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E-PROCEEDINGS

INTERNATIONAL TINKER INNOVATION & ENTREPRENEURSHIP CHALLENGE (i-TIEC 2025)

"Fostering a Culture of Innovation and Entrepreneurial Excellence"



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PTDI, UiTM Cawangan Johor
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Electrical Engineering Studies, College of Engineering
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Kampus Pasir Gudang
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A-ST007: IN-SITU EPOXIDATION OF CASTOR OIL WITH APPLIED NOVEL SULFATE-IMPREGNATED ZEOLITE CATALYST	8
A-ST009: ADVANCED SOLAR TRACKING SYSTEM WITH TEMPERATURE CONTROL AND REAL-TIME MONITORING.....	13
A-ST012: ONLINE PARKING SYSTEM: PARKING MANAGEMENT AND MONITORING DATA	19
A-ST013: CONTINUOUS FOOD SUPPORT FOR STRAY ANIMALS.....	24
A-ST014: AUTOMATED AQUAPONIC WATER QUALITY MANAGEMENT SYSTEM.....	29
A-ST017: SMART WATERING SYSTEM	34
A-ST018: INTEGRATED IMMUNE CHAOTIC EVOLUTIONARY PROGRAMMING (IICEP) OPTIMIZER TOOL FOR INTEGRATING BATTERY ENERGY STORAGE SYSTEMS IN TRANSMISSION NETWORK FOR LOSS MINIMIZATION	39
A-ST019: BAYMAX: GUARD COMPANION	48
A-ST021: ECODRY LUXE	53
A-ST022: REVOLUTIONIZING EPOXIDE SYNTHESIS: CATALYTIC INNOVATIONS IN WASTE COOKING OIL EPOXIDATION	60
A-ST023: ALERTIFY: RECEIPT FRAUD DETECTION APPLICATION	64
A-ST026: REVOLUTIONIZING ACCESSIBILITY: AN IOT-POWERED DOORBELL FOR THE DEAF COMMUNITY.....	69
A-ST028: CREATION OF SUSTAINABLE COASTAL SEDIMENT DATABASES FOR SCIENTIFIC, ENVIRONMENTAL, AND SOCIETAL APPLICATIONS.....	73
A-ST029: GREEN SAPONIFICATION PROCESS: LIQUID SOAP FROM WASTE COOKING OIL AND PANDAN LEAVES	77
A-ST031: LECTURERS TO COURSES STRUCTURED ASSIGNMENT BY ZONING BINARY INTEGER GOAL PROGRAMMING MODELS FEATURING ENHANCED MODIFIED HUNGARIAN METHOD (L-CSAZ BIGPE-MHM MODELS)	82
A-ST032: INTERACTIVE REAL-TIME VISUALIZATION OF FAULT TOLERANCE SIMULATION FOR INDUCTION MACHINES	90
A-ST033: SWEETATO CREAMER.....	95

A-ST012: ONLINE PARKING SYSTEM: PARKING MANAGEMENT AND MONITORING DATA

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ABSTRACT

Technology has greatly improved our lives, but parking remains a common problem. Many parking areas are poorly managed, causing congestion and frustration as drivers waste time searching for open spaces, especially in crowded areas. This project presents the design and simulation of an Online Parking System: Parking Management and Monitoring Data aims to create a mobile app that helps users find available parking spots easily. The app provides real-time updates on parking availability and locations, saving time and reducing stress. The system uses Arduino-based sensors and devices, including a Proximity Sensor, RFID Reader, and Relay Module. It's equipped with a Wi-Fi module to enable remote monitoring and control, making it an IoT solution. The Proximity Sensor detects whether a parking spot is occupied or empty, and this information is sent to the app via the ESP32 Wi-Fi module. The mobile app allows users to track and locate parking spots in real time, offering a simple and effective way to manage parking.

Keywords: Online Parking System, Proximity Sensor, RFID Reader, ESP32 Wi-Fi module, IoT, Parking management.

