Initial Project and Group Identification Document

# Park Shark


**University of Central Florida**

Department of Electrical Engineering and Computer Science

Senior Design 1

**Group D**

| | |
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## Project Narrative

One of the hardest challenges every student will encounter throughout their academic career at the University of Central Florida is finding a parking spot on campus. UCF currently has a system in place that attempts to monitor the availability of parking in each of the several parking garages on-campus. However, this system is inaccurate and often leaves students scrambling to find a spot before their class starts. The idea behind Park Shark is to create a system that will report an accurate number of available parking spots left and be able to communicate this information to students quickly and effectively via the internet.

The goal of this project is to create a small, portable device that can easily be installed in parking garages around campus. One of our primary objectives is to detect the availability of multiple spots using one device. This will reduce the cost of our system compared to other systems that require monitoring systems for each individual parking spot. We plan to achieve this goal by using a video camera in conjunction with OpenCV to detect the availability of multiple spots. Our device will also be able to connect to the internet using the on-campus Wi-Fi to send the parking data to publish to an online database. With this data, our next goal will be to collect and display this information via a mobile app and website so students can access parking availability information on the go. We will also display the available parking spaces on each individual floor with a digital sign at each ramp entrance. This way students who do not check the app or whose phones have died can check how many spots are available on that particular floor. We also plan to utilize the statistics gathered from our data to inform students of peak times and give them an estimated amount of time to find a parking spot.

## Project Requirements and Specifications

1. Small form factor
    - Size of device should not exceed: 2.9 x 8.9 x 6.5 inches
2. Low cost
    - The production of a single unit should not exceed: $200
3. Low power
    - The total power consumption should not exceed: 480mA
    - The device should only require a battery change once every 12 hours
4. Low maintenance
    - Once the device is installed, it should require little to no maintenance
    - During battery change every 6 months, inspection of the camera to ensure good line of sight
5. Communication
    - Communicate wirelessly with internet
    - Publish parking availability data to online database
6. App/Website
    - Display information in a simple, effective way

## Project Constraints

Project constraints that we are aware of at this time.

**Cost**: The project will be completely funded by the team.

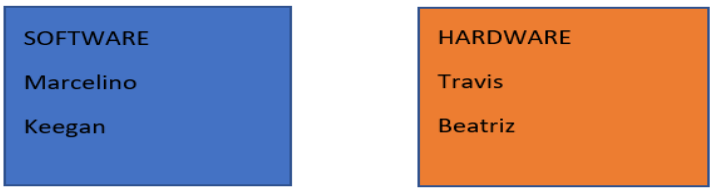
**Time**: With only a year to plan and implement and limited funding, we will only be able to outfit a small section of a parking garage as a proof of concept.

**Rooftop**: Our current design utilizes the ceiling of the parking garage to attach our device to. The rooftop has no such anchor point. If we had funding and time, we would be able to make pillars on the rooftop walls to install our devices.

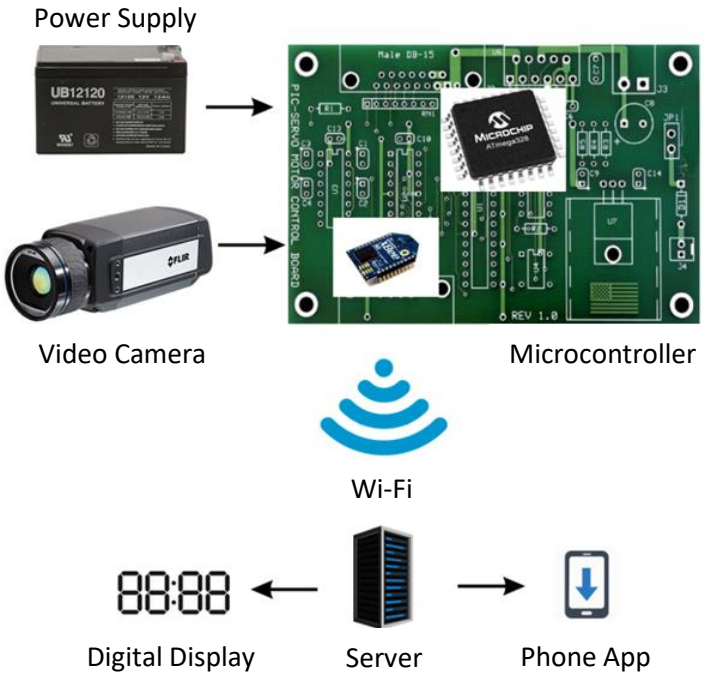
**Power**: Again, with limited funding and planning, the device will only run for a total of 12 hours. If the design was being implemented for an entire garage, power would be run to each of the devices via the power cables already present in the garages.

