**WATECHPARK**

SMART Parking Lot System

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Status

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# Declaration of Joint Authorship

We, Student A (Vikas Sharma), Student B (George Alexandris), and Student C (Elias Sabbagh), confirm that this work submitted is the joint work of our group and is expressed in our own words. Any uses made within it of the works of any other author, in any form (ideas, equations, figures, texts, tables, programs), are properly acknowledged at the point of use. A list of the references used is included. The work breakdown is as follows: Each of us provided functioning, documented hardware for a sensor or effector. Student A provided VCNL4010 Proximity Sensor. Student B provided IR Beam Sensor. Daniel O Donnell provided LSR Camera Sensor/2 Stepper motors. Due to unexpected circumstances, Daniel’s involvement with the project was passed to Elias Sabbagh joining the group during the Winter 2020 semester, to ensure successful progression of the project. In the integration effort, Student A is the lead for further development of our mobile application, Student B is the lead for the Hardware, and Student C is the lead for connecting the two via the Database.

# Proposal

**WatechPark** - SMART Parking Lot System Proposal

**From:** Vikas Sharma, N01160135

**Discipline:** Computer Engineering Technology

**Date:** January 15, 2020

# Background

This document will outline the software portion of the project in CENG 319 that will be coupled with hardware in CENG 317 for the final integration in CENG 355. Our project is going to be on a SMART parking lot system. Many busy parking lots are often plagued with congestion, drivers competing to find a spot by cruising around and visually finding spots. This is inefficient, time consuming where productivity is lost for consumers and businesses. The system we will be developing will address payment for parking, capacity management and location finding following an IoT approach using hardware and software.

# Problem Statement

The problem being addressed includes, time spent searching for a parking spot, increased capacity levels during peak hours. This project is focused on solving these issues by connecting consumers to parking lot owners and providing parking services by using a more convenient, simpler method to retrieve parking lot data seamlessly.

# Methodology

Phase 1: Hardware Design/Build

The small physical prototypes that we build are to be small and safe enough to be brought to class every week as well as be worked on at home. In alignment with the space below the tray in the Humber North Campus Electronics Parts kit the overall project maximum dimensions are 12 13/16" x 6" x 2 7/8" = 32.5cm x 15.25cm x 7.25cm. Keeping safety and Z462 in mind, the highest AC voltage that will be used is 16Vrms from a wall adapter from which +/- 15V or as high as 45 VDC can be obtained. Maximum power consumption will not exceed 20 Watts.

Phase 2: System Integration/Connection

This phase will be completed during the final semester of the Computer Engineering Program. The work gathered from both software/hardware courses will be combined and integrated for the final capstone project. The development platforms we will be working with is Android Studio 3.5.2, Raspberry Pi 4 Model B, and Google Firebase database.The mobile application provides key functionality to allow consumers to access parking lot data, view sensor/effector information specific to a location and choose the best parking space during different peak hours of the day. The VCNL4010 Proximity sensor will be used to detect the status of a given parking space at a specific time of access. The IR Beam Sensor will control the gate opening/closing and detect the presence of a vehicle near/far away. The LSR Camera sensor will be used for valid license plate recognition. The 2 stepper motors will control the gate and allow entry/exit based on the sensor data, and status of the lot.

Phase 3: Final Demonstration to Potential Employers

At this stage, we will demonstrate our 2 semester’s worth of work to be assessed. Our project description/specifications will be reviewed by, Mike Wrona, ideally an employer in a position to potentially hire once we graduate.

# Hypothesis

This project is focused on providing a solution for managing parking lot data, providing a less time-consuming experience with a simple, intuitive interface. This is an opportunity to showcase our knowledge and understanding to build a collaborative effort for an industry sampled IoT project. I request approval of this project.

# Executive Summary

In retrospect, this document outlines both the hardware and software aspects of the project. This project intends to build an IoT design that would help support industry related issues such as capacity management, location-finding by finding ways to reduce the time spent manually searching for parking spots. This document aims to provide insight into the design, development, testing phase of our SMART parking lot system project. In collaboration with our partner at ParkingBoxx, we have gathered our ideas to create a simple, intuitive and user-friendly platform for consumers within the market.

Our product aims to provide the essential needs for both consumers/businesses to view and manage parking lot data. In terms of market use, we believe through the project we will build a product that can be offered from an industry standpoint as well as be marketable to other fields of interest. Through the development of this product, we wanted to reach as many demographics and be able to provide an inexpensive and reliable platform where parking lot information can be retrieved at a glance. We offer users with the ability to be able to add/manage cars, view parking lot data, make on-the go reservations for parking passes, accessible via an online database to send/receive information in real-time, all built-in with a simple, effective interface. Due to these reasons, we believe it will be ideal to be considered to be hired by an investor for employment. This will be an extraordinary opportunity for us to be able present our work, knowledge and skills to promote our product from a marketing perspective.