1. Product Description

This project presents an online parking system featuring IoT technology with Arduino-based sensors to enhance parking management. In order to make things easier for drivers and parking facility managers, the system focusses on tracking and managing parking availability in real time. A proximity sensor, an RFID reader, a relay module, and an ESP32 Wi-Fi module are essential parts. The Wi-Fi module sends the information to a mobile application when the proximity sensor determines if a parking space is filled or unoccupied. This helps consumers find open spots faster and spend less time searching by enabling them to get real-time information about available parking spaces straight from their mobile phones. The system also has LED indicators for every parking space, which lights up to indicate whether a spot is occupied or available. When there are no parking spots available, a servo motor at the entrance automatically blocks access to the lot. This guarantees that only vehicles with slots available can enter and prevents needless traffic. By facilitating remote monitoring and control, the IoT feature improves the system and makes it much more effective and user-friendly. The solution greatly enhances parking lot management and lessens user annoyance by fusing real-time data updates with clear visual signs and automatic entry control. In addition to making parking easier for vehicles, this project maximizes available space and guarantees improved traffic flow inside parking lots.

2. Block diagrams and Flow Charts

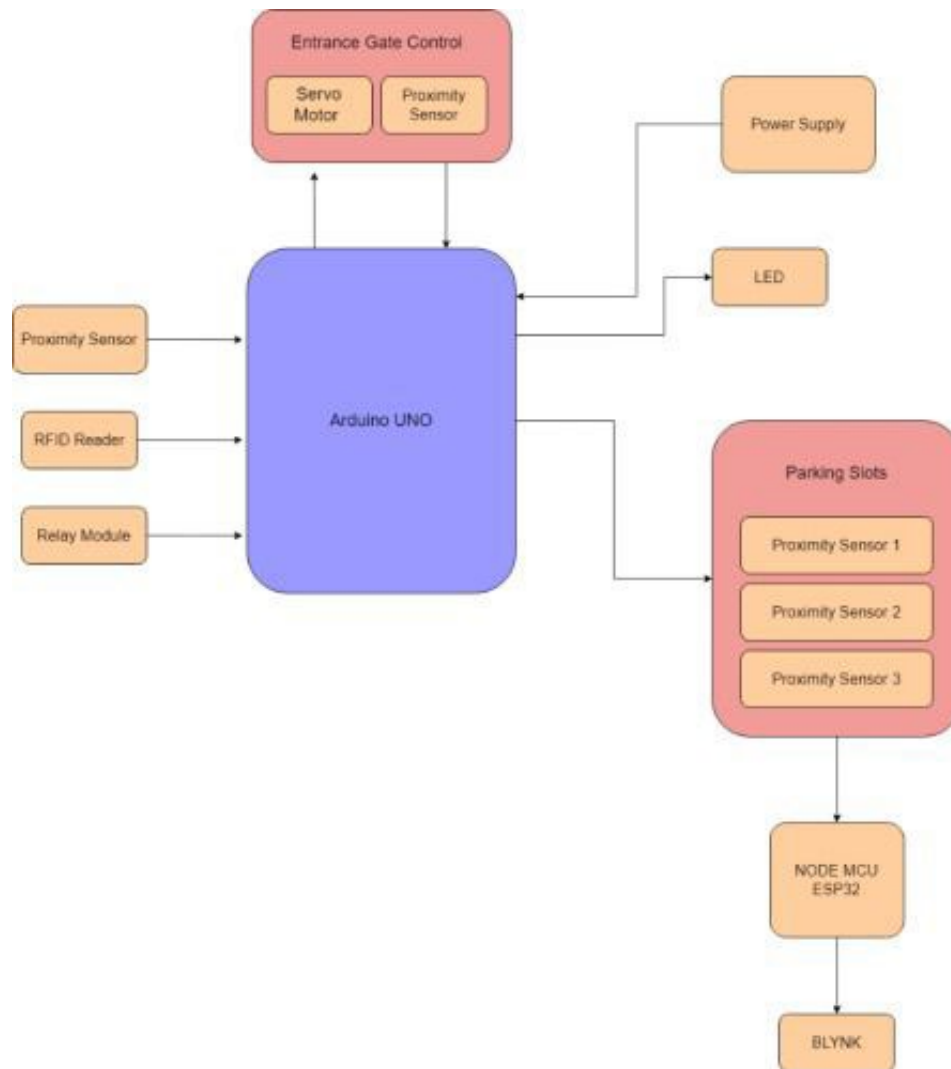


Figure 1. Block Diagram of Online Parking System: Parking Management and Monitoring Data

