boost engagement and knowledge retention.

Description

Traditional environmental education often lacks engaging methods, leading to low student interest and retention. Schools and colleges struggle to provide interactive, up-to-date resources for critical environmental topics.

Idea

Develop “EcoQuest,” a comprehensive gamified platform designed to make learning about environmental science, sustainability, and conservation captivating and effective for students in schools and colleges.

Problem Resolution

EcoQuest transforms dry environmental topics into engaging quests, challenges, and interactive modules. It fosters deeper understanding and active participation, directly addressing the engagement gap in current education.

How It Works

EcoQuest is a web and mobile application. Users engage in interactive modules, quizzes, and virtual simulations covering environmental topics. Gamification mechanics include points for correct answers, badges for completing tasks, and leaderboards for competition. Students can participate in collaborative projects, earning “green points” for real-world actions like waste audits. Technologies include a frontend built with React/Vue.js and native mobile apps (Swift/Kotlin), a backend using Node.js/Python with a PostgreSQL database, a gamification engine (e.g., customized rules engine), and a content management system for educators to upload new material. AI/ML could personalize learning paths and recommend content. IoT integration might allow real-time data from local environmental sensors.

Unique Selling Points

- Interactive gamified learning paths with points, badges, and leaderboards for sustained engagement.
- Curriculum-aligned content ensures relevance and seamless integration into existing educational frameworks.
- Real-world project integration allows students to apply knowledge and make tangible environmental impact.
- Collaborative challenges and team-based activities promote social learning and critical thinking skills.
- Personalized learning journeys adapt to individual student pace and preferences, maximizing comprehension.

Feasibility and Viability

- Leveraging existing gamification frameworks and educational content platforms simplifies development.
- Cloud-based infrastructure (AWS/Azure/GCP) provides scalable and reliable hosting solutions.
- Access to open-source environmental data and educational resources for content creation.
- High market demand for innovative and engaging STEM and environmental education tools.
- Potential for subscription models for schools/colleges and freemium tiers for individuals.
- Opportunities for partnerships with NGOs, educational publishers, and government initiatives.

Impact and Beneficiaries

- Significantly raises environmental literacy, fostering a generation of responsible global citizens.
- Drives tangible local and global environmental action through educated, engaged individuals.
- Students gain deeper, more engaging environmental knowledge and practical skills.
- Educators get an effective, ready-to-use tool to enrich their environmental curriculum.

Problem Statement 25

Real-Time Public Transport Tracking for Small Cities (Software)

Need to Know

Real-time public transport tracking means knowing the exact current location and estimated arrival times of public vehicles (like buses) at any given moment, accessible via digital platforms such as mobile apps or websites.

Description

Small cities often lack real-time public transport tracking systems. This leads to commuter uncertainty about bus locations and schedules, resulting in wasted time, frustration, and reduced adoption of public transportation services.

Idea

Develop a user-friendly, low-cost real-time public transport tracking system tailored for small cities. It will provide commuters with live bus locations and estimated arrival times via a simple mobile application and web portal, enhancing their daily commute.

Problem Resolution

Our idea directly addresses the information gap by providing accurate, real-time data to commuters. This enhances convenience, significantly reduces waiting times, and ultimately encourages greater utilization and reliability of public transport in smaller urban areas.

How It Works

GPS devices are installed on public transport vehicles, continuously transmitting their location data via cellular networks (e.g., 4G, NB-IoT) to a central cloud-based server. A backend application processes this real-time data, calculates estimated arrival times based on current traffic and predefined routes. This information is then made available through APIs. A user-friendly mobile application (iOS/Android, developed with frameworks like React Native or Flutter) and a web portal consume these APIs to display live vehicle locations on an interactive map (using GIS mapping services like OpenStreetMap or Google Maps API) and provide arrival predictions to commuters. Cloud computing platforms (e.g., AWS, Azure) host the backend and database, ensuring scalability and reliability.

Unique Selling Points

- Low-cost implementation and maintenance, optimized for small city budgets.
- Intuitive and easy-to-use interface accessible for all age groups.
- Scalable design to integrate new routes and vehicles seamlessly.
- Offline access to schedules and route maps for areas with limited connectivity.
- Data insights for city planners to optimize routes and schedules.

Feasibility and Viability

- GPS tracking technology is mature, widely available, and cost-effective to deploy.
- Existing cellular network infrastructure in most small cities supports data transmission.
- Utilizing open-source mapping and software tools significantly reduces development costs.
- Strong potential for partnerships with local city governments for funding and implementation.
- Subscription models for transport operators or localized advertising revenue streams.

- Improves city infrastructure, making the area more attractive to residents and businesses.

Impact and Beneficiaries

- Significantly enhances commuter experience by reducing uncertainty and waiting times.
- Promotes environmental sustainability by encouraging greater public transport usage.
- Daily commuters benefit from predictable travel and reduced stress.
- Local city governments gain data for improved urban planning and service efficiency.

Problem Statement 26

Maximizing Section Throughput Using AI-Powered Precise Train Traffic Control (Software)

Need to Know

Section Throughput refers to the maximum number of trains that can pass through a specific railway segment within a given time. AI-Powered Train Traffic Control involves using artificial intelligence algorithms to optimize train movements, scheduling, and signaling in real-time.

Description

Inefficient train traffic management leads to congestion, delays, and underutilized rail infrastructure. Maximizing train throughput in specific sections is crucial for improving overall network efficiency and reducing operational costs.

Idea

Develop an AI-driven system for real-time, precise train traffic control to optimize train movements, minimize idle times, and increase the number of trains passing through railway sections efficiently and safely.

Problem Resolution

This AI system analyzes real-time data, predicts conflicts, and optimizes train schedules and speeds, enabling more trains to safely traverse rail sections, thereby maximizing throughput and reducing delays.

How It Works

The system integrates data from various sources: train location (GPS/track circuits), signal status, switch positions, and schedules. AI algorithms (e.g., Reinforcement Learning, Predictive Models) analyze this data in real-time. It predicts potential conflicts or bottlenecks and dynamically adjusts train speeds, routes, and signaling. Technologies involved include IoT sensors (for real-time data collection), cloud computing (for processing and storage), Machine Learning/Deep Learning frameworks (TensorFlow, PyTorch) for AI model development, and a robust communication network (5G, TETRA) for transmitting commands to trains and infrastructure.

Unique Selling Points

- Real-time Predictive Analytics: AI anticipates conflicts and optimizes routes before they impact operations.
- Dynamic Speed Optimization: Adjusts train speeds precisely to maintain optimal headways and flow.
- Enhanced Safety Protocols: Reduces human error and ensures safer train operations through automation.
- Scalable Across Networks: Adaptable solution for various railway infrastructures, from urban to long-haul.
- Significant Cost Savings: Reduces fuel consumption and operational expenses by minimizing delays.

Feasibility and Viability

- Existing sensor infrastructure and communication networks can be leveraged for data input.
- Advanced AI/ML frameworks are readily available for developing predictive control models.
- Pilot programs on contained sections can demonstrate effectiveness and gather feedback.
- Potential for significant operational cost reductions through optimized fuel usage and reduced delays.
- Increased capacity allows for more freight/passengers, boosting railway revenue.
- Improved customer satisfaction due to more punctual and reliable services.

Impact and Beneficiaries

- Reduces carbon emissions by optimizing train movements and minimizing idling, supporting green transportation.
- Enhances national infrastructure utilization, supporting economic growth and logistics efficiency.
- Railway Operators: Benefit from increased efficiency, reduced costs, and improved service reliability.
- Commuters & Freight Companies: Experience fewer delays, faster transit times, and more dependable services.

Problem Statement 27

Software other than a circuit breaker that can be used to detect and turn off LT lines when the line breaks (Software)

Need to Know

LT lines refer to Low Tension electrical lines, typically used for local distribution to homes and businesses. A circuit breaker is an automatic electrical switch designed to protect an electrical circuit from damage caused by an overload or short circuit. It does not primarily detect physical line breaks.

Description

Current circuit breakers primarily react to overcurrents or short circuits, not physical line breaks. There's a critical need for an alternative software-driven system to detect and isolate broken Low Tension (LT) lines, preventing hazards and power outages efficiently.

Idea

Develop a smart grid monitoring system utilizing real-time data analytics and IoT sensors. This software will precisely detect physical breaks in Low Tension (LT) lines and automatically trigger their safe deactivation, enhancing public safety and grid reliability.

Problem Resolution

Our idea proposes a real-time monitoring software that uses sensor data to identify physical line breaks. Upon detection, it autonomously sends commands to smart switches, immediately isolating the broken LT line. This prevents electrocution risks and minimizes outage impact.

How It Works

The system integrates various technologies. IoT sensors (e.g., current sensors, vibration sensors, thermal cameras) are deployed along LT lines to continuously monitor electrical parameters, physical integrity, and environmental factors. Data from these sensors is transmitted via a secure wireless network (e.g., LoRaWAN, 5G, NB-IoT) to a central cloud-based platform. This platform hosts a real-time data analytics engine, potentially leveraging Machine Learning algorithms, to analyze sensor data for anomalies indicative of a line break (e.g., sudden loss of current, unusual vibration patterns, localized temperature changes, or sag detection). Upon detecting a confirmed line break, the software triggers an automated command. This command is sent through the network to smart switches or remote terminal units (RTUs) integrated into the LT grid, instructing them to isolate the affected line section. This ensures immediate power cut-off to the broken segment, preventing hazards.

Unique Selling Points

- **Enhanced Public Safety:** Proactive detection of broken lines minimizes electrocution risks for the public and utility workers.
- **Reduced Outage Duration:** Pinpoints fault location rapidly, allowing quicker restoration and minimizing downtime for consumers.
- **Automated Response:** Automatically deactivates broken lines without human intervention, improving response time significantly.
- **Preventative Maintenance Data:** Collects data on line health, enabling predictive maintenance and preventing future breaks.

- **Cost-Effective Grid Management:** Reduces operational costs associated with manual fault detection and extended outages.

Feasibility and Viability

- IoT sensor technology for monitoring electrical parameters and physical integrity is already mature and widely available.
- Cloud computing and real-time data analytics platforms can process vast amounts of sensor data efficiently.
- Smart grid infrastructure with remote switching capabilities is increasingly being adopted by utilities.
- Significant market potential with utility companies seeking to enhance safety and reliability of their distribution networks.
- Reduces operational costs for utilities by automating fault detection and minimizing manual patrols.
- Offers a competitive edge by providing a solution beyond traditional circuit breakers for line breaks.

Impact and Beneficiaries

- Drastically improves public safety by preventing electrocution from live, fallen power lines.
- Enhances grid reliability and resilience by swiftly isolating faults and reducing power outage durations.
- Utility companies will benefit from improved grid management, reduced liabilities, and enhanced service delivery.
- General public will experience increased safety and more reliable power supply, minimizing disruptions.

Problem Statement 28

Develop API code to integrate NAMASTE and or the International Classification of Diseases (ICD-11) via the Traditional Medicine Module 2 (TM2) into existing EMR systems that comply with Electronic Health Record (EHR) Standards for India. (Software)

Need to Know

NAMASTE (National AYUSH Morbidity And Standardized Terminologies Electronic) is a portal for Traditional Indian Medicine. ICD-11 (International Classification of Diseases, 11th Revision) includes the TM2 (Traditional Medicine Module 2) for classifying traditional medicine conditions. EMR (Electronic Medical Records) systems manage patient data. EHR Standards for India refers to guidelines for digital health records in the country.

Description

Existing Electronic Medical Record (EMR) systems in India lack standardized integration with NAMASTE and ICD-11 (TM2). This gap hinders the proper documentation and exchange of traditional medicine data, preventing comprehensive patient care and compliance with India's Electronic Health Record (EHR) standards.

Idea

Develop a robust API integration layer to seamlessly connect NAMASTE and ICD-11 (TM2) with existing EMR systems compliant with Indian EHR standards. This will facilitate standardized documentation and data exchange for traditional medicine practices within digital health records.

Problem Resolution

This API layer standardizes traditional medicine data within EMRs, improving data accuracy, interoperability, and reporting. It ensures compliance with national and international coding standards, enhancing holistic patient care, research, and adherence to Indian EHR guidelines.

How It Works

The solution involves developing a set of secure, RESTful APIs that act as a bridge between existing EMR systems and the NAMASTE/ICD-11 TM2 databases. When an EMR system needs to record or retrieve information related to traditional medicine, it sends a request to these APIs. The APIs then query the respective NAMASTE or ICD-11 TM2 databases, retrieve the standardized codes or terminologies, and return them to the EMR system. This ensures that traditional medicine data is consistently classified and stored in line with national and international standards. Technologies involved include: RESTful APIs for communication; JSON for data exchange; OAuth2 or API keys for secure authentication; microservices architecture for scalability; and potentially cloud platforms (e.g., AWS, Azure) for hosting the API services, ensuring high availability and performance. The architecture would also consider FHIR (Fast Healthcare Interoperability Resources) for broader health data exchange compatibility.

Unique Selling Points

- Seamlessly integrates traditional medicine data with modern EMR systems.
- Ensures compliance with WHO ICD-11 TM2 and NAMASTE for standardized data.
- Enhances interoperability for improved data exchange across healthcare platforms.
- Future-proof solution designed to adapt to evolving Indian EHR standards.
- Supports holistic patient care by incorporating traditional health records.

Feasibility and Viability

- Existing EMR systems commonly support API integrations, simplifying technical implementation.
- NAMASTE and ICD-11 TM2 provide well-defined data structures suitable for API mapping.
- Modern API development tools and frameworks streamline development and deployment processes.
- Addresses a critical gap in standardizing traditional medicine data within EMRs for better outcomes.
- Supports government initiatives like Ayushman Bharat Digital Mission (ABDM) promoting digital health.
- Enhances research capabilities by providing structured, standardized data on traditional medicine practices.

Impact and Beneficiaries

- Revolutionizes traditional medicine documentation by integrating it into mainstream digital health records.
- Empowers data-driven policy making and research in AYUSH by providing rich, standardized datasets.
- Healthcare providers: Simplifies documentation, ensures compliance, and improves holistic patient care.
- Patients: Benefits from comprehensive, integrated health records for better-informed treatment decisions.

Problem Statement 29

Accelerating High-Fidelity Road Network Modeling for Indian Traffic Simulations. (Software)

Need to Know

High-Fidelity Road Network Modeling refers to creating highly accurate digital maps of road infrastructure, including details like lane markings, traffic signs, and road geometry, essential for realistic simulations. Indian Traffic Simulations are computer models that mimic traffic flow in India, considering its unique and complex driving behaviors and road conditions.

Description

Current methods for creating detailed road network models for Indian traffic simulations are slow and labor-intensive. This hinders effective urban planning, autonomous vehicle development, and traffic management solutions tailored for India's unique conditions.

Idea

An AI-powered platform for automated, rapid generation of high-fidelity road network models, specifically optimized for the diverse and complex traffic patterns found in Indian cities.

Problem Resolution

This platform drastically reduces the time and effort required for road network modeling by automating data extraction and model generation, enabling faster, more accurate simulations critical for Indian urban development.

How It Works

The platform leverages satellite imagery, drone footage, and street-level data. Computer Vision and Machine Learning algorithms identify road segments, lane markings, traffic signs, and intersections. A Deep Learning model processes historical traffic data and local driving patterns to infer behavioral parameters specific to India. Geographic Information Systems (GIS) integrate these layers, creating a comprehensive, high-fidelity digital twin of the road network. This model is then exported in formats compatible with standard traffic simulation software. Key technologies include OpenCV for image processing, TensorFlow/PyTorch for deep learning, and open-source GIS libraries like GDAL/ Shapely for spatial data handling and integration.

Unique Selling Points

- Automated extraction from diverse data sources (satellite, drone, street-level imagery).
- AI-driven optimization for unique Indian traffic rules and behaviors.
- Significantly faster model generation compared to manual methods.
- High-fidelity output, ensuring simulation accuracy for critical applications.
- Scalable solution for various city sizes and road network complexities.

Feasibility and Viability

- Existing AI/ML and GIS technologies are mature enough for data processing and model generation.
- Availability of diverse geospatial data (satellite, drone, street view) for training and input.
- Modular architecture allows for incremental development and integration of new data sources.

- Local expertise in Indian traffic patterns can be integrated.
- Addresses a critical bottleneck in urban planning and smart city initiatives in India.
- Offers significant cost savings and faster time-to-market for traffic simulation projects.
- Growing demand from autonomous vehicle developers and government agencies for accurate models.

Impact and Beneficiaries

- Enables more efficient urban planning, leading to reduced traffic congestion and pollution.
- Accelerates the development and testing of autonomous vehicles adapted for India's unique conditions.
- Government urban planning departments and municipal corporations across India.
- Automotive companies and startups developing autonomous driving technologies for India.

Problem Statement 30

Blockchain-Based Supply Chain Transparency for Agricultural Produce (Software)

Need to Know

Blockchain is a distributed, immutable ledger system for secure and transparent record-keeping. Supply Chain Transparency in agriculture means knowing the complete journey of produce from farm to fork, ensuring authenticity and quality.

Description

Current agricultural supply chains suffer from a lack of transparency, leading to food fraud, inefficient recall processes, and unfair practices for farmers. Consumers often lack trust in the origin and quality of their produce.

Idea

Implement a blockchain-based platform to create an immutable and transparent record of agricultural produce throughout its entire supply chain, from initial harvest to the final consumer purchase.

Problem Resolution

The blockchain platform ensures every step of the produce journey is securely and transparently recorded. This builds consumer trust, reduces fraud, and empowers farmers with verifiable product history and fair compensation.

How It Works

The system utilizes blockchain technology (e.g., Hyperledger Fabric or Ethereum), IoT sensors, smart contracts, and unique identifiers like QR codes or NFC tags. Farmers register their produce batches, providing details like harvest date and location. IoT sensors monitor conditions (temperature, humidity) during transport and storage, automatically recording data onto the blockchain. Each transfer of custody (e.g., to packer, distributor, retailer) is recorded as a transaction, creating an immutable log. Smart contracts can automate payments or trigger alerts for quality deviations. Consumers can scan a product's QR code to access its complete, verifiable journey and history.

Unique Selling Points

- Provides end-to-end immutable traceability for all agricultural products.
- Enhances consumer trust through verifiable product origin and journey details.
- Reduces food fraud significantly and enables more efficient recall management.
- Ensures fairer compensation for farmers via verifiable quality and origin proof.
- Offers improved data integrity and robust security across the entire supply chain.

Feasibility and Viability

- Existing robust blockchain frameworks and IoT hardware are readily available for integration.
- Successful pilot projects in other industries prove blockchain's technical viability for supply chains.
- Cloud infrastructure offers scalable and cost-effective deployment options for the platform.
- Growing industry and regulatory interest in blockchain for traceability solutions.

- Strong consumer demand for transparently sourced, ethical, and safe food products.
- Increasing regulatory pressure for enhanced food safety and traceability standards.
- Potential for significant cost savings by reducing fraud and improving supply chain efficiency.

Impact and Beneficiaries

- Revolutionizes food safety and significantly boosts consumer trust in agricultural products globally.
- Empowers small farmers and producers by ensuring fair value and broader market access.
- Consumers gain access to verifiable, safe, and ethically sourced food products with confidence.
- Farmers and producers receive fair compensation and an enhanced reputation for their quality produce.

Problem Statement 31

Earthquake stabilised dialysis system for patient safety during seismic events. (Hardware)

Need to Know

A “dialysis system” is a medical treatment that removes waste products and excess fluid from the blood when kidneys fail. “Seismic events” are natural ground tremors or earthquakes.

Description

Current dialysis systems are vulnerable to damage and disruption during earthquakes, endangering patients who rely on continuous treatment for survival. Patient safety during seismic events is a critical concern.

Idea

Develop an “Earthquake-Resilient Dialysis Unit” (ERDU) that integrates advanced seismic stabilization technologies to ensure continuous and safe dialysis treatment for patients during and immediately after seismic events.

Problem Resolution

The ERDU mitigates earthquake-induced risks by isolating dialysis machines from ground motion, preventing equipment damage, and maintaining critical connections. This ensures uninterrupted, life-sustaining treatment for vulnerable patients.

How It Works

The Earthquake-Resilient Dialysis Unit (ERDU) utilizes a multi-layered approach to stabilization. The core technology is base isolation, where the entire dialysis unit (machines, patient chairs, and connected infrastructure) rests on a flexible foundation that decouples it from ground motion. This can involve lead-rubber bearings, friction pendulum systems, or spring-damper mechanisms, absorbing seismic energy and reducing lateral forces. Integrated accelerometers and gyroscopes continuously monitor ground motion and system stability, triggering safety protocols. Self-sealing fluid connectors and reinforced tubing prevent leaks and disconnections of critical dialysis lines, using materials resistant to stress and vibration. Uninterruptible Power Supplies (UPS) ensure continuous power even if the main grid fails, maintaining machine operation. Additionally, the unit incorporates a secure anchoring system for individual machines to the isolated platform, preventing tipping or movement within the unit. The entire system is housed in a robust, lightweight, and vibration-dampened casing for enhanced protection.

Unique Selling Points

- **Guaranteed patient safety:** Minimizes physical harm and treatment interruption for patients during earthquakes.
- **Uninterrupted treatment:** Ensures continuous dialysis operation, crucial for patient survival in critical situations.
- **Reduced equipment damage:** Protects expensive dialysis machines and infrastructure from seismic forces.
- **Integrated monitoring:** Real-time seismic activity and system stability monitoring for immediate alerts.

- Rapid post-event readiness: System allows quick assessment and resumption of services after a seismic event.

Feasibility and Viability

- Leverages mature seismic isolation and dampening technologies used in buildings and bridges.
- Modular design permits integration of stabilization components into existing or new dialysis units.
- Advances in sensor technology and robust materials make real-time monitoring and secure connections viable.
- Significant market demand in earthquake-prone regions globally with large dialysis patient populations.
- Addresses a critical, life-threatening gap in emergency medical preparedness and patient care.
- Potential for strong support from healthcare institutions, disaster relief organizations, and insurance providers.

Impact and Beneficiaries

- Directly saves lives by preventing treatment cessation, complications, and injuries for dialysis patients during seismic events.
- Reduces strain on emergency services and healthcare infrastructure by preventing widespread treatment disruptions.
- Dialysis patients in active seismic zones, ensuring their safety and continuity of life-sustaining treatment.
- Hospitals, clinics, and medical facilities by protecting vital equipment and maintaining operational capacity.

Problem Statement 32

AI-Based Farmer Query Support and Advisory System (Software)

Need to Know

An “AI-Based Farmer Query Support and Advisory System” leverages artificial intelligence to provide timely, personalized, and accurate agricultural advice to farmers, helping them make informed decisions regarding crops, soil, pests, and market trends. It aims to bridge the knowledge gap often faced by rural communities.

Description

Farmers often lack immediate access to expert agricultural advice, leading to poor decision-making, crop losses, and reduced income. Existing support systems are frequently slow, geographically limited, or not tailored to individual farm needs. This hinders productivity and sustainable farming practices.

Idea

Our idea is an AI-powered platform that offers instant, personalized responses to farmer queries on various agricultural topics, including crop health, soil management, pest control, and market prices. It will provide proactive advisories to enhance farming efficiency.

Problem Resolution

This system offers 24/7 access to intelligent, data-driven agricultural expertise, directly addressing the critical need for timely and tailored advice. It helps farmers optimize resource use, mitigate risks, and improve yields, ultimately boosting their livelihoods and food security.

How It Works

The system functions through several integrated components. Farmers submit queries via a mobile application, using text, voice (speech-to-text), or by uploading images (image recognition for disease/pest identification). Natural Language Processing (NLP) models analyze text and voice queries to understand their intent and extract key information. This information, along with farm-specific data (location, crop type, historical data), is fed into Machine Learning (ML) models trained on vast datasets of agricultural practices, soil science, meteorology, and plant pathology. These ML models generate predictive insights and optimal recommendations. A comprehensive knowledge base containing best practices, government schemes, market prices, and regional agricultural data is continuously updated and acts as a primary information source. Geospatial data and real-time weather APIs provide hyper-localized context. A recommendation engine synthesizes all this information to deliver accurate, actionable advice directly to the farmer. Key technologies involved include Python for backend logic, TensorFlow/PyTorch for ML model development, cloud computing platforms (e.g., AWS, Azure) for scalability and data storage, a robust database (e.g., PostgreSQL, MongoDB) for the knowledge base, and mobile development frameworks (e.g., Flutter, React Native) for the user-friendly interface.

Unique Selling Points

- Instant, 24/7 expert agricultural advice via text or voice, available anytime, anywhere.
- Personalized recommendations tailored to specific farm conditions, crops, and local climate data.
- Proactive alerts for potential threats like pest outbreaks, diseases, or adverse weather conditions.

- Multi-lingual support ensures accessibility for diverse farming communities.
- Continuously learning system, improving accuracy and relevance with every interaction and new data.

Feasibility and Viability

- Mature AI/ML frameworks and tools for NLP and image recognition are readily available.
- Extensive agricultural data, including weather, soil, and crop research, exists for model training.
- Increasing mobile internet penetration in rural areas enables widespread adoption of such a system.
- Addresses a clear, widespread market need for accessible and reliable agricultural information.
- Revenue potential through premium features, subscriptions, or partnerships with agribusiness.
- Scalable to serve millions of farmers across different geographies and languages.

Impact and Beneficiaries

- Significantly boosts crop yields and reduces agricultural losses, improving farmer income and food security.
- Promotes sustainable farming practices through data-driven resource optimization and timely intervention.
- Small and medium-scale farmers, especially in developing regions, gaining access to expert, personalized advice.
- Agricultural extension workers and government agencies, amplifying their reach and effectiveness.

Problem Statement 33

Detection and Prevention of Tampering in Weighing and Measuring instruments (Hardware)

Need to Know

Tampering refers to the act of deliberately altering weighing and measuring instruments (e.g., scales, fuel pumps) to provide inaccurate readings, usually for fraudulent purposes. This can lead to financial losses for consumers or businesses, and undermine trust in fair trade practices.

Description

Fraudulent activities involving tampered weighing and measuring instruments cause significant financial losses and erode public trust. A robust solution is needed to effectively detect and prevent these illicit alterations, ensuring accuracy and fairness in all transactions.

Idea

An AI-powered IoT monitoring system designed for real-time detection and prevention of tampering in weighing and measuring instruments. It ensures data integrity and operational transparency by identifying abnormal physical and data patterns.

Problem Resolution

This system proactively identifies suspicious activities and deviations from normal operational parameters using AI. It immediately alerts stakeholders, preventing fraudulent transactions, safeguarding financial integrity, and maintaining fair trade practices.

How It Works

The system utilizes an array of IoT sensors (e.g., accelerometers, load cells, proximity sensors, environmental sensors) discreetly attached to or integrated with weighing and measuring instruments. These sensors continuously collect real-time data related to the instrument's physical state, environmental conditions, and operational parameters. This data is securely transmitted via wireless protocols (e.g., Wi-Fi, LoRaWAN, cellular networks) to a centralized cloud-based platform. Machine Learning (ML) models, specifically anomaly detection algorithms, analyze the incoming data streams. These models are trained on extensive datasets representing normal, untampered instrument behavior. Any significant deviation from these learned patterns—such as sudden changes in weight, unusual vibrations, unauthorized access via proximity sensors, or unexpected environmental shifts—is flagged as a potential tampering event. Additionally, computer vision techniques, employing small, discreet cameras, can monitor the instrument's physical housing and surrounding area for signs of forced entry or suspicious activity. When a potential tampering event is detected, the system generates immediate alerts (e.g., SMS, email, dashboard notification) to relevant authorities or personnel. Furthermore, all sensor data, detected anomalies, and alert timestamps are recorded onto a distributed ledger using blockchain technology. This ensures an immutable, transparent, and verifiable audit trail, preventing any retrospective data manipulation or record alteration.

Unique Selling Points

- Real-time, continuous monitoring provides instant alerts for any detected tampering attempts, ensuring swift response.

- AI/ML algorithms learn normal instrument behavior, significantly enhancing the accuracy of anomaly detection.
- Non-invasive installation ensures broad compatibility with various existing weighing and measuring equipment.
- A centralized data dashboard offers a comprehensive overview and historical analysis of instrument integrity.
- Blockchain-based data logging ensures immutable and verifiable records of all measurement data and alerts.

Feasibility and Viability

- IoT sensor technology is mature, widely available, and cost-effective for deployment on various instruments.
- Advanced machine learning algorithms for anomaly detection are well-developed and commercially accessible.
- Cloud computing platforms provide scalable, secure infrastructure for data processing and storage needs.
- Blockchain technology offers robust, tamper-proof data logging capabilities.
- Addresses a critical and pervasive problem across multiple industries (retail, logistics, manufacturing, government).
- Offers significant return on investment by preventing fraud, reducing financial losses, and enhancing consumer trust.
- Aligns with and can be integrated into existing regulatory and compliance frameworks for metrology.
- High demand for solutions that ensure fairness and accuracy in commercial transactions.

