University of Plymouth

SCHOOL OF ENGINEERING, COMPUTING AND MATHEMATICS

MAL3018

COMPUTING PROJECT

2024/2025

ParkFinder: "IoT-Based Real-Time Parking System with User-Friendly Interface for Spot-Level Availability"

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Acknowledgments

I want to express my gratitude to my supervisor Miss Nafisah for her feedback and guidance throughout this project which ultimately led to a stronger end product.

I would also like to extend my thanks to my family and friends, who have supported me through the project and helped out wherever they could, including participating in the usability sessions to improve Park Finder.

Abstract

This report presents the development of an IoT-based Smart Valet Parking Reservation System designed to address urban parking challenges through an integrated IoT solution along with back- end support using an AWS server. The system uses the back-end server of the AWS system to launch the system globally and lets users make reservations via the web interface. It utilizes the IoT ultrasonic sensors to detect the presence of availability of the parking slot with ESP32 microcontrollers connecting it to the back-end server. The RFID system is added to verify the user's identity upon arrival. A centralized AWS web hosting platform processes and presents this data along with a database setup to ensure efficient parking management.

Users can interact with a web-based interface to check real-time parking slot availability and make reservations in advance, making the valet process more orderly and reducing congestion at arrival points. To enhance security, the system includes an RFID-based access control mechanism that verifies user identity at the entry point and controls a servo motor gate for automated access.

The report explores the background and significance of proven smart parking solutions, which justifies the best technology for the project and details the system architecture through diagrams and code. Furthermore, the key development stages, the strength of the architecture, future security improvement of the architecture, and recommendations are discussed in the report. Last but not least, the legal, professional, and ethical considerations are examined alongside proven project management strategies.

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