



C M R COLLEGE OF ENGINEERING & TECHNOLOGY

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CENTRE FOR ENGINEERING EDUCATION RESEARCH

CMR HACKFEST-2.0

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PROBLEM STATEMENTS

S.No	THEMES	PROBLEM STATEMENT
1	IOT	Healthcare systems globally face significant challenges in monitoring patient health, particularly for chronic conditions or patients requiring ongoing observation. Traditional methods often rely on in-person visits, which can lead to delays in diagnosis, increased healthcare costs, and poor patient compliance. The proposed Health Monitoring System aims to revolutionize patient care by improving accessibility, enhancing monitoring capabilities, and ultimately leading to better health outcomes.
2	IOT	In the context of urban environments, incidents of child loss and abduction pose significant safety challenges, exacerbated by the complexities of urban life and the limitations of current surveillance systems. These incidents often occur in crowded public spaces, making rapid identification and response critical yet challenging. The inability to swiftly detect and respond to these situations results in prolonged distress for families and increased risk to children's safety.
3	IOT	Traditional water quality monitoring methods in rural areas rely on periodic manual testing, which is often too infrequent to detect water contamination in a timely manner. As a result, waterborne diseases and health risks may not be identified until it's too late. Implement IoT-based sensors that continuously monitor key water quality parameters such as pH levels, turbidity, temperature, dissolved oxygen (DO), nitrate concentrations, and the presence of harmful pathogens (e.g., E. coli). These sensors will provide real-time data about water quality, reducing the reliance on manual testing and increasing the speed of detection.
4	IOT	Vaccines are highly sensitive to temperature fluctuations, and deviations from the required storage conditions can compromise their effectiveness. The challenge is to ensure that vaccines remain within the specified temperature range (typically between 2°C and 8°C) throughout the entire supply chain, including storage, transportation, and delivery to healthcare facilities. Develop a IOT system that continuously monitors temperature at various stages (from manufacturing facilities to end-users).
5	IOT	Service interruptions in street lighting systems can compromise public safety, especially in urban environments where reliable lighting is critical for traffic safety, crime prevention, and public well-being. A smart lighting system needs to be resilient and capable of ensuring minimal downtime. Develop robust communication networks (e.g., wireless mesh networks, 5G) that enable quick and reliable transmission of data, even in case of local power outages.
6	IOT	Women's safety is a big challenge in India. India is unfortunately the ninth most dangerous country for women and fifth for intimate partner violence. About 86 rape cases are reported every day, and this trend has not shown a downward trajectory in the last couple of years, making it a pressing issue. The need for creative concepts, practical solutions, and strategic approaches to ensure the safety of women is pressing. This is vital not only to provide women with a life free from fear but also to unlock their vast potential. By tackling these issues, we not only empower women to overcome barriers but also catalyse a positive transformation in societal attitudes.
7	Agriculture	Excessive and improper use of fertilizers leads to soil degradation and reduced agricultural productivity, negatively impacting farmers' income. A data-driven solution that recommends optimal fertilizer types and quantities based on soil health, crop type, and weather patterns, ensuring sustainable agricultural practices is required. Hence, Create an application that analyzes soil data and provides tailored fertilizer recommendations, promoting sustainable farming while enhancing crop yield and farmer income.
8	Agriculture	Traditional irrigation methods often lead to over-irrigation or under-irrigation, wasting water and harming crop yields. Farmers struggle to manage irrigation schedules effectively, especially during variable weather conditions. Design an IoT-based irrigation system that uses real-time soil moisture, weather forecasts, and crop-specific water needs to optimize irrigation. Machine learning algorithms can predict optimal watering times and quantities, helping reduce water wastage and ensuring crops receive adequate water.