Impact and Beneficiaries

- Ensures fairness and transparency in commercial transactions, protecting both consumers and businesses from fraud.
- Enhances public trust in measurement systems, bolstering regulatory compliance and market integrity.
- Consumers and businesses, who benefit from accurate measurements, fair pricing, and prevention of financial losses due to fraud.
- Regulatory bodies and law enforcement agencies, gaining powerful tools for oversight, compliance, and combating illicit activities.

Problem Statement 34

- **Students are supposed to use Fusion software to generate NC code with machine details & tool library for any industrial component.**
- **Students should possess technical skills in areas such as CAD/CAM software, G-code programming, toolpath optimization, and machining fundamentals. Additionally, their project ideas should demonstrate a viable solution to a real-world problem, ensuring feasibility and practicality in implementation. (Hardware)**

Need to Know

Fusion software: Autodesk Fusion 360, an integrated CAD/CAM/CAE tool for product design and manufacturing. NC code: Numerical Control code (e.g., G-code, M-code) instructs CNC machines for automated manufacturing. CAD/CAM software: Computer-Aided Design for drawing, Computer-Aided Manufacturing for preparing designs for production. G-code programming: Standardized language for controlling CNC machines. Toolpath optimization: Efficient routes for cutting tools to reduce machining time and wear. Machining fundamentals: Basic principles of material removal processes using machine tools.

Description

Students struggle to apply CAD/CAM and G-code skills to real industrial components, lacking practical experience in generating accurate NC code, optimizing toolpaths, and validating feasible, practical solutions for real-world manufacturing challenges.

Idea

Industry-Integrated Manufacturing Simulation & Project Hub: A platform connecting students with real industrial component challenges, providing structured projects, virtual machining environments, and expert mentorship to master CAD/CAM, NC code generation, and practical problem-solving.

Problem Resolution

Our platform bridges the gap between theoretical knowledge and practical application. Students engage with authentic industrial problems, gaining hands-on experience in Fusion 360, NC code generation, and toolpath optimization, leading to feasible, real-world manufacturing solutions.

How It Works

The platform will leverage cloud-based CAD/CAM software (like Fusion 360 for design, simulation, and NC code generation). Students receive a problem statement for an industrial component. They design in CAD, create toolpaths in CAM, and generate NC code. A virtual machining simulator, potentially utilizing WebGL or a similar rendering engine, will visualize the machining process based on the generated G-code. AI/ML algorithms can analyze toolpath efficiency and suggest optimizations. A database of machine details and tool libraries will ensure accurate code generation. Version control (e.g., Git) will manage project iterations, and a feedback system will provide insights from mentors. Key technologies: Fusion 360 APIs, cloud computing, virtual simulation (WebGL/Unity/Unreal), AI/ML for optimization, database management, and a web-based user interface.

Unique Selling Points

- Provides real-world industrial projects for practical skill development.
- Offers an integrated virtual machining environment for safe practice and error analysis.
- Connects students with expert mentorship from industry professionals for guidance.
- Features automated NC code validation and toolpath optimization feedback.
- Enables creation of a strong project portfolio through validated industrial solutions.

Feasibility and Viability

- Leverages existing CAD/CAM software APIs (e.g., Fusion 360), reducing core development efforts.
- Cloud-based architecture ensures high scalability and broad accessibility for global student users.
- Modular platform design allows for phased development, ensuring manageable implementation and iterative improvements.
- Addresses a critical and growing skill gap in modern manufacturing industries.
- Potential for strong partnerships with academic institutions and industrial companies.
- Diverse revenue streams possible through premium features, certifications, and industry sponsorships.

Impact and Beneficiaries

- Significantly boosts student employability by providing job-ready CAD/CAM and CNC programming skills.
- Drives innovation by encouraging practical, problem-solving approaches to complex industrial challenges.
- Students: Gain practical, in-demand skills, build impressive portfolios, and secure better career opportunities.
- Industry: Access a pipeline of well-trained talent and benefit from student-generated innovative manufacturing solutions.

Problem Statement 35

Solution for NON-REVENUE LOSS IN WATER SUPPLY Solution to improve AWARENESS IN WATER CONSERVATION TREATMENT OF WASTE WATER AND REUSE FOR DOMESTIC PURPOSES (Hardware)

Need to Know

Non-Revenue Water (NRW) refers to water that has been produced and is lost before it reaches the customer, primarily due to leakages, theft, and metering inaccuracies. It represents a significant financial and resource loss for water utilities.

Description

Water utilities face substantial Non-Revenue Water losses. There's also a critical need to enhance public awareness for water conservation and implement advanced wastewater treatment for safe domestic reuse.

Idea

A Smart Water Management Platform integrating IoT sensors for leak detection and consumption monitoring, coupled with AI-driven analytics, and an interactive public awareness module for conservation and wastewater reuse education.

Problem Resolution

This platform addresses NRW by pinpointing leaks and theft, boosts conservation via real-time data and education, and promotes domestic reuse through informative content and verified treatment processes.

How It Works

The system uses a network of IoT sensors (flow meters, pressure sensors, acoustic sensors) deployed throughout the water distribution network to collect real-time data on water flow, pressure, and potential leak signatures. This data is transmitted to a central cloud platform. AI and machine learning algorithms analyze this data to detect anomalies indicating leaks, pipe bursts, or unauthorized consumption (theft) with high precision. For water conservation awareness, an integrated mobile application provides users with personalized consumption data, tips, and gamified challenges. It also features educational modules on wastewater treatment processes, benefits of reuse, and local regulations. Advanced wastewater treatment facilities will integrate their operational data, and the platform can provide verified information on the quality and safe applications of treated water for domestic purposes (e.g., toilet flushing, gardening), potentially connecting users with local reuse programs. Technologies involved include IoT devices, cloud computing (e.g., AWS, Azure), AI/ML for data analytics, mobile application development frameworks (e.g., React Native, Flutter), and secure data transmission protocols.

Unique Selling Points

- Real-time, granular leak detection minimizes water loss and infrastructure damage, significantly reducing Non-Revenue Water.
- Personalized water consumption insights empower users to actively conserve, fostering a culture of responsible water use.
- Integrated public awareness campaigns use gamification and data to educate on conservation and safe water reuse practices.
- AI-powered predictive analytics optimize water distribution and treatment processes, enhancing operational efficiency.
- Facilitates the adoption of treated wastewater for non-potable domestic use, extending water resources sustainably.

Feasibility and Viability

- IoT sensor technology is mature and cost-effective, allowing for widespread deployment in existing infrastructure.
- Cloud computing and AI analytics platforms are readily available, enabling robust data processing and insights.
- Mobile application development is a well-established field, making the awareness module easily deployable to users.
- Reduces operational costs for utilities by minimizing water loss and optimizing maintenance efforts, ensuring financial savings.
- Enhances community trust and engagement by providing transparency and empowering citizens in water management.
- Creates new revenue streams by potentially selling treated wastewater or through efficiency-driven utility savings.

Impact and Beneficiaries

- Significantly reduces water wastage, improving resource availability for communities and environmental sustainability.
- Fosters a proactive, informed citizenry that actively participates in water conservation and resource management efforts.
- Water Utility Companies: Benefit from reduced NRW, optimized operations, and improved public relations and compliance.
- Residential Consumers: Gain awareness, save on water bills, and potentially access new sources of recycled water for non-potable needs.

Problem Statement 36

Telemedicine Access for Rural Healthcare in Nabha (Software)

Need to Know

Telemedicine is remote clinical healthcare provided via technology. Nabha refers to a city and its surrounding rural areas in Punjab, India, indicating a focus on rural health access.

Description

Rural areas in Nabha face significant barriers to accessing specialist healthcare due to geographical distance and limited medical infrastructure. This leads to delayed diagnoses and treatment, compromising patient health outcomes.

Idea

Establish a 'Rural Telehealth Hub Network' in Nabha. Connect existing rural primary health centers with urban specialist doctors using secure digital platforms, supported by trained local health workers.

Problem Resolution

This network directly bridges the gap between rural patients and urban specialists. It ensures timely consultations, reduces patient travel burdens, and significantly improves overall health outcomes for remote communities.

How It Works

The system involves setting up dedicated telemedicine booths in rural primary health centers. These booths are equipped with computers, internet connectivity (using existing broadband/4G/5G infrastructure), and essential diagnostic tools. Local health workers, trained in basic patient assessment and digital operation, assist patients. Patient data, including medical history and vitals, is securely uploaded to an Electronic Health Records (EHR) system. Specialists in urban centers access this data and conduct virtual consultations via secure video conferencing platforms (e.g., custom secure platform, or commercial solutions like Zoom/Google Meet with enhanced security). Prescriptions and follow-up plans are digitally communicated back to the patient and local health center. Cloud storage ensures data accessibility and security.

Unique Selling Points

- Leverages existing local primary health center infrastructure, minimizing initial setup costs and maximizing resource utilization.
- Empowers local health workers through comprehensive training and digital tools, enhancing their roles in patient care coordination.
- Offers a highly cost-effective model, drastically reducing patient travel expenses and lost wages associated with urban visits.
- Designed for scalability, this model can be easily replicated and expanded to other underserved rural regions across Punjab.
- Provides access to a diverse range of medical specialists, offering comprehensive care that is otherwise unavailable locally.

Feasibility and Viability

- Leveraging existing digital infrastructure and readily available internet connectivity in most rural areas.
- Training local ASHA workers and nurses for basic telemedicine assistance is a feasible and quick process.
- Many open-source telehealth platforms exist, reducing software development costs and accelerating deployment.
- Potential for significant government funding and grants due to alignment with national digital health missions.
- Reduces the burden on overcrowded urban hospitals by decentralizing primary and specialist care effectively.
- Sustainable through a mixed revenue model involving public funding and potential micro-payments for specialist consults.

Impact and Beneficiaries

- Enhances health equity by providing underserved rural populations with critical access to specialist medical care.
- Significantly improves public health outcomes through earlier disease detection and more consistent treatment adherence.
- Rural residents of Nabha, gaining convenient and affordable access to specialist healthcare previously out of reach.
- Urban specialist doctors, expanding their reach and impact while managing patient load more efficiently.

Problem Statement 37

Development of a Digital Farm Management Portal for Monitoring Maximum Residue Limits (MRL) and Antimicrobial Usage (AMU) in Livestock (Software)

Need to Know

MRL (Maximum Residue Limits) refers to the highest allowable concentrations of veterinary drug residues or pesticides in food. AMU (Antimicrobial Usage) is the use of antimicrobial drugs, essential to monitor for preventing antimicrobial resistance.

Description

Farmers struggle with manual, inefficient, and error-prone monitoring of Maximum Residue Limits (MRL) and Antimicrobial Usage (AMU) in livestock. This hinders compliance, animal welfare, and food safety, posing risks to public health and market access.

Idea

A comprehensive digital farm management portal designed to centralize and automate the monitoring of MRL and AMU in livestock, providing real-time data and analytics for improved compliance, animal health, and food safety.

Problem Resolution

The portal automates data capture and analysis for MRL and AMU, offering real-time insights and generating compliance reports. This reduces manual errors, ensures regulatory adherence, and enhances decision-making for farmers.

How It Works

The digital farm management portal works by integrating various data sources. Farmers input information about animal treatments, feed, and health records directly into the platform via a user-friendly web and mobile interface. IoT sensors deployed in farms can automatically collect environmental data, animal vital signs, and movement patterns. This data is then securely stored on a cloud-based platform. AI and Machine Learning algorithms process this data to identify patterns, predict potential MRL violations, and flag abnormal AMU. For enhanced data integrity and transparency, a blockchain ledger can be used to record critical AMU and MRL events, providing an immutable audit trail. The system generates customizable reports and real-time alerts for farmers, veterinarians, and regulators when MRL thresholds are approached or AMU protocols are violated. It also offers predictive analytics to optimize feed and treatment plans, ensuring compliance and efficiency. Technologies involved include: Cloud Computing (AWS, Azure, GCP) for scalable infrastructure, IoT for data collection, AI/ML for data analysis and predictions, Blockchain for secure and transparent record-keeping, and web/mobile development frameworks for user interfaces.

Unique Selling Points

- Real-time MRL and AMU monitoring for immediate insights.
- Automated compliance reporting reduces administrative burden.

- Proactive alerts for potential residue limit breaches.
- Enhances animal health and welfare management.
- Improves consumer confidence in food safety standards.

Feasibility and Viability

- Existing cloud infrastructure and IoT technologies allow for practical real-time data collection and processing.
- Open-source AI/ML libraries are available to develop predictive analytics and anomaly detection features.
- Standardized MRL and AMU data protocols can be integrated with current regulatory reporting systems.
- Mobile and web development tools make user interface creation straightforward.
- Reduces regulatory fines for non-compliance, saving livestock farmers significant costs.
- Increases consumer trust in livestock products, enhancing marketability and brand reputation.
- Potential for a subscription-based SaaS model, offering tiered features for different farm sizes.
- Improves operational efficiency, leading to higher productivity and profitability for farmers.

Impact and Beneficiaries

- Significantly improves food safety and public health by minimizing harmful drug residues in livestock products.
- Promotes responsible antimicrobial use, directly contributing to the global fight against antimicrobial resistance.
- Livestock farmers benefit from streamlined operations, improved compliance, and better animal health outcomes.
- Consumers gain safer food products with reduced MRL and more responsible antimicrobial usage practices.

Problem Statement 38

Development of AI-powered FRA Atlas and WebGIS-based Decision Support System (DSS) for Integrated Monitoring of Forest Rights Act (FRA) Implementation. (States to be concentrated: Madhya Pradesh, Tripura , Odisha, Telangana) (Software)

Need to Know

FRA (Forest Rights Act) is a law protecting rights of forest-dwelling communities. FRA Atlas refers to maps showing these rights. WebGIS is a web-based geographic information system. DSS (Decision Support System) is a system aiding decision-making. AI-powered means using Artificial Intelligence for advanced analysis.

Description

Efficiently monitoring Forest Rights Act (FRA) implementation in states like Madhya Pradesh, Tripura, Odisha, and Telangana is challenging. There's a need for an integrated, AI-powered solution to streamline this process, ensuring transparency and effective decision-making.

Idea

Develop an AI-powered FRA Atlas and WebGIS-based Decision Support System (DSS) for integrated and real-time monitoring of Forest Rights Act implementation, enhancing transparency and efficiency in selected states.

Problem Resolution

The system centralizes and analyzes diverse data using AI and WebGIS, providing real-time insights for better decision-making. This automates monitoring, reduces human error, and ensures compliant and timely FRA implementation.

How It Works

The system integrates diverse data sources including satellite imagery (e.g., Sentinel, Landsat), ground survey data, government land records, and community inputs into a centralized GIS database (e.g., PostgreSQL/PostGIS). A WebGIS platform, built using technologies like OpenLayers/Leaflet (frontend) and GeoServer/MapServer with a Python/Django or Node.js/Express backend, visualizes spatial data such as forest boundaries, FRA claim areas, and land-use patterns. An AI/ML engine employs machine learning algorithms for image processing to detect deforestation, encroachment, or land-use changes. Natural Language Processing (NLP) could analyze textual claims. Predictive models forecast potential conflict zones or processing delays. These AI-derived insights feed into a Decision Support System (DSS) dashboard, providing actionable recommendations, alerts, and comprehensive reports to government agencies, enabling data-driven policy and operational decisions. User interfaces are designed for various roles, from administrators to field officers.

Unique Selling Points

- AI-driven predictive analytics for potential FRA conflicts and issues.
- Real-time, integrated data visualization via intuitive WebGIS interfaces.
- Automated compliance tracking and reporting for enhanced accountability.
- Improved transparency and accessibility for all stakeholders involved.
- Scalable architecture adaptable for various states and future expansions.

Feasibility and Viability

- Availability of open-source GIS tools and robust AI/ML libraries reduces development time.
- Abundant satellite imagery and public government land records provide essential data sources.
- Existing technical expertise in GIS, AI, and web development supports implementation.
- Significantly reduces manual effort and operational costs associated with monitoring.
- Enhances the accuracy and speed of FRA implementation and conflict resolution.
- High potential for government adoption due to improved governance and transparency.

Impact and Beneficiaries

- Empowers forest-dwelling communities by ensuring their land rights are more effectively protected.
- Contributes to environmental sustainability by promoting better forest management.
- Forest-dwelling communities, gaining quicker, fairer resolution of land and resource claims.
- Government agencies, achieving enhanced efficiency and transparency in policy execution.

Problem Statement 39

Gamified Platform to Promote Sustainable Farming Practices (Software)

Need to Know

Sustainable farming practices refer to environmentally friendly methods like crop rotation, reduced pesticide use, and water conservation. A gamified platform integrates game-like elements such as points, badges, and leaderboards into non-game contexts to encourage engagement and learning.

Description

Farmers often lack accessible, engaging resources to learn and adopt sustainable farming. This leads to practices that harm the environment and deplete resources, hindering long-term agricultural sustainability and productivity.

Idea

Develop an interactive gamified platform that educates farmers on sustainable agriculture techniques. It incentivizes adoption through challenges, rewards, and community features, making learning engaging and practical for real-world application.

Problem Resolution

By integrating game mechanics like points, badges, and leaderboards, the platform makes learning sustainable practices enjoyable and rewarding. It encourages farmers to adopt new methods by providing clear steps and visible progress.

How It Works

The platform will feature interactive learning modules on various sustainable practices (e.g., composting, water management, organic pest control). Farmers complete challenges, earn points, badges, and compete on leaderboards. It uses a backend database (e.g., PostgreSQL) to store user data, progress, and farm-specific information. Frontend development (e.g., React, Vue.js) will create an engaging user interface. Gamification mechanics are implemented using a scoring engine. Optional IoT integration (e.g., via APIs for sensors collecting soil data, weather) could provide personalized recommendations and track impact. Machine learning could analyze data for optimized suggestions.

Unique Selling Points

- Interactive learning modules with real-time feedback on sustainable farming techniques.
- Personalized progression paths tailored to individual farm needs and local conditions.
- Community features enabling knowledge sharing and peer-to-peer support among farmers.
- Integration with IoT sensors for data-driven recommendations and performance tracking.
- Tangible rewards and recognition for achieving sustainability milestones.

Feasibility and Viability

- Leverages existing gamification frameworks and widely available web/mobile development tools.
- Content can be crowdsourced or developed in partnership with agricultural experts.
- Scalable cloud infrastructure can support a growing user base and data.
- Viability points:
 - Addresses a critical need for sustainable food production and environmental conservation.
 - Potential for partnerships with agricultural organizations, NGOs, and government bodies.

- Subscription models, premium content, or data analytics services can generate revenue.

Impact and Beneficiaries

- Promotes environmental health through reduced chemical use, improved soil, and water conservation.
- Increases farm productivity and resilience, ensuring long-term food security and farmer livelihoods.
- Farmers gain practical knowledge, improve farm efficiency, and adopt environmentally sound practices.
- Consumers benefit from healthier, sustainably produced food and a cleaner environment.

Problem Statement 40

A hardware that can detect and prevent unauthorized use of electric fences (Hardware)

Need to Know

Electric fences are barriers that use high voltage to deter trespassers or contain livestock. Unauthorized use refers to tampering, bypassing, or attempting to steal components.

Description

Existing electric fences lack real-time monitoring, making them vulnerable to unauthorized access, tampering, or theft. This leads to security breaches, property damage, and potential safety hazards.

Idea

Develop a smart, IoT-enabled hardware device that integrates with existing electric fences to provide real-time monitoring, intrusion detection, and automated alert systems to prevent unauthorized use.

Problem Resolution

Our device proactively detects anomalies like voltage drops, cuts, or bypass attempts. It instantly alerts property owners, enabling quick intervention and preventing security breaches.

How It Works

The system involves various sensors and technologies. Current sensors monitor the electrical pulses of the fence, detecting voltage drops or breaks. Capacitive or vibration sensors can detect physical tampering or attempts to climb. A microcontroller (e.g., ESP32 or Arduino) processes sensor data. This data is transmitted via Wi-Fi, cellular (GSM/LTE), or LoRaWAN to a cloud platform. The cloud platform uses machine learning algorithms to analyze patterns, identify anomalies, and trigger alerts. Users receive notifications via a mobile app or SMS. Actuators could potentially trigger sirens or lights. GPS modules could track device location if stolen.

Unique Selling Points

- Real-time, remote monitoring of fence integrity from anywhere via a mobile app.
- AI-powered anomaly detection to differentiate true threats from false alarms.
- Modular design ensures easy integration with existing electric fence systems.
- Automated alerts and customizable response protocols for rapid intervention.
- Low power consumption and solar charging options for continuous operation.

Feasibility and Viability

- Off-the-shelf sensors and microcontrollers are readily available and affordable, reducing development costs.
- Existing IoT platforms and communication protocols simplify data transmission, processing, and alert management.
- Basic AI/ML models for anomaly detection are well-documented and implementable with open-source libraries.
- Significant market need exists for enhanced security in agriculture, industrial sites, and private properties.

- Potential for a recurring subscription-based model for cloud monitoring and advanced features, ensuring sustained revenue.
- Scalable solution, easily adaptable to various electric fence types and sizes across different sectors.

Impact and Beneficiaries

- Significantly enhances property security by proactively deterring theft, vandalism, and unauthorized access.
- Reduces financial losses for owners from property damage, livestock theft, and security breaches.
- Farmers and ranchers protecting valuable livestock and crops from trespassers and poachers.
- Industrial sites, critical infrastructure, and private property owners seeking robust perimeter security.

Problem Statement 41

Developing a cost effective solution for detecting the breakage of Low Voltage AC Distribution Over Head conductors (Hardware)

Need to Know

Low Voltage AC Distribution Over Head conductors are the power lines that deliver electricity from distribution transformers to homes and businesses, typically at voltages below 1000V. Breakage detection refers to identifying when these conductors snap or fall, which can cause power outages and safety hazards.

Description

The problem is to develop an inexpensive and efficient method for identifying breaks in overhead low voltage AC distribution conductors. Current methods are often manual, slow, and costly, leading to prolonged outages and safety risks.

Idea

A smart, cost-effective IoT-based monitoring system using acoustic/vibration sensors and AI analytics for real-time detection of conductor breakage in low voltage AC overhead distribution networks.

Problem Resolution

This system provides immediate, precise alerts about conductor breakages, drastically reducing response times, minimizing power outages, and significantly improving public safety, all while maintaining cost-effectiveness.

How It Works

The system employs a network of small, low-power acoustic and/or vibration sensors strategically placed along the Low Voltage AC Distribution Over Head conductors. These sensors continuously monitor for abnormal sounds or vibrations indicative of a conductor breaking or falling. When a potential breakage event is detected, the sensor data is wirelessly transmitted using low-power wide-area network (LPWAN) technologies like LoRaWAN or NB-IoT to a central gateway. From the gateway, the data is sent to a cloud platform (e.g., AWS IoT, Google Cloud IoT) for processing. An Artificial Intelligence (AI) / Machine Learning (ML) model, trained on various breakage signatures, analyzes the incoming sensor data in real-time to confirm a breakage event. Upon confirmation, an alert is immediately sent to utility operators via SMS, email, or integrated SCADA systems, pinpointing the exact location of the fault. The system leverages edge computing for initial data filtering to reduce bandwidth usage and latency.

Unique Selling Points

- Real-time alerts enable rapid response and fault isolation, drastically reducing outage duration for consumers and improving grid reliability.
- Utilizes low-cost, off-the-shelf IoT components, making the solution economically viable for widespread deployment across existing infrastructure.

- Enhances public safety by immediately detecting fallen conductors, minimizing risks of electrocution and property damage.
- Offers predictive maintenance insights by monitoring conductor vibrations, potentially identifying weak points before complete breakage occurs.
- Easy to deploy and scale across vast distribution networks with minimal installation effort, integrating seamlessly with existing grid management systems.

Feasibility and Viability

- Low-cost IoT sensors and LPWAN communication technologies are mature and readily available for large-scale deployment.
- AI/ML models can be effectively trained to differentiate conductor breakage events from environmental noise with high accuracy.
- The system can be powered by small solar panels or harvested energy, ensuring continuous operation without external power grids.
- Significantly reduces operational costs for utility companies by minimizing manual inspections and accelerating fault localization.
- Improves customer satisfaction by ensuring quicker restoration of power and increasing overall grid reliability.
- Addresses a critical safety concern, reducing liabilities and enhancing the public image of utility providers.

Impact and Beneficiaries

- Enhances grid resilience and reliability by preventing extended power outages caused by undetected conductor breakages.
- Significantly improves public safety by reducing the risk of accidents from fallen live electrical conductors.
- Promotes sustainable energy management by optimizing resource allocation for maintenance and repairs.
- Drives innovation in smart grid technologies, setting new standards for power distribution monitoring.
- Utility companies will benefit from reduced operational costs, improved service reliability, and enhanced safety compliance.
- The general public will benefit from fewer power outages, quicker restoration times, and a significant reduction in safety hazards associated with fallen power lines.

Problem Statement 42

Smart Crop Advisory System for Small and Marginal Farmers (Software)

Need to Know

Small and marginal farmers typically have land holdings less than 2 hectares and often lack access to modern technology and information. A Crop Advisory System provides guidance on crop selection, farming practices, and pest management.

Description

Small and marginal farmers face challenges due to lack of timely, accurate, and localized agricultural information. This leads to suboptimal crop choices, inefficient resource use, lower yields, and reduced income, hindering their livelihood and food security.

Idea

An AI-powered Smart Crop Advisory System delivered via a mobile application to provide personalized, real-time recommendations to small and marginal farmers. It will optimize crop selection, input usage, and pest management for improved productivity and profitability.

Problem Resolution

This system bridges the information gap by delivering tailored advice on crop selection, soil health, weather, irrigation, and pest control directly to farmers. This empowers them to make data-driven decisions, reducing risks and increasing profitability and sustainability.

How It Works

The Smart Crop Advisory System works by integrating multiple data sources and leveraging AI/ML models. It starts with comprehensive data collection from satellite imagery for crop health and land use, IoT sensors in fields for real-time soil and environmental parameters (moisture, pH, nutrients, temperature), and weather APIs for current and historical meteorological data. Farmers also contribute input on their practices and observations. This data is processed on a cloud-based platform (e.g., AWS, Azure) where machine learning algorithms perform several functions. Crop recommendation models suggest optimal crops based on soil type, weather, and market demand. Image recognition (using CNNs) identifies pests and diseases from uploaded photos or satellite data. Predictive models forecast outbreaks and yield. Nutrient management algorithms recommend precise fertilizer application, and irrigation scheduling optimizes water use. The insights are delivered to farmers via a user-friendly mobile application (Android/iOS). The app provides a personalized dashboard, real-time alerts, and a chatbot/voice interface for local language queries. It also integrates a marketplace. Technologies include Python for ML, TensorFlow/PyTorch for deep learning, AWS/Azure for cloud, Android/iOS for mobile, IoT protocols (MQTT), GIS, and NLP for language support.

Unique Selling Points

- Provides hyper-local, personalized crop and farm management recommendations.
- Offers a multilingual interface, making it accessible to diverse linguistic groups.
- Features offline capabilities to ensure functionality in remote areas with limited internet access.
- Integrates a marketplace connecting farmers with input suppliers and buyers directly.

- Utilizes predictive analytics for early warnings regarding pests, diseases, and adverse weather conditions.

Feasibility and Viability

- Availability of open-source AI/ML tools and accessible cloud platforms reduces development costs.
- Rapidly increasing smartphone penetration among farming communities enables wide adoption and reach.
- Abundant open agricultural data, satellite imagery, and weather APIs provide essential foundational datasets.
- Potential for a subscription-based model for premium advisory services or advanced features.
- Opportunity to earn commission through an integrated marketplace connecting farmers with buyers and suppliers.
- Partnerships with government agricultural departments and agri-businesses for wider adoption and funding support.

Impact and Beneficiaries

- Significantly enhances crop yields and increases farmer income through data-driven decisions and optimized resource use.
- Promotes sustainable farming practices by optimizing water, fertilizer, and pesticide use, reducing environmental impact.
- Small and marginal farmers gain access to crucial, tailored agricultural intelligence to improve productivity and income.
- Agricultural input suppliers and buyers benefit from a more efficient, direct, and transparent marketplace.

Problem Statement 43

AI-based drop-out prediction and counseling system (Software)

Need to Know

Drop-out prediction involves using data to identify students at risk of leaving education prematurely. Counseling systems provide support and guidance to address these risks, helping students stay enrolled and succeed.

Description

Student dropouts lead to wasted potential and significant resource loss for educational institutions. Identifying at-risk students early and providing timely, personalized support is a critical challenge.

Idea

Our idea is an AI-powered system that predicts student drop-out risks using academic and behavioral data. It then offers personalized, automated counseling and connects students with human support when needed.

Problem Resolution

This system proactively identifies at-risk students before they disengage, enabling early, targeted intervention. Personalized counseling addresses individual issues, significantly reducing drop-out rates.

How It Works

The system uses Machine Learning (ML) algorithms (e.g., classification models like Random Forest, XGBoost) trained on historical student data, including grades, attendance, course engagement, and demographic information, to predict drop-out probability. Natural Language Processing (NLP) is employed for analyzing student feedback or communication patterns to detect sentiment and identify specific issues. A recommendation engine suggests relevant counseling resources and interventions based on predicted risks. Chatbots, powered by AI, provide initial personalized support and guidance, escalating to human counselors for complex cases. Cloud computing infrastructure hosts the data and models, ensuring scalability and accessibility. Data analytics dashboards provide insights for educators and administrators.

