Automated Parking Management System

Customer Requirements

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# Introduction

## Project Purpose

* + 1. 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.

## Project Scope

* + 1. This project aims to develop a general system model for parking management that can be scaled and applied to a real-life scenario. This includes a user interface application that allows users to book parking spots, a central hub of servers that store data, provide authentication for users, monitor and collect data for each parking lot. This system is used to automate management of parking lots. Security and maintenance of parking lots is not included scope of this project.

# Document Description

* 1. This document shall describe the high-level customer and end-user requirements that should be satisfied by this project. It should describe the purpose of each high-level subsystem and their requirements.

# Project Features and Requirements

## Parking Lot Management Subsystem

### Authentication

* + - 1. Users must book a parking spot to enter the parking lot.
      2. Users shall be able to enter only within the time of a valid booking.
      3. Users must exit within their booked time.
      4. System shall authenticate users with a booking one at a time.

### Parking

* + - 1. Regular parking users shall be able to park at any “regular” spot.
      2. Premium parking users shall be able to park at a specific premium spot.
      3. Disabled parking users shall be able to park at any disabled spot.
      4. System shall have a physical indicator in the parking lot to indicate that a spot is occupied.
      5. System shall track the occupancy of parking spots.
      6. Vehicle length and width shall not exceed parking spot length and width.

### Tracking

* + - 1. System shall use Internet of Things (IOT) technology to implement tracking software for parking spots.
      2. System shall perform real-time monitoring of parking spots.
      3. System shall use sensors to detect the presence of a vehicle in a parking spot.
      4. System shall authenticate users for “special” (premium , disabled, etc.) parking spots.

## Data Analysis

### Parking Lot Data

* + - 1. System shall track the real-time parking occupancy in a remote server.
      2. System shall collect and store parking occupancy data in a remote database.

### Prediction Algorithms

* + - 1. System shall use prediction algorithms using collected data to predict parking occupancy at certain times at specific locations.
      2. System shall track peak hours at specific parking spots.
      3. System shall track the most popular parking spots.

## Web-Based User Interface Application

### User Profile

* + - 1. Users must have a registered account to login to the application.
      2. Users shall be able to register an account using the application.
      3. Users shall be to login to use the application features and services.
      4. Users shall be able to store personal information associated with their account profile.
      5. Users shall be able to logout of the application.

### Spot Booking

* + - 1. Users shall be able to book parking spots for available times.
      2. Booking information shall be used to authenticate users at the parking lot.
      3. Users shall be able to cancel their bookings at any time.
      4. Users shall be refunded if booking is canceled prior to the booked time slot.
      5. Users are required to pay at the time of booking.

### Parking Data Display

* + - 1. Users shall be able to see real-time parking occupancy of spots.
      2. Users shall be able to see peak hours at specific spots.
      3. Users shall be able to see occupancy rate of each spot.
      4. Users shall receive recommended booking times based on predicted availability of parking spots.