



Graphic Era University Student Chapter



CODE CRUSADE

Introduction

A dynamic coding contest that fosters an innovative environment where tech enthusiasts collaborate to solve real-world problems through coding. Participants, ranging from seasoned developers to eager beginners, converge for an intense coding marathon typically spanning a day or a weekend. It cultivates creativity, teamwork, and rapid problem-solving as teams brainstorm, design, and implement solutions to challenges posed by organizers. Besides the thrill of coding under pressure, participants benefit from networking opportunities, mentorship, and skill development. It facilitates social interaction by providing a common language for individuals to collaborate, share ideas, and build connections. A platform for coding but also a community-driven learning experience that fuels innovation in the tech industry.

DOMAINS

DOMAIN: CLOUD COMPUTING

Problem Statement ID: CC01

Problem Statement: How can a cutting-edge cloud-based platform revolutionize decision-making processes across industries by seamlessly integrating advanced algorithms, scalable infrastructure, and powerful machine learning models for real-time data analytics and predictive analytics?

Description: Develop a cutting-edge cloud-based platform tailored for real-time data analytics and machine learning, empowering businesses and organizations to swiftly and precisely make informed decisions. This platform will harness advanced algorithms and scalable infrastructure to seamlessly ingest, process, and analyze vast streams of data in real time. By seamlessly integrating powerful machine learning models, it will provide actionable insights and predictive analytics, enabling users to anticipate trends, detect anomalies, and optimize operations with unprecedented speed and accuracy. This solution will revolutionize decision-making processes across industries, fostering innovation and driving competitive advantage in today's fast-paced digital landscape.

Problem Statement ID: CC02

Problem Statement: How does the proposed comprehensive solution address the healthcare needs of elderly individuals living on pensions by offering discounted

medications through streamlined access, technology integration, and authentication based on pension status?

Description: To address the healthcare needs of elderly individuals, particularly those living on pensions, a comprehensive solution is proposed for the delivery of medicines at discounted rates. This initiative targets seniors above a specified age limit, leveraging their existing identification documents for streamlined access. By integrating technology with healthcare services, the platform will allow eligible seniors to order prescribed medications conveniently from their homes, ensuring timely delivery while reducing the financial burden through discounted pricing. The system will authenticate users based on their pension status, ensuring that discounts are applied accordingly. Moreover, the platform will offer a user-friendly interface accessible via smartphones or computers, catering to the diverse needs of elderly individuals. Through collaboration with pharmacies and healthcare providers, this solution aims to enhance the quality of life for senior citizens by facilitating affordable access to essential medications and promoting their well-being and independence.

Problem Statement ID: CC03

Problem Statement: What open-source API testing tools offer comprehensive capabilities for functional, reliability, performance, and security testing across various API types (REST, SOAP, Graph QL), prioritizing ease of use and robustness?

Description: Participants are tasked with researching and evaluating open-source API testing tools to ensure reliability, performance, and security. The objective is to select tools based on ease of use, robustness, and suitability for various API types (REST, SOAP, Graph QL). The goal is to identify tools that offer comprehensive testing capabilities, including functional, reliability, performance, and security testing, to address modern software development needs effectively. Participants should document their findings and propose innovative strategies for enhancing API testing efficiency.

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Problem Statement ID: CC04

Problem Statement: How can we collaboratively develop an open-source backup solution with a user-friendly GUI-based control panel, enabling effortless client registration through GUI or API interfaces? The goal is to create a robust system for monitoring, scheduling, and tracking backup statuses, providing a seamless experience for users across businesses of all sizes

Description: Develop an open-source backup solution with a user-friendly GUI-based control panel. This innovative tool will empower users to register clients effortlessly through either GUI or API interfaces. Dive into the world of open-source backend engines to craft a robust system capable of monitoring, scheduling, and tracking backup statuses with ease. Imagine a seamless experience where users can effortlessly manage backups, ensuring the safety and security of their data. From small businesses to large enterprises, this solution will cater to various needs, offering flexibility and scalability. Get ready to showcase your skills and creativity by contributing to an essential tool that simplifies backup management while embracing the power of open source. Join us in revolutionizing data backup solutions and making an impact on the tech community!

Problem Statement ID: CC05

Problem Statement: How can participants develop a solution to streamline the migration of legacy systems to the cloud, addressing complexities like data format conversions, integrity checks, and preserving business logic while ensuring minimal disruption and optimizing data security?