Unique Selling Points

- Proactive identification of at-risk students, enabling early intervention to prevent dropouts.
- Personalized counseling pathways tailored to each student's unique academic and personal needs.
- 24/7 accessible support, providing instant guidance and resources outside traditional office hours.
- Data-driven insights for institutions to understand underlying dropout causes and improve programs.
- Scalable solution adaptable for various educational levels, from K-12 to higher education.

Feasibility and Viability

- Abundant historical student data is readily available for training robust AI prediction models.
- Mature AI/ML frameworks and cloud platforms exist, simplifying development and deployment.
- Integration with existing Learning Management Systems (LMS) and student information systems is achievable.

- High demand from educational institutions seeking to improve retention and student success rates.
- Potential for significant cost savings for institutions by reducing student attrition.
- Scalable business model, applicable across diverse educational sectors and student populations.

Impact and Beneficiaries

- Significantly increases student retention rates and academic success, fostering a positive learning environment.
- Empowers educational institutions with actionable insights to refine curricula and support services.
- Students at risk of dropping out, receiving timely, personalized support to succeed academically and personally.
- Educational institutions, improving retention rates, maximizing resource utilization, and enhancing reputation.

Problem Statement 44

Language Agnostic Chatbot (Software)

Need to Know

Language Agnostic means the system operates independently of any specific human language, processing and responding in the user's preferred language without pre-programming for each one.

Description

Current chatbots often struggle with multiple languages, requiring separate development or limited language support. This creates barriers for global users and businesses seeking broad reach.

Idea

Develop a "Language Agnostic Chatbot" capable of understanding and responding in any user's native language, breaking down communication barriers for truly global interaction.

Problem Resolution

This chatbot dynamically translates user input and bot responses, ensuring seamless communication regardless of language. It eliminates the need for language-specific bot versions, streamlining operations.

How It Works

The Language Agnostic Chatbot leverages a combination of advanced natural language processing (NLP) and machine translation (MT) technologies. When a user inputs a query, the system first detects the language using a language detection model (e.g., based on statistical models or deep learning). The detected language input is then passed to a high-quality machine translation API (e.g., Google Cloud Translation, DeepL) to translate it into a pivot language (e.g., English) for processing. The core chatbot logic (e.g., a transformer-based model like BERT or GPT fine-tuned for conversational AI) processes the query in the pivot language to generate a response. This response is then translated back into the user's original language using the same MT API before being delivered to the user. Key technologies involved include: Language Detection APIs, Machine Translation APIs (e.g., neural machine translation models), and advanced NLP models for conversational AI.

Unique Selling Points

- Universal accessibility, serving users worldwide in their preferred language effortlessly.
- Reduces development costs by eliminating the need to build separate language models.
- Enhances user experience with personalized, native-language interactions.
- Scalable solution for businesses expanding into new international markets.
- Provides real-time, accurate, bidirectional translation for natural conversations.

Feasibility and Viability

- Existing robust NMT (Neural Machine Translation) models offer high accuracy for many language pairs.
- Cloud-based APIs provide scalable and accessible language detection and translation services.
- Modern NLP frameworks allow for efficient development and integration of conversational AI.
- Businesses can save significant costs by not developing separate language-specific chatbots.
- Expands market reach for companies, allowing global customer engagement without linguistic barriers.

- Improved customer satisfaction leads to higher retention and brand loyalty across diverse demographics.

Impact and Beneficiaries

- Democratizes information and services, making them accessible to a wider global audience.
- Fosters better cross-cultural communication and understanding in digital interactions.
- Global businesses seeking to provide seamless, localized support and services to international customers.
- Users from diverse linguistic backgrounds who prefer interacting in their native language with digital platforms.

Problem Statement 45

FloatChat - AI-Powered Conversational Interface for ARGO Ocean Data Discovery and Visualization (Software)

Need to Know

ARGO is a global array of autonomous profiling floats collecting oceanographic data like temperature and salinity. Ocean Data Discovery and Visualization refers to the process of finding, accessing, and graphically representing complex oceanographic datasets for analysis.

Description

Scientists and researchers struggle to easily access, interpret, and visualize vast ARGO ocean data. Current methods are often complex, requiring specialized programming or software, hindering quick insights and broader accessibility for non-experts.

Idea

FloatChat is an AI-powered conversational interface that simplifies ARGO ocean data discovery and visualization. Users can interact naturally via text or voice, asking questions to retrieve and visualize complex oceanographic data effortlessly, making data exploration intuitive.

Problem Resolution

FloatChat resolves the complexity of ARGO data access by providing an intuitive, natural language interface. It democratizes data discovery, allowing users to quickly query, analyze, and visualize oceanographic information without needing specialized technical skills or extensive programming knowledge.

How It Works

FloatChat leverages several key technologies to deliver an intuitive ocean data experience. At its core, a Natural Language Processing (NLP) engine processes user queries, breaking them down into structured data requests. This NLP component utilizes machine learning models (e.g., transformer networks) trained on oceanographic terminology and data query patterns. The processed queries are then translated into API calls or database queries directed at the ARGO data repository. This repository likely involves cloud-based storage and databases optimized for large scientific datasets. Once the relevant data is retrieved, a data visualization engine (e.g., leveraging libraries like D3.js, Plotly, or Matplotlib) renders the information into interactive charts, graphs, and maps, suitable for understanding oceanographic trends (e.g., temperature profiles, salinity over time, current movements). Generative AI could be used to enhance the conversational aspect, offering context-aware follow-up questions or summarizing complex findings. The entire system is presented through a conversational user interface (CUI), accessible via web or potentially mobile applications, allowing for seamless text or voice interaction.

Unique Selling Points

- **Natural Language Interaction:** Query complex ocean data using everyday language, eliminating the need for coding or advanced database skills.
- **Instant Visualization:** Automatically generates clear, customizable charts and graphs from conversational queries for immediate insights.

- **Broad Accessibility:** Empowers non-technical users and domain experts alike to explore vast oceanographic datasets efficiently.
- **AI-Powered Insights:** AI understands context, refines queries, and suggests relevant data points for deeper scientific exploration.
- **Time-Saving Efficiency:** Significantly reduces the time spent on data retrieval and preparation, accelerating research and decision-making.

Feasibility and Viability

- **Existing Data Infrastructure:** ARGO data is publicly available and well-structured, providing a robust foundation for integration.
- **Mature AI/NLP Tools:** Advanced AI and NLP libraries/APIs are readily available, simplifying the development of the conversational interface.
- **Cloud Computing Scalability:** Cloud platforms offer scalable resources to handle large datasets and complex AI model processing efficiently.
- **Growing Demand:** Increasing global focus on climate change and ocean health drives demand for accessible ocean data tools.
- **Diverse User Base:** Serves researchers, educators, policymakers, and environmental organizations, broadening market appeal.
- **Subscription/API Model:** Potential for subscription-based access or API integration for institutions, ensuring recurring revenue.

Impact and Beneficiaries

- **Accelerated Ocean Research:** Significantly speeds up data analysis, leading to quicker discoveries and better understanding of ocean processes.
- **Enhanced Public Awareness:** Makes complex oceanographic data digestible for a wider audience, fostering greater environmental literacy.
- **Oceanographers & Researchers:** Gaining faster, easier access to critical ARGO data for their scientific studies and publications.
- **Educators & Students:** Utilizing an intuitive tool to teach and learn about oceanography, simplifying complex data interpretation.

Problem Statement 46

AI-Driven Unified Data Platform for Oceanographic, Fisheries, and Molecular Biodiversity Insights (Software)

Need to Know

Oceanographic data includes information like sea temperature, currents, and salinity. Fisheries data covers fish populations, catch rates, and migration. Molecular Biodiversity insights involve genetic data of marine species and environmental DNA (eDNA). An AI-Driven Unified Data Platform is a central system that uses artificial intelligence to integrate, analyze, and extract meaningful information from these diverse types of data for a holistic understanding.

Description

Marine research suffers from fragmented data across oceanography, fisheries, and molecular biodiversity. This siloed approach hinders comprehensive analysis and predictive modeling, making it difficult to understand complex marine ecosystems and respond effectively to environmental changes and resource management challenges.

Idea

Develop an AI-driven unified data platform that integrates diverse oceanographic, fisheries, and molecular biodiversity datasets. This platform will provide a holistic view for advanced analytics, predictive modeling, and deeper insights into marine ecosystems and sustainable resource management.

Problem Resolution

This platform centralizes disparate marine datasets, using AI to identify complex correlations and patterns. It breaks down data silos, enabling comprehensive cross-domain analysis for a better understanding of marine health, biodiversity, and sustainable resource management strategies.

How It Works

The platform utilizes a cloud-native architecture. Data from various sources such as satellites, marine sensors, eDNA sequencing, and fishing logs is ingested via APIs and ETL pipelines into a data lake (e.g., AWS S3, Azure Data Lake). Data is then processed and standardized using big data frameworks like Apache Spark for cleaning and transformation. Machine learning models (e.g., neural networks for pattern recognition, time-series models for prediction, clustering algorithms for biodiversity classification) are deployed on containerized platforms (like Kubernetes) to analyze the integrated datasets. A knowledge graph can be built on top to represent complex relationships between different data entities. Insights are delivered through interactive dashboards (e.g., Tableau, Power BI) and accessible APIs for third-party applications and research tools. Key technologies involved include AWS/Azure/GCP for infrastructure, Apache Kafka for real-time streaming data, TensorFlow/PyTorch for AI model development, and a combination of PostgreSQL/NoSQL databases for structured and unstructured data storage.

Unique Selling Points

- Seamlessly combines oceanographic, fisheries, and molecular data for a complete marine ecosystem picture.

- Leverages advanced AI/ML to forecast trends, identify anomalies, and predict environmental impacts effectively.
- Uncovers hidden relationships between diverse data types, providing novel scientific discoveries and insights.
- Built on robust cloud technology, ensuring high availability, data security, and scalability for growing data volumes.
- Offers intuitive tools for data exploration, enabling users to quickly grasp complex information and patterns.

Feasibility and Viability

- Existing cloud platforms offer scalable storage, processing, and AI services, making infrastructure readily available.
- Open-source advanced AI/ML libraries and frameworks like TensorFlow and PyTorch are mature and accessible.
- Abundant public and private datasets for oceanography, fisheries, and genomics already exist and can be integrated.
- Modern data integration tools simplify connecting diverse data sources.
- Addresses a critical research gap by providing integrated marine data analysis tools.
- Provides actionable insights directly supporting effective policy making and conservation efforts.
- Attracts significant funding opportunities from environmental, research, and governmental organizations.

Impact and Beneficiaries

- Enables data-driven decisions for protecting vulnerable marine species, ecosystems, and habitats.
- Optimizes fisheries management practices and predicts climate-induced shifts for greater sustainability.
- Marine scientists and researchers gain unparalleled access to integrated data for groundbreaking discoveries.
- Environmental policy makers and conservationists receive actionable insights for effective strategies.

Problem Statement 47

Integrated Platform for Crowdsourced Ocean Hazard Reporting and Social Media Analytics (Software)

Need to Know

Crowdsourced Ocean Hazard Reporting refers to people actively reporting marine dangers (e.g., pollution, unsafe conditions, natural phenomena) via a platform. Social Media Analytics involves using AI to scan social media for relevant posts, images, and trends related to ocean hazards for early detection.

Description

Current methods for identifying ocean hazards are often slow or localized. There's a critical need for a real-time, comprehensive system that leverages public input and social media intelligence to detect and report marine dangers quickly and efficiently, enhancing safety and response.

Idea

Develop an "AquaAlert" integrated platform combining crowdsourced mobile reporting with real-time social media analytics to swiftly detect, verify, and disseminate information on ocean hazards.

Problem Resolution

AquaAlert provides a centralized system for rapid hazard identification. It unifies user reports and social media data, enabling quicker response times and enhanced safety for marine activities and coastal communities through proactive alerts.

How It Works

The platform consists of a mobile application for crowdsourced reporting and a robust backend system for social media analytics. Users report hazards (e.g., oil spills, dangerous currents, marine debris, algal blooms) via the app, providing location, photos, and descriptions. This data is instantly sent to the cloud. Concurrently, a social media monitoring module uses natural language processing (NLP) and computer vision (CV) to scan public posts on platforms like Twitter, Instagram, and Facebook for keywords, images, and hashtags related to ocean hazards. AI algorithms correlate user reports with social media data, prioritizing and verifying reports based on multiple data points and credibility scores. Verified hazards are displayed on a real-time interactive map using GIS technology and trigger automated alerts to relevant environmental agencies, coast guards, and local communities. Key technologies involved include: Mobile SDKs (e.g., React Native, Flutter for cross-platform app development), Cloud platforms (e.g., AWS, Azure, GCP for scalable infrastructure), Database (e.g., PostgreSQL for relational data, MongoDB for unstructured social media data), Social Media APIs (e.g., Twitter API, Instagram Graph API), NLP libraries (e.g., SpaCy, NLTK for text analysis), Computer Vision frameworks (e.g., OpenCV, TensorFlow/PyTorch for image analysis), and GIS tools (e.g., Leaflet.js, OpenLayers for mapping).

Unique Selling Points

- Real-time data aggregation from diverse sources for comprehensive hazard detection and monitoring.
- AI-powered social media sentiment and image analysis for early warning and verification of potential dangers.

- User-friendly mobile application for easy, on-the-go reporting by the public and marine enthusiasts.
- Geospatial mapping functionality to visualize hazard locations and affected areas instantly for better situational awareness.
- Automated alert system to notify relevant authorities and communities proactively about verified ocean hazards.

Feasibility and Viability

- Leverages existing mobile app development frameworks and scalable cloud infrastructure for efficient and rapid deployment.
- Open-source AI/ML libraries and social media APIs are readily available for data analysis and integration.
- Scalable cloud services can handle increasing user reports and high-volume social media data processing efficiently.
- Availability of readily accessible satellite imagery and geospatial data for enhanced hazard verification.
- Addresses a critical and growing need for timely ocean hazard detection, significantly improving marine safety.
- Potential for strong partnerships with environmental agencies, coast guards, and maritime industries for adoption.
- Can be monetized through premium features for institutional users, data licensing, or government contracts.

Impact and Beneficiaries

- Significantly reduces response times to marine emergencies and environmental disasters, mitigating damage and saving lives.
- Enhances public safety for ocean users, coastal communities, and marine wildlife by providing timely and accurate warnings.
- Environmental protection agencies, coast guards, and maritime authorities gain critical real-time intelligence for rapid response.
- Fishermen, surfers, boaters, and coastal residents receive vital safety information and hazard alerts directly.

Problem Statement 48

One-Stop Personalized Career & Education Advisor (Software)

Need to Know

A “One-Stop Personalized Career & Education Advisor” refers to a single, integrated platform that offers tailored guidance on academic and professional paths, customized to an individual’s profile, goals, and market trends.

Description

Students and professionals often struggle with scattered information, generic advice, and a lack of personalized guidance when making crucial career and education choices. This leads to confusion and suboptimal decisions.

Idea

An AI-powered “One-Stop Personalized Career & Education Advisor” platform that provides tailored recommendations for courses, skills, and career paths, ensuring informed decision-making for users.

Problem Resolution

This platform aggregates vast educational and career data. Using AI, it analyzes user profiles to offer highly relevant, personalized advice, simplifying complex choices and fostering goal achievement.

How It Works

Users create profiles including academic history, skills, interests, and career goals. AI/ML algorithms, specifically natural language processing (NLP) for resume/profile analysis and recommendation engines, process this data. It then matches users with relevant educational programs, job opportunities, and skill development resources from a vast, continuously updated database. Technologies involved include AI/ML for personalization, big data analytics for market trends, cloud infrastructure for scalability, and a responsive web/mobile application for user interface.

Unique Selling Points

- AI-driven personalized recommendations for courses, skills, and career paths.
- Comprehensive database of global universities, courses, jobs, and industry trends.
- Skill gap analysis and personalized learning path generation.
- Interactive mentor connection feature with industry experts.
- Real-time market insights and future career predictions.

Feasibility and Viability

- Leverages existing AI/ML frameworks and robust cloud infrastructure for development.
- Publicly available educational and job market data can be aggregated and utilized.
- Modular design allows for iterative development and feature expansion easily.
- Strong market demand for personalized career and education guidance is evident.
- Potential for diverse revenue streams, including subscription models and partnerships.
- Scalable solution capable of catering to a broad global audience effectively.

Impact and Beneficiaries

- Empowers individuals to make informed academic and career decisions, reducing uncertainty.
- Contributes to a more skilled workforce by guiding individuals to relevant opportunities.

- Students and recent graduates seeking clear academic and career direction and planning.
- Working professionals looking to upskill, reskill, or transition into new careers.

Problem Statement 49

Digitize and Showcase Monasteries of Sikkim for Tourism and Cultural Preservation (Software)

Need to Know

Sikkim is an Indian state known for its unique culture and numerous Buddhist monasteries. 'Digitize' means creating digital versions using technology like 3D scans and virtual reality. 'Showcase' implies making these accessible globally to promote tourism and ensure cultural preservation.

Description

Sikkim's ancient monasteries, rich in cultural heritage, face limited global visibility and preservation challenges. Digitizing and showcasing them can enhance tourism, attract broader audiences, and safeguard their invaluable cultural significance for future generations.

Idea

Develop an immersive digital platform featuring Sikkim's monasteries using VR/AR. This platform will offer virtual tours, educational content, and interactive experiences to promote tourism and ensure the long-term preservation of cultural heritage.

Problem Resolution

The digital platform resolves limited visibility by offering global access to monasteries via VR/AR. It ensures cultural preservation through digital archiving and educates visitors, making heritage accessible and sustainable for future generations.

How It Works

The idea involves developing a multi-platform application (web and mobile) to host digital content. We'll utilize 3D scanning and photogrammetry technologies (e.g., RealityCapture, Metashape) to create high-fidelity 3D models and virtual reality environments of monasteries. Virtual tours will be built using game engines like Unity or Unreal Engine, compatible with VR headsets and web browsers. Augmented reality features for on-site experiences will be developed using ARCore (Android) and ARKit (iOS), allowing users to overlay digital information (history, stories, 3D artifacts) onto their physical surroundings through their smartphone cameras. The backend will be powered by cloud services (e.g., AWS, Google Cloud) for scalable storage of high-resolution images, videos, 3D assets, and textual data. A content management system (CMS) will enable easy updates and additions of new monasteries and information. AI will be used for content tagging, search optimization, and personalized user recommendations, enhancing discoverability and engagement. GPS integration will be crucial for location-aware AR experiences.

Unique Selling Points

- Immersive VR tours provide global access to detailed monastery interiors and serene spiritual experiences.
- AR guides enhance on-site visits with real-time historical facts, legends, and cultural context.
- A centralized digital archive permanently preserves intricate artworks, manuscripts, and architectural details.
- Interactive learning modules educate users on Buddhist philosophy, traditions, and local customs.

- Promotes sustainable tourism by reducing physical impact while increasing cultural appreciation and local economy support.

Feasibility and Viability

- Modern 3D scanning and VR/AR development tools are readily available and mature enough.
- Cloud infrastructure provides scalable storage and processing for extensive digital content.
- A growing talent pool in photogrammetry, 3D modeling, and XR development exists.
- Government initiatives and funding support cultural digitization and tourism projects.
- Potential for diverse revenue streams through premium VR tours, partnerships, and sponsorships.
- High global demand for unique cultural and immersive travel experiences online.
- Strong support from cultural organizations and local governments for heritage preservation.
- Scalable platform design allows for future expansion to other cultural sites or regions.

Impact and Beneficiaries

- Significantly boosts tourism to Sikkim, creating new economic opportunities for local communities.
- Ensures the invaluable cultural and architectural heritage of monasteries is preserved digitally forever.
- Global tourists and cultural enthusiasts gain unprecedented, immersive access to Sikkim's spiritual sites.
- Local communities and monastic institutions benefit from increased visibility, tourism revenue, and heritage preservation support.

Problem Statement 50

Smart Traffic Management System for Urban Congestion (Software)

Need to Know

Urban Congestion refers to excessive traffic volumes leading to slower speeds, longer travel times, and increased vehicle queuing. A Smart Traffic Management System uses technology to optimize traffic flow and reduce congestion.

Description

Urban areas globally suffer from severe traffic congestion, leading to lost time, increased pollution, and economic inefficiency. Existing traffic systems often lack real-time adaptability, exacerbating the problem.

Idea

Develop an AI-powered Smart Traffic Management System that uses real-time data from various sources to dynamically optimize traffic light timings, reroute vehicles, and manage road capacity to reduce urban congestion.

Problem Resolution

Our AI-driven system will dynamically adjust to real-time traffic conditions, optimizing light cycles and suggesting alternative routes. This proactive approach will significantly reduce bottlenecks, travel times, and fuel consumption.

How It Works

The system utilizes a network of IoT sensors (e.g., cameras, radar, lidar) installed at intersections and along major roads to collect real-time traffic data, including vehicle count, speed, and density. This data is fed into a cloud-based AI engine, which employs machine learning algorithms (e.g., deep reinforcement learning) to analyze patterns, predict congestion, and calculate optimal traffic light timings for each intersection. It can also communicate with navigation apps to suggest dynamic rerouting for drivers. Additionally, it integrates with variable message signs to display real-time traffic updates and alternative routes. Technologies involved include IoT for data collection, cloud computing for processing, AI/ML for decision-making, and communication protocols (e.g., 5G, LoRaWAN) for data transmission.

Unique Selling Points

- Real-time AI-driven traffic optimization for immediate response to congestion.
- Predictive analytics to anticipate and prevent future traffic jams before they occur.
- Seamless integration with existing city infrastructure and smart devices.
- Personalized route recommendations for drivers to avoid congested areas.
- Scalable and modular design allowing for phased implementation and expansion.

Feasibility and Viability

- Existing smart city infrastructure can be leveraged for sensor deployment.
- Cloud computing and AI technologies are mature and readily available.
- Modular design allows for phased implementation, starting small and scaling up.
- Reduces fuel consumption and emissions, appealing to environmental goals.
- Improves commuter quality of life and city's economic productivity.

- Generates valuable traffic data for urban planning and policy making.
- Potential for revenue generation through data insights and partnerships.
- High demand from cities globally seeking solutions for congestion.

Impact and Beneficiaries

- Significantly reduces daily commute times for millions of urban dwellers.
- Lowers carbon emissions, contributing to cleaner, healthier city air quality.
- Boosts local economies by improving logistical efficiency and productivity.
- Enhances public safety by reducing the risk of traffic-related incidents.
- Urban commuters will experience reduced travel times and less stress.
- City governments will achieve cleaner environments and economic growth.

Problem Statement 51

Comprehensive Cloud-Based Practice Management & Nutrient Analysis Software for Ayurvedic Dietitians, Tailored for Ayurveda-Focused Diet Plans (Software)

Need to Know

Ayurveda is an ancient Indian holistic healing system. Ayurvedic Dietitians apply these principles to nutrition, creating diet plans tailored to individual Dosha (body constitution). Cloud-Based Practice Management software helps professionals manage patient records, appointments, and billing online. Nutrient Analysis Software evaluates the nutritional content of food.

Description

Ayurvedic dietitians lack an integrated cloud-based solution for practice management and nutrient analysis. Current tools don't cater to unique Ayurvedic principles, Dosha-specific diets, or traditional food properties, leading to inefficiencies and challenges in personalized patient care.

Idea

AyurConnect: A comprehensive cloud-based platform for Ayurvedic dietitians. It integrates practice management, specialized nutrient analysis, and AI-powered Ayurvedic diet plan generation, streamlining workflow and enhancing personalized patient care delivery.

Problem Resolution

AyurConnect provides a unified platform for Ayurvedic dietitians. It automates Dosha-specific diet plan creation, offers accurate Ayurvedic nutrient analysis, and manages patient data efficiently. This enhances personalized care, saves time, and improves practice management significantly.

How It Works

AyurConnect operates on a secure cloud infrastructure (e.g., AWS, Azure) for scalability and global accessibility. Dietitians input patient Dosha assessments, health goals, and conditions. An AI/ML engine then leverages a proprietary database of Ayurvedic food properties (Gunas, Vipaka, Virya) and traditional recipes to generate highly personalized diet plans. This engine ensures recommendations align with the patient's specific Dosha (Vata, Pitta, Kapha) and seasonal needs. The platform also integrates standard nutritional data with Ayurvedic properties for a holistic view. Core modules include: Electronic Health Records (EHR) tailored for Ayurvedic consultations, appointment scheduling, billing, and secure patient messaging. Patients access their plans and track progress via a dedicated portal. Key technologies involve: Cloud computing platforms, a robust database (e.g., PostgreSQL) for Ayurvedic food data, AI/ML frameworks (e.g., TensorFlow, PyTorch) for the recommendation engine, and secure APIs for potential third-party integrations. Frontend development uses modern web frameworks (e.g., React, Angular) with a backend in Python (Django) or Node.js (Express).

Unique Selling Points

- Integrated Ayurvedic nutrient database for Dosha-specific food analysis and recommendations.

- AI-driven personalized diet plan generation based on individual Ayurvedic body constitution.
- Comprehensive cloud-based practice management tools for seamless operations and patient records.
- Secure patient portal for remote access to diet plans, progress tracking, and communication.
- Tailored billing and appointment scheduling features designed for Ayurvedic practitioners.

Feasibility and Viability

- Existing cloud infrastructure and mature AI/ML technologies make development achievable.
- A wealth of Ayurvedic knowledge can be digitized and integrated into the database.
- Skilled software development teams are readily available to build and deploy the platform.
- Addresses a specific, underserved niche market of Ayurvedic dietitians with high demand.
- Subscription-based SaaS model offers a stable, recurring revenue stream.
- Potential for market expansion into wellness, e-health, and global Ayurvedic communities.

Impact and Beneficiaries

- Empowers Ayurvedic dietitians with modern, efficient tools, significantly improving patient care and practice management.
- Standardizes and digitizes Ayurvedic dietary practices, enhancing global accessibility and scientific understanding.
- Ayurvedic Dietitians: Streamlines their practice, saving time, improving efficiency, and enhancing personalized patient outcomes.
- Patients Seeking Ayurvedic Care: Receive more precise, personalized, and easily accessible diet plans and ongoing support.

Problem Statement 52

AyurSutra- Panchakarma Patient Management and therapy scheduling Software (Software)

Need to Know

Panchakarma is a traditional Ayurvedic detoxification and rejuvenation therapy involving five primary actions. It requires precise scheduling and patient-specific treatment plans.

Description

Ayurvedic clinics offering Panchakarma face challenges in efficiently managing patient data, treatment plans, therapy scheduling, and resource allocation, leading to operational inefficiencies.

Idea

AyurSutra is an integrated software solution designed to streamline patient management, therapy scheduling, and administrative tasks specifically for Panchakarma clinics, enhancing efficiency and patient care.

Problem Resolution

AyurSutra centralizes patient records, automates appointment booking, optimizes therapy scheduling, and manages resources, eliminating manual errors and improving operational flow for clinics.

How It Works

AyurSutra operates as a cloud-based web application, accessible via browsers. It leverages a backend built with Python/Django or Node.js/Express, a PostgreSQL database for secure patient data storage, and a React/Vue.js frontend for an intuitive user interface. Key modules include patient registration, detailed medical history capture (using FHIR-like standards for health data), customizable Panchakarma therapy protocols, therapist allocation, treatment room scheduling, inventory management for Ayurvedic medicines, and integrated billing. Data is encrypted, ensuring patient privacy (HIPAA/GDPR compliance). AI/ML algorithms could optimize scheduling based on therapist availability, room capacity, and patient preferences, reducing wait times and improving resource utilization. API integrations with telemedicine platforms or wearable health devices could further enhance patient monitoring and engagement.

Unique Selling Points

- Specialized for Panchakarma: Tailored features address unique Ayurvedic treatment needs.
- Integrated Patient Journey: Seamlessly tracks patient history, diagnostics, and therapy progress.
- Optimized Scheduling: AI-driven scheduling maximizes resource utilization and minimizes conflicts.
- Personalized Treatment Plans: Supports customization of therapies based on individual patient requirements.
- Scalable Cloud Solution: Accessible anywhere, scalable for growing clinics and multiple branches.

Feasibility and Viability

- Existing cloud infrastructure and web technologies make development straightforward and cost-effective.

- Modular design allows phased implementation, starting with core features and expanding.
- A skilled development team can build and deploy the application within a reasonable timeframe.
- Large, underserved market of Ayurvedic clinics needing specialized management tools.
- Subscription-based SaaS model ensures recurring revenue and scalable business growth.
- Reduces operational costs for clinics, offering clear ROI for adoption.

Impact and Beneficiaries

- Significantly improves operational efficiency and reduces administrative burden for Ayurvedic clinics.
- Enhances patient experience through streamlined appointments and personalized care delivery.
- Ayurvedic practitioners and clinic staff benefit from simplified workflows and reduced administrative load.
- Panchakarma patients receive more organized, personalized, and timely treatment, improving satisfaction.

