**TO:** UCF BOARD OF TRUSTEES **DATE:** DEC 10, 2020

**FROM:** MICHAEL KISIDA

**SUBJECT:** PROPOSAL- IMPLEMENTATION OF PARKING SPOT SENSORS ON CAMPUS

## PROJECT OVERVIEW

I am writing on behalf of the University of Central Florida student body to address problems we have identified on campus and propose improvements to better student life. The first problem that has been identified is the inconvenience of not knowing whether or not a floor on a parking garage is full. This makes finding a parking spot much more time consuming and inefficient than necessary. A solution to this problem is to install parking sensor sechnology in all major parking garages and parking lots on campus.

## PROJECT DESCRIPTION

Currently each parking garage has a display outside of their entrances that displays if there are any spots available in the garage. This also includes a website that users can see where spaces are available. Although this is useful it does not provide enough data to make an accurate judgement on where spaces are available. Another issue with this is that drivers should not be on their phone while driving trying to find a parking space. This project aims to provide useful and accurate data at an affordable cost that is easy to access and displayed on each parking garage floor and entrance. Using modules containing a long lasting battery, ultrasonic sensors, microcontrollers, and LEDS placed on either the floor of parking spots or the ceiling in parking garages, sensors can detect each spot availability and send information using internet to a central server where it will be updated on a display or on a mobile app. A web API will need to be developed to handle the data that is received from each micro controller and pushed to a web app for access.

## RESOURCES NEEDED

The technlogy for the system and hardware is pretty simple only requiring 4 main components. Each of these components can be purchased in bulk at a low cost to keep the overall price of the complete system down. The 5 main parts for each module are listed

### ULTRASONIC SENSOR

An ultrasonic sensor was chosen as for this design because of its low cost and high accuracy. These sensors work by detecting when an object has crossed its threshold distance which can be manually programmed. These can also be mounted in any orientation as long as the sensors are pointed where they will be detecting vehicles.

### LITHIUM BATTERY

Lithium batteries were chosen due to the option of them being mounted to the floor of parking spots in addition to the ceiling mounts of parking garages. These batteries would last from 1-2 years before needing to be replaced.

### ALTERNATIVE POWER

A constant supply of 5V DC power is needed to power system so an alternative to battery power is using an AC - DC converter.

### MICROCONTROLLER

An ESP8266 was chosen as it is a micontroller that has wifi built in and has low power draw.

## COST/BUDGET

***The estimated cost for each module will cost around $50:***

The ESP 8266 module- $5
Ultrasonic Sensor- 4$ x 2
Battery- 30$
Plastic Casing- 5$ (estimate for mass production of plastic casing to hold parts)

| PARKING GARAGE | NUMBER OF SPOTS |
|---|---|
| GARAGE A | 1623 |
| GARAGE B | 1259 |
| GARAGE C | 1852 |
| GARAGE D | 1241 |
| GARAGE H | 1282 |
| GARAGE I | 1231 |
| GARAGE LIBRA | 1007 |
| ***TOTAL*** | ***9,495*** |

The cost of the total system is estimated to be at a price of ***$250,000.*** This is estimated by using the total number of parking spaces in the garages and dividing by it 2 as each module can detect two spots which ends up being 4, 748 modules needed. With the cost for each module estimated at $50, it ends up being $237, 375. The extra money added to the cost of the propsoal is for displays, and the development of a web API and app for users to access.

### RETURN ON INVESTMENT

This system can pay for itself in a few years by providing an interface on the app to allow users to reserve certain spots for a few hours at a time to get the most spot convenient for them. These reservations can cost between 1-3$ depending on how long students want to reserve them for.

## CONCLUSION

In conclusion I hope that you consider this proposal for an improvement to the already beautiful UCF campus in order to improve student life and make everything easier. This cost effective system will solve issues with parking and parking traffic in all parking garages on campus. It is an effective way for students to figure out where they can park and even reserve parking spots for use.

Works Cited

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