Automated Vehicle Parking Management System

#### 2023 Computer Engineering Design Project (AA05)

### Faculty Lab Coordinator

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### Faculty Advisor

Same as FLC

### Preamble

Vehicle parking in places such as crowded cities and airports has become an issue for many drivers. Limited parking spaces arising from shortage of real estate, increased population and more automobile use have resulted in a great demand for efficient parking management systems. Delays in finding a parking spot can be reduced with an intelligent system to monitor and provide feedback on the availability of parking space in real-time. In this project, wireless sensing and reporting capabilities along with central server/processor and intelligent decision making will be used to develop an efficient parking space management system.

### Objective

To demonstrate the effectiveness of the well-designed automated intelligent parking system using the Internet of Things (IoT) technology. The system uses sensors to detect the presence of vehicles in individual parking slots and the movement of vehicles through the parking lot as input to the central processing unit. Prediction algorithms are then used to determine the time of the next available slot and provide a system-level view based on current parking lot information and past customer parking behaviors if possible. The implemented system enables the administrator to efficiently manage the flow of traffic through the parking lot, to collect data to later analyze peak hours and volume, and develop time-zone based parking rates.

### Partial Specifications

The parking management system to be implemented should: (a) use Internet of Things (IoT) development kit and/or Arduino (or appropriate) board in sensing, data acquisition, and networking (b) in real- time monitor via wireless technologies at desktop computer and smartphone, (c) use Java/C++/Python and Android/iPhone- based display, (d) demonstrate efficiency in automated operations for end users (accurate prediction of availability, empty location etc). This project may be done with the combination of simulation and real implementation.

### Suggested Approach

Study the literature on automation, sensors, wireless control, and monitoring - Research on technology for automation, wireless device communication and decide on the appropriate networking solution. - Design a data acquisition/monitoring of subsystems (sensors) and develop software/server for the data acquisition/processing - Incorporate intelligent decision making to optimize the parking operations and maximize the revenue Use modular approach in design/test and then integrate. - Design/develop the GUI with appropriate inputs and ease of use - Arduino (or similar) programming and APPS development for demonstration. - Test the integrated system for typical/extreme utility conditions which will be done through simulation and some implementation.

### Group Responsibilities

Study the sensor based automation, networking and wireless communication systems, design/develop the technical specifications required for the selected parking management system, implement and test the entire system with the above objectives. Follow the project management plan carefully and thoroughly. Responsible for the demo and project report.

### Student A Responsibilities

To design, develop and implement (or simulate) a parking management system and demonstrate its automation, efficiency and usefulness.

### Student B Responsibilities

To design, develop and implement (or simulate) a parking management system and demonstrate its automation, efficiency and usefulness.

### Student C Responsibilities

To design, develop and implement (or simulate) a parking management system and demonstrate its automation, efficiency and usefulness.

### Student D Responsibilities

To design, develop and implement (or simulate) a parking management system and demonstrate its automation, efficiency and usefulness.

### Course Co-requisites

### Collaborating Hospital

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