Problem Statement 53

Development of a low-cost camera-based automated beach sand grain size mapping system (Hardware)

Need to Know

Sand grain size mapping involves measuring and charting the size distribution of sand particles on beaches. This data is crucial for coastal erosion studies, environmental monitoring, and understanding beach dynamics. Traditional methods are often manual, time-consuming, and expensive.

Description

Current methods for mapping beach sand grain size are often manual, costly, and labor-intensive. There's a pressing need for an efficient, affordable, and automated solution to gather crucial coastal data.

Idea

A low-cost, camera-based system automating beach sand grain size mapping. It uses image processing and AI to analyze sand texture from photos, providing rapid, accurate, and spatially resolved data for coastal management.

Problem Resolution

This system automates and reduces the cost of sand grain size analysis, replacing slow manual methods. It provides rapid, precise data, enabling better coastal erosion monitoring and environmental decision-making.

How It Works

The system uses a standard digital camera (e.g., smartphone, drone-mounted camera) to capture high-resolution images of beach sand. These images are then processed using computer vision algorithms. First, calibration is performed using a known scale object in the image. Next, image segmentation isolates individual sand grains. Machine learning models, trained on datasets of various sand grain sizes, analyze features like pixel area, perimeter, and shape eccentricity to determine the size distribution of grains within the image. Technologies involved include: Digital Cameras: For image acquisition. Computer Vision Libraries (e.g., OpenCV): For image preprocessing, segmentation, and feature extraction. Machine Learning Frameworks (e.g., TensorFlow, PyTorch): To build and deploy models for grain size classification. Geospatial Information Systems (GIS): To map the analyzed grain size data geographically, creating comprehensive maps. Cloud Computing (optional): For large-scale image processing and data storage.

Unique Selling Points

- **Cost-Effective:** Utilizes readily available camera technology and open-source software, significantly reducing operational expenses compared to traditional lab analysis.
- **Automated Efficiency:** Eliminates manual sampling and sieving, speeding up data collection and analysis, allowing for broader area coverage in less time.
- **Non-Invasive:** Gathers data without disturbing the beach environment, preserving natural conditions and minimizing ecological impact during surveys.

- **High Spatial Resolution:** Provides detailed grain size maps by capturing numerous data points across the beach, offering granular insights into sand distribution.
- **Accessibility:** Low barrier to entry allows for wider adoption by research institutions, local governments, and citizen science initiatives.

Feasibility and Viability

- Existing camera technology and open-source image processing libraries are mature and readily available.
- Machine learning models can be trained on diverse sand samples for accurate size classification.
- Field testing with GPS integration proves the system's ability to map grain sizes effectively.
- Significant market demand from coastal management agencies and environmental research institutions for cost-effective data.
- Potential for subscription-based data services or selling system kits to interested organizations globally.
- Scalable solution applicable to any sandy coast, opening doors for widespread adoption and data generation.

Impact and Beneficiaries

- Enables better, data-driven coastal erosion management and protection strategies against climate change.
- Fosters citizen science, empowering communities to contribute to environmental monitoring and data collection.
- Coastal management authorities and environmental agencies gain precise, frequent data for informed decision-making.
- Researchers and scientists acquire a cost-effective tool for extensive beach dynamics and ecological studies.

Problem Statement 54

Digital Health Record Management System for migrant workers in Kerala aligned with sustainable development goals. (Software)

Need to Know

Digital Health Records (DHRs) are electronic versions of a patient's medical history, accessible securely. Sustainable Development Goals (SDGs) are UN objectives for global well-being, specifically SDG 3 (Good Health) and SDG 10 (Reduced Inequalities) are relevant.

Description

Migrant workers in Kerala lack a centralized, accessible digital health record system, leading to fragmented care and health disparities. This hinders their access to timely medical services and impacts their overall well-being.

Idea

Our idea is 'Swasthya Seva': a secure, blockchain-powered Digital Health Record system for migrant workers in Kerala, ensuring portable and accessible health data aligned with SDG 3 and 10.

Problem Resolution

Swasthya Seva centralizes health data, enabling seamless access for workers and providers, overcoming language barriers, and reducing treatment delays. It promotes equitable healthcare access for this vulnerable population.

How It Works

The system utilizes a mobile application for migrant workers and a web portal for healthcare providers. Workers register using a unique ID (e.g., Aadhaar or a dedicated migrant ID) and can input basic health data, medical history, and past prescriptions. Healthcare providers can access and update records with worker consent using the web portal. Blockchain technology (e.g., Hyperledger Fabric or Ethereum-based private chain) is employed to store encrypted health records securely as immutable ledger entries, ensuring data integrity and patient privacy. IPFS (InterPlanetary File System) can be used for storing large files like X-rays or reports, with hashes stored on the blockchain. A user-friendly interface supports multiple languages. Machine learning can analyze anonymized data for public health insights. Data is accessible via secure login with multi-factor authentication. QR codes can provide quick access to essential medical alerts.

Unique Selling Points

- Blockchain-backed security ensures tamper-proof and private health data, building trust among users and providers.
- Multi-language interface with voice input supports diverse linguistic backgrounds of migrant workers.
- Offline accessibility via QR codes allows basic health info retrieval even without internet.
- Integration with existing public health infrastructure for seamless data exchange and reporting.
- Portable health identity across different clinics and states, ensuring continuity of care.

Feasibility and Viability

- Existing digital infrastructure in Kerala and smartphone penetration among workers facilitate adoption.
- Open-source blockchain frameworks like Hyperledger reduce development costs and accelerate deployment.
- Partnerships with local NGOs and government health departments can aid implementation and outreach.
- Reduced administrative burden for healthcare providers through digitized records saves operational costs.
- Improved public health outcomes can lead to government funding and reduced healthcare expenditures.
- Potential for premium features (e.g., teleconsultation) or data analytics services for sustainability.

Impact and Beneficiaries

- Significantly improves health access and continuity of care for a vulnerable population, aligning with SDG 3.
- Reduces health inequalities and empowers migrant workers with their own health data, supporting SDG 10.
- Migrant workers in Kerala gain better, more accessible, and continuous healthcare services.
- Healthcare providers benefit from streamlined record management, better patient insights, and reduced errors.

Problem Statement 55

AI-Powered Personal Farming Assistant for Kerala Farmers (Software)

Need to Know

Kerala is a state in India known for its agriculture. An AI-Powered Personal Farming Assistant is a digital tool using artificial intelligence to provide tailored guidance to individual farmers for better crop management.

Description

Kerala farmers face challenges like unpredictable weather, pest outbreaks, soil nutrient deficiencies, and lack of timely, localized advice. This leads to reduced crop yields, increased costs, and lower farmer income, impacting food security and rural livelihoods.

Idea

An AI-powered personal farming assistant tailored for Kerala farmers to provide hyper-localized, real-time, and actionable agricultural insights, optimizing crop management from planting to harvest and boosting overall productivity.

Problem Resolution

This AI assistant will deliver personalized recommendations on planting, irrigation, fertilization, and pest control based on specific farm data and local conditions. It empowers farmers with data-driven decisions, mitigating risks and improving yields.

How It Works

The AI-Powered Personal Farming Assistant operates by collecting and analyzing diverse data points. It ingests data from satellite imagery for land and crop health monitoring, local weather stations for real-time conditions, and optionally, IoT sensors placed in farm fields for soil moisture, pH, and nutrient levels. Farmers can also input their observations and crop data via a user-friendly mobile application. This vast dataset is then fed into advanced AI models, primarily utilizing Machine Learning (ML) algorithms for pattern recognition and predictive analytics. Deep Learning models might be used for image analysis (e.g., identifying plant diseases from farmer-uploaded photos). Natural Language Processing (NLP) enables a voice-command interface, allowing farmers to interact with the assistant in local languages like Malayalam. The processed information generates personalized recommendations for optimal planting times, irrigation schedules, fertilization needs, and early pest/disease detection alerts. These insights are delivered directly to the farmer via the mobile app, SMS, or voice messages. Cloud computing infrastructure handles data storage, processing power, and scalability for the entire system.

Unique Selling Points

- Hyper-localized advice considering Kerala's diverse micro-climates and specific soil compositions.
- Predictive analytics for early warnings on pest outbreaks, diseases, and adverse weather conditions.
- Voice-enabled interface in local languages (Malayalam) ensuring accessibility for all farmers.
- Cost-effective solutions reducing reliance on expensive traditional agricultural consultancy services.

- Integration with government schemes, market prices, and buyer networks for comprehensive support.

Feasibility and Viability

- Existing AI/ML frameworks are mature enough to be adapted for agricultural data analysis.
- High smartphone penetration in rural Kerala allows for wide adoption of a mobile application.
- Availability of satellite imagery and open-source weather data provides crucial input for the AI.
- Government support for agricultural technology initiatives in India.
- Tiered subscription model offering freemium basic services and premium features.
- Partnerships with agricultural input suppliers for commissions on recommended products.
- Potential for government subsidies or grants for promoting sustainable farming tech.
- Data monetization (anonymized and aggregated) for agricultural research and policy-making.

Impact and Beneficiaries

- Significantly increases crop yields by an estimated 15-20% and reduces input costs, boosting farmer income.
- Promotes sustainable farming practices through optimized resource usage, minimizing environmental impact.
- Small and marginal farmers in Kerala gain access to advanced, personalized agricultural insights.
- Agricultural scientists and researchers benefit from aggregated data for studies and policy formulation.

Problem Statement 56

Image based breed recognition for cattle and buffaloes of India (Software)

Need to Know

Image-based breed recognition refers to using computer vision and AI to identify specific breeds of livestock from their photos. In India, precise breed identification for cattle and buffaloes is crucial for genetic improvement, disease control, and optimal farm management.

Description

Farmers in India face challenges accurately identifying cattle and buffalo breeds. Misidentification leads to suboptimal breeding, health management, and economic losses, hindering livestock development and productivity.

Idea

Develop an AI-powered mobile application for instant and accurate image-based breed recognition of Indian cattle and buffaloes, supporting farmers and livestock stakeholders.

Problem Resolution

Our AI app leverages deep learning to instantly identify breeds from photos, eliminating manual errors. This empowers farmers with precise data for better breeding, health, and productivity decisions.

How It Works

The system works by collecting a vast dataset of images of various Indian cattle and buffalo breeds, properly labeled. This dataset is used to train a deep convolutional neural network (CNN) model, a type of artificial intelligence algorithm particularly adept at image classification. The CNN learns to identify distinct features unique to each breed. Once trained, the model is integrated into a mobile application. Users capture an image of an animal, which is then sent to a cloud-based server where the trained AI model processes it. The model analyzes the image, compares it to its learned features, and returns the most probable breed identification back to the user's mobile app. Key technologies involved include: Deep Learning (specifically CNNs like ResNet or InceptionV3), Mobile App Development (Android/iOS), Cloud Computing (for model deployment and scalability, e.g., AWS, GCP, Azure), and potentially computer vision libraries (e.g., OpenCV) for image preprocessing.

Unique Selling Points

- High accuracy in recognizing diverse Indian cattle and buffalo breeds.
- Instant recognition via a user-friendly mobile application.
- Supports data collection for genetic tracking and herd management.
- Aids in early detection of breed-specific health issues.
- Cost-effective solution accessible to rural farmers.

Feasibility and Viability

- Availability of deep learning frameworks and pre-trained models simplifies development.
- Smartphones are widely accessible, enabling broad adoption among farmers.
- Existing research and datasets for animal image recognition provide a strong foundation.
- Significant market demand from farmers, dairy industries, and governmental livestock programs.
- Potential for integration with existing e-governance and agricultural schemes.

- Monetization through premium features, data insights, or partnership models is possible.

Impact and Beneficiaries

- Significantly improves livestock breeding programs and genetic conservation efforts in India.
- Boosts farmer income through optimized animal management and productivity gains.
- Indian farmers gain accurate tools for better herd management and increased profits.
- Veterinarians and livestock researchers benefit from precise breed data for studies and health interventions.

Problem Statement 57

Designing and development of an application for on spot assessment of Roof Top Rain water harvesting and artificial recharge potential and size of the RTRWH and AR. (Software)

Need to Know

Roof Top Rainwater Harvesting (RTRWH) involves collecting and storing rainwater from rooftops for future use. Artificial Recharge (AR) is the process of intentionally replenishing groundwater aquifers through methods like percolation tanks or injection wells.

Description

Assessing the potential for Roof Top Rainwater Harvesting and Artificial Recharge, along with sizing these systems, is currently complex and time-consuming. A need exists for an application to automate and simplify this on-spot evaluation process.

Idea

Develop a user-friendly mobile and web application that provides on-spot assessment of Roof Top Rainwater Harvesting and Artificial Recharge potential. It will accurately size systems, offering data-driven insights for efficient water management.

Problem Resolution

This application streamlines the assessment of RTRWH and AR potential, replacing manual calculations with an automated, location-specific analysis. It simplifies system sizing, enabling quick and accurate decisions for sustainable water management.

How It Works

The application will function by allowing users to input their location and roof dimensions (either manually or by selecting on a map). It will then use a combination of technologies: Geographic Information Systems (GIS) for spatial data and elevation, satellite imagery for roof area estimation (e.g., Google Maps API or OpenStreetMap data), and weather APIs (e.g., OpenWeatherMap, national meteorological services) for historical and real-time rainfall data. Hydrological models and algorithms, incorporating roof material runoff coefficients and local rainfall patterns, will calculate the estimated rainwater yield. For artificial recharge, it will consider soil permeability data (from public databases or user input) and local geology to estimate recharge potential. The application will then output the optimal size for RTRWH tanks/ponds and AR structures, along with potential savings and benefits. The backend would handle data processing and storage (e.g., Python with Django/Flask, Node.js with Express, using PostgreSQL or MongoDB), while the frontend could be built with frameworks like React Native or Flutter for mobile, and React/Angular/Vue for web, ensuring a responsive and intuitive user experience.

Unique Selling Points

- Automated, on-spot assessment provides immediate and accurate calculations for RTRWH and AR potential, saving significant time and effort.

- Leverages real-time weather data and geographical information for highly precise sizing and recommendations tailored to specific locations.
- Offers a user-friendly interface, making complex hydrological calculations accessible to homeowners, builders, and urban planners alike.
- Generates actionable recommendations and visual reports, empowering users to make informed decisions about water conservation projects.
- Promotes sustainable water management by simplifying the implementation of rainwater harvesting and artificial recharge systems globally.

Feasibility and Viability

- Existing GIS, mapping, and weather APIs are mature and readily available for integration into the application.
- Standard hydrological models and algorithms can be adapted and implemented to accurately calculate runoff and recharge potential.
- Modern mobile and web development frameworks allow for efficient creation of robust and user-friendly interfaces.
- Cloud computing platforms offer scalable infrastructure for data processing and storage at a reasonable cost.
- Addresses a critical global need for water conservation and sustainable resource management amid increasing water scarcity.
- Potential for widespread adoption by homeowners, commercial entities, government bodies, and NGOs for informed decision-making.
- Offers a scalable solution applicable to diverse geographical regions with varying climatic conditions and regulatory environments.

Impact and Beneficiaries

- Enhances water security by optimizing rainwater harvesting, reducing reliance on municipal water supplies and groundwater extraction.
- Promotes environmental sustainability and climate resilience by fostering efficient water use and recharging natural aquifers.
- Empowers communities with tools to actively participate in local water resource management and conservation efforts.
- Individual homeowners and farmers who can optimize their water use, reduce utility bills, and ensure water availability.
- Urban planners, government agencies, and construction companies for efficient planning and implementation of sustainable infrastructure.

Problem Statement 58

Authenticity Validator for Academia (Software)

Need to Know

Authenticity Validator for Academia refers to a system designed to verify the legitimacy of academic work, credentials, and research. It addresses critical issues like plagiarism, fake degrees, and fraudulent research, aiming to ensure and uphold academic integrity across institutions and professional fields.

Description

Academia struggles with verifying the authenticity of research, publications, and certifications. Plagiarism and fake credentials erode trust and compromise intellectual integrity. A robust, reliable verification system is urgently needed to maintain academic standards.

Idea

A decentralized authenticity validation platform for academic records. This system leverages blockchain technology and AI to secure and transparently verify academic achievements, research papers, and institutional credentials globally, ensuring data integrity.

Problem Resolution

Our platform provides an immutable, transparent record of academic achievements. By securely linking credentials and research to their original sources, it effectively prevents fraud and ensures the integrity of all academic data.

How It Works

The system utilizes a permissioned blockchain (e.g., Hyperledger Fabric or an Ethereum private network) to store hashed versions of academic documents, credentials, and research papers. When an educational institution issues a degree, or a researcher publishes a paper, a unique cryptographic hash is generated from the document's content and recorded on the blockchain, along with relevant metadata (e.g., issuer, date, recipient, author). For verification, a user or entity submits the document; the system then re-hashes it and compares the new hash against the immutable record on the blockchain. If the hashes match, the document's authenticity is confirmed. Additionally, AI and Machine Learning algorithms are integrated for advanced plagiarism detection, cross-referencing submitted works against vast databases, and for anomaly detection in credential patterns to flag potential fraud. Smart contracts automate the issuance, verification, and potential revocation processes, enhancing transparency and minimizing manual intervention. Key technologies involved include: Blockchain (Hyperledger Fabric, Ethereum), InterPlanetary File System (IPFS) for decentralized storage of larger academic files (with their hashes stored on the blockchain), AI/ML for content analysis and fraud detection, and intuitive web/mobile interfaces for user interaction.

Unique Selling Points

- **Immutable records:** Blockchain ensures tamper-proof storage of all academic achievements and research data.
- **Instant verification:** AI-powered algorithms provide quick and reliable authenticity checks for submitted academic works.

- Global standard: Creates a universal, trusted system for validating academic credentials worldwide.
- Enhanced trust: Restores confidence in academic qualifications and research integrity for all stakeholders.
- Data privacy: Decentralized architecture allows users control over their verified academic data and permissions.

Feasibility and Viability

- Blockchain technology is mature enough for secure, distributed ledger implementation.
- Existing AI/ML tools can be adapted for plagiarism and anomaly detection effectively.
- Interoperability standards allow smooth integration with current academic information systems.
- High market demand for combating academic fraud and credential misrepresentation.
- Subscription models for institutions and pay-per-verification for employers are viable.
- Potential for global adoption as the trusted standard for academic verification.

Impact and Beneficiaries

- Elevates academic integrity globally, fostering a culture of honest scholarship and innovation.
- Significantly reduces economic losses caused by fraudulent credentials and unverified research.
- Educational institutions benefit from enhanced reputation and streamlined, secure verification processes.
- Students and professionals gain credible, tamper-proof credentials for career advancement.

Problem Statement 59

E tongue for Dravya identification (Hardware)

Need to Know

An E-tongue is an analytical instrument using a sensor array to detect and distinguish tastes, mimicking human perception. Dravya refers to substances, often botanical, used in Ayurvedic medicine, requiring precise identification for efficacy and safety.

Description

Accurate identification of Ayurvedic Dravyas is often subjective, relies on expert knowledge, and lacks standardization. This leads to inconsistencies in quality and potential adulteration, impacting product efficacy and consumer trust.

Idea

Develop an AI-powered E-tongue system for rapid, objective, and accurate identification of Ayurvedic Dravyas. This system will analyze chemical taste profiles to ensure authenticity and quality control.

Problem Resolution

Our E-tongue provides an objective, fast, and consistent method for Dravya identification. It eliminates reliance on subjective human expertise, enhancing quality control and standardization in Ayurvedic product manufacturing.

How It Works

The E-tongue utilizes an array of diverse chemical sensors (e.g., electrochemical, optical, mass-sensitive) designed to react specifically to various chemical compounds present in Dravyas. When a prepared liquid extract of a Dravya is introduced, each sensor generates a unique electrical signal proportional to its interaction with the compounds, creating a 'taste fingerprint' or unique chemical profile. These complex sensor responses are then digitized and fed into a sophisticated machine learning model, such as Artificial Neural Networks or Support Vector Machines. This AI model is pre-trained on a comprehensive database of known Dravya profiles, allowing it to recognize patterns. By comparing the new sample's fingerprint to its vast database, the AI can rapidly and accurately identify the Dravya, detect adulteration, and assess its purity. Key technologies include advanced sensor arrays, high-speed data acquisition systems, and robust machine learning algorithms for pattern recognition and classification.

Unique Selling Points

- High accuracy and precision in identifying even subtly different Dravyas from complex mixtures.
- Rapid analysis, providing identification results within minutes, significantly accelerating quality control processes.
- Non-destructive testing, preserving precious and often rare Dravya samples during the identification process.
- Objective and standardized identification, eliminating human subjectivity and ensuring consistent quality.
- Cost-effective solution for quality control, reducing the need for extensive lab testing and expert hours.

Feasibility and Viability

- Existing E-tongue technologies are proven for complex mixture analysis in various industries.
- Availability of diverse chemical sensor types suitable for broad-spectrum organic compound detection.
- Advanced AI and machine learning algorithms are readily available for complex pattern recognition.
- Growing demand for quality control in the expanding global Ayurvedic market presents a clear need.
- Miniaturization of sensor technology enables compact and portable device development.
- Collaborations with Ayurvedic experts can provide valuable datasets for training the AI.
- Addresses a critical gap in quality control for the rapidly growing global Ayurvedic market.
- Reduces reliance on scarce human experts, making quality assurance more scalable and consistent.
- Enables standardization of Ayurvedic products, fostering trust and facilitating global trade.
- Offers significant cost savings for manufacturers by streamlining identification processes.
- Provides a competitive edge for companies adopting this technology by ensuring product authenticity.
- Potential for licensing the technology to multiple manufacturers and research institutions.

Impact and Beneficiaries

- Ensures the safety, efficacy, and authenticity of Ayurvedic medicines, directly benefiting consumer health.
- Promotes standardization and scientific validation of traditional Ayurvedic practices, boosting global acceptance.
- Reduces resource waste and financial losses caused by misidentified or adulterated raw materials.
- Empowers smaller manufacturers to meet high-quality standards, leveling the playing field.
- Ayurvedic manufacturers and pharmacies, for ensuring raw material authenticity and product quality control.
- Consumers of Ayurvedic products, by guaranteeing they receive safe, effective, and genuine medicines.

Problem Statement 60

AI-Based Timetable Generation System aligned with NEP 2020 for Multidisciplinary Education Structures (Software)

Need to Know

NEP 2020 (National Education Policy 2020) emphasizes flexible, multidisciplinary education. Multidisciplinary education structures allow students to choose diverse subjects across different fields, requiring complex timetable management.

Description

Generating efficient, compliant timetables for educational institutions under NEP 2020's multidisciplinary framework is highly complex. Manual methods are time-consuming and prone to errors.

Idea

Develop an AI-powered timetable generation system that seamlessly aligns with NEP 2020 principles, accommodating multidisciplinary course selections, faculty availability, and resource optimization.

Problem Resolution

This AI system automates and optimizes timetable creation, efficiently managing complex constraints of multidisciplinary courses and NEP 2020. It reduces manual effort and minimizes conflicts.

How It Works

The system leverages Artificial Intelligence and Machine Learning algorithms to process various inputs: student course selections, faculty expertise and availability, classroom/lab capacities, and NEP 2020 guidelines. It uses constraint satisfaction problem (CSP) solvers and optimization techniques to generate multiple feasible timetable options. A user-friendly interface allows administrators to input data, set priorities, and review generated schedules. Technologies involved include Python for AI/ML development (e.g., TensorFlow, scikit-learn), cloud platforms (AWS, Azure) for scalability, and possibly a web framework (e.g., Django, React) for the front-end. Data is stored in databases (SQL/NoSQL) and APIs facilitate integration with existing SIS (Student Information Systems).

Unique Selling Points

- **NEP 2020 Compliance:** Automatically adheres to policy guidelines for flexible and holistic education.
- **AI Optimization:** Utilizes advanced algorithms to find the most efficient and conflict-free schedules.
- **Multidisciplinary Flexibility:** Seamlessly integrates diverse subject choices and cross-faculty courses.
- **Resource Management:** Optimizes allocation of classrooms, labs, and faculty time effectively.

- **User-Friendly Interface:** Provides intuitive tools for administrators to manage and customize timetables.

Feasibility and Viability

- Existing AI algorithms for scheduling and optimization are mature and readily available.
- Data for student preferences, faculty loads, and room availability can be digitally collected.
- Modular architecture allows for phased development and integration with current systems.
- Growing demand for automated solutions to manage NEP 2020 complexities in education.
- Significant cost savings and efficiency gains for institutions by reducing manual workload.
- Scalable to various institution sizes, from small colleges to large universities.

Impact and Beneficiaries

- Enhances educational quality by enabling flexible learning paths and reducing scheduling conflicts.
- Reduces administrative burden, freeing up staff to focus on more strategic tasks.
- Educational institutions: Streamlines operations, ensures NEP compliance, and optimizes resource use.
- Students: Provides greater flexibility in course selection and a smoother learning experience.

Problem Statement 61

Automated Student Attendance Monitoring and Analytics System for Colleges (Software)

Need to Know

Automated Student Attendance Monitoring refers to using technology to record student presence without manual intervention. Analytics System means processing this data to gain insights into attendance patterns and student engagement.

Description

Manual attendance tracking in colleges is time-consuming, prone to errors, and lacks real-time insights. This leads to inefficiencies in record-keeping and difficulty in identifying at-risk students promptly.

Idea

Our idea is an automated, smart attendance monitoring and analytics system using AI-powered facial recognition and IoT sensors. It provides real-time attendance data and actionable insights to college administrations and faculty.

Problem Resolution

This system eliminates manual errors, saves faculty time, and offers immediate, accurate attendance records. It enables proactive intervention for low attendance, improving student engagement and academic outcomes effectively.

How It Works

The system utilizes AI-powered facial recognition technology via cameras installed in classrooms to identify students. Alternatively, RFID/NFC readers can scan student ID cards upon entry. This data is timestamped and securely stored in a cloud-based database (e.g., AWS, Azure). A backend application processes this raw data, calculates attendance percentages, and identifies patterns. A user-friendly web dashboard, built with technologies like React/Angular and a Python/Node.js backend, displays real-time attendance, generates reports, and provides analytical insights to faculty and administrators. It also integrates with existing Student Information Systems (SIS) via APIs for seamless data exchange. Machine learning models can be used for predictive analytics to identify at-risk students.

Unique Selling Points

- Real-time, accurate attendance data capture eliminates manual errors and saves significant administrative time for faculty.
- AI-powered facial recognition ensures high accuracy and prevents proxy attendance, enhancing data integrity.
- Integrated analytics dashboard provides deep insights into attendance trends and student engagement patterns.
- Automated notifications for low attendance allow timely intervention, supporting student success proactively.
- Scalable and customizable solution, easily adaptable to various college sizes and specific institutional requirements.

Feasibility and Viability

- Existing facial recognition and IoT technologies are mature and readily available for integration.
- Cloud infrastructure provides scalable and cost-effective data storage and processing capabilities.
- Integration with current college IT systems is achievable through standard API protocols.
- Addresses a critical pain point for colleges: reducing administrative burden and improving data accuracy.
- Potential for subscription-based SaaS model, offering recurring revenue streams to educational institutions.
- High demand from colleges seeking to modernize operations and enhance student support systems.

Impact and Beneficiaries

- Significantly improves administrative efficiency and reduces faculty workload related to attendance management.
- Enhances student accountability and provides data-driven insights for better academic support and retention.
- College administrators benefit from streamlined operations, accurate data, and improved resource allocation.
- Faculty members save valuable time, gaining quick access to attendance records and student engagement insights.

Problem Statement 62

AR-Based Cultural Heritage Preservation Platform (Software)

Need to Know

AR stands for Augmented Reality, which overlays digital information onto the real world via a device camera. Cultural Heritage Preservation involves protecting and presenting historical sites, artifacts, and traditions.

Description

Traditional methods struggle with accessibility, engagement, and degradation of physical sites. Many historical contexts are lost or hard to visualize for the public, limiting widespread appreciation and understanding.

Idea

Develop an Augmented Reality (AR) platform allowing users to virtually explore and interact with cultural heritage sites and artifacts, enhancing accessibility, engagement, and educational value.

Problem Resolution

Our AR platform overcomes physical limitations and degradation, making cultural heritage accessible globally. It offers immersive, interactive experiences, bringing history to life for deeper understanding and engagement.

How It Works

The platform works by utilizing mobile Augmented Reality (AR) frameworks like ARCore and ARKit. First, 3D models of heritage sites and artifacts are created using photogrammetry and LiDAR scanning, combined with historical research. These models are then imported into game engines like Unity or Unreal Engine, where interactive elements (e.g., audio guides, informational hotspots, animated historical events) are added. The user downloads a mobile application. When they point their device camera at a physical heritage site or even a specific marker, the app uses computer vision and GPS data to recognize the location. It then overlays the pre-rendered 3D models and interactive content onto the real-world view in real-time, accurately aligned with the physical environment. Users can walk around, zoom in, and interact with the virtual content as if it were part of their surroundings. Cloud storage ensures content delivery and updates, while a content management system allows for easy addition of new heritage data.