Description: “Cloud Data Migration: Streamlining Legacy System Migration to the Cloud”. Participants are tasked with developing a solution that simplifies the process of migrating legacy systems to the cloud. The challenge involves identifying and addressing the complexities associated with data migration, such as data format conversions, data integrity checks, and preserving business logic during the migration process. Participants should design a solution that ensures minimal disruption to business operations, optimizes data transfer speeds, and maintains data security and privacy throughout the migration.

DOMAIN: MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE

Problem Statement ID: ML01

Problem Statement: How can an AI-driven platform be developed to proactively monitor and analyze network traffic for security threats, including advanced persistent threats, providing continuous, automated threat detection and actionable insights for organizations?

Description: Develop a platform leveraging AI and machine learning to proactively monitor and analyze network traffic for potential security threats and vulnerabilities. This platform should be capable of detecting and mitigating advanced persistent threats (APTs) and other sophisticated attacks in real time. The solution should provide continuous, automated threat detection and analysis, offering actionable insights to enhance overall security posture. Emphasis should be placed on scalability, efficiency, and adaptability to evolving threat landscapes. Participants are encouraged to explore innovative approaches in data processing, anomaly detection, and threat intelligence integration to deliver robust, reliable, and proactive protection against emerging cyber threats. The goal is to empower organizations that enable them to stay ahead of malicious actors and safeguard their digital assets effectively.

Problem Statement ID: ML02

Problem Statement: How can we develop an advanced data analysis system to identify high-risk accident patterns, pinpoint vulnerable locations, and analyze contributing factors like weather, road conditions, and driver behaviors to inform targeted safety interventions?

Description: Develop an advanced data analysis system capable of identifying high-risk accident patterns, pinpointing locations with heightened vulnerability, and discerning the contributing factors such as weather conditions, road conditions, and driver behaviors. This system aims to inform targeted safety interventions and infrastructure improvements to mitigate the occurrence and severity of accidents. By leveraging comprehensive datasets encompassing historical accident data, weather

reports, road maintenance records, and driver behavior analytics, participants are tasked with designing algorithms and models to detect emerging accident hotspots, predict potential risk factors, and recommend actionable strategies for enhancing road safety. The ultimate goal is to empower stakeholders including transportation agencies, law enforcement, and urban planners with actionable insights to prioritize and implement targeted interventions, thereby reducing accident rates and promoting safer road environments for communities.

Problem Statement ID: ML03

Problem Statement: How can this hackathon address the challenge of personalized learning in education by developing an AI-powered platform that caters to individual student needs, learning styles, and progress in real-time?

Description: Current educational platforms lack personalized learning experiences, often leading to disengagement and inefficiencies in learning. This hackathon seeks to address this challenge by developing a personalized learning platform that utilizes AI and adaptive learning techniques. The platform aims to cater to each student's unique needs, learning style, and pace by analyzing their learning behaviors, preferences, and progress. By leveraging AI algorithms, the platform will dynamically adjust learning content, pace, and delivery methods to optimize engagement and learning outcomes. Additionally, it will provide real-time feedback and insights to both students and educators, facilitating targeted interventions and support. The goal is to revolutionize the traditional one-size-fits-all approach to education and empower learners to achieve their full potential through a tailored and adaptive learning experience.

Problem Statement ID: ML04

Problem Statement: How can a secure bank locker system be developed utilizing facial recognition technology, excluding infrared (IR) technology, to ensure accurate identification of authorized users while prioritizing security, reliability, speed, and user-friendliness?

Description: Develop a secure bank locker system utilizing face recognition technology without relying on infrared (IR) technology. The system should allow authorized users to access their lockers by verifying their identity through facial recognition. Participants are tasked with designing a robust and user-friendly system that ensures accurate identification while eliminating the need for IR technology, which can be costly and potentially intrusive. The solution should prioritize security, ensuring that only authorized individuals can access the lockers, while also considering factors such as reliability, speed, and ease of use. Participants are encouraged to explore alternative technologies and approaches to achieve accurate and efficient facial recognition without IR technology, providing an innovative solution that enhances the banking experience for customers and strengthens security measures for bank lockers.

Problem Statement ID: ML05

Problem Statement: How can we develop an AI chatbot with NLP capabilities to provide personalized recommendations for tasks and activities, integrating with external APIs and continuously learning from user feedback for improved accuracy?

Description: Create an AI chatbot capable of providing personalized recommendations for various tasks or activities. Utilize natural language processing (NLP) techniques to understand user queries and preferences, and machine learning algorithms to analyze data and generate tailored suggestions. Implement a user-friendly interface for seamless interaction, allowing users to communicate with the chatbot through text or voice commands. Ensure the chatbot is adaptable and continuously learns from user feedback to improve recommendation accuracy over time. Consider integrating with external APIs or databases to access relevant information across different domains such as food, travel, entertainment, or productivity. Emphasize the chatbot's ability to understand context, handle ambiguity, and maintain a conversational flow to deliver a satisfying user experience. Evaluate performance based on the accuracy, responsiveness, and relevance of recommendations provided.