3. Novelty and uniqueness

This concept is unique and distinctive because it combines Arduino-based sensor with Internet of Things technology to improve parking management. The system is a major improvement over conventional parking systems since it uses real-time monitoring to offer precise data on parking spot availability, which is visibly shown by LED indications. Its automated access control system, which restricts vehicle entry when there are no available parking spaces using a servo motor, is one of its most significant features. This proactive strategy ensures smoother parking operations by preventing needless congestion.

Additionally, The Blynk app operates as an easy-to-use interface for customers to track parking space availability in real-time, and the entire system is built to function as an Internet of Things (IoT) solution, enabling remote monitoring and control. This project stands out among conventional parking management systems because of its fully automated and user-friendly solution.

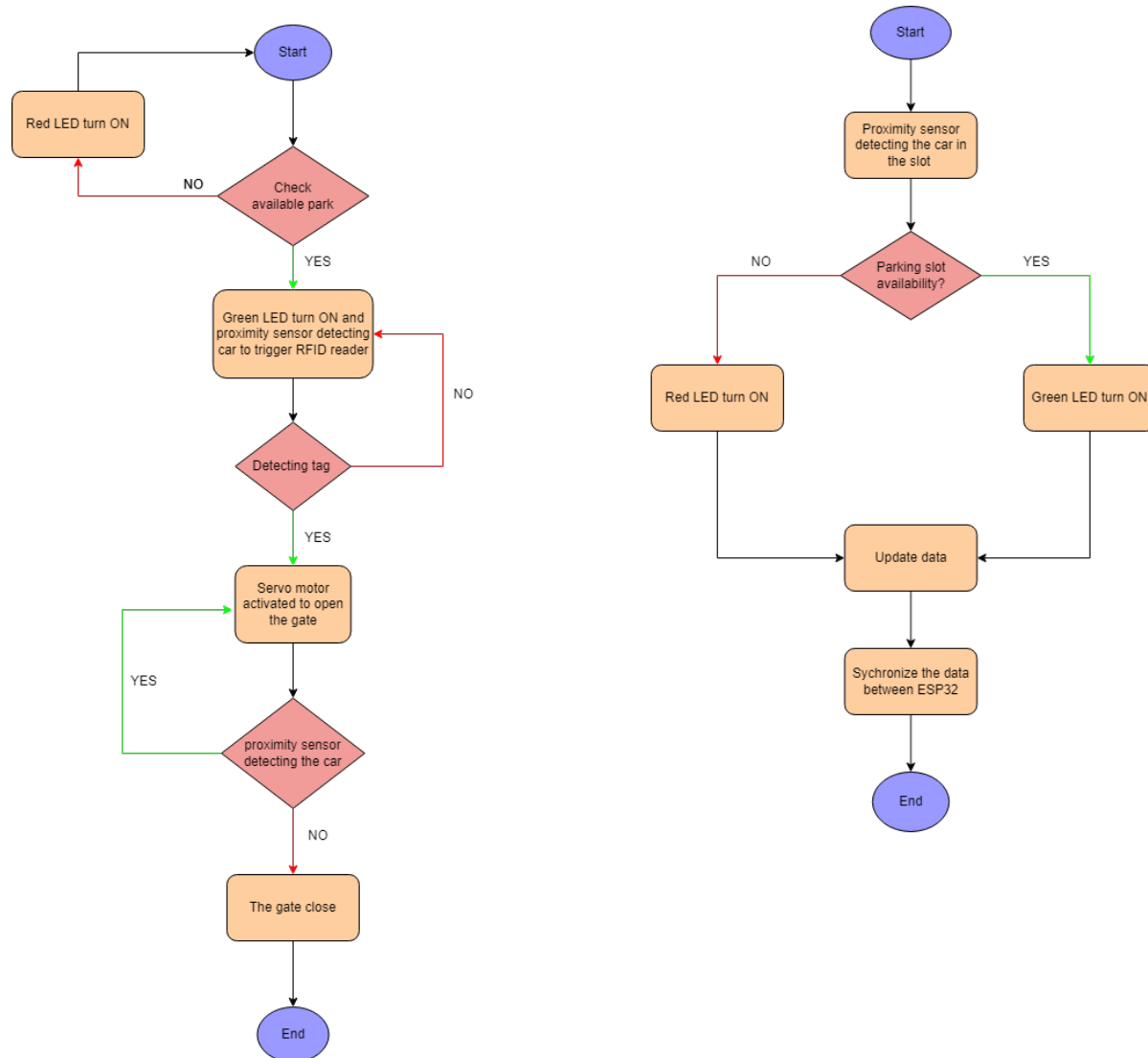


Figure 2. Flowchart of Online Parking System: Parking Management and Monitoring Data

4. Benefit to mankind

This Online Parking System reduces drivers time and stress, which is one of its significant benefits for mankind. It reduces the frustration of searching for available spots, especially in congested areas, by directing users straight to parking spots that are available. The user experience is enhanced by this efficient technology, which also lessens traffic in parking lots and around the area. Congestion is further reduced by the system's ability to block needless

car entry when there are no spaces available, facilitating easier flow of traffic both inside and outside the parking lots. Because vehicles spend less time looking for parking, the technology helps lower vehicle emissions and fuel usage from an environmental perspective. By reducing carbon footprints, this helps create a more environmentally friendly world.

5. Innovation and Entrepreneurial Impact

This parking system's implementation of IoT technology influences another industry that still uses outdated, manual parking management techniques. This solution opens up novel opportunities for parking and transportation innovation by automating the process and providing real-time information. From small parking spaces to big cities buildings like shopping centres, airports, and stadiums, this able to adapt solution can be used in a variety of locations. Because of its flexibility, the system is extremely adaptable and may be used in a variety of settings. Furthermore, by providing a technical solution to city-wide issues like traffic congestion and inefficient parking, the idea supports the objectives of proactive society programs.