Unique Selling Points

- Immersive 3D reconstructions of historical sites and artifacts.
- Interactive storytelling at heritage locations through AR overlays.
- Global accessibility, bringing endangered or distant sites to users.
- Rich educational content integrated for all age groups and learners.
- Potential for crowdsourced contributions to cultural preservation.

Feasibility and Viability

- AR technology is mature and readily available on most modern smartphones.
- 3D scanning, modeling tools, and historical data are accessible resources.
- Existing digital heritage archives can be integrated to build initial content quickly.
- Strong market demand for immersive educational and cultural tourism experiences.

- Opportunities for partnerships with museums, institutions, and tourism boards.
- Potential for multiple revenue streams through subscriptions, premium content, and grants.

Impact and Beneficiaries

- Democratizes access to cultural heritage, making it globally available to everyone.
- Digitally preserves at-risk historical sites and artifacts for future generations.
- Tourists and students seeking interactive, engaging learning experiences about history.
- Cultural institutions and historians for digital archiving and public outreach.

Problem Statement 63

Identifying Taxonomy and Assessing Biodiversity from eDNA Datasets (Software)

Need to Know

eDNA (environmental DNA) is genetic material collected from environmental samples (water, soil) rather than direct observation. Taxonomy is the scientific classification of organisms. Biodiversity refers to the variety of life in an ecosystem.

Description

Current methods for identifying species and assessing biodiversity from eDNA datasets are often slow, labor-intensive, and complex, hindering rapid ecological insights for conservation efforts.

Idea

Develop an AI-powered platform for automated, rapid, and accurate analysis of eDNA datasets to identify taxonomy and comprehensively assess biodiversity, accelerating ecological research.

Problem Resolution

Our platform automates eDNA data analysis, providing fast, accurate taxonomic identification and biodiversity assessments. It overcomes manual processing bottlenecks and accelerates ecological research and conservation actions.

How It Works

Environmental samples are collected, and eDNA is extracted and sequenced using high-throughput sequencing technologies (e.g., Illumina). The raw sequencing data is then uploaded to our cloud-based platform. Our system employs bioinformatics pipelines for quality control, adapter trimming, and amplicon sequence variant (ASV) generation. AI/ML models, specifically deep learning neural networks (e.g., convolutional neural networks or recurrent neural networks) and traditional machine learning algorithms (e.g., random forests, SVMs), are trained on vast genomic reference databases (e.g., NCBI GenBank, BOLD Systems) to identify and classify taxonomic units. These models analyze sequence similarities and evolutionary relationships to assign species-level identification where possible. Post-classification, statistical algorithms calculate various biodiversity indices such as species richness, evenness, and diversity metrics (e.g., Shannon, Simpson). The platform leverages cloud computing infrastructure (e.g., AWS, Azure) for scalable processing, Python for scripting and data manipulation, and popular AI/ML frameworks like TensorFlow or PyTorch for model development and inference. Results are presented through an interactive dashboard with visualizations.

Unique Selling Points

- Automated, rapid analysis significantly reduces processing time for eDNA data.
- High accuracy in species identification using advanced AI algorithms and extensive reference databases.
- Comprehensive biodiversity metrics and ecological insights from diverse eDNA sources.
- User-friendly interface lowers barriers for researchers and conservationists to perform complex analyses.

- Scalable solution supports large-scale environmental monitoring and global biodiversity initiatives.

Feasibility and Viability

- Existing eDNA sequencing technologies are mature and widely accessible globally.
- Vast genomic reference databases and open-source bioinformatics tools are available.
- Advanced AI/ML frameworks and cloud computing infrastructure are readily available.
- High demand from ecological research and conservation sectors worldwide.
- Significantly reduces manual labor, specialized expertise, and time costs.
- Potential for subscription-based models and value-added data analysis services.

Impact and Beneficiaries

- Accelerates biodiversity monitoring and conservation efforts crucial for ecosystem health.
- Provides critical, timely data for informed environmental policy and management decisions.
- Environmental researchers, academic institutions, and citizen science initiatives.
- Conservation organizations, government agencies, and policymakers managing ecosystems.

Problem Statement 64

Waste Segregation Monitoring System for Urban Local Bodies (Hardware)

Need to Know

Urban Local Bodies (ULBs) are local governing bodies in urban areas responsible for municipal services. Waste segregation is the separation of waste into different categories (e.g., wet, dry, hazardous) to facilitate recycling and proper disposal.

Description

Urban Local Bodies struggle with effective monitoring of waste segregation at source and collection points. This leads to inefficient waste management, increased landfill burden, and environmental pollution, impacting public health and resource recovery.

Idea

An AI-powered Waste Segregation Monitoring System that automates the identification and reporting of improperly segregated waste. This enhances compliance, improves collection efficiency, and promotes sustainable waste management practices across urban areas.

Problem Resolution

This system uses real-time monitoring and AI analytics to identify non-segregated waste. It provides actionable insights to ULBs, enabling timely interventions and improving waste collection efficiency, ultimately reducing environmental impact.

How It Works

The system utilizes IoT sensors, high-resolution cameras, and AI/ML algorithms. Cameras capture images of waste at collection points. These images are processed by AI models (e.g., Convolutional Neural Networks for object detection and classification) in real-time to identify different waste types and detect improper segregation. IoT sensors (e.g., ultrasonic sensors for bin fill levels) can complement data. The processed data is sent to a cloud platform (e.g., AWS, Azure) for storage and further analysis. A web/mobile application dashboard provides ULB officials with real-time alerts, segregation reports, and performance metrics. This allows for immediate action and data-driven policy adjustments.

Unique Selling Points

- Real-time monitoring and instant alerts for non-compliance.
- AI-driven accuracy in waste type identification and segregation assessment.
- Automated reporting and data analytics for informed decision-making.
- Reduced manual effort and operational costs for ULBs.
- Increased public accountability and improved waste management outcomes.

Feasibility and Viability

- Leverages mature and readily available IoT sensor and camera technology.
- AI/ML models for object detection are well-developed and cost-effective.
- Cloud infrastructure provides scalable and robust data processing.
- Aligns with national waste management policies and mandates.
- Offers significant cost savings by optimizing waste collection routes.
- Scalable to cover entire cities, integrating with existing infrastructure.

Impact and Beneficiaries

- Significantly reduces landfill burden and environmental pollution.
- Promotes a cleaner, healthier urban environment for residents.
- Urban Local Bodies gain efficiency and compliance in waste management.
- Citizens benefit from improved public health and cleaner surroundings.

Problem Statement 65

Development of a travel related software app that can be installed on mobile phones that could capture trip related information (Software)

Need to Know

A “travel related software app” is a mobile application designed to assist users with various aspects of their journeys. “Trip related information” includes itineraries, expenses, photos, notes, and locations visited, which the app will capture and organize.

Description

Travelers often struggle to organize and recall trip details like itineraries, expenses, and memorable moments. Manual tracking is cumbersome and prone to loss, leading to inefficiencies and forgotten experiences.

Idea

VoyageLog: A smart mobile application that serves as a personal travel companion, automatically capturing and organizing all trip-related information, offering a seamless travel experience from start to finish.

Problem Resolution

VoyageLog automates the collection of itinerary, expenses, and experiences using mobile phone capabilities. It eliminates the hassle of manual tracking, ensuring all trip data is centrally stored and easily accessible.

How It Works

The VoyageLog app leverages mobile device capabilities. GPS data tracks locations and automatically suggests points of interest. Optical Character Recognition (OCR) captures details from photos of receipts for expense tracking. Cloud synchronization stores data securely and allows access across devices. APIs integrate with travel services (flights, hotels, attractions) for itinerary generation. Machine learning analyzes user preferences to offer personalized recommendations. The app will be developed using native mobile frameworks (Swift/Kotlin) or cross-platform tools (React Native/Flutter) for broad accessibility, with a backend powered by a scalable cloud platform like AWS or Google Cloud for data storage and processing.

Unique Selling Points

- Automated itinerary generation and real-time updates based on user location and booked services.
- Integrated expense tracker with photo receipt capture and budget management features.
- Offline access to all trip data, including maps and critical documents.
- Collaborative planning and sharing features for group trips.
- AI-powered personalized recommendations for activities and dining.

Feasibility and Viability

- Leverages existing smartphone features like GPS, camera, and offline storage.
- Utilizes well-established cloud platforms and mobile development frameworks.

- APIs for flight, hotel, and attraction bookings are readily available for integration.
- High demand for seamless travel planning and memory preservation tools.
- Potential for subscription models, premium features, and affiliate partnerships.
- Scalable to a global audience with multi-language support and varied content.

Impact and Beneficiaries

- Significantly reduces travel planning stress and enhances the overall trip experience.
- Empowers travelers to create lasting memories and effortlessly share their adventures.
- Individual travelers seeking organization, convenience, and memory preservation.
- Group travelers needing collaborative planning and shared expense management.

Problem Statement 66

AI-Based Rockfall Prediction and Alert System for Open-Pit Mines (Software)

Need to Know

Open-pit mines are large-scale surface excavations for mineral extraction. Rockfall refers to fragments of rock detaching and falling from a steep slope or cliff, posing significant safety hazards and operational risks.

Description

Open-pit mines face critical safety challenges due to unpredictable rockfalls, which endanger workers and disrupt operations. Existing monitoring often lacks the real-time, predictive capability needed for effective risk mitigation.

Idea

An AI-powered system designed for open-pit mines to predict rockfall occurrences with high accuracy and issue real-time alerts, thereby significantly enhancing worker safety and operational continuity.

Problem Resolution

This system proactively identifies unstable rock formations using AI and sensor data, providing early warnings. It enables timely evacuations and preventive measures, drastically reducing accident risks and minimizing costly operational downtime.

How It Works

The system integrates multiple data sources from various sensors strategically placed within the mine, including LiDAR for precise topographical mapping and deformation detection, radar for monitoring surface movement, ground-penetrating radar for subsurface anomaly detection, seismic sensors for detecting micro-seismic activity indicating instability, and inclinometers for measuring slope deformation. Environmental data such as rainfall and temperature from weather stations are also incorporated. This continuous stream of raw data is processed and fed into a sophisticated machine learning model, potentially utilizing deep learning architectures like Recurrent Neural Networks (RNNs) for time-series analysis of deformation or Convolutional Neural Networks (CNNs) for analyzing spatial data patterns. The AI model, trained on historical rockfall incidents, geological surveys, and real-time sensor data, learns to identify precursor patterns indicative of potential rockfall. When the model predicts a high probability of rockfall exceeding a predefined threshold, the system triggers immediate, multi-channel alerts (e.g., SMS, email, visual alarms, integrated control room dashboards) to mine managers, safety officers, and onsite personnel. Cloud computing infrastructure provides scalable data storage, processing power for AI models, and facilitates remote monitoring and system updates.

Unique Selling Points

- Proactive real-time prediction capability significantly enhances worker safety.
- Leverages advanced AI/ML for high accuracy in identifying rockfall risks.
- Reduces operational downtime and financial losses from unforeseen rockfall events.
- Offers scalable deployment and adaptability to diverse open-pit mine environments.
- Provides data-driven insights for continuous improvement of slope stability management.

Feasibility and Viability

- Advanced sensor technologies (LiDAR, radar) are readily available for precise data collection.
- Mature AI/ML frameworks and tools exist for developing robust predictive models.
- Cloud computing provides scalable infrastructure for data processing and model deployment.
- Strong market demand driven by increasing safety regulations in the mining industry.
- Significant potential for cost savings by preventing accidents, damages, and operational halts.
- Generates recurring revenue through system maintenance, software updates, and data analytics services.

Impact and Beneficiaries

- Significantly enhances worker safety, leading to fewer injuries and fatalities in mining operations.
- Optimizes mine operations by reducing unpredictable downtime and infrastructure damage.
- Mine workers benefit directly from a safer working environment and reduced risk of rockfall incidents.
- Mine operators gain improved operational efficiency, reduced insurance costs, and enhanced regulatory compliance.

Problem Statement 67

Document Overload at Kochi Metro Rail Limited (KMRL)-An automated solution (Software)

Need to Know

KMRL stands for Kochi Metro Rail Limited, a public transit company. “Document overload” refers to excessive volume and manual management of physical and digital documents, leading to inefficiencies.

Description

KMRL faces significant challenges managing a vast volume of operational and administrative documents. Manual handling leads to inefficiencies, lost information, and slow processes, impacting operational efficiency and decision-making.

Idea

An AI-powered Document Management System (DMS) to automate the classification, storage, retrieval, and analysis of all operational and administrative documents at KMRL, enhancing efficiency and accessibility.

Problem Resolution

This automated DMS will centralize document handling, reduce manual effort, eliminate misplacement, and speed up information retrieval. AI-driven classification ensures accuracy and consistency, resolving KMRL’s document overload.

How It Works

The system would utilize Optical Character Recognition (OCR) to convert scanned physical documents into digital text. Natural Language Processing (NLP) and machine learning algorithms would then classify, tag, and index documents based on their content, context, and metadata. Documents would be securely stored in cloud storage (e.g., AWS S3 or Azure Blob Storage). A user-friendly web-based interface or mobile application would allow authorized personnel to upload, search, retrieve, and collaborate on documents. Key technologies involved include Python for backend logic, machine learning frameworks like TensorFlow or PyTorch for AI models, Elasticsearch for efficient search indexing, PostgreSQL or MongoDB for metadata management, and frontend frameworks like React or Angular for the user interface. APIs would facilitate seamless integration with other existing KMRL systems.

Unique Selling Points

- AI-powered intelligent classification for rapid and accurate document sorting and tagging.
- Automated version control and audit trails for enhanced compliance and security standards.
- Intuitive search capabilities with natural language processing for quick information retrieval.
- Seamless integration with existing KMRL systems for smooth workflow adoption.
- Scalable architecture designed to grow with KMRL’s evolving documentation needs.

Feasibility and Viability

- OCR and AI/ML technologies are mature and readily available for robust document processing.
- Cloud infrastructure offers scalable, secure, and cost-effective deployment options.

- Utilizing open-source libraries and frameworks significantly reduces development time and costs.
- Reduces KMRL's operational costs significantly by minimizing manual document handling.
- Improves decision-making speed by providing instant, accurate access to critical information.
- Enhances compliance and mitigates legal risks through robust audit trails and version control.

Impact and Beneficiaries

- Streamlines KMRL's overall operations, leading to faster project execution and service delivery.
- Fosters a data-driven culture by making information easily accessible for analysis and insights.
- KMRL employees benefit from reduced administrative burden, improved productivity, and less frustration.
- KMRL management gains better oversight and faster access to strategic data for informed decisions.

Problem Statement 68

Research and redesign a sport equipment commonly found in sport industry and utilize Fusion software to reimagine its design. Students can use Fusion Features such as Generative Design, Topology Optimization, Additive Build etc. The redesigned component should showcase innovation, enhanced functionality, and improved efficiency, all while being optimized for 3D printing. (Hardware)

Need to Know

Fusion software is an integrated CAD/CAM/CAE platform by Autodesk. Generative Design is an AI-powered design exploration process creating multiple solutions based on constraints. Topology Optimization mathematically optimizes material distribution for given loads. Additive Build refers to additive manufacturing (3D printing) processes.

Description

The problem is to research and redesign sports equipment using Fusion software, leveraging features like Generative Design and Topology Optimization. The redesigned component must be innovative, highly functional, efficient, and optimized for 3D printing.

Idea

Redesigning a high-performance bicycle frame to achieve significant weight reduction and improved structural integrity. This will be accomplished by utilizing Fusion's Generative Design and Topology Optimization capabilities for 3D printing.

Problem Resolution

This idea addresses the problem by demonstrating how Fusion's advanced features can create an ultralight, optimized bicycle frame. It showcases enhanced functionality, efficiency, and innovation, specifically tailored for additive manufacturing techniques.

How It Works

The process begins in Fusion 360 by defining performance criteria, load conditions, and manufacturing constraints for the bicycle frame. We input desired weight reduction targets, stiffness requirements, and material properties like those of titanium alloys or high-performance composites. Generative Design is then employed, where Fusion's algorithms automatically explore thousands of design possibilities, presenting optimal geometries that meet the specified parameters. This automates the initial design exploration, leading to highly efficient and innovative structures. Following this, Topology Optimization is applied to further refine material distribution. This method removes unnecessary material from low-stress areas and reinforces high-stress regions,

resulting in organic, often lattice-like internal structures that maximize strength while minimizing weight. Finally, the optimized 3D models are prepared for Additive Build. This involves generating support structures, orienting the part for optimal print quality, and slicing the model into layers. The frame is then manufactured using advanced 3D printing technologies such as Selective Laser Melting (SLM) for metal alloys or Fused Deposition Modeling (FDM) for composite materials, allowing for complex geometries and internal structures not achievable with traditional fabrication methods.

Unique Selling Points

- Significantly lighter frame for enhanced speed and agility on various terrains.
- Optimized strength-to-weight ratio for superior durability and competitive performance.
- Customizable geometry allows for individual rider ergonomics and specialized cycling disciplines.
- Reduced material waste through precise additive manufacturing, supporting sustainability.
- Novel aesthetic designs and integrated features not possible with traditional manufacturing.

Feasibility and Viability

- Fusion software provides robust generative design and optimization tools readily available for use.
- Advanced 3D printing technologies and materials exist to manufacture complex, lightweight structures.
- Expertise in CAD/CAM and material science is accessible for both design and prototyping phases.
- Manufacturing costs are decreasing, making high-performance 3D printed components more accessible.
- Growing market demand for high-performance, lightweight, and customizable sports equipment.
- Potential for significant competitive advantage in cycling with innovative, performance-enhancing designs.
- Cost-efficiency in prototyping and small-batch production through advanced additive manufacturing.
- Ability to quickly iterate and adapt designs based on user feedback and performance testing.

Impact and Beneficiaries

- Revolutionizes bicycle frame design, setting new benchmarks for performance, weight, and customization.
- Showcases the transformative potential of advanced manufacturing in the sports equipment industry.
- Professional cyclists and enthusiasts seeking peak performance, lighter, and more efficient equipment.
- Sports equipment manufacturers looking for innovative design, production methods, and competitive advantages.

Problem Statement 69

Real life solutions for Waste Management. (Software)

Need to Know

Waste Management involves collecting, transporting, processing, recycling, or disposing of waste materials. It's crucial for public health, environmental protection, and resource recovery.

Description

Inefficient waste collection, improper segregation, and overflowing landfills pose significant environmental and public health challenges globally, requiring innovative, scalable solutions for effective management.

Idea

A 'Smart Circular Waste Hub' – a community-based, tech-enabled platform optimizing waste collection, segregation, and upcycling, promoting a circular economy and reducing landfill burden.

Problem Resolution

This hub addresses inefficient waste management by using smart bins for optimal collection routes, incentivizing segregation, and connecting waste to recycling/upcycling initiatives, reducing landfill waste.

How It Works

The Smart Circular Waste Hub utilizes IoT-enabled smart bins with ultrasonic sensors to monitor fill levels and detect waste types. This data feeds into a central cloud platform (e.g., AWS IoT) that optimizes collection routes using AI algorithms (e.g., machine learning for route optimization). A mobile application allows users to report waste, receive segregation guidelines via computer vision (e.g., TensorFlow Lite on device), and earn points through a blockchain-based reward system (e.g., Ethereum smart contracts for token issuance). The platform also features a marketplace connecting verified waste streams (plastics, organics, e-waste) to local upcyclers, recyclers, and compost facilities. Technologies involved include IoT, AI/ML, cloud computing, mobile app development, and blockchain.

Unique Selling Points

- Real-time waste level monitoring for optimized collection routes, reducing fuel costs and emissions.
- AI-powered segregation assistance guiding users to correctly sort waste for higher recycling rates.
- Blockchain-based incentive system rewarding communities and individuals for proper waste disposal.
- Integrated marketplace connecting segregated waste directly to upcycling businesses and recyclers.
- Hyperlocal impact data and analytics for city planners to make informed waste management decisions.

Feasibility and Viability

- Leverages existing IoT infrastructure and cloud platforms for rapid deployment.
- Mobile app development is standard; AI/ML for sorting and routing is well-established.
- Modular design allows for phased implementation and scalability in different communities.

- Reduces waste disposal costs for municipalities, creating direct savings.
- Generates revenue by selling high-quality segregated raw materials to recyclers and upcyclers.
- Creates green jobs in waste collection, processing, and community engagement roles.

Impact and Beneficiaries

- Significantly reduces landfill waste and environmental pollution, improving public health.
- Promotes a circular economy by maximizing resource recovery and minimizing virgin material use.
- Local municipalities and waste management companies benefit from optimized operations and reduced costs.
- Community residents benefit from cleaner environments, health improvements, and economic incentives.

Problem Statement 70

Embedded Intelligent Microscopy System for Identification and Counting of Microscopic Marine Organisms (Hardware)

Need to Know

An “Embedded Intelligent Microscopy System” is a self-contained, AI-powered microscope. “Microscopic Marine Organisms” are tiny aquatic life, like plankton, vital for marine ecosystems.

Description

Manually identifying and counting microscopic marine organisms is time-consuming, error-prone, and requires specialized expertise. This limits efficient environmental monitoring and scientific research efforts.

Idea

An AI-driven embedded microscopy system for automated, accurate, and rapid identification and counting of diverse microscopic marine organisms, enhancing real-time data collection.

Problem Resolution

The system automates identification and counting using AI, significantly reducing manual effort, time, and human error. It provides efficient and accurate data for marine research and monitoring.

How It Works

The system integrates a high-resolution microscope with an embedded camera and a compact processing unit. A sample of marine water is placed under the microscope. The embedded camera captures live video or still images of the microscopic organisms. These images are fed to a pre-trained Artificial Intelligence (AI) model, specifically utilizing Computer Vision techniques (e.g., Convolutional Neural Networks - CNNs) running on the embedded processor. The AI model identifies and classifies different species of marine organisms and counts their numbers. Results are displayed on a local screen or transmitted wirelessly (e.g., via Wi-Fi or Bluetooth) to a connected device for further analysis and data logging. Technologies involved include embedded systems (e.g., Raspberry Pi, NVIDIA Jetson), high-resolution cameras, microscopy optics, machine learning (specifically Deep Learning for Computer Vision), image processing libraries (e.g., OpenCV), and potential cloud connectivity for data storage and advanced analytics.

Unique Selling Points

- Automated, real-time identification and counting of marine organisms.
- High accuracy achieved through advanced AI-powered computer vision.
- Significantly faster analysis compared to traditional manual methods.
- Portable and deployable, suitable for field environments and remote locations.
- Generates consistent, quantitative data for robust trend analysis.

Feasibility and Viability

- AI/ML and embedded processing technologies are mature and readily accessible today.
- Cost-effective components like Raspberry Pi or Jetson make hardware affordable.
- Existing open-source computer vision libraries simplify development and deployment.
- High demand exists from marine research and environmental monitoring sectors.

- Reduces operational costs and labor for scientific studies and routine monitoring.
- Enables rapid data collection, critical for urgent environmental responses and policy-making.

Impact and Beneficiaries

- Enhances marine ecosystem understanding, supporting critical conservation efforts.
- Facilitates early detection of harmful algal blooms, pathogens, and pollution sources.
- Marine biologists and researchers conducting species population and biodiversity studies.
- Environmental agencies monitoring ocean health, water quality, and climate change effects.

Problem Statement 71

AI-Driven Train Induction Planning & Scheduling for Kochi Metro Rail Limited (KMRL) (Software)

Need to Know

Train Induction Planning & Scheduling refers to optimizing when and where trains start service, their routes, and timings to meet demand efficiently. KMRL is Kochi Metro Rail Limited, the operator of the metro system in Kochi, India.

Description

KMRL faces challenges in efficiently planning and scheduling train inductions. This impacts operational costs, passenger wait times, and overall system reliability, needing optimized solutions.

Idea

Develop an AI-driven platform for KMRL that intelligently plans and schedules train inductions. It will optimize resource allocation, reduce operational costs, and enhance passenger experience through predictive analytics.

Problem Resolution

The AI system analyzes real-time data to predict demand, track availability, and operational constraints. It generates optimal schedules, significantly improving efficiency and responsiveness compared to manual or rule-based methods.

How It Works

The system utilizes Machine Learning (ML) models for demand prediction based on historical data, events, and real-time inputs (e.g., weather, public transport disruptions). Optimization algorithms (e.g., Genetic Algorithms, Reinforcement Learning) then process these predictions along with operational constraints (track availability, maintenance schedules, staff rostering) to generate optimal train induction plans and schedules. Data integration with KMRL's existing operational systems (e.g., SCADA, Passenger Information Systems) is crucial. A user-friendly dashboard provides actionable insights and allows for manual overrides. Technologies involved include Python for ML/optimization, cloud platforms for scalability, and robust database systems for data management.

Unique Selling Points

- Real-time demand forecasting for adaptive scheduling.
- Dynamic optimization of train and staff assignments.
- Significant reduction in operational energy costs.
- Proactive identification and mitigation of delays.
- Enhanced passenger satisfaction with improved punctuality.

Feasibility and Viability

- Leverages existing data from KMRL's operational systems for training AI models.
- Mature AI/ML and optimization technologies are readily available for implementation.
- Modular design allows for phased development and integration with current infrastructure.
- Reduces operational costs by optimizing train mileage and energy consumption.

- Increases revenue potential through improved service reliability and passenger volume.
- Enhances KMRL's brand image as an innovative, efficient public transport provider.

Impact and Beneficiaries

- Significant reduction in carbon footprint due to optimized energy use.
- Improves urban mobility, contributing to economic growth in Kochi.
- KMRL benefits from reduced operational costs and increased efficiency.
- Passengers experience shorter wait times, increased punctuality, and reliability.

Problem Statement 72

Smart Tourist Safety Monitoring & Incident Response System using AI, Geo-Fencing, and Blockchain-based Digital ID (Software)

Need to Know

AI (Artificial Intelligence) refers to systems that analyze data for anomaly detection. Geo-Fencing creates virtual boundaries, triggering alerts when crossed. Blockchain-based Digital ID provides a secure, immutable, and privacy-preserving digital identity for tourists.

Description

Tourists face safety risks in unfamiliar areas, leading to delayed incident response. Current monitoring systems lack real-time insights and secure identification, hindering swift action during emergencies.

Idea

A Smart Tourist Safety Monitoring & Incident Response System integrating AI for proactive monitoring, geo-fencing for zone management, and a blockchain-based digital ID for secure identification and rapid emergency response.

Problem Resolution

This system proactively monitors tourist safety using AI, triggers instant alerts via geo-fencing, and enables rapid, secure identification through blockchain, ensuring swift and effective incident response to enhance visitor security.

How It Works

Tourists register for a Blockchain-based Digital ID, which securely stores essential information without centralizing personal data. Their location is continuously monitored via a mobile application or wearable device. AI algorithms analyze movement patterns, behavior, and location data to detect anomalies or deviations from safe routes. Geo-fencing sets virtual boundaries around safe zones, attractions, or restricted areas; if a tourist crosses these, an alert is triggered. In case of an emergency (e.g., a tourist entering a high-risk zone, a distress signal), the AI system processes the data, and the digital ID facilitates immediate identification. Local authorities and emergency services receive instant alerts with location data and encrypted digital ID for rapid, targeted response. Technologies involved include: Blockchain for immutable digital identities; Artificial Intelligence (AI) for anomaly detection and predictive analytics; Geo-Fencing using GPS and location-based services for virtual perimeters; Mobile Application/Wearable Technology for user interface and data collection; Cloud Computing for scalable data processing; and API Integrations for connecting with emergency services.

Unique Selling Points

- Proactive AI-driven anomaly detection for real-time risk assessment and early warning.
- Secure and verifiable tourist identity management using blockchain technology, protecting privacy.
- Automated geo-fencing alerts for restricted zones or emergency areas, enhancing control.

- Integrated rapid incident response protocol for immediate assistance and coordination.
- Decentralized data storage via blockchain ensures data integrity and reduces single points of failure.

Feasibility and Viability

- Existing GPS, AI, and blockchain technologies are mature enough for integration and deployment.
- Smartphones and wearables provide the necessary hardware for location tracking and user interaction.
- Open-source blockchain platforms and cloud services reduce development and infrastructure costs.
- Interoperability standards allow integration with existing emergency response systems.
- Addresses a critical market need for enhanced tourist safety and security globally.
- Potential for partnerships with tourism boards, travel agencies, and local governments.
- Offers a premium safety service, attracting safety-conscious travelers and families.
- Opportunity for subscription models or integration fees for tourism operators.

Impact and Beneficiaries

- Significantly enhances tourist safety and security, boosting visitor confidence and destination reputation.
- Improves efficiency of emergency services with faster, more accurate incident detection and response.
- Tourists: Enjoy enhanced safety, peace of mind, and quick assistance during emergencies.
- Tourism Authorities: Gain real-time insights for better management, improved destination reputation, and data-driven policy making.

Problem Statement 73

Development of a Smart Digital Platform to Promote Eco & Cultural Tourism in Jharkhand (Software)

Need to Know

Eco-tourism focuses on responsible travel to natural areas, conserving the environment and improving local well-being. Cultural tourism explores historical sites, art, and traditions. Jharkhand is an Indian state rich in natural beauty and tribal heritage.