## Project Block Diagrams

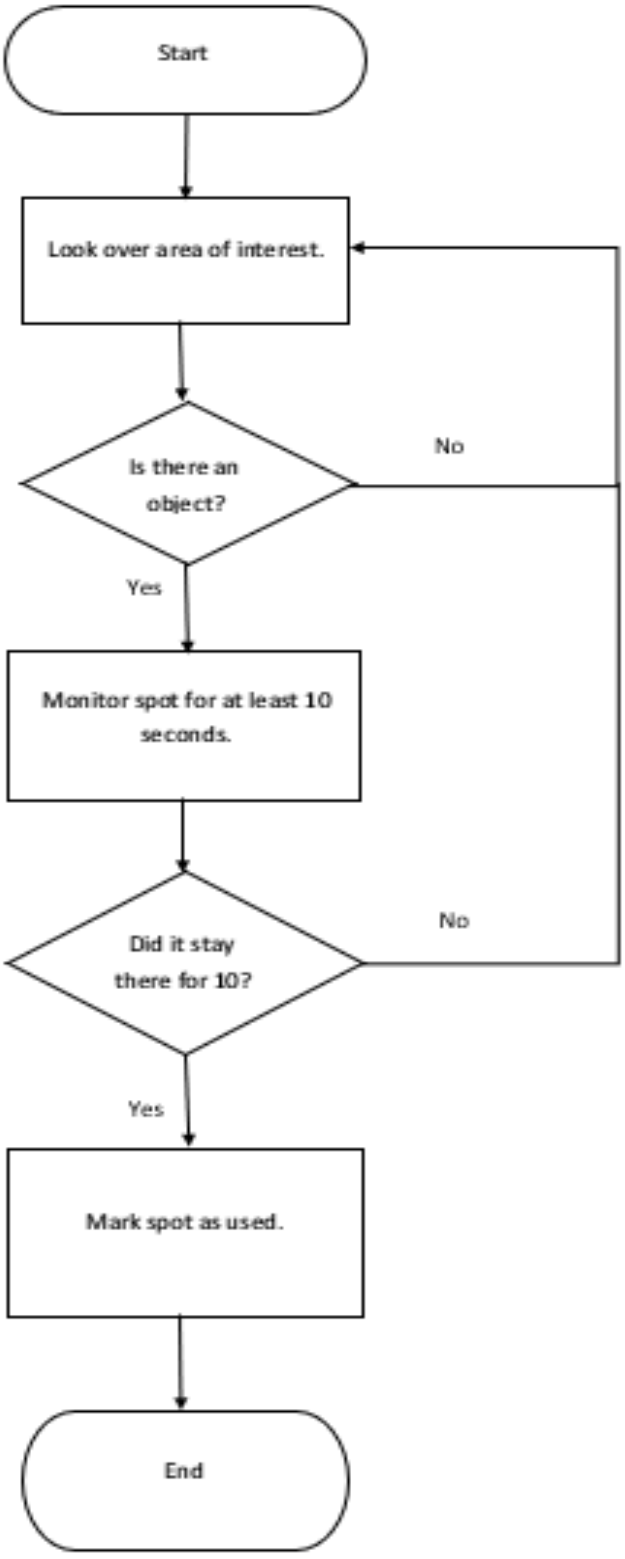
**Software/Hardware Responsibilities**



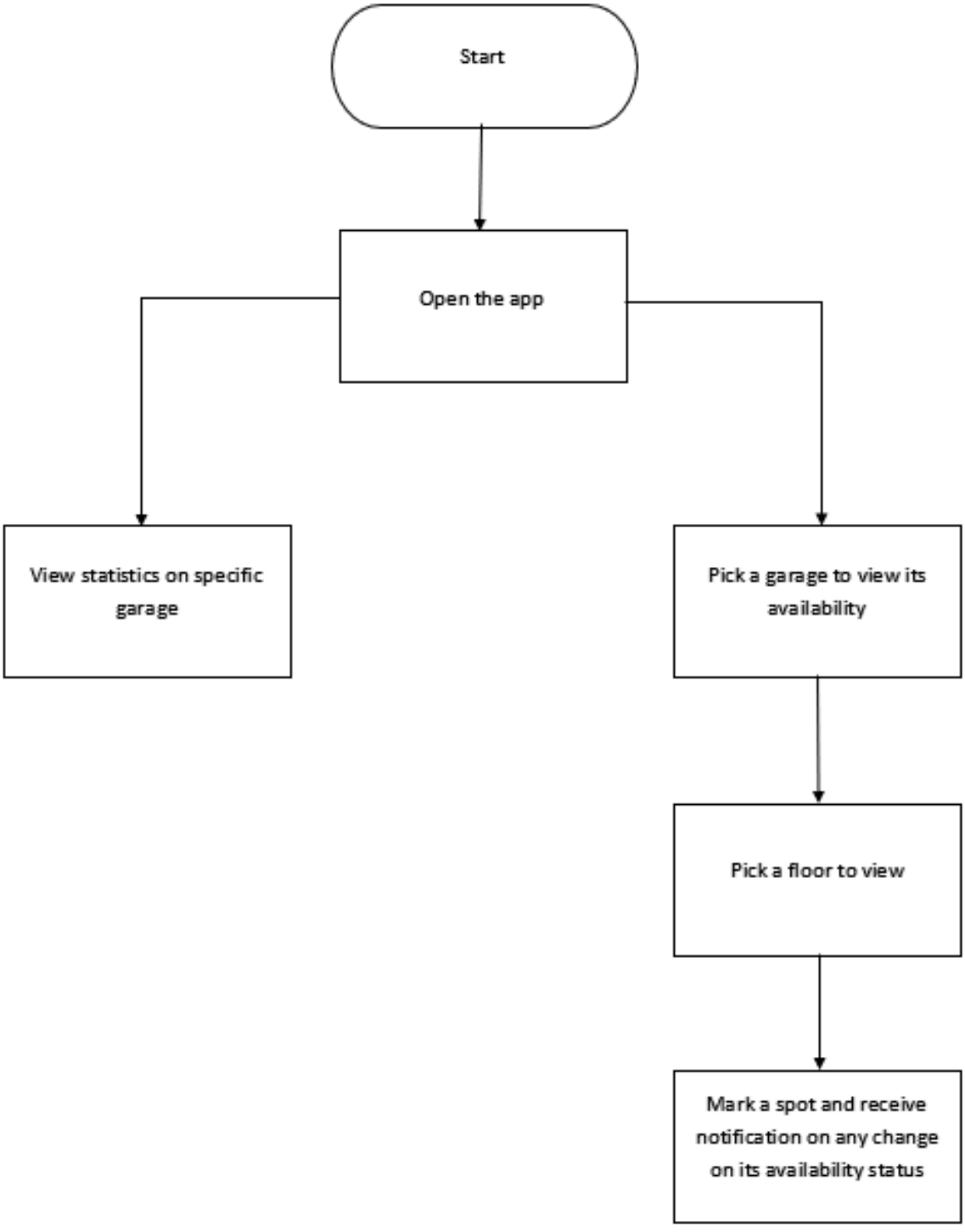

**Hardware Diagram**



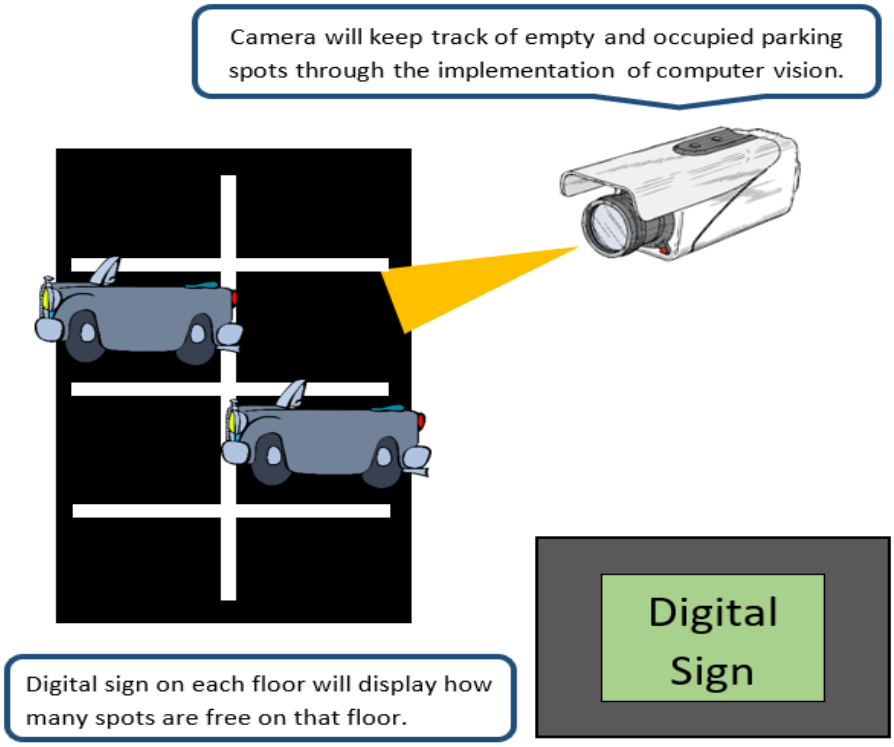
## Software Diagram



## Mobile App Diagram



## Project Prototype Illustration




## Project Budget

Estimated project budget and financing. Our project will be self-funded.

| **Budget** | | |
|---|---|---|
| **Description** | **Quantity** | **Estimated Cost** |
| Video Camera | 2 | $60 |
| Battery | 1 | $25 |
| W-Fi transmitter/receiver | 1 | $6 |