6. Potential Commercialization

There is a lot of potential for commercialization of this system, especially in cities and busy places where parking is a constant problem. Universities, business buildings, shopping centres, airports, and more might implement it. Paying for usage strategies for users accessing the mobile app, hardware sales for IoT components (sensors, relay modules, etc.), and subscription fees for parking lot operators are a few examples of potential revenue sources. The system's installation and reach could be increased with the support of partnerships with private operators and communities. Its compatibility with smart city objectives and environmental sustainability adds to its attraction, utilizing in investors and government programs that emphasize green technology and urban efficiency. Offering a workable, innovative respond to to the severe problem of parking in larger cities areas, this system has been designed for both local and international commercialization due to its scalability and adaptability.

7. Acknowledgment

The project is financially supported by the Electrical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, Masai, Malaysia

8. Authors' Biography



Nur Aina Syasya Mashuri is a student of Electrical and Electronic Engineering at Universiti Teknologi MARA (UiTM). Her final year project focuses on developing an Online Parking System: Parking Management and Monitoring Data that uses sensors, Wi-Fi, and a Blynk app to help drivers find available parking spots in real time. By aiming to reduce the time spent searching for parking and minimizing congestion, the project seeks to make parking more efficient and environmentally friendly. With the goal of improving traffic flow and optimizing parking space usage, the project aligns with the growing demand for smart area solutions and presents possible commercial possibilities in the smart transportation industry.



Ts. Dr. Siti Aminah Nordin  is a distinguished senior lecturer currently affiliated with UiTM Campus Pasir Gudang. She earned both her master's and Ph.D. degrees in Electrical Engineering from UiTM Shah Alam in 2014 and 2022, respectively, showcasing her commitment to academic excellence. With a specialized focus in the realm of Electrical Engineering, her research interests are notably centered around microwave filters, antennas, and electromagnetic wave area. She can be contacted email: sitia181@uitm.edu.my.



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