Description

Jharkhand's rich eco and cultural heritage remains underexposed. Lack of a centralized, accessible platform hinders tourist discovery and local community engagement, limiting tourism growth and economic benefits for the state.

Idea

Our idea is 'Explore Jharkhand,' a smart digital platform. It will be a comprehensive mobile and web application promoting the state's diverse eco-tourism sites, cultural festivals, and heritage trails, fostering sustainable and responsible travel.

Problem Resolution

This platform solves the problem by centralizing information, enhancing discoverability through AI-driven recommendations, and providing seamless booking for tours and local experiences, directly boosting tourism and local economies.

How It Works

The platform will be a mobile and web application built using a modern frontend framework like React or Vue.js, with a robust backend using Node.js or Python (Django/Flask) and a PostgreSQL database. It will integrate AI/ML for personalized recommendations (e.g., collaborative filtering, natural language processing for content analysis), GPS for location-based services, and secure payment gateways for bookings. Users can browse destinations, view virtual tours using 360-degree imagery, book eco-friendly accommodations, cultural experiences, and connect with local guides. Augmented Reality features can overlay historical information on real-world landmarks.

Unique Selling Points

- AI-powered personalized itinerary builder for tourists, suggesting unique eco & cultural experiences.
- Integrated local artisan marketplace, connecting visitors directly with authentic Jharkhandi products.
- Real-time multilingual virtual guides offering immersive storytelling about sites and traditions.
- Gamified exploration with rewards for visiting lesser-known spots, encouraging deeper engagement.
- Blockchain-based transparent donation system for local conservation and community development projects.

Feasibility and Viability

- Leverages existing open-source mapping APIs and cloud infrastructure for cost-effective development.
- Integration with state tourism databases and local guides can be achieved through phased partnerships.
- Mobile-first design ensures broad accessibility, catering to diverse user demographics.
- Monetization through commission on bookings, premium features, and local vendor subscriptions ensures revenue.
- Strong government support for tourism in Jharkhand provides a conducive environment for growth.
- Demand for authentic, sustainable travel experiences is growing globally, ensuring market relevance.

Impact and Beneficiaries

- Significantly boosts local economy by increasing tourist footfall and direct sales for local businesses.
- Promotes cultural preservation and environmental awareness through responsible tourism practices.
- Tourists: Gain easy access to curated, authentic eco and cultural experiences in Jharkhand.
- Local Communities: Achieve economic empowerment and cultural preservation through tourism revenue.

Problem Statement 74

AI-Driven Life Cycle Assessment (LCA) Tool for Advancing Circularity and Sustainability in Metallurgy and Mining (Software)

Need to Know

Life Cycle Assessment (LCA) is a method to evaluate environmental impacts of a product/service from raw material extraction to disposal. Circularity means keeping resources in use for as long as possible. Sustainability involves meeting present needs without compromising future generations. Metallurgy is the science of metals; mining is the extraction of valuable minerals.

Description

The metallurgy and mining sectors face significant challenges in accurately assessing environmental impacts and implementing circular economy principles. Traditional LCA is complex, time-consuming, and often lacks the precision needed for these resource-intensive industries, hindering sustainability efforts.

Idea

An AI-driven Life Cycle Assessment (LCA) tool specifically designed for the metallurgy and mining industries. This tool will automate impact analysis, identify circularity opportunities, and provide actionable insights to accelerate sustainability and optimize resource use from extraction to recycling.

Problem Resolution

This AI-driven LCA tool automates complex environmental impact assessments, drastically reducing the time and effort required. It provides precise, data-backed insights specific to metallurgy and mining, enabling companies to identify and implement circularity and sustainability improvements more effectively and efficiently.

How It Works

The AI-driven LCA tool works by ingesting comprehensive data related to metallurgy and mining operations, including raw material extraction, processing, energy consumption, transportation, waste generation, and end-of-life scenarios. Users input process parameters, material flows, and energy data. The core of the system uses machine learning (ML) and deep learning (DL) algorithms to process this data. These algorithms are trained on vast datasets of existing Life Cycle Inventory (LCI) data, environmental impact factors, and industry-specific benchmarks. The tool leverages cloud computing for scalable data processing and storage. It integrates with existing industry databases and potentially IoT sensors for real-time data acquisition. The AI analyzes the inputs to calculate various environmental indicators (e.g., carbon footprint, water usage, waste production) across the entire life cycle. It can perform scenario analysis, comparing different operational choices or material selections. The output includes detailed reports, visualizations, and actionable recommendations for reducing environmental impact and improving circularity. Key technologies involved are machine learning (e.g., neural networks, regression models), big data analytics, cloud platforms (AWS, Azure, GCP), and specialized LCI databases.

Unique Selling Points

- Automated, rapid LCA for complex industrial processes, saving significant time and resources compared to manual methods.
- Utilizes AI/ML for enhanced accuracy and predictive insights into environmental impacts unique to metallurgy and mining.
- Tailored specifically for the metallurgy and mining value chain, offering industry-specific data and analysis capabilities.
- Identifies concrete opportunities for circular economy implementation, such as material recycling and waste reduction.
- Supports data-driven decision-making for sustainable practices, optimizing resource use and reducing environmental footprints.

Feasibility and Viability

- Existing LCA methodologies provide a robust framework, which AI can significantly enhance and automate.
- Mature AI/ML technologies are readily available for complex data analysis, pattern recognition, and predictive modeling.
- Availability of increasing volumes of operational and environmental data from the metallurgy and mining sectors.
- Cloud computing offers scalable infrastructure for data storage and processing required for AI models.
- Increasing global demand for sustainable practices and products, driving market adoption for such tools.
- Potential for significant cost savings through optimized resource use, waste reduction, and energy efficiency.
- Growing regulatory pressure and reporting requirements for environmental performance in industrial sectors.
- Competitive advantage for companies demonstrating clear, data-backed sustainability efforts to stakeholders.

Impact and Beneficiaries

- Significantly reduces the environmental footprint of metallurgy and mining operations by identifying key impact hotspots.
- Accelerates the transition towards a circular economy by promoting material reuse, recycling, and waste valorization.
- Metallurgy and mining companies gain a powerful tool to streamline sustainability efforts and improve environmental performance.
- Environmental regulators and policymakers receive more accurate data, facilitating informed policy development and oversight.

Problem Statement 75

Proposal for Design and development of application or Heavy Metal Pollution indices (Software)

Need to Know

Heavy metal pollution refers to environmental contamination by dense metallic elements like lead, mercury, cadmium. Pollution indices are standardized metrics used to quantify the level and risk of such contamination in various environmental matrices (water, soil, air).

Description

Current methods for monitoring and assessing heavy metal pollution are often manual, time-consuming, and lack real-time insights. There's a need for an efficient system to calculate and visualize pollution indices.

Idea

Develop an integrated web-based platform and mobile application for real-time monitoring, calculation, and visualization of heavy metal pollution indices across diverse environmental data sources.

Problem Resolution

The proposed application automates data collection, standardizes index calculation, and provides intuitive visualizations. This enables rapid assessment, informed decision-making, and proactive management of heavy metal pollution.

How It Works

The system involves sensor integration (IoT devices) to collect environmental data (water, soil, air quality parameters, heavy metal concentrations). This data is transmitted to a cloud-based backend (e.g., AWS IoT, Azure IoT Hub) for storage (e.g., PostgreSQL, MongoDB). A data processing engine (e.g., Apache Flink, Spark) calculates various heavy metal pollution indices (e.g., Geo-accumulation Index, Pollution Load Index, Enrichment Factor) based on established formulas. Machine learning models (e.g., TensorFlow, Scikit-learn) can be used for predictive analytics. A RESTful API serves data to the frontend, which includes a web application (e.g., React, Angular, Vue.js) for detailed dashboards, GIS visualization (e.g., Leaflet, OpenLayers), and reporting, and a mobile application (e.g., React Native, Flutter) for on-the-go monitoring and alerts.

Unique Selling Points

- Real-time data integration from diverse environmental sensors for up-to-date pollution insights.
- Automated calculation of various standardized heavy metal pollution indices, reducing manual effort.
- Interactive geographical information system (GIS) mapping for visual representation of pollution hotspots.
- Customizable alert system notifying stakeholders of critical pollution levels.
- Data analytics and predictive modeling for forecasting pollution trends and impact.

Feasibility and Viability

- Leveraging existing IoT sensor technology and cloud infrastructure makes data collection and processing viable.
- Standardized algorithms for pollution indices are well-documented and can be implemented efficiently.
- Open-source GIS libraries and web frameworks allow for rapid development of the user interface.
- Addresses a critical global environmental concern, appealing to governments and environmental agencies.
- Potential for subscription models for advanced features or consulting services for data interpretation.
- Scalable architecture allows for expansion to other pollutants or geographical regions.

Impact and Beneficiaries

- Empowers environmental regulators and policymakers with data-driven insights for effective pollution control.
- Contributes to public health by identifying and mitigating risks associated with heavy metal exposure.
- Environmental protection agencies and governmental bodies responsible for monitoring pollution.
- Research institutions, scientists, and NGOs focused on environmental studies and advocacy.

Problem Statement 76

Development of a Digital Farm Management Portal for Implementing Biosecurity Measures in Pig and Poultry Farms (Software)

Need to Know

Biosecurity measures are practices implemented on farms to prevent the introduction and spread of disease-causing organisms. This is crucial for maintaining animal health, preventing epidemics, and ensuring food safety in pig and poultry farming.

Description

Farmers struggle with consistent implementation and monitoring of biosecurity measures in pig and poultry farms. Manual processes are inefficient, lack real-time data, and lead to potential disease outbreaks and significant economic losses.

Idea

A digital farm management portal offering real-time biosecurity monitoring, compliance tracking, and data analytics. This platform helps farmers effectively manage and adhere to crucial biosecurity protocols.

Problem Resolution

The portal automates biosecurity tracking, provides real-time alerts for non-compliance, and offers data-driven insights. This significantly enhances adherence to protocols, preventing disease spread and improving overall farm productivity.

How It Works

The digital portal integrates various technologies: IoT sensors monitor environmental factors (temperature, humidity, air quality) and animal behavior. RFID/NFC tags track animal movements and personnel access to restricted zones. Computer vision algorithms analyze video feeds for anomaly detection, such as signs of illness or unauthorized entry. All data is securely collected, processed, and stored in a cloud-based database (e.g., AWS, Azure). A backend system (e.g., Python with Django, Node.js with Express) handles data processing, logic, and API management. A user-friendly frontend (web and mobile application built with React, Flutter, or similar frameworks) provides dashboards, alerts, and reporting. Machine learning models analyze historical and real-time data to predict potential risks and offer actionable insights to farmers for proactive disease management.

Unique Selling Points

- Real-time monitoring and automated alerts for biosecurity breaches.
- Customizable biosecurity protocols tailored to specific farm needs.
- Integrated data analytics for identifying disease risk patterns early.
- User-friendly interface accessible on mobile and web platforms.
- Enhanced traceability of animals and personnel for better control.

Feasibility and Viability

- Existing IoT hardware and cloud infrastructure are readily available and affordable.
- Digitizing standard biosecurity protocols is straightforward and implementable.
- Widespread smartphone adoption ensures easy access for farmers.
- Technologies like computer vision are becoming more accessible.
- Reduces disease outbreaks significantly, saving farmers substantial costs.
- Meets increasing consumer demand for safe and traceable food products.
- Subscription model ensures recurring revenue and sustainable growth.
- Improves farm operational efficiency and compliance with regulations.

Impact and Beneficiaries

- Significantly improves animal welfare and contributes to public health by preventing zoonotic diseases.
- Boosts farm productivity and economic stability, ensuring food security for the region.
- Pig and poultry farmers benefit from enhanced disease prevention, operational efficiency, and reduced losses.
- Consumers benefit from safer, higher-quality food products and reduced risks of foodborne illnesses.

Problem Statement 77

Real time Groundwater resource evaluation using DWLR data (Software)

Need to Know

DWLR stands for Digital Water Level Recorder. These are automated devices used to continuously monitor and record groundwater levels at specific locations, providing crucial data for water resource management.

Description

Current groundwater evaluation often lacks real-time insights due to manual data collection and delayed processing from DWLRs. This hinders proactive resource management and effective decision-making for sustainable water usage.

Idea

Develop an AI-powered, real-time groundwater monitoring and predictive analytics platform that seamlessly integrates and processes DWLR data. This platform provides immediate insights and forecasting for improved resource management.

Problem Resolution

This platform automates data collection, processes DWLR readings instantly, and uses AI for immediate evaluation. It generates predictive models and alerts, enabling proactive decisions and sustainable management of groundwater resources.

How It Works

DWLR devices transmit groundwater level data wirelessly via IoT modules (e.g., LoRaWAN, NB-IoT, cellular) to a central cloud-based platform (e.g., AWS IoT Core, Google Cloud IoT). Data is ingested and stored in a time-series database (e.g., InfluxDB, PostgreSQL with TimescaleDB). A data processing pipeline (e.g., Apache Kafka for streaming, Apache Flink for real-time analytics) cleans, validates, and transforms the raw data. Machine learning models, specifically time-series forecasting algorithms (e.g., LSTM, ARIMA), are applied to analyze current trends and predict future groundwater levels. A web-based dashboard (built with frameworks like React or Angular) provides interactive visualizations, reports, and alerts to users. An API facilitates integration with existing GIS systems or other water management platforms.

Unique Selling Points

- Instantaneous groundwater level updates and trend analysis for immediate situational awareness.
- AI-driven predictive modeling forecasts future water availability and potential scarcity.
- Automated alert system notifies stakeholders of critical water level changes.
- User-friendly dashboard provides simplified data visualization and reporting features.
- Scalable and cost-effective solution for widespread deployment across regions.

Feasibility and Viability

- DWLR sensors are widely available, cost-effective, and have established deployment practices.
- Mature IoT communication protocols and cloud infrastructure exist for data transmission and storage.
- Advanced machine learning algorithms and computational resources are readily accessible for real-time analytics.

- Addresses a critical global need for sustainable water resource management and scarcity mitigation.
- Potential for significant cost savings by optimizing water allocation and reducing manual efforts.
- Strong market demand from government water authorities, environmental agencies, and agriculture sectors.

Impact and Beneficiaries

- Enables data-driven policy-making and proactive measures for sustainable management of vital groundwater reserves.
- Helps mitigate risks of water scarcity, supports agricultural planning, and ensures environmental stability.
- Government water resource departments and environmental agencies for policy and regulation.
- Farmers and agricultural communities for efficient irrigation and crop planning.

Problem Statement 78

Improving the Renewable Energy hosting capacity in Distribution Feeders improving the Power quality of Distribution network during high RE injection (Hardware)

Need to Know

RE refers to Renewable Energy. Hosting capacity is the maximum amount of RE a feeder can integrate without issues. Distribution Feeders are parts of the grid delivering power. Power quality is the consistency of voltage, frequency, and waveform. High RE injection means large amounts of renewable energy being fed into the grid.

Description

Integrating higher amounts of Renewable Energy (RE) into distribution feeders often degrades power quality. The challenge is to increase RE hosting capacity while maintaining grid stability and power quality, especially during peak RE generation periods.

Idea

Develop an AI-powered Distributed Energy Resource Management System (DERMS) coupled with smart inverters and localized energy storage. This system will optimize RE injection, manage voltage fluctuations, and enhance overall power quality within distribution networks.

Problem Resolution

Our AI-powered DERMS dynamically manages RE injection, smart inverters, and storage to absorb excess energy and mitigate voltage swings. This approach increases hosting capacity while actively improving power quality and grid stability in real-time.

How It Works

The system uses a combination of technologies. Smart meters and sensors across the distribution feeder collect real-time data on power flow, voltage, and RE generation. This data feeds into a central AI/Machine Learning engine which predicts RE output and load demand. Based on these predictions and current grid conditions, the AI sends commands to smart inverters connected to RE sources and local battery energy storage systems (BESS). Smart inverters can actively manage reactive power and voltage support, while BESS units store excess RE or inject power to stabilize the grid during dips. Communication between components is facilitated by a robust, secure IoT network. The AI continuously learns and adapts to optimize RE injection, minimize power quality issues like voltage sags/swells, and maximize the feeder's renewable energy hosting capacity.

Unique Selling Points

- Real-time AI optimization prevents grid instability, ensuring seamless integration of intermittent renewable energy sources.
- Maximizes the utilization of existing grid infrastructure, delaying costly upgrades and expanding RE hosting capacity efficiently.

- Enhances grid resilience and reliability by actively managing power flows and mitigating disturbances caused by high RE.
- Reduces electricity costs for consumers through optimized energy management and higher renewable penetration.
- Scalable and modular design allows for flexible deployment across various distribution network sizes and configurations.

Feasibility and Viability

- Existing smart grid technologies and communication infrastructure provide a strong foundation for deployment.
- Advancements in AI/ML algorithms allow for accurate prediction and real-time control necessary for grid management.
- Declining costs of battery energy storage systems make localized deployment economically viable.
- Growing demand for renewable energy and grid modernization initiatives drives market opportunity for this solution.
- Potential for significant operational cost savings for utilities through improved grid efficiency and reduced maintenance.
- Aligns with global environmental policies and incentives promoting cleaner energy integration and grid resilience.

Impact and Beneficiaries

- Accelerates the transition to a sustainable energy future by enabling higher penetration of renewable sources.
- Improves energy security and reliability by diversifying energy sources and strengthening local grids.
- Utility companies benefit from enhanced grid control, reduced operational costs, and increased customer satisfaction.
- Electricity consumers receive more reliable, higher-quality power and contribute to a greener energy system.

Problem Statement 79

Develop a blockchain-based system for botanical traceability of Ayurvedic herbs, including geo-tagging from the point of collection (farmers/wild collectors) to the final Ayurvedic formulation label. (Software)

Need to Know

Ayurvedic herbs are traditional Indian medicinal plants. Botanical traceability refers to tracking a plant's origin and journey through the supply chain. Geo-tagging involves adding geographical coordinates to data. Blockchain is a secure, decentralized, and immutable digital ledger.

Description

Ensuring authenticity and transparent traceability of Ayurvedic herbs from collection to final product is a major challenge. Current systems lack verifiable proof of origin, purity, and supply chain integrity, leading to potential adulteration.

Idea

A decentralized blockchain platform for end-to-end botanical traceability of Ayurvedic herbs. It will use geo-tagging and IoT for transparent tracking from collection by farmers/wild collectors to the final formulation label, ensuring authenticity.

Problem Resolution

Our blockchain system provides an immutable record of each herb's journey, from geo-tagged collection to formulation. This ensures authenticity, prevents adulteration, builds consumer trust, and offers verifiable proof of origin and processing.

How It Works

The system begins at the point of collection where farmers or wild collectors use a mobile application to geo-tag the precise location, capture photos of the herbs, and input initial data such as species and quantity. This information is time-stamped and immutably recorded onto a blockchain. As the herbs move through the supply chain (e.g., drying, processing, transportation), each handler scans a unique QR code or NFC tag associated with the batch. GPS data from their devices automatically updates location. Any processing steps, quality checks, or certifications are added as new blocks of data to the herb's immutable ledger. When an Ayurvedic manufacturer uses these herbs in a formulation, they record the specific batch IDs, linking the final product to the complete history of its ingredients. The final Ayurvedic product label will include a QR code, allowing consumers to scan it and access a comprehensive, verifiable history of the herbs, including their origin, processing details, and quality certifications. The core technologies involved are: Blockchain (e.g., Hyperledger Fabric or Ethereum for enterprise solutions) for secure, decentralized, and immutable data storage; GPS and Geo-tagging for location verification; IoT devices (optional, but can enhance data collection for environmental conditions); Mobile Applications for data input at collection and processing points; Smart Contracts to automate verification, trigger alerts, and manage ownership transfers; and QR/NFC Tags for easy physical tracking and data access.

Unique Selling Points

- Immutable record of origin and processing via blockchain ensures data integrity and trust.
- Real-time geo-tagging for precise location data at every stage of the supply chain.
- Enhanced consumer trust through verifiable product authenticity and transparent sourcing.
- Significant reduction in adulteration and fraud within the Ayurvedic supply chain.
- Streamlined compliance and regulatory reporting for producers and manufacturers.

Feasibility and Viability

- Blockchain technology is mature and proven for supply chain traceability.
- Ubiquitous GPS and mobile technology enable widespread, easy geo-tagging.
- Existing supply chain logistics can integrate digital tracking solutions readily.
- Growing consumer demand for authentic, transparent, and ethically sourced Ayurvedic products.
- Reduces potential recall costs and significantly improves brand reputation for manufacturers.
- Enables premium pricing for certified, transparent products, creating new market opportunities.

Impact and Beneficiaries

- Empowers consumers with full transparency, ensuring product safety and quality.
- Supports ethical sourcing, fair trade practices, and sustainable collection for farmers.
- Consumers gain trust in the authenticity, purity, and safety of Ayurvedic medicines.
- Ayurvedic manufacturers enhance brand reputation, ensure compliance, and optimize supply chain efficiency.

Problem Statement 80

GREY WATER MANAGEMENT AND REUSE WET LAND MANAGEMENT WATER CONSERVATION (Hardware)

Need to Know

Grey water refers to wastewater from sinks, showers, and laundry, excluding toilet water. Wetland management involves the conservation and restoration of natural or constructed wetlands, which act as natural filters and crucial ecosystems.

Description

Global water scarcity and environmental degradation necessitate effective grey water management, reuse, and sustainable wetland conservation to ensure long-term water security.

Idea

An integrated smart grey water recycling system combined with constructed wetlands to treat, reuse, and conserve water resources efficiently for residential and community applications.

Problem Resolution

This system efficiently treats grey water, significantly reduces fresh water demand for non-potable uses, and enhances ecological health through natural filtration in constructed wetlands.

How It Works

Grey water from sources like showers, sinks, and washing machines is collected and directed through an initial physical filtration stage (e.g., mesh screens, sand filters) to remove larger particles. The pre-treated water then flows into a constructed wetland, which is an engineered system designed to mimic natural wetlands. Here, specific aquatic plants (e.g., reeds, cattails) and a diverse microbial community living in the root zone and substrate biologically break down and filter out pollutants (nutrients, organic matter, pathogens) through processes like adsorption, nitrification, and denitrification. IoT sensors are integrated to monitor key parameters such as water levels, flow rates, pH, turbidity, and dissolved oxygen at various stages, allowing for real-time performance tracking and system optimization. The treated water, now safe for non-potable uses, is collected in a storage tank and can be pumped for irrigation, toilet flushing, car washing, or released to recharge groundwater, further contributing to water conservation. Key technologies involve smart sensors, low-power pumps, bio-filtration media, and a selection of native wetland plant species suited for bioremediation.

Unique Selling Points

- Eco-friendly approach utilizing natural processes for water treatment and purification, reducing chemical dependency.
- Reduces household water bills by providing a sustainable alternative for non-potable uses like irrigation and flushing.
- Scalable and modular design suitable for both individual homes and community-level implementation, ensuring adaptability.
- Enhances local biodiversity and creates green spaces through integrated constructed wetlands, improving aesthetics.

- Smart monitoring system ensures optimal performance and real-time water quality assessment, ensuring safety and efficiency.

Feasibility and Viability

- Utilizes well-established filtration and bioremediation technologies, ensuring technical viability and reliability.
- Modular design allows for easy implementation and scaling across different property sizes and community needs.
- Availability of materials, plant species, and technical expertise for constructing wetlands is widespread.
- Government incentives and policies often support water-saving technologies, aiding adoption.
- Significant long-term savings on municipal water bills make it economically attractive for end-users.
- Reduces strain on existing municipal fresh water supplies, benefiting water utilities and public resources.
- Increases property value by offering sustainable living features and green infrastructure integration.

Impact and Beneficiaries

- Substantially reduces fresh water consumption from municipal sources, easing pressure on strained natural water resources.
- Improves local ecosystem health and biodiversity by creating or enhancing wetland habitats, attracting wildlife.
- Households and communities gain access to a sustainable, cost-effective water source for non-potable needs, reducing reliance on fresh water.
- The local environment and wildlife benefit from healthier ecosystems, reduced water pollution, and enhanced biodiversity.

Problem Statement 81

Research and develop a design on autonomous small precision focused machine for planting crops or weeding. (Software)

Need to Know

Autonomous means self-governing. A small precision focused machine is a compact robot performing accurate, localized tasks. Planting crops is sowing seeds; weeding is removing unwanted plants.

Description

Farmers face challenges with labor-intensive, imprecise crop planting and weeding. Current methods are often inefficient, leading to resource waste and environmental harm from excessive herbicide use.

Idea

An AI-powered, autonomous micro-robot system designed for precision agriculture, capable of intelligent, targeted crop planting and weed removal, optimizing resource use and minimizing manual labor for farmers.

Problem Resolution

This autonomous robot addresses labor shortages and improves efficiency by automating precision tasks. It reduces herbicide use through targeted weeding and optimizes planting for higher yields and sustainability in farming.

How It Works

The autonomous machine utilizes GPS/RTK for centimeter-level navigation accuracy within fields. Integrated computer vision systems, powered by deep learning models, analyze camera feeds to precisely differentiate between crops and weeds. Based on this identification, a precision robotic arm with specialized end-effectors (e.g., seed dispensers, micro-sprayers for targeted herbicide, or mechanical removers) performs the task. IoT sensors gather real-time data on soil conditions. All data is processed on-board or transmitted to a cloud platform for continuous learning, operational optimization, and detailed farm mapping. Key technologies include AI/Machine Learning, Computer Vision, GPS/RTK, Robotics (actuators, end-effectors), IoT sensors, and Cloud Computing.

Unique Selling Points

- Ultra-precise task execution for planting and weeding, significantly reducing resource waste and enhancing crop health.
- Fully autonomous operation minimizes human intervention, dramatically lowering labor costs and freeing up farmer time.
- AI-driven plant recognition precisely identifies crops and weeds, enabling targeted action without affecting desired plants.
- Environmentally friendly design reduces reliance on chemical herbicides, promoting healthier soil and ecosystems.

- Modular and scalable system, adaptable for various farm sizes and crop types, offering versatile agricultural solutions.

Feasibility and Viability

- Existing mature technologies in autonomous navigation and computer vision are readily available and proven.
- Advancements in miniaturization of robotics and embedded AI processing make compact, efficient designs possible.
- Decreasing costs of sensors and robotic components lower the barrier to entry for developing such systems.
- Addresses critical agricultural labor shortages and the increasing demand for sustainable farming practices.
- Potential for substantial return on investment through increased crop yields and reduced operational costs.
- Strong market demand for innovative, efficient, and eco-friendly solutions in precision agriculture globally.

Impact and Beneficiaries

- Transforms traditional farming practices by introducing automation, significantly boosting efficiency and productivity on farms.
- Promotes environmental sustainability by drastically reducing chemical herbicide use and optimizing resource allocation.
- Small to medium-sized farmers gain efficiency, reduce labor dependency, and achieve higher yields with optimized farming.
- The environment benefits from reduced chemical runoff, improved soil health, and more sustainable agricultural practices.

Problem Statement 82

Smart Classroom & Timetable Scheduler (Software)

Need to Know

A Smart Classroom refers to a learning space enhanced with technology for improved teaching. A Timetable Scheduler automates the process of assigning classes, teachers, and rooms, optimizing resource allocation.

Description

Manual classroom and timetable scheduling is inefficient, leading to conflicts, underutilized resources, and significant administrative burden. This impacts academic operations and student learning experiences negatively.

Idea

An AI-powered Smart Classroom & Timetable Scheduler that automates and optimizes resource allocation for educational institutions. It ensures efficient use of classrooms and faculty, minimizing conflicts and enhancing learning environments.

Problem Resolution

This system resolves scheduling conflicts instantly, optimizes classroom usage based on capacity and features, and ensures equitable faculty load distribution. It significantly enhances operational efficiency and institutional adaptability.

How It Works

The system leverages AI and Machine Learning algorithms to process extensive input data including course requirements, faculty availability, classroom features (e.g., lab equipment, capacity), and student enrollment numbers. A cloud-based platform (e.g., AWS, Azure) hosts the core application, enabling scalability and accessibility. IoT sensors deployed in smart classrooms provide real-time data on occupancy, temperature, and lighting conditions. This data is fed into a central database and used by the ML model to continuously learn from usage patterns, refine future schedules, and automatically adjust classroom settings for optimal learning environments. APIs facilitate seamless integration with existing student information systems (SIS) and other institutional platforms. The backend is typically built with Python or Java, interacting with a robust SQL or NoSQL database, while the frontend is developed using modern frameworks like React or Angular for an interactive user interface.

Unique Selling Points

- AI-driven optimization for conflict-free, highly efficient timetables.
- Real-time adaptability to unexpected changes like faculty absences or facility issues.
- Predictive analytics for future resource planning and demand forecasting.
- Seamless integration with smart classroom IoT for automated environment control.
- Intuitive, user-friendly interface for easy schedule management and access.

Feasibility and Viability

- Core scheduling algorithms are well-established and can be adapted effectively.
- Cloud infrastructure provides scalable, accessible, and robust computing resources.
- Off-the-shelf IoT sensors for smart classroom functionalities are readily available.