9	Agriculture	Agricultural productivity and food security are heavily dependent on the health of crops and livestock. Farmers, especially in remote or resource-limited areas, often face challenges in diagnosing and reporting diseases that affect their livestock and crops. Early diagnosis and timely reporting are crucial for effective disease management and prevention of widespread outbreaks. A mobile portal powered by Artificial Intelligence (AI) for disease diagnosis and reporting can revolutionize how farmers manage animal and plant health. This portal enables farmers to use their smartphones to access diagnostic tools, report symptoms, and receive actionable advice.
10	Agriculture	Identifying diseases based on visual symptoms alone can be challenging, especially when symptoms are similar across multiple diseases. Traditional diagnostic methods might result in false positives or negatives, leading to improper treatment. Develop a robust machine learning-based model for disease identification using high-resolution images. The system should be trained to distinguish between different diseases and pests with high accuracy.
11	Agriculture	Consumers often have limited information about where their food comes from, how it was produced, and whether it meets health, safety, and environmental standards. This lack of transparency leads to mistrust in the food supply chain and makes it difficult to verify the authenticity of claims such as "organic," "sustainably farmed," or "locally sourced." By leveraging blockchain's immutable ledger, consumers can verify the origin, quality, and journey of their food with full visibility into each step of the supply chain. Develop a blockchain-based platform that provides transparent, real-time traceability of agricultural products from farm to consumer.
12	Fin Tech	The increasing complexity and scope of insurance products make it difficult for individuals to track what they have bought and assess the suitability of new products. Develop an end-to-end insurance platform that would allow the customer to manage, track, review, and buy insurance policies in a simple and informed manner. The platform should allow the insurer or intermediaries to sell their solutions directly to the customer.
13	Fin Tech	Schools in India require cash payments for different transactions, e.g. canteen purchases, school enrichment classes, textbooks purchases, school bus services. Typically, parents give pocket money (in cash) to their children to manage such expenses. Design a solution that would enable a cashless school system. Information could also be used to monitor students' expenditure and even dietary habits.
14	Fin Tech	Develop a creative and engaging tool, game or app that provides financial literacy education at strategic points in a person's early life. The technology could include secondary school curriculum modules, or game style tools that teach basic financial skills such as opening bank accounts, as well as more elaborate financial concepts such as budgeting, savings, credit, interest, debt, financial planning or even basics on markets and how these work and interact.
15	Fin Tech	Rural entrepreneurs often lack trust in traditional microfinance institutions (MFIs) due to high-interest rates, administrative fees, and a history of opaque or fraudulent practices. The challenge is to create a blockchain-based platform that enhances transparency, ensures accountability, and builds trust with rural borrowers.
16	Fin Tech	Groups often struggle with maintaining trust among members when it comes to savings and lending activities, leading to disputes or financial mismanagement. The challenge is to create a system that ensures transparency, accountability, and trust in financial transactions and group management, using UPI and other digital tools.
17	Fin Tech	Rural bank customers, especially elderly or illiterate individuals, may fall victim to social engineering attacks such as phishing, vishing, or impersonation, leading to unauthorized transactions. The challenge is to design a fraud detection system that can identify suspicious behaviors linked to social engineering and protect users with minimal digital literacy.
18	Health Care	Many rural and underserved regions have limited internet access, with low bandwidth and high latency, making it difficult to use traditional telemedicine platforms that require fast and stable internet connections for video consultations and large file transfers. Develop a telemedicine platform that is optimized to function effectively in low-bandwidth environments, using technologies such as data compression, low-bandwidth video streaming, and adaptive resolution to ensure smooth consultations, even with limited connectivity.
19	Clean & Renewable Energy	Solar Efficient System: The measured performance of solar panel is found less than designed condition due to dust settle on solar panel and moisture content in atmosphere settle on panel. The problem is identified and solution is proposed with solar cleaning mechanism in such a way that reduce manpower requirement. The mechanism is prepared to provide periodic cleaning of solar panel. It utilizes thermal and solar radiation energy together with AI monitoring system.
20	Clean & Renewable Energy	Effective Energy Conversion System: Due to gradual reduction in fossil fuels there is a need for Renewable energy sources directly to generate electricity rather than conventional sources. The solution is to provide a novel design for trapping renewable energy into electrical energy