| Arduino, TI MCU | 1-5 | $10 |
| Enclosure | 1 | $25 |
| Display | 3 | $45 |
| **Total Cost Estimate** | | ~$171 |

## Initial Project Milestones

Initial project milestone for both semesters.

| Senior Design 1 (Spring Semester) | | |
|---|---|---|
| **Number** | **Task** | **Completion Windows** |
| 1 | Ideas | January 19th |
| 2 | Project Selection | January 26th |
| 3 | Project Proposal | January 31st |
| 4 | Research and Plan | February 1st – March 7th |
| 5 | Work on Draft | Marth 8th – April 8th |
| 6 | Redesign | April 8th – April 16th |
| 7 | Prototype | April 16th – May 5th |
| 8 | Finalize Report | April 6th – May 5th |
| 9 | Order Parts | May 5th |

| Senior Design 2 (Fall Semester) | | |
|---|---|---|
| **Number** | **Task** | **Completion Windows** |
| 1 | Build Working Prototype | August 20th – September 14th |
| 2 | Program App and Website | September 15th – October 20th |
| 3 | Testing/Debug and Redesign | September 15th – October 20th |
| 4 | Finalize/Finishing Touches | October 21st – November 21st |
| 5 | Final Report | November 1st – December 1st |
| 6 | Presentation | December |