- Data for scheduling, such as course details and faculty availability, is easily accessible.
- Significant market demand from educational institutions globally seeking efficiency.
- Reduces administrative costs and improves resource utilization for schools and universities.
- Scalable architecture allows deployment across various institution sizes and complexities.

Impact and Beneficiaries

- Enhances the learning environment through optimized classroom conditions and stable, conflict-free schedules.
- Boosts administrative efficiency by significantly reducing the manual workload associated with scheduling.
- Students benefit from stable schedules, reduced class disruptions, and optimal learning environments.
- Faculty gain from fair workload distribution, reduced scheduling conflicts, and improved teaching conditions.

Problem Statement 83

Secure Data Wiping for Trustworthy IT Asset Recycling (Software)

Need to Know

Secure Data Wiping is the permanent, irrecoverable deletion of data from storage devices. IT Asset Recycling is the environmentally responsible disposal and reuse of old computer equipment. The core challenge is ensuring data is truly gone before recycling to prevent breaches.

Description

Many organizations struggle with truly secure data wiping on old IT assets, leading to potential data breaches and privacy risks when these assets are recycled or disposed of. Current methods often lack verifiable proof.

Idea

A blockchain-powered platform for verifiable and tamper-proof secure data wiping, ensuring complete data destruction before IT assets are recycled, building trust and compliance.

Problem Resolution

This idea provides an auditable, cryptographic record of secure data destruction for every IT asset, eliminating uncertainty and mitigating data breach risks during recycling.

How It Works

The system involves several steps and technologies to ensure verifiable data destruction. First, each IT asset is registered with a unique identifier on a blockchain ledger, recording details like asset type and serial number. Next, specialized data wiping software (e.g., using DoD 5220.22-M, NIST SP 800-88, or Gutmann algorithms) is applied to the storage media, securely overwriting data multiple times. Post-wiping, a verification module performs forensic checks to confirm data irrecoverability, generating a cryptographic hash of the wiped drive's state. This verification report, including the cryptographic hash and timestamp, is then recorded as an immutable transaction on the blockchain. Smart contracts can automate compliance checks and generate certificates of destruction once wiping and verification are successfully recorded. A cloud-based dashboard provides users (organizations, recycling partners, auditors) with real-time access to asset status, destruction certificates, and audit trails. Integration with hardware-based wiping solutions or physical destruction methods can also be verified and recorded on the blockchain for comprehensive asset management.

Unique Selling Points

- **Tamper-Proof Verification:** Blockchain ensures an immutable record of data wipe status, providing unquestionable proof.
- **Enhanced Security:** Utilizes industry-leading data destruction algorithms for complete data sanitization, preventing recovery.
- **Regulatory Compliance:** Simplifies adherence to stringent data protection laws like GDPR, HIPAA, and CCPA, avoiding penalties.
- **Transparency & Auditability:** Provides verifiable proof of data destruction for all stakeholders, enhancing trust and accountability.

- Environmental Responsibility: Encourages secure recycling while protecting sensitive information, supporting sustainable practices.

Feasibility and Viability

- Blockchain technology is mature and proven for creating tamper-proof, distributed ledgers, making immutable record-keeping feasible.
- Advanced data wiping software and forensic verification tools are readily available and widely implemented in the industry.
- Cloud infrastructure and APIs support scalable deployment, real-time access, and integration with existing IT asset management systems.
- Addresses a critical market need for enhanced data security and compliance in IT asset disposition, demanded by businesses.
- Reduces legal and financial risks associated with data breaches and non-compliance, saving organizations significant costs.
- Enhances brand reputation and customer trust through transparent and verifiable secure data handling practices.

Impact and Beneficiaries

- Significantly reduces the risk of costly data breaches and identity theft originating from improperly wiped IT assets.
- Promotes a more secure and trustworthy circular economy for electronics, encouraging responsible recycling practices globally.
- Organizations (businesses, government agencies) needing secure, compliant, and verifiable IT asset disposal solutions.
- IT asset recycling companies gaining a competitive edge by offering demonstrably trustworthy and transparent services.

Problem Statement 84

Centralised Digital Platform for Comprehensive student activity record in HEIs (Software)

Need to Know

HEIs stands for Higher Education Institutions, referring to universities and colleges. A comprehensive student activity record includes not just academic grades but also extracurriculars, projects, volunteering, awards, certifications, and leadership roles.

Description

Higher Education Institutions (HEIs) lack a centralized digital platform to comprehensively record and track diverse student activities beyond academics. This leads to fragmented data, making it challenging to get a holistic view of student engagement and achievements.

Idea

A 'Student Activity Hub' – a centralized digital platform for HEIs to manage, verify, and showcase all student activities, from academic projects to extracurricular involvement, fostering holistic development and verifiable portfolios.

Problem Resolution

This platform consolidates all student data into one secure location, providing a complete, verifiable record. It simplifies tracking, enhances student profiles, and enables HEIs to better assess and support student growth beyond academic metrics.

How It Works

The platform allows students to log various activities such as club participation, project completions, volunteer hours, and awards. Faculty or designated administrators verify these entries, ensuring data accuracy. All verified information is securely stored in a cloud-based database (e.g., AWS, Azure). Students can access a personalized dashboard via a web portal or mobile app to view their complete activity profile, track progress, and generate official, verifiable reports or digital badges. The system will leverage a modern technology stack: a frontend built with React or Angular for a responsive user interface, a backend developed using Node.js with Express.js or Python with Django/Flask for robust API services, a PostgreSQL or MongoDB database for scalable data storage, and potentially blockchain technology for immutable record verification and enhanced trust. APIs will facilitate integration with existing HEI systems like LMS (Learning Management Systems) and SIS (Student Information Systems).

Unique Selling Points

- Verified activity logs ensuring authenticity and credibility of student participation and achievements.
- Holistic student profiles showcasing skills, projects, and leadership, not just academic grades.
- Seamless integration capabilities with existing HEI learning management and student information systems.
- Personalized skill and interest mapping helping students identify growth areas and opportunities.
- Enhanced employability through a robust, verifiable digital portfolio for career and further study applications.

Feasibility and Viability

- Leverages existing, mature cloud infrastructure for scalable, secure data storage and processing.
- Utilizes widely adopted web and mobile development frameworks, enabling rapid development and deployment.
- Integration with university IT systems is achievable through standard API protocols and data exchange methods.
- Reduces significant administrative burden on HEI staff by automating student activity record keeping.
- Enhances institutional reputation by showcasing comprehensive student success and engagement.
- Provides a valuable service to students, improving their academic journey and future career prospects.

Impact and Beneficiaries

- Revolutionizes student assessment beyond academic grades, recognizing diverse talents and contributions.
- Empowers students with a verifiable, comprehensive digital portfolio for future academic and career pursuits.
- **Students:** Gain a complete, verifiable digital record of all their achievements, aiding academic and career progression.
- **Higher Education Institutions (HEIs):** Streamline record management, enhance student support, and improve institutional reporting.

Problem Statement 85

Disaster Preparedness and Response Education System for Schools and Colleges (Software)

Need to Know

This system aims to educate students and staff in schools and colleges about how to prepare for, respond to, and recover from various disasters like earthquakes, floods, and fires, minimizing risks and enhancing safety.

Description

Many educational institutions lack comprehensive and engaging disaster preparedness education. This leaves students and staff vulnerable during emergencies due to insufficient knowledge and practice, leading to potential chaos and increased casualties.

Idea

Develop an interactive, AI-powered digital platform providing tailored disaster preparedness and response education, incorporating gamification, simulations, and real-time alerts for schools and colleges.

Problem Resolution

The platform offers engaging, standardized, and location-specific training modules, empowering students and staff with critical skills and knowledge. This proactive approach reduces panic and enhances effective emergency response.

How It Works

The platform uses AI to create personalized learning paths, adapting content based on user interaction and local risk assessments. It integrates AR/VR for immersive simulation drills, allowing users to practice emergency responses in virtual environments. Gamification elements, like points and badges, incentivize participation. Cloud computing ensures scalability and data storage, while mobile applications offer accessibility on smartphones and tablets. Content is developed collaboratively with disaster management experts and localized using geospatial data. Technologies involved include AI/ML for personalization, AR/VR for simulations, cloud services (AWS, Azure, GCP) for infrastructure, mobile development frameworks (React Native, Flutter), and data analytics for performance tracking.

Unique Selling Points

- Gamified learning modules and interactive simulations make education engaging and memorable for students.
- Personalized learning paths adapted by AI based on user progress and regional disaster risks.
- Integration with local emergency services for real-time alerts and localized response protocols.
- AR/VR-based immersive drills provide realistic scenario training without physical risk.
- Cloud-based platform ensuring accessibility across devices and easy content updates for all institutions.

Feasibility and Viability

- Leverages existing widely available digital technologies (AI, AR/VR, cloud) for rapid development.

- Scalable content creation, allowing easy adaptation to specific regional disaster risks and languages.
- Can be integrated with existing school management systems for seamless user onboarding and progress tracking.
- Offers subscription models for institutions, ensuring sustainable revenue for continuous development and updates.
- Potential for partnerships with government disaster management agencies and NGOs for broader adoption.
- Regular content updates and new module additions keep the platform relevant and engaging for long-term use.

Impact and Beneficiaries

- Significantly reduces potential casualties and injuries during disasters by fostering a well-prepared community.
- Enhances the overall resilience of educational institutions and surrounding communities against various emergencies.
- Students and educators gain crucial life-saving skills, empowering them to act decisively in emergencies.
- Emergency services benefit from a more informed public, streamlining response efforts and reducing chaos.

Problem Statement 86

Disaster Response Drone for Remote Areas (Hardware)

Need to Know

Disaster response drones are uncrewed aerial vehicles used for reconnaissance, search and rescue, and aid delivery during emergencies. Remote areas are geographically isolated regions often lacking infrastructure, making traditional response difficult.

Description

Remote areas face significant challenges during disasters due to difficult terrain, damaged infrastructure, and slow traditional response. This delays critical aid, information, and rescue operations, increasing casualties and suffering.

Idea

Our idea is a 'Rapid Response Drone System' specifically designed for disaster relief in remote, inaccessible areas. It utilizes advanced AI and robust hardware to quickly assess damage, locate survivors, and deliver essential supplies.

Problem Resolution

This drone system overcomes remote area challenges by providing rapid aerial assessment, bypassing impassable routes. It accelerates search and rescue efforts and ensures faster delivery of critical aid, saving lives effectively.

How It Works

The system involves advanced drones equipped with high-resolution cameras, thermal imaging sensors, and LiDAR for comprehensive environmental mapping and victim detection. AI algorithms process this data for autonomous navigation, obstacle avoidance, and identifying anomalies (e.g., heat signatures for survivors). Communication is maintained via satellite links or mesh networks, enabling real-time data transmission to ground control. Drones can carry modular payloads for delivering small medical kits, communication devices, or emergency rations to specific locations using precision drop mechanisms. GPS ensures accurate positioning and delivery.

Unique Selling Points

- Rapid deployment and high mobility in challenging terrains.
- AI-powered autonomous navigation and victim detection.
- Real-time high-definition mapping and data collection.
- Modular payload for diverse aid delivery (medical, communication).
- Extended flight time and robust all-weather operation.

Feasibility and Viability

- Existing drone technology offers robust aerial platforms.
- AI and sensor tech for imaging and navigation are mature.
- Satellite communication provides global connectivity.
- Reduces operational costs compared to manned aircraft.
- Scalable system adaptable to various disaster types.
- Enhances emergency response efficiency significantly.

Impact and Beneficiaries

- Significantly reduces fatalities and injuries in remote disasters.
- Provides critical information for effective resource allocation.
- Disaster-stricken communities in remote and isolated regions.
- Emergency response teams and humanitarian organizations.

Problem Statement 87

AI-Powered Mobile Platform for Democratizing Sports Talent Assessment (Software)

Need to Know

Democratizing Sports Talent Assessment means making talent identification and evaluation fair, accessible, and available to all aspiring athletes, irrespective of their location, background, or economic status. It aims to break down traditional barriers.

Description

Current sports talent identification is often subjective, biased, geographically limited, and inaccessible to many aspiring athletes, especially in underserved regions, hindering potential discovery.

Idea

An AI-powered mobile platform that utilizes advanced video analysis and machine learning to provide objective, affordable, and globally accessible sports talent assessment for all athletes.

Problem Resolution

The platform democratizes talent assessment by offering a standardized, unbiased, and accessible tool via a smartphone, overcoming geographical and financial barriers to opportunity.

How It Works

Users record their sports performance exercises via a mobile application. The app then uploads these videos to a cloud-based server. AI and Machine Learning algorithms, specifically computer vision models (e.g., using frameworks like TensorFlow or PyTorch for pose estimation, object tracking, and biomechanical analysis), process the video data. These algorithms analyze various sport-specific metrics such as speed, agility, technique, form, and reaction time. Deep learning models continuously refine their accuracy with more data. The processed data is then compiled into comprehensive performance reports, offering objective scores, strengths, weaknesses, and personalized feedback. Technologies involved include mobile app development (iOS/Android), cloud computing platforms (AWS, Azure, Google Cloud), computer vision libraries (OpenCV), and machine learning frameworks.

Unique Selling Points

- Objective AI analysis eliminates human bias in talent evaluation, ensuring fairness.
- Global accessibility via any smartphone, transcending geographical limitations for talent discovery.
- Cost-effective solution compared to traditional, expensive scouting and assessment methods.
- Provides personalized, data-driven feedback for athlete skill development and improvement.
- Standardized metrics ensure consistent and fair comparison across all users worldwide.

Feasibility and Viability

- Smartphone camera technology is ubiquitous and advanced enough for high-quality video capture.
- Existing AI/ML frameworks for computer vision are readily available for integration and powerful.

- Cloud computing infrastructure provides scalable processing power for intensive video analysis.
- Addresses a clear market gap for accessible, unbiased talent assessment globally.
- Potential for diverse revenue streams, including subscriptions and professional scouting services.
- Strong partnership opportunities with sports federations, academies, and professional clubs.

Impact and Beneficiaries

- Uncovers hidden talent globally, fostering diversity and inclusion in professional sports.
- Empowers aspiring athletes with objective feedback and data, opening pathways to opportunities.
- Aspiring athletes gain fair, unbiased assessment and development insights, regardless of background.
- Sports organizations and scouts access a wider, more diverse, and objectively pre-assessed talent pool efficiently.

Problem Statement 88

Low-Cost smart transportation solution for Agri produce from remote farms to nearest motorable road in NER Region (Hardware)

Need to Know

Agri produce refers to agricultural products like fruits, vegetables, grains. NER Region stands for North Eastern Region of India, known for its challenging terrains and remote farming communities.

Description

Farmers in remote areas of India's North Eastern Region struggle with transporting agricultural produce to main roads, leading to spoilage and economic loss. A low-cost, smart transport solution is urgently needed.

Idea

Develop 'Agri-Connect', an autonomous, electric-powered last-mile transport system using small, rugged robotic shuttles and a smart logistics platform to connect remote farms to motorable roads in the NER.

Problem Resolution

Agri-Connect provides an affordable, efficient, and reliable transport link for farmers. It minimizes spoilage, reduces manual labor, and boosts market access, directly addressing current logistical hurdles in remote areas.

How It Works

The Agri-Connect system utilizes small, rugged autonomous electric vehicles (EVs) specifically designed for rough, unpaved farm roads. These EVs are equipped with a suite of sensors including LiDAR, cameras, GPS, and Inertial Measurement Units (IMU) for precise navigation and obstacle avoidance. Farmers use a simple mobile application to request a pick-up, specifying their location, the type of produce, and estimated quantity. A central cloud-based logistics platform, powered by AI and machine learning algorithms, processes these requests. It optimizes routing, allocates the nearest available Agri-Connect shuttle, and schedules pick-ups to maximize efficiency and minimize waiting times. The autonomous shuttles navigate to the specified farm, where farmers can easily load their produce into secured compartments. The shuttle then transports the produce to a designated collection hub located on the nearest motorable road, where it can be transferred to larger vehicles for further distribution. Communication between the shuttles, the central platform, and farmers is facilitated by IoT modules and robust cellular network connectivity. Battery swapping stations or fast-charging points are strategically deployed to ensure continuous operation. Data collected from each trip helps the system continually learn and improve its routing and scheduling algorithms, further enhancing operational efficiency.

Unique Selling Points

- Cost-effective, autonomous electric vehicles reduce labor and fuel expenses for farmers significantly.

- Off-road capability ensures access to highly remote and challenging farm locations where traditional transport fails.
- Real-time tracking and optimized routing minimize transit time and spoilage, preserving produce quality.
- Environmentally friendly operation with zero emissions supports sustainable agriculture and local ecosystems.
- Scalable network easily integrates with existing infrastructure and can expand coverage across the NER region.

Feasibility and Viability

- Existing autonomous navigation technologies are mature enough for controlled, low-speed environments like farm roads.
- Electric vehicle manufacturing costs are steadily decreasing, making specialized Agri-Connect shuttles affordable to produce.
- Widespread mobile network coverage, even in remote areas, supports app-based logistics and real-time tracking.
- Off-the-shelf components for robotics and EV propulsion can be adapted for rugged agricultural use.
- Local government support for agricultural innovation and infrastructure development in NER.
- Farmers will pay a subscription or per-use fee, creating a sustainable revenue model for the service provider.
- Potential for government subsidies and grants for agricultural technology and green transportation initiatives.
- Scalability allows for expansion across the entire NER region and other remote agricultural zones, ensuring market growth.

Impact and Beneficiaries

- Significantly reduces post-harvest losses, increasing farmer income by ensuring fresh produce reaches markets efficiently.
- Empowers remote farmers with better market access, fostering rural economic growth and reducing reliance on intermediaries.
- Farmers in remote NER regions gain efficient, affordable access to markets for their produce, improving their livelihoods.
- Consumers benefit from fresher, more readily available agricultural products at potentially lower costs due to reduced spoilage.

Problem Statement 89

AI based development of Laser based QR Code marking on 'track fittings on Indian Railways'. (Hardware)

Need to Know

Track fittings are components securing rails to sleepers. Indian Railways is a vast network needing robust asset management. QR Code marking uses scannable codes for unique identification. Laser marking ensures durable, precise, non-contact identification.

Description

Indian Railways' track fitting identification and tracking are often manual, time-consuming, and error-prone. This leads to inefficient maintenance, poor asset management, and safety concerns. A robust, automated identification system is crucial for improving operational efficiency.

Idea

An AI-powered laser-based QR code marking system for Indian Railways' track fittings. This automates precise, durable asset identification, enhancing traceability, maintenance efficiency, and safety across the vast rail network.

Problem Resolution

The AI-driven laser marking system resolves manual tracking inefficiencies by providing durable, unique QR codes on fittings. This automates asset identification, streamlines maintenance, reduces human error, and improves data accuracy for Indian Railways.

How It Works

The system integrates several key technologies. Computer Vision and Machine Learning algorithms are trained on images of various track fittings to accurately identify their type, orientation, and optimal marking location. Once identified, a robotic arm positions a high-precision fiber laser engraver to etch a unique QR code onto the fitting's surface. The QR code contains essential metadata like manufacturing date, material, and serial number. This data is then linked to a central IoT-enabled cloud database for real-time tracking and inventory management. When fittings require inspection or maintenance, mobile devices with QR code scanners can quickly access their history and specifications. The AI continuously learns from marking outcomes, optimizing speed and accuracy over time, making the process highly efficient and automated.

Unique Selling Points

- Laser-etched QR codes resist extreme weather, corrosion, and wear, ensuring long-term readability and durability in harsh rail environments.
- AI vision systems enable precise placement and marking on diverse fitting types, significantly reducing manual errors and enhancing accuracy.
- Unique digital IDs for each fitting facilitate real-time tracking, comprehensive inventory management, and detailed maintenance history records.
- Reduces labor costs, minimizes asset misidentification, and optimizes maintenance schedules, leading to substantial operational cost efficiencies.
- Accurate asset data enables proactive maintenance and swift replacement of faulty components, significantly enhancing railway safety and reliability.

Feasibility and Viability

- Laser marking, AI computer vision, and robotics are mature, commercially available technologies ready for integration.
- Indian Railways possesses extensive historical data on track components, ideal for training robust AI identification models.
- The system can be deployed incrementally, starting with critical components, allowing for phased implementation and scaling.
- Significantly reduces manual labor, minimizes asset loss, and optimizes preventive maintenance, leading to substantial cost savings.
- Streamlines inspection, repair, and replacement processes, boosting operational efficiency and minimizing track downtime.
- Provides robust audit trails and accurate data, ensuring compliance with safety regulations and industry standards more effectively.

Impact and Beneficiaries

- Revolutionizes Indian Railways' asset management by transforming how vast infrastructure components are tracked and maintained.
- Significantly enhances safety and reliability through proactive, data-driven maintenance, reducing risks from faulty components.
- Indian Railways benefits from improved asset visibility, reduced operational costs, and enhanced network safety and efficiency.
- Maintenance crews gain faster, more accurate identification, streamlined workflows, and access to critical asset information.

Problem Statement 90

AI-powered monitoring of crop health, soil condition, and pest risks using multispectral/hyperspectral imaging and sensor data. (Software)

Need to Know

Multispectral/Hyperspectral imaging captures detailed data across many light spectrums, revealing crop health and soil characteristics. Sensor data provides real-time environmental metrics. AI processes this information to identify issues proactively.

Description

Farmers struggle with manual, time-consuming crop health, soil condition, and pest risk assessments. Current methods lack precision and proactive insights, leading to delayed interventions and potential yield losses due to undetected issues.

Idea

An AI-powered precision agriculture platform using multispectral/hyperspectral imaging from drones/satellites and ground sensor data. It provides real-time insights into crop health, soil dynamics, and pest threats for optimized farm management.

Problem Resolution

This platform offers automated, precise, and proactive monitoring. It quickly identifies issues like nutrient deficiencies or pest outbreaks, enabling timely interventions, reducing losses, and improving resource efficiency for farmers.

How It Works

The system uses drones or satellites equipped with multispectral/hyperspectral cameras for imaging, alongside ground-based IoT sensors gathering soil moisture, pH, and temperature data. This vast dataset is transmitted to a cloud computing platform. Machine Learning and Deep Learning algorithms, specifically Convolutional Neural Networks (CNNs), process the imagery and sensor data. Computer Vision techniques extract features, identifying anomalies related to crop health, nutrient deficiencies, and pest infestations. Geographic Information Systems (GIS) provide spatial context. The AI models analyze patterns and predict risks. Farmers then receive actionable insights, alerts, and precise recommendations via a user-friendly web/mobile application dashboard, enabling targeted interventions and optimized resource management. Key technologies involved include multispectral/hyperspectral imaging, IoT sensors, cloud computing, machine learning, deep learning, computer vision, and GIS.

Unique Selling Points

- Early detection of crop diseases and nutrient deficiencies before visible symptoms appear, minimizing yield loss.
- Optimized resource allocation for water, fertilizers, and pesticides, leading to significant cost savings and sustainability.
- Predictive analytics for pest outbreaks and disease spread, allowing for proactive, targeted interventions.

- Comprehensive, real-time insights into entire farm health, accessible via user-friendly dashboards on any device.
- Improved decision-making for farmers through data-driven recommendations, maximizing crop yield and quality.

Feasibility and Viability

- Multispectral cameras, IoT sensors, and drone technology are mature and commercially available, lowering development barriers.
- Advancements in AI and cloud computing provide robust platforms for processing and analyzing large datasets efficiently.
- Existing agricultural data and research on plant signatures facilitate training accurate machine learning models.
- High demand for precision agriculture solutions to optimize yields, reduce costs, and enhance sustainability.
- Significant return on investment for farmers through reduced input costs and increased crop productivity.
- Scalable business model adaptable to various farm sizes and crop types, from small to large-scale operations.

Impact and Beneficiaries

- Enhances global food security by increasing agricultural productivity and reducing crop losses worldwide.
- Promotes sustainable farming practices by optimizing resource use and minimizing environmental impact.
- Farmers: Gain real-time, actionable insights for better decision-making, leading to higher yields and profits.
- Agricultural industry: Benefits from increased efficiency, reduced waste, and a more resilient food supply chain.

Problem Statement 91

To explore new/alternative assaying methods to the fire assay method for testing of gold jewellery and artefacts through non-destructive testing (Hardware)

Need to Know

Fire assay is a traditional, destructive method for determining gold purity, involving melting a small sample. Non-destructive testing (NDT) refers to evaluating materials or components without causing permanent damage to the item being tested.

Description

Current gold assaying, like fire assay, damages valuable items. We need new, non-destructive ways to accurately test gold jewelry and artifacts, preserving their integrity and value for owners.

Idea

Develop an advanced Non-Destructive Gold Assaying System using X-ray Fluorescence (XRF) combined with Eddy Current testing for rapid, accurate, and damage-free purity verification of gold jewelry and artifacts.

Problem Resolution

This system offers precise, real-time gold purity analysis without destroying or damaging valuable items. It preserves the integrity of jewelry and artifacts, overcoming limitations of destructive methods, enhancing trust and efficiency.

How It Works

The system primarily utilizes X-ray Fluorescence (XRF) spectroscopy. An XRF analyzer directs a focused beam of X-rays onto the gold item. These X-rays excite atoms in the sample, causing them to emit secondary, characteristic X-rays (fluorescence) unique to each element. A detector measures the energy and intensity of these fluorescent X-rays. By analyzing the spectrum, the system identifies the elemental composition (e.g., gold, silver, copper, nickel) and their proportions, thereby calculating the gold karat value. For enhanced verification and to detect gold plating versus solid gold, Eddy Current testing can be integrated. Eddy Current technology works by inducing a magnetic field that creates small electrical currents (eddy currents) in conductive materials. Changes in these currents, caused by variations in material conductivity or thickness (like a thin gold layer over a base metal), are measured to provide insights into the item's internal structure and material depth. Technologies involved include a miniature X-ray tube, a high-resolution silicon drift detector (SDD), digital signal processors for spectrum analysis, specialized software for data interpretation, and an Eddy Current probe with an associated impedance analyzer.

Unique Selling Points

- Preserves item integrity: No physical damage to valuable gold jewelry or historical artifacts during testing.

- **Rapid analysis:** Provides instant or near-instantaneous results, significantly faster than traditional destructive methods.
- **High accuracy:** Delivers precise elemental composition and karat values, ensuring reliable purity assessment.
- **Environmentally friendly:** Eliminates the use of harsh chemicals or high heat associated with destructive assays.
- **Versatile application:** Suitable for a wide range of gold items, from delicate antiques to modern jewelry pieces.

Feasibility and Viability

- XRF technology is mature and widely available for elemental analysis in various industries, proving its reliability.
- Existing portable XRF devices demonstrate the practical application and ease of on-site gold testing.
- Integration with Eddy Current sensors is straightforward, enhancing detection of gold plating or base metal cores.
- Specialized XRF software is available for accurate karat value calculation and elemental identification.
- High market demand from jewelers, pawn shops, customs, and museums for non-destructive, quick, accurate gold testing.
- Reduces material loss and liability for businesses, increasing operational efficiency and building customer trust.
- Potentially lower long-term operational costs compared to destructive methods requiring specific lab setups and consumables.

Impact and Beneficiaries

- Enhances consumer trust and transparency in gold transactions by providing verifiable, non-destructive purity checks.
- Preserves historical and cultural heritage by allowing analysis of invaluable artifacts without any damage or alteration.
- Jewelers and pawn shop owners benefit from faster, more accurate, and damage-free gold testing, improving workflow and security.
- Consumers and collectors gain assurance of gold purity and authenticity without risk to their valuable and cherished items.

Problem Statement 92

Development of indigenous contactless Integrated Track Monitoring Systems (ITMS) for Track Recording on Indian Railways (Hardware)

Need to Know

ITMS stands for Integrated Track Monitoring Systems, which are crucial for assessing railway track health. Contactless means measurement without physical contact, typically using sensors. Indigenous development implies creating the system within India, reducing reliance on foreign technology. Track Recording involves systematically measuring parameters like track gauge, alignment, and cant to ensure safety and operational efficiency on Indian Railways.

Description

Indian Railways needs an indigenous, contactless Integrated Track Monitoring System (ITMS) for efficient and accurate track recording. The current reliance on manual methods and imported solutions limits scalability and real-time insights, impacting safety and operational costs.

Idea

Develop an AI-powered, contactless ITMS utilizing advanced sensors and computer vision for real-time track monitoring. This indigenous system will enhance track safety, optimize maintenance, and reduce operational costs for Indian Railways.

Problem Resolution

This system provides real-time, accurate track data, eliminating manual errors and reducing dependency on imports. It enables proactive maintenance, significantly enhancing safety and efficiency across the vast Indian Railways network.

How It Works

The system involves a sensor suite mounted on a inspection coach, comprising high-resolution cameras, LiDAR scanners, and Inertial Measurement Units (IMUs). These sensors continuously capture images, 3D point clouds, and motion data as the train moves. Onboard Edge AI processors analyze this data in real-time to detect various track defects like rail cracks, gauge variations, and alignment issues. GPS provides precise location tagging. Detected anomalies are instantly transmitted to a central cloud platform via secure wireless communication. The cloud platform, powered by advanced Machine Learning algorithms, performs deeper analysis, identifies trends, generates comprehensive reports, and schedules predictive maintenance tasks. Data visualization dashboards provide maintenance teams with actionable insights and historical data for long-term planning and asset management.