21	Clean & Renewable Energy	Battery cooling system in EV: In the present scenario, the popular usage of electric vehicles has started to grow extensively, but the automobile industries are not providing proper cooling systems for the Li-ion batteries in the electrical vehicles, so we\there is a need to develop an intelligent battery cooling and health monitoring system in EVs.
22	Clean & Renewable Energy	Solar panels installed in rural areas are often fixed at a specific angle, resulting in suboptimal energy harvesting throughout the day and year, as the sun's position changes. This can lead to lower overall energy production compared to a system that dynamically adjusts to the sun's path.Design a solar tracking system that dynamically adjusts the position of solar panels to maximize solar energy capture throughout the day and across seasons
23	Clean & Renewable Energy	Homeowners often do not have access to real-time data on both their energy consumption and solar energy production. Without this data, it is difficult to assess system performance, identify inefficiencies, and optimize energy usage. Develop an IoT-based system that provides real-time data on energy generation (from solar panels) and energy consumption (in the household), enabling users to monitor system performance and consumption patterns efficiently
24	Transporation & Logistics	Design a rewards program that incentivizes users to use public transport, offering discounts, points, or other perks for regular use, thereby promoting sustainable commuting.
25	Transporation & Logistics	Public transportation systems often face challenges in optimizing routes, schedules, and vehicle allocation, resulting in overcrowding, underutilized vehicles, and delays. Traditional methods based on fixed schedules may not respond well to real-time changes in demand or traffic conditions. Develop a machine learning-based real-time optimization system that can dynamically adjust schedules, routes, and vehicle allocation based on real-time demand, traffic conditions, and other factors such as weather or special events
26	Transporation & Logistics	Many rural areas lack standardized postal addressing systems, and customers may provide incomplete or inaccurate addresses. This makes it difficult for delivery drivers to locate destinations, increasing the risk of missed or delayed deliveries. Designing a last-mile delivery optimization platform for rural areas involves addressing a series of unique challenges that impact the efficiency, cost-effectiveness, and accessibility of delivering goods to remote locations.
27	Transporation & Logistics	In many urban areas, parking spaces are underutilized, while other areas face overcrowding, leading to unnecessary cruising for parking, congestion, and wasted time. Drivers often don't know when a parking space will become available, leading to inefficient use of existing resources. Design a smart parking system that uses real-time occupancy data and predictive analytics to help drivers identify available parking spaces quickly and efficiently, reducing congestion and time spent searching for parking
28	Smart Education	Create a fun gaming App that teaches Indian languages to kids, to get awareness about good learning and bad learning through animations. It should include General Knowledge to entertain and create interest among them.
29	Waste Management	Manual waste segregation, often performed at waste collection centers or by individuals, is prone to human error and inefficiency. This results in contamination of recyclable materials with non-recyclables, leading to lower recycling rates and higher operational costs. Develop an AI-powered system capable of accurately and efficiently sorting waste into recyclable and non-recyclable categories, reducing human error and ensuring higher-quality recyclables are processed.
30	Waste Management	Traditional plastic waste management systems lack transparency, leading to inefficiencies and a lack of trust. Consumers and businesses are often unaware of whether their plastic waste is being properly recycled or improperly disposed of. Develop a blockchain-based platform that enables end-to-end transparency, tracking the journey of plastic waste from collection to recycling, providing consumers and businesses with verifiable information on how their plastic is being managed.
31	Waste Management	A significant amount of food waste is generated daily, often ending up in landfills, where it contributes to greenhouse gas emissions. Many urban areas lack efficient systems for food waste management and recycling, exacerbating waste disposal issues. Without precise monitoring and control, it can be difficult to predict and optimize the yield of biogas, resulting in inconsistent energy production. Develop a biogas generation system with real time monitoring, that effectively converts food waste into renewable energy, thus reducing the volume of waste sent to landfills, while providing a sustainable solution for waste management.
32	Generative AI	Autonomous Search and Rescue Drone: Design an AI system that can control drones to autonomously search for and identify missing persons in challenging environments such as forests, mountains, or disaster zones. The drone should be capable of navigating without human intervention, recognizing objects or people, and transmitting location data back to the rescue team Key Features: Object/person detection and recognition.obstacle avoidance in real-time.GPS and path optimization for faster rescue operations.