DOMAIN: INTERNET OF THINGS (IOT)

Problem Statement ID: IOT01

Problem Statement: How can our IoT-based system, utilizing sensors to detect various air pollutants and machine learning algorithms to analyze data, empower building managers to address air pollution and improve air quality?

Description: Our hackathon project aims to tackle the pressing issue of air pollution by leveraging IoT technology. We will develop a comprehensive system that utilizes IoT sensors to detect various air pollutants, such as particulate matter (PM2.5 and PM10), nitrogen dioxide (NO2), sulfur dioxide (SO2), carbon monoxide (CO), and ozone (O3). These sensors will be strategically deployed in key locations to monitor air quality in real-time. The data collected by the sensors will be transmitted to a centralized platform where it will be analyzed using machine learning algorithms. These algorithms will identify patterns and trends in air pollution levels, allowing us to generate insights into pollution hotspots and trends over time. In addition to monitoring air quality, our system will also incorporate an alerting system for building management. When pollutant levels exceed predefined thresholds, alerts will be triggered to notify building managers, enabling them to take timely action, such as adjusting ventilation systems or implementing air purifiers. Through this innovative approach, we aim to empower building managers and communities to proactively address air pollution and improve overall air quality.

Problem Statement ID: IOT02

Problem Statement: How can a computer vision-based device leverage advanced algorithms like object detection and image segmentation to autonomously determine the safest and most efficient delivery path while avoiding obstacles in real-time?

Description: Develop a computer vision-based device capable of autonomously determining the optimal path for delivering items while avoiding obstacles. Leveraging advanced computer vision algorithms and techniques such as object detection, image segmentation, and depth estimation, the device will analyze its surroundings in real-time to identify obstacles such as walls, furniture, or other objects in its path. By processing the visual data captured by onboard cameras or sensors, the device will generate a detailed map of its environment and calculate the

safest and most efficient route to navigate through the space. Machine learning models can be trained to classify different types of obstacles and prioritize routes based on factors such as distance, accessibility, and safety. This technology holds significant potential for applications in various sectors including logistics, warehouse management, and autonomous delivery systems, where efficient and obstacle-free navigation is essential for optimizing operations and ensuring timely delivery of goods and services.

Problem Statement ID: IOT03

Problem Statement: How can a comprehensive framework be developed to protect IoT device security and privacy, incorporating robust authentication, encryption, and communication protocols to mitigate cyber threats and safeguard data integrity and confidentiality?

Description: Develop a system that involves crafting a robust framework to safeguard IoT device security against cyber threats and privacy breaches. It encompasses implementing robust authentication mechanisms to verify device identities, encryption techniques to secure data transmission, and stringent communication protocols to thwart unauthorized access. By fortifying these crucial aspects, the framework aims to shield IoT ecosystems from potential vulnerabilities, ensuring the integrity and confidentiality of data while preserving user privacy in interconnected environments.

Problem Statement ID: IOT04

Problem Statement: How can innovative IoT solutions be developed to optimize electric vehicle (EV) usage, charging infrastructure, and user experience while addressing challenges and fostering advancements in sustainability and usability within the EV ecosystem?

Description: In today's rapidly evolving transportation landscape, the widespread adoption of electric vehicles (EVs) presents both opportunities and challenges. To address these challenges and propel the evolution of electric transportation, we are seeking innovative IoT solutions that optimize EV usage, charging infrastructure, and user experience. Participants are tasked with developing a scalable IoT platform that seamlessly integrates real-time vehicle data, charging station information, and energy optimization algorithms. The platform should focus on enhancing efficiency and convenience for EV owners by addressing key areas such as vehicle monitoring and management, charging infrastructure integration, energy optimization, user experience, data analytics, security, scalability, compatibility, and fostering innovation and creativity. By tackling these areas, participants will contribute to advancing electric transportation technology, ultimately leading to improved sustainability and usability for all stakeholders involved in the EV ecosystem.

Problem Statement ID: IOT05

Problem Statement: "How can participants in our hackathon create an IoT device that dynamically adjusts solar panel positioning based on real-time data, aiming to optimize sunlight exposure and improve energy production efficiency?"