Unique Selling Points

- Real-time defect detection provides immediate alerts, preventing potential accidents and ensuring proactive maintenance actions.
- Non-invasive, high-speed data acquisition minimizes operational disruptions and allows monitoring during regular train movements.

- Reduced human intervention lowers operational costs and enhances safety by automating hazardous track inspections.
- Indigenous development promotes self-reliance, local innovation, and customized solutions tailored for Indian Railways' unique challenges.
- Predictive analytics, driven by AI, optimizes maintenance schedules, extending track lifespan and improving asset utilization.

Feasibility and Viability

- Commercial off-the-shelf sensors and AI hardware are readily available, reducing development complexity and cost.
- Existing data from Indian Railways can be utilized to train and validate initial AI models effectively.
- Modular system design allows for phased development, testing, and easy integration with existing railway infrastructure.
- Significant cost savings by reducing reliance on expensive imported systems and associated maintenance contracts.
- High demand from Indian Railways for advanced, reliable, and indigenously developed track monitoring solutions.
- Improved safety record reduces incident-related costs and enhances the public perception and trust in railway services.

Impact and Beneficiaries

- Significantly enhances railway safety by proactively identifying and addressing track defects before they lead to accidents.
- Boosts operational efficiency through optimized maintenance schedules, reducing downtime and extending track asset lifespan.
- Indian Railways maintenance and operations teams gain real-time insights for efficient, data-driven track management.
- Millions of passengers benefit from safer, more reliable, and punctual train journeys across the network.

Problem Statement 93

AI-Based Smart Allocation Engine for PM Internship Scheme (Software)

Need to Know

A 'PM Internship Scheme' refers to a program where aspiring Product Managers gain experience, often requiring matching interns to suitable projects/teams. An 'AI-Based Smart Allocation Engine' is an intelligent system using artificial intelligence to optimize this matching process, considering various factors.

Description

Manual allocation of Product Management interns to projects is inefficient, prone to human bias, and often results in suboptimal matches. This impacts intern learning, engagement, and overall project success within the scheme.

Idea

Develop an AI-powered engine to intelligently match Product Management interns with suitable projects and mentors. It considers intern skills, interests, and project requirements for optimal placements, enhancing program effectiveness.

Problem Resolution

The AI engine leverages data-driven insights to eliminate manual biases and inefficiencies. It ensures interns are placed in roles aligning with their skills and growth potential, significantly boosting productivity and satisfaction for all stakeholders.

How It Works

The AI-Based Smart Allocation Engine operates through several integrated stages. First, it collects comprehensive data including intern profiles (skills, past experience, project preferences, career goals) and detailed project descriptions (required skills, project scope, mentor availability, learning opportunities). This data is then fed into a sophisticated Machine Learning (ML) model. This model utilizes various algorithms: Natural Language Processing (NLP) extracts and categorizes skills from resumes and project descriptions; collaborative filtering identifies patterns between successful past matches; and optimization algorithms (e.g., linear programming or constraint satisfaction) find the best possible match based on a weighted criteria of skills, preferences, and project needs. The system provides a user-friendly interface for both interns to input preferences and program administrators to review and finalize allocations. It also incorporates a feedback loop, where post-internship performance data and satisfaction ratings are used to continuously refine and improve the matching algorithm over time. Key technologies involved include Python for ML development, libraries like TensorFlow or PyTorch for deep learning aspects (especially NLP), SQL or NoSQL databases for data storage, and web frameworks (e.g., Django, Flask, React) for the user interface.

Unique Selling Points

- Personalized matching: Tailors placements based on intern skills, interests, and project requirements for optimal fit.
- Bias reduction: Eliminates human subjectivity in allocation, ensuring fair and equitable opportunities for all interns.

- Optimized learning paths: Places interns in projects that maximize their skill development and career growth.
- Increased project success: Matches highly suitable interns to projects, significantly boosting team productivity and outcomes.
- Scalability: Efficiently handles large cohorts of interns and diverse project needs without increasing administrative burden.

Feasibility and Viability

- Data availability: Intern profiles, project details, and performance metrics are readily accessible for training the AI.
- Mature AI/ML tools: Existing open-source libraries and frameworks simplify development and implementation of the engine.
- Iterative development: The system can be built incrementally, starting with core matching features and adding complexity.
- Technical expertise: Skilled AI/ML developers are available to build and maintain such a system.
- Scalable infrastructure: Cloud computing resources allow the engine to scale with increasing intern numbers.
- Reduces significant administrative overhead and time for program managers in manual allocation processes.
- Enhances intern satisfaction and retention rates by providing better, more relevant project placements.
- Improves project outcomes and success rates by ensuring skilled and motivated interns are assigned effectively.
- Increases efficiency for organizations by optimizing resource allocation and reducing mismatches.
- Provides data-driven insights for program improvement and talent development strategies.

Impact and Beneficiaries

- Elevates the overall quality and effectiveness of Product Management internship programs, making them more competitive.
- Fosters a more meritocratic, equitable, and growth-oriented environment for all participating interns.
- Significantly reduces the time and effort spent on manual allocation, allowing program managers to focus on strategic initiatives.
- Improves organizational efficiency by optimizing talent placement and project success.
- Product Management Interns: Receive tailored and enriching project experiences that align with their skills and career goals.
- Program Administrators and Hiring Managers: Save significant time and effort, achieving more efficient and objective intern allocations.

Problem Statement 94

Sentiment analysis of comments received through E-consultation module (Software)

Need to Know

E-consultation module refers to a digital platform used by public bodies to gather feedback and opinions from citizens on proposed policies, projects, or services. Sentiment analysis is the process of using natural language processing (NLP) to determine the emotional tone or opinion expressed in a piece of text (e.g., positive, negative, neutral).

Description

Manually reviewing vast volumes of comments from E-consultation modules is time-consuming, resource-intensive, and prone to subjective bias. Extracting actionable insights from this unstructured text is a major challenge for public bodies.

Idea

An AI-powered automated sentiment analysis system specifically designed for E-consultation comments. This solution will efficiently process citizen feedback, providing objective, real-time insights into public opinion and key sentiment drivers.

Problem Resolution

This system automates the analysis of public feedback, transforming raw text into actionable sentiment data. It eliminates manual effort, reduces bias, and delivers real-time insights, enabling more informed and responsive policy development.

How It Works

The system ingests comments directly from the E-consultation module. It utilizes Natural Language Processing (NLP) techniques, including tokenization, stop-word removal, and lemmatization, to clean and pre-process the text data. Advanced machine learning models, such as recurrent neural networks (RNNs) or transformer-based models (e.g., BERT, RoBERTa) which can be fine-tuned on public sector specific language, then classify the sentiment of each comment (positive, negative, neutral, or even more nuanced emotions). Topic modeling algorithms may also be employed to identify recurring themes within the comments. Technologies involved include Python for scripting, NLTK and SpaCy for basic NLP, Hugging Face Transformers for state-of-the-art sentiment models, and cloud platforms like AWS, Azure, or GCP for scalable data storage and computation. The results are then aggregated and presented via interactive dashboards with sentiment scores, trend analysis, and key phrase identification.

Unique Selling Points

- Automated processing saves significant time and human resources compared to traditional manual review methods.
- Provides objective and unbiased sentiment insights, free from human interpretation errors or political influence.
- Scalable solution efficiently handles extremely large volumes of comments without performance degradation.
- Offers granular sentiment breakdown, identifying specific positive, negative, or neutral themes and topics.

- Integrates seamlessly with existing E-consultation platforms for a streamlined and user-friendly experience.

Feasibility and Viability

- Existing robust NLP libraries and pre-trained sentiment analysis models are readily available for immediate use.
- Cloud computing infrastructure provides scalable resources to handle large datasets and processing demands effectively.
- Abundant public text data from various consultation exercises can be used for training and validation.
- Technical expertise in AI, NLP, and cloud deployment is widely available in the market.
- There is a clear and urgent market need for efficient public feedback analysis within government sectors.
- Significant cost savings are achieved by automating tasks traditionally requiring extensive human labor.
- Enhances public trust by demonstrating a data-driven and responsive approach to citizen engagement.
- The solution can be easily integrated with existing government digital platforms, ensuring broader adoption.

Impact and Beneficiaries

- Enables more informed, evidence-based policy-making, leading to better public services and outcomes.
- Increases efficiency for public sector employees by automating time-consuming manual data analysis.
- Fosters greater citizen engagement by ensuring their voices are heard and systematically analyzed.
- Government agencies and public bodies, gaining deeper, unbiased insights into public sentiment for better policy formation.
- Citizens, who benefit from more responsive governance and policies that accurately reflect their needs and concerns.

Problem Statement 95

AI-Based Crop Recommendation for Farmers (Software)

Need to Know

AI refers to Artificial Intelligence, where computers mimic human intelligence to solve problems. In farming, it can analyze vast data for optimal crop selection and resource management.

Description

Farmers often struggle with selecting the best crops due to complex variables like soil type, weather patterns, and market demand. This leads to suboptimal yields and financial losses.

Idea

Develop an AI-driven platform that provides personalized crop recommendations to farmers, optimizing yield and resource utilization based on various environmental and economic factors.

Problem Resolution

Our AI system analyzes soil data, climate, and market trends to give farmers precise crop suggestions. This helps them make informed decisions, reducing risk and boosting profitability.

How It Works

The system gathers data from various sources: soil sensors (pH, nutrients, moisture), weather APIs (temperature, rainfall, humidity), satellite imagery (crop health), and historical yield and market price databases. This data is fed into a machine learning model, specifically a classification or regression algorithm trained on extensive agricultural datasets. The AI processes this information to identify optimal crop types, suitable varieties, and best planting times for specific land parcels. Technologies involved include IoT for sensor data collection, cloud computing for data storage and processing (e.g., AWS, Azure), Python with libraries like TensorFlow or PyTorch for AI model development, and a web/mobile application for farmer interaction. The farmer inputs their location and land details, and the AI outputs tailored crop recommendations.

Unique Selling Points

- Personalized recommendations based on hyper-local data specific to each farm.
- Predictive analytics for future market demands, ensuring profitable crop choices.
- Optimizes resource usage (water, fertilizer) for sustainable and eco-friendly farming.
- Reduces financial risk for farmers by improving the accuracy of crop selection.
- User-friendly interface accessible via mobile devices for convenience and reach.

Feasibility and Viability

- Existing AI/ML frameworks and cloud infrastructure are readily available for development.
- Affordable IoT sensors and satellite data make comprehensive data collection practical.
- Open-source agricultural datasets can be leveraged for initial model training and validation.
- Significant market demand from farmers seeking to optimize yields and reduce losses.
- Potential for subscription models or pay-per-recommendation services for revenue generation.
- The solution is highly scalable for diverse agricultural regions globally.
- This addresses a critical need in the agricultural sector, promising high adoption rates.
- Partnerships with agricultural cooperatives can expand market reach and user base.

Impact and Beneficiaries

- Increases food security by improving agricultural productivity and crop yields.
- Promotes sustainable farming practices by optimizing resource use and reducing waste.
- Farmers benefit directly from higher yields, increased profitability, and reduced risks.
- Consumers gain from more stable food supplies, diverse options, and potentially lower prices.

Problem Statement 96

AI-Powered Crop Yield Prediction and Optimization (Software)

Need to Know

AI (Artificial Intelligence) refers to computer systems designed to simulate human intelligence. Crop yield prediction involves estimating the quantity of crops harvested from a given area. Optimization means maximizing the output and efficiency of farming practices.

Description

Farmers face challenges in accurately predicting crop yields and optimizing resources due to complex environmental factors. This leads to inefficient resource allocation, potential crop loss, and economic instability.

Idea

An AI-powered platform that accurately predicts crop yields and provides data-driven recommendations for optimized farming practices, enhancing productivity, sustainability, and profitability for farmers.

Problem Resolution

Our AI platform integrates diverse agricultural data to generate precise yield forecasts and actionable insights. This empowers farmers to make informed decisions on resource management, improving efficiency, reducing waste, and boosting overall crop output.

How It Works

The system operates by collecting and analyzing vast amounts of agricultural data. This includes satellite imagery (e.g., Normalized Difference Vegetation Index - NDVI, Enhanced Vegetation Index - EVI) to monitor crop health and growth, real-time weather data (temperature, rainfall, humidity) from meteorological stations, and soil sensor data (moisture levels, nutrient content, pH). Historical crop yield data and farm-specific records are also integrated. All this data feeds into sophisticated machine learning models, primarily deep neural networks (such as Long Short-Term Memory networks for time-series weather prediction and Convolutional Neural Networks for image analysis) and ensemble models. These models process the data to identify complex patterns and accurately predict future crop yields. Based on these predictions, a recommendation engine generates optimal strategies for farmers, including precise irrigation schedules, ideal fertilizer types and quantities, optimal planting and harvesting times, and early detection and management of pests and diseases. The underlying technologies involve cloud computing for scalable data storage and processing, Internet of Things (IoT) for sensor data collection, and robust AI/ML frameworks like TensorFlow or PyTorch for model development and deployment.

Unique Selling Points

- Hyper-accurate crop yield forecasts powered by advanced machine learning algorithms.
- Real-time, actionable recommendations for irrigation, fertilization, and pest management.
- Seamless integration of diverse data sources including satellite imagery, weather, and soil sensors.
- Customizable solutions adaptable to various crop types, soil conditions, and regional climates.
- Promotes sustainable farming by optimizing resource use and minimizing environmental impact.

Feasibility and Viability

- Existing satellite imagery, IoT sensors, and readily available weather data provide rich input for AI models.
- Advanced machine learning algorithms are mature enough to handle complex agricultural data patterns.
- Cloud computing platforms offer scalable and cost-effective infrastructure for data processing and model deployment.
- High demand from the agricultural sector for tools that improve yield, reduce costs, and enhance efficiency.
- A subscription-based service model offers a consistent and predictable revenue stream for the platform.
- Scalable solution applicable to a wide range of farm sizes and diverse agricultural markets globally.

Impact and Beneficiaries

- Significantly enhances global food security by maximizing crop production and minimizing harvest losses.
- Promotes environmental sustainability through optimized resource use, reducing water and chemical waste.
- Boosts economic prosperity for farmers by increasing yields and reducing operational costs.
- Farmers, who gain higher profitability, reduced operational costs, and data-driven insights for better decision-making.
- Consumers, who benefit from more stable and potentially lower food prices, and a more consistent food supply.

Problem Statement 97

ERP-based Integrated Student Management system (Software)

Need to Know

ERP (Enterprise Resource Planning) in an educational context means a unified system integrating all facets of an institution's operations, including student data, academics, finance, and administration, eliminating disparate systems.

Description

Educational institutions face fragmentation with separate systems for student data, admissions, academics, and finance. This leads to inefficiencies, data silos, and poor decision-making, hindering overall student and administrative experience.

Idea

Develop a comprehensive, ERP-based integrated student management system. This platform will centralize all student-related operations, from admission to alumni, enhancing efficiency and data accessibility across the institution.

Problem Resolution

Our ERP solution unifies disparate systems into a single platform. It streamlines administrative tasks, improves data accuracy, and provides real-time insights, effectively resolving fragmentation and enhancing operational efficiency.

How It Works

The system will utilize a microservices architecture for modularity, allowing different modules (e.g., Admissions, Academics, Finance, HR, Library) to operate independently yet integrate seamlessly. A central relational database (e.g., PostgreSQL or MySQL) will store all student and institutional data, ensuring consistency and integrity. APIs will facilitate secure communication between modules and external systems like learning management systems (LMS) or payment gateways. Technologies involved will include a robust backend framework (e.g., Node.js with Express, Python with Django/Flask, or Java with Spring Boot) for business logic, a modern frontend framework (e.g., React, Angular, Vue.js) for an intuitive and responsive user interface, and cloud platforms (e.g., AWS, Azure, Google Cloud) for scalable deployment, high availability, and robust security features. Data analytics and visualization tools (e.g., Power BI, Tableau integration, or custom dashboards) will provide actionable insights from the consolidated data.

Unique Selling Points

- Single pane of glass for all student data, from admissions to alumni lifecycle management.
- Automated workflows for common administrative tasks, significantly reducing manual effort and human error.
- Real-time analytics and reporting tools for informed, data-driven decision-making processes.
- Modular design allows for flexible customization to meet diverse institutional needs and scales.
- Enhanced data security and compliance features for sensitive student information, ensuring privacy.

Feasibility and Viability

- Leverages existing open-source ERP components for rapid development and lower initial costs.

- Scalable cloud infrastructure reduces upfront hardware investments and operational overhead.
- Modular architecture simplifies development, testing, and future maintenance efforts.
- Utilizes widely adopted and stable web technologies, ensuring broad developer availability.
- Significant market demand for unified, efficient educational management systems globally.
- Subscription-based SaaS model ensures recurring revenue streams and predictable growth.
- Reduces operational costs for institutions, offering a clear and attractive return on investment (ROI).

Impact and Beneficiaries

- Transforms educational administration, fostering data-driven decision-making and strategic planning.
- Significantly improves the student experience through streamlined services and enhanced access to information.
- Educational institutions benefit from increased operational efficiency, reduced costs, and better data insights.
- Students gain from simplified access to services, improved communication, and a more organized academic journey.

Problem Statement 98

Blockchain-Based Blue Carbon Registry and MRV System (Software)

Need to Know

Blue Carbon refers to carbon stored in coastal and marine ecosystems like mangroves, seagrasses, and tidal marshes. A Registry is a system for tracking and recording ownership of carbon credits. MRV System stands for Measurement, Reporting, and Verification, crucial for assessing carbon sequestration.

Description

Current blue carbon MRV and registry systems lack transparency, trust, and efficiency. Data collection is often manual, prone to errors, and difficult to verify, hindering market growth and investment in crucial coastal conservation efforts.

Idea

Develop a decentralized, blockchain-based Blue Carbon Registry and MRV system. It will ensure transparent, immutable, and verifiable tracking of blue carbon credits, enhancing trust and efficiency in carbon markets.

Problem Resolution

Blockchain ensures data integrity and transparency, addressing the lack of trust and efficiency in current MRV and registry systems. It automates verification processes, reduces fraud, and streamlines credit issuance, boosting market confidence.

How It Works

The system uses a blockchain network to record blue carbon project data. IoT sensors and satellite imagery collect environmental data (e.g., mangrove growth, tidal marsh health). This data is fed into the blockchain, where smart contracts automatically process and verify it against predefined MRV standards. Once verified, carbon credits are minted as non-fungible tokens (NFTs) on the blockchain and issued to project developers. Buyers can then purchase these transparently, with all transaction history immutably recorded. Technologies involved include a distributed ledger technology (Blockchain, e.g., Ethereum or Polygon for smart contracts), Internet of Things (IoT) for real-time data acquisition from environmental sensors, satellite imaging for remote monitoring, and potentially Artificial Intelligence/Machine Learning for data analysis and anomaly detection in MRV processes.

Unique Selling Points

- **Immutable ledger:** All data is permanently recorded, preventing tampering and ensuring auditability.
- **Enhanced transparency:** Publicly verifiable transactions and carbon credit lifecycle tracking.
- **Streamlined MRV:** Automates data collection, reporting, and verification using smart contracts.
- **Reduced fraud risk:** Cryptographic security makes fraudulent claims nearly impossible.
- **Global accessibility:** Enables wider participation and investment in blue carbon projects.

Feasibility and Viability

- Blockchain technology is mature for secure data management.
- Availability of IoT sensors and satellite imaging for environmental monitoring.

- Smart contract development can automate complex MRV logic.
- Existing open-source blockchain frameworks facilitate rapid development.
- Growing demand for verifiable carbon credits and offsets.
- Potential to attract impact investors and foster blue carbon economy.
- Reduces operational costs for MRV compared to traditional methods.

Impact and Beneficiaries

- Accelerates funding for vital blue carbon ecosystem restoration and conservation.
- Provides a reliable mechanism for climate change mitigation and adaptation.
- Coastal communities benefit from ecosystem protection and economic incentives.
- Companies seeking credible carbon offsets for their sustainability goals.

Problem Statement 99

Digital Platform for Centralized Alumni Data Management and Engagement (Software)

Need to Know

Alumni data management refers to organizing and maintaining records of former students. Engagement means fostering active participation and connection between alumni, their institution, and each other for networking, mentorship, and support.

Description

Institutions struggle with decentralized, outdated alumni data, leading to fragmented communication and missed opportunities for meaningful engagement. This weakens the alumni network's potential.

Idea

A comprehensive digital platform designed to centralize alumni data, streamline communication, and foster a vibrant, connected global alumni community for educational institutions.

Problem Resolution

The platform centralizes all alumni data for easy access and updates. It provides tools for targeted communication and diverse engagement activities, transforming passive lists into an active, supportive network.

How It Works

The platform operates as a web and mobile application accessible to alumni and administrators. A robust backend database (e.g., PostgreSQL, MongoDB) securely stores all alumni profiles, career history, engagement data, and communication logs. The frontend, built with modern frameworks like React or Angular for web and React Native or Flutter for mobile, provides a responsive and intuitive user interface. It integrates features such as profile management, job boards, mentorship program modules, event calendars, donation portals, a dynamic news feed, and secure messaging capabilities. Technologies involved include RESTful APIs for communication between frontend and backend, cloud hosting services (e.g., AWS, Azure, GCP) for scalable infrastructure, OAuth2 for secure authentication, and third-party integrations (e.g., SendGrid for email, Twilio for SMS, Stripe for payments) to enhance functionality and communication.

Unique Selling Points

- Dynamic, self-updating alumni profiles with career and contact information.
- AI-powered networking for relevant connections and mentorship opportunities.
- Integrated event management, ticketing, and secure payment processing.
- GDPR-compliant data privacy and robust security features.
- Customizable dashboards and analytics for institutional administrators.

Feasibility and Viability

- Existing web and mobile development technologies are mature for efficient building.
- Cloud infrastructure offers scalable, secure data storage and processing solutions.
- Robust APIs for external services like email, SMS, and payment are readily available.

- Educational institutions highly value strong alumni networks for fundraising and reputation.
- Subscription models for institutions ensure recurring revenue streams.
- Platform offers significant ROI through improved alumni relations and increased donations.

Impact and Beneficiaries

- Strengthens institutional reputation and fundraising efforts via an engaged alumni network.
- Fosters career growth, mentorship, and professional opportunities among alumni globally.
- Educational institutions benefit from streamlined data management and stronger alumni support.
- Alumni gain a powerful network for career advancement, mentorship, and social connections.

Problem Statement 100

Smart Waste Segregation and Recycling System (Hardware)

Need to Know

Smart Waste Segregation refers to automated sorting of waste. A Recycling System processes sorted waste into reusable materials. Both aim to reduce landfill waste and promote sustainability.

Description

Inefficient manual waste segregation leads to contamination, reduced recycling rates, and increased landfill burden. Current systems often lack precision and automation, hindering effective waste management and environmental efforts.

Idea

Our idea is a 'Smart Waste Segregation and Recycling System' that uses AI and IoT to automate waste sorting at the source, improving recycling efficiency and reducing environmental impact. It creates a cleaner, more sustainable future.

Problem Resolution

This system automates accurate waste classification, minimizing human error and contamination. By enhancing recycling rates and optimizing waste processing, it directly tackles the inefficiencies of current waste management, creating value from waste.

How It Works

The system utilizes computer vision and machine learning (AI) for real-time waste identification. Sensors (IoT) detect waste type (plastic, paper, metal, organic) and weight. Robotic arms or automated sorting mechanisms then accurately segregate the waste into designated bins. Data from sensors and segregation processes are sent to a cloud platform for analysis and optimization. Technologies involved include: High-resolution cameras for image capture, Edge AI processors for on-device recognition, various sensors (proximity, weight, chemical) for material verification, actuators and motors for robotic arm movement, and a cloud-based analytics platform for data storage, processing, and system management. This integrated approach ensures efficient and precise segregation, preparing waste for further recycling processes.

Unique Selling Points

- High-precision AI-driven waste recognition ensures optimal material separation, significantly boosting recycling rates.
- Real-time data analytics provide insights into waste generation patterns for improved resource management and planning.
- Modular and scalable design allows for easy deployment in diverse settings, from households to industrial facilities.
- Reduces manual labor costs and exposure to hazardous waste, improving worker safety and operational efficiency.
- Promotes circular economy principles by maximizing resource recovery and minimizing landfill waste globally.

Feasibility and Viability

- Existing AI and IoT technologies are mature enough for accurate waste identification and automated sorting.
- Modular hardware components can be readily sourced and integrated, reducing development complexity and cost.
- Pilot projects demonstrate successful automated waste sorting, validating the core technological approach.
- Strong market demand driven by increasing environmental regulations and corporate sustainability goals.
- Potential for significant cost savings in waste management through reduced landfill fees and increased recycling revenue.
- Scalable business model applicable to various sectors, including municipalities, industries, and residential complexes.

Impact and Beneficiaries

- Significantly reduces landfill waste and plastic pollution, contributing to a healthier environment.
- Boosts resource efficiency by recovering valuable materials, fostering a more sustainable circular economy.
- Municipalities and waste management companies will benefit from streamlined operations and cost efficiencies.
- Citizens and the environment will gain from cleaner communities, reduced pollution, and sustainable resource use.

Problem Statement 101

Automated High-Current Short-Circuit Test System for MCB to comply with IEC 60898-1:2015 (Hardware)

Need to Know

MCB stands for Miniature Circuit Breaker, a safety device that automatically switches off an electrical circuit during an overload or short circuit. IEC 60898-1:2015 is an international standard defining the requirements for circuit-breakers used in household and similar installations, particularly for AC operation. A high-current short-circuit test is a critical procedure to verify that an MCB can safely interrupt a large fault current without damage.

Description

Manual testing of MCBs for high-current short-circuit compliance with IEC 60898-1:2015 is inefficient, hazardous, and prone to human error. Manufacturers need a reliable, automated solution to ensure product safety and regulatory adherence.

Idea

An automated high-current short-circuit test system for MCBs ensures compliance with IEC 60898-1:2015. It will enhance safety, boost efficiency, and improve data accuracy in the manufacturing and quality control processes for these critical electrical components.

Problem Resolution

This automated system eliminates human exposure to hazardous high-current short-circuit tests. It ensures precise adherence to IEC 60898-1:2015, providing repeatable, accurate results, and overcoming the limitations and risks associated with manual testing procedures.

How It Works

The system involves a high-current source, a robust test fixture for the MCB, and an array of sensors for precise data acquisition. A programmable logic controller (PLC) or microcontroller acts as the central control unit, managing the test sequence and safety interlocks. The MCB is placed in the fixture, and test parameters compliant with IEC 60898-1:2015 are loaded via a Human-Machine Interface (HMI). The control unit then initiates the high-current short-circuit. Sensors (current transformers, voltage dividers) monitor the current, voltage, and the MCB's tripping time and performance. Data is captured by a high-speed data acquisition (DAQ) system. The control unit analyzes this real-time data against the standard's criteria to determine a pass or fail. The system automatically generates a detailed test report. Technologies involved include industrial PLCs (e.g., Siemens, Rockwell), high-power switching components (SCRs, contactors), precision current/voltage sensors, SCADA/HMI software for user interaction and data visualization, and DAQ modules. Software (e.g., Python, C++) can be used for custom control logic and data processing.

Unique Selling Points

- **Enhanced Safety:** Eliminates human exposure to dangerous high-current short-circuit events, ensuring operator safety during critical tests.
- **Assured Compliance:** Guarantees strict adherence to the rigorous testing requirements of the IEC 60898-1:2015 standard automatically.

- **Increased Efficiency:** Automates the entire testing process, significantly reducing test cycle times and boosting production throughput.
- **Improved Data Accuracy:** Provides precise, repeatable measurements and automatically logs test results, minimizing human error and enhancing data reliability.
- **Cost Reduction:** Decreases labor costs associated with manual testing and reduces potential for material wastage due to incorrect procedures.

Feasibility and Viability

- **Existing Technology:** Core components like high-current sources, sensors, and robust control systems are mature and readily available.
- **Expertise:** Electrical and automation engineering expertise is widely available for system design, integration, and programming.
- **Standard Compliance:** The IEC 60898-1:2015 standard provides clear, detailed guidelines for test procedures, simplifying implementation.
- **Market Need:** Manufacturers require efficient, compliant testing to meet regulatory demands and ensure high product quality.
- **Cost Savings:** Reduces labor costs and potential for human error, leading to long-term operational savings for businesses.
- **Scalability:** The system can be adapted for various MCB types and production volumes, offering flexible testing solutions.

Impact and Beneficiaries

- **Enhanced Public Safety:** Ensures only compliant MCBs reach the market, significantly reducing electrical fire risks and hazards in homes and installations.
- **Industry Standard Elevation:** Sets a new benchmark for MCB testing efficiency and accuracy, promoting higher quality and reliability across the electrical protection industry.
- **MCB Manufacturers:** Benefit from faster, safer, and more accurate testing, ensuring product quality, regulatory compliance, and reduced operational costs.
- **Consumers & Electricians:** Gain confidence in electrical safety, relying on accurately tested and certified MCBs for protection in homes and installations.