33	Generative AI	AI for Fake News/Photo/Video Detection: problem: The spread of misinformation and fake online social networks has become a major issue. Objective: Develop an AI-based tool that can analyze all types of social media posts, and other online content to detect and flag misinformation or fake news by comparing it with verified sources and patterns.
34	Generative AI	Smart Innovation Statement: Software tool to aid question and answer repository generation using AI Description: Create a simple user interface and tool that leverages AI to aid in generating a question-and-answer repository that can streamline the creation and management of comprehensive knowledge bases. the tool should automatically generate relevant questions and produce accurate answers based on given content or user input. It can also categorize topics, identify frequently asked questions, rating of questions from easy to tough, and use any LLM of your choice.
35	Generative AI	Cyber Security Statement: Software tools that track users log in and log-out sessions in Windows Description: Create a simple tool with UI that leverages AI to analyze logs of a Windows 10/11 computer to identify warnings, log off, and login time of users, the tool should automatically email a summary to a particular email ID.
36	Generative AI	Government documents and services often contain complex legal, technical, and bureaucratic language, which can be difficult to translate accurately into local languages without losing the original meaning. The challenge is to ensure that the translation system preserves the integrity and precision of legal terminology, policy language, and official communication. Develop a specialized translation engine that can accurately handle legal and technical terms in local languages, using legal corpora and government-approved terminologies.
37	Generative AI	Educational content often requires deep domain knowledge, and AI systems must be able to generate high-quality material that is both factually accurate and contextually appropriate for students of different levels. The challenge lies in ensuring that AI-generated content is correct, relevant to the curriculum, and free from biases. Implement AI models capable of understanding educational curriculums and standards to ensure content aligns with the intended learning objectives.
38	Generative AI	Voice inputs in healthcare often include specialized medical terms, symptoms, and patient-specific jargon that must be accurately transcribed. The challenge is to develop a speech recognition system that can handle diverse accents, informal speech, and medical terminology to ensure accurate transcription of symptoms and queries.
39	Industry Innovation	1. Web 3.0 User-Data Decentralization This challenge centers on developing a Web 3.0 solution that truly decentralizes user data storage, placing full control in users' hands. Unlike centralized cloud systems or entirely local storage, this approach aims for a middle ground that leverages distributed storage, preventing platforms from accessing or storing user data in a centralized way. The task is to build a storage solution that mirrors user data on a decentralized network, ensuring data privacy, encryption, decryption, and secure access protocols are in place. For pure demonstration purposes, participants will be permitted to fulfil their solution by just creating a prototype too (e.g., a social media platform) showcasing how user data can be stored, fetched, and managed without central ownership, mirroring only user-approved data as needed. Final presentations should display a complete storage solution that is implementable, with secure storage methods, retrieval, and privacy checks to show how this solution empowers users to control their data independently from any platform. The solution should address key privacy concerns and decentralize data management as its core purpose, and it is mandatory to implement Web 3.0 principles.
40	Smart Education	An Engineering College requires a software solution to prepare a question paper from the given question bank. The given question bank will cover possible questions from all 5 units. The question paper to set for maximum 60 marks which consists of two parts PART-A(10 Marks) and PART-B(50 Marks). i) PART-A consists of 10 questions (Each question carries 1 mark) from all 5 units such that 2 questions from each unit ii) PART-B consists of 5 questions with internal choice (Each question carries 10 marks). iii) Question paper should cover all 6 Levels of Bloom's Taxonomy iv) the software should generate a question paper from given question bank based on the input given (Bloom's level for each question).