Description: Our hackathon challenge invites participants to design an innovative IoT device to optimize the positioning of solar panels based on the changing position

of the sun throughout the day. The solution aims to maximize solar energy capture and improve the efficiency of solar panel systems. Participants will develop a scalable IoT platform that integrates real-time data from sun-tracking sensors and weather-forecasting algorithms to dynamically adjust the orientation of solar panels. By continuously monitoring the sun's position and cloud cover, the device will automatically tilt or rotate the panels to ensure they are always facing the optimal direction for maximum sunlight exposure. This intelligent IoT device will enhance the performance of solar energy systems, increasing energy production and reducing reliance on grid electricity. By addressing the challenge of solar panel positioning with innovative technology, participants will contribute to the advancement of renewable energy solutions and sustainability.

DOMAIN: SMART CITY

Problem Statement ID: SC01

Problem Statement: How does our Smart Waste Management System, leveraging IoT technology with sensors in waste bins, optimize collection routes, schedule pickups, and enable remote monitoring for municipal authorities in smart cities?

Description: Our hackathon project proposes a Smart Waste Management System designed to revolutionize waste collection in smart cities. Utilizing IoT technology, our system will deploy smart waste bins equipped with sensors to monitor waste levels in real time. These sensors will detect when bins reach capacity, optimizing waste collection routes and schedules for efficiency. A centralized platform will receive data from these sensors, allowing municipal authorities to remotely monitor waste levels across the city. Machine learning algorithms will analyze historical data to predict future waste generation patterns, enabling proactive planning and resource allocation.

Problem Statement ID: SC02

Problem Statement: How can a smart parking system leveraging IoT devices and data analytics revolutionize urban transportation by monitoring parking occupancy, providing real-time availability information, optimizing spot assignments, and offering insights for city planning?

Description: Develop a project that involves the creation of a smart parking system that has the capabilities of IoT devices and data analytics to revolutionize parking space management, the problem of congestion in parking lots, and improve the efficiency of urban transportation. By deploying IoT sensors or cameras at parking spaces, the system continuously monitors occupancy in real time, providing accurate information about available parking spots to drivers through a mobile application or digital displays. Utilizing data analytics algorithms, the system can predict parking demand patterns based on historical data, events, or trends, allowing for proactive management of parking space allocation. Additionally, machine learning algorithms can optimize parking spot assignments, considering factors such as proximity to destinations, parking duration, and user preferences. By guiding drivers to available parking spaces efficiently, the system reduces traffic congestion and emissions associated with circling for parking, ultimately enhancing the overall flow of urban transportation. Moreover, the system can provide valuable insights to city planners,

enabling them to make informed decisions regarding parking infrastructure investments, and traffic flow optimization.

Problem Statement ID: SC03

Problem Statement: How can smart traffic light systems, integrating IoT technology and real-time data analytics, enhance urban mobility by dynamically adjusting signal timings based on traffic patterns to reduce congestion and improve safety?

Description: How can we enhance urban mobility and reduce traffic congestion through the implementation of smart traffic light systems? Develop innovative solutions that leverage IoT technology, real-time data analytics, and machine learning algorithms to optimize traffic flow and minimize wait times at intersections. Consider integrating sensors and cameras into traffic lights to detect vehicle and pedestrian traffic patterns, allowing for dynamic adjustment of signal timings based on current conditions. Additionally, explore the use of predictive modeling to anticipate traffic trends and prioritize signal changes accordingly. By creating smarter traffic light systems that adapt to changing traffic demands in real time, we can improve traffic efficiency, reduce travel times, and enhance safety for pedestrians and motorists alike, ultimately fostering more sustainable and livable cities.

Problem Statement ID: SC04

Problem Statement: How can we create a user-friendly and efficient platform integrating geolocation data and real-time information to help users instantly find nearby schools, cinemas, hospitals, malls, and food courts in urban areas?

Description: How can we develop an integrated platform or application that utilizes geolocation data and real-time information to provide users with instant access to the nearest schools, cinemas, hospitals, malls, and food courts, streamlining the process of finding essential amenities in urban areas? Participants are challenged to create a user-friendly and efficient solution that leverages geospatial technologies and data analytics to deliver comprehensive and up-to-date information about nearby schools, cinemas, hospitals, malls, and food courts. The solution should offer intuitive search functionalities, customizable filters, and real-time navigation capabilities to help users easily locate and access desired amenities. Additionally, participants are encouraged to explore innovative features such as reviews and ratings, accessibility information, and crowd-sourced updates to enhance the user experience and ensure accuracy. By addressing these challenges, participants will contribute to improving urban navigation and accessibility, enhancing the quality of life for residents and visitors alike.

DOMAIN: AGRICULTURE

Problem Statement ID: AG01

Problem Statement: How does the proposed platform empower farmers by providing user-friendly tools for assessing soil fertility, detecting crop diseases, determining nutrient requirements, and monitoring environmental conditions to enhance agricultural productivity?

Description: The project aims to create a user-friendly platform for farmers to assess soil fertility, detect infectious diseases in crops, determine nutrient needs, and monitor environmental conditions for optimal crop growth. Through this platform, farmers can easily test soil health, identify diseases early, and receive recommendations for fertilizers and environmental adjustments. By providing comprehensive insights, the platform helps farmers maximize crop yield and minimize losses. This technology empowers farmers with essential information to make informed decisions and improve agricultural productivity effectively.

Problem Statement ID: AG02

Problem Statement: How can blockchain-based solutions revolutionize the agricultural industry by providing real-time monitoring, immutable transaction records, and transparency from farm to fork to enhance food safety and consumer trust?

Description: In the global agricultural industry, ensuring transparency, authenticity, and food safety from farm to fork remains a significant challenge. Traditional supply chain tracking systems often lack transparency and are susceptible to fraud and errors, leading to compromised food safety and consumer trust. To address this issue, we seek innovative blockchain-based solutions for tracking and tracing agricultural products throughout the supply chain. These solutions should enable real-time monitoring of product movements, provide immutable records of transactions, and ensure transparency for consumers and stakeholders. By leveraging blockchain technology, we aim to enhance food safety measures, authenticate product origins, and establish a trustworthy ecosystem from farm to fork. Participants are encouraged to develop scalable and user-friendly blockchain applications that can revolutionize the agricultural industry, ensuring the integrity and safety of agricultural products for consumers worldwide."

Problem Statement ID: AG03

Problem Statement: How can technology be leveraged to revolutionize water management and irrigation in agriculture, integrating IoT sensors, data analytics, and automation to optimize scheduling, minimize wastage, and enhance crop yield sustainably?

Description: How can we revolutionize water management and irrigation systems using technology to ensure efficient and sustainable use of water resources in agriculture? Develop innovative solutions that integrate IoT sensors, data analytics, and automation to optimize irrigation scheduling, minimize water wastage, and enhance crop yield. Consider the implementation of smart irrigation systems that utilize real-time data on soil moisture levels, weather forecasts, and crop water requirements to deliver precise and targeted irrigation. Additionally, explore methods for capturing and recycling water runoff, implementing drip irrigation techniques, and promoting soil conservation practices to further enhance water efficiency. By harnessing the power of technology, we can address water scarcity challenges and promote water sustainability in agriculture, ensuring the resilience of food production systems in the face of climate change and water stress.

Problem Statement ID: AG04

Problem Statement: "How can sensor technologies be utilized to create age-friendly urban environments for elderly residents, focusing on safety, well-being, accessibility, and social engagement, while integrating real-time data analytics and smart devices?"

Description: How can we harness the power of sensor technologies to design and implement innovative solutions that prioritize the safety and well-being of elderly residents in urban environments? Develop a comprehensive system that integrates sensor technologies, real-time data analytics, and smart devices to create age-friendly urban environments tailored to the needs of elderly residents. Participants will design solutions that address key safety concerns such as fall detection, emergency response, and environmental monitoring, while also enhancing accessibility and mobility through features such as smart pedestrian crossings, adaptive lighting, and wayfinding assistance. Additionally, participants will explore strategies to promote social interaction and community engagement among elderly residents through digital communication tools and social networking platforms integrated into the urban environment. By addressing these challenges, participants will contribute to the creation of inclusive and supportive urban environments that enhance the quality of life for elderly residents.

Problem Statement ID: AG05

Problem Statement: How can sensor-based monitoring systems be leveraged to create innovative solutions that optimize plant growth and water usage in kitchen gardens, aiming to reduce resource waste and environmental impact?

Description: How can we utilize sensor-based monitoring systems to develop innovative solutions that optimize plant growth and water usage in kitchen gardens, ultimately reducing resource waste and environmental impact? Participants are tasked with designing and implementing systems that integrate sensors, actuators, and data analytics to monitor and control environmental variables such as soil moisture, temperature, light levels, and nutrient levels in kitchen gardens. The goal is to develop smart gardening solutions that automate watering schedules, adjust lighting conditions, and administer nutrients based on real-time plant needs, thereby maximizing growth potential while minimizing water consumption and nutrient waste. By addressing these challenges, participants will contribute to the advancement of sustainable gardening practices and environmental conservation efforts.

DOMAIN: NEW IDEA

Problem Statement ID: NEW001

Problem Statement: "What fresh concepts or innovations have emerged recently, prompting advancements in various fields and stimulating creativity and progress?"