APSU Parking Lot Availability Application

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# Abstract

The Austin Peay State University (APSU) Parking lot application is created to make parking easier for students and staff on the APSU campus. This application will have real-time updates on a user-friendly interface. The app will allow users to view the parking availability across campus and see more detailed information about a single parking lot. Some information that will be provided about the parking lots will be what lots are most popular, what lots are running low on spaces, directions to each parking lot, and an option for users to report vehicles parked incorrectly. Additionally, the application will notify users when a parking lot is almost empty or about to reach full capacity.

Our application’s goal is to make the process of parking on campus more manageable and less stressful for everyone. By providing real-time updates on the applications, students or staff will not have to drive around campus hoping to find an empty parking spot. This application could possibly reduce traffic around the campus area by letting its users know where to go to find the empty parking space. The reporting option on the application will make sure everyone is held accountable and to think twice before parking in an invalid spot.

# Description

This project will incorporate JavaScript, Cascading Style Sheets (CSS), and Hyper-Text Markup Language (HTML) for maximum device compatibility. It is an application that will be designed to run in Google chrome. The application will be open to anyone who chooses to download it or visit the webpage. It will provide a map of Austin Peay State University in the form of a viewable file. When you click on a parking lot, its total spots available will be displayed if there are any. If there are not any parking spots available, then the parking lot will display “FULL” or “UNAVAILABLE.”

We would like to code the entire project in JavaScript, HTML, CSS, and utilize superbase. The application on whatever device will geotag a student’s location at APSU and prompt the user to save their location in that parking lot and add it to the parking lot total. When a student leaves the parking lot, they will be given a prompt that has two buttons. One button will say “Going to Class” and the other button will say “Going Home.” When the user selects “Going to Class”, the application will increment the total in the parking lot by one, and if the user selects “Going Home”, the application will de-increment the total in that parking lot by one. The application should also have a button in the (Graphical User Interface) GUI that allows the user to create or view a graph based on when parking lots are most and least full. The application will have other features such as an interactive graph showing times when the easiest and most difficult to park. This is an application that is designed to be accessed remotely, regardless of whether one is on or off campus. It will provide notifications to the user based on lot availability as well.

No dynamic data will be stored locally, and all will be taken care of by Supa base in the back-end side. The web application and/or local application will be on the front-end and will consist of a combination of HTML, CSS, and JavaScript. We plan on incorporating a fully functional front-end swift application that communicates with Supa base to give the user the same information as they will receive in the web application if time permits.

One of the main components of this project is going to be the Graphical User Interface (GUI), that appears to the user each time they wish to use our software. This interface should be intuitive, smooth, and visually appealing. We plan on using a pallet of colors that is synonymous with Austin Peay’s own pallet. What this means is that our application will try and focus on a combination of red, black, and white when focusing on each device’s interface.

Another one of our main components in this software is the open-source platform “Supa base.” Without this component, it would be impossible for our software to operate as it would have no way of communicating outside of a local network. Through research, we have discovered that Supa base can integrate well with JavaScript and the other languages we plan on using. This should increase efficiency as well as save team members valuable time on their tasks, allowing us to complete the software faster. These two main components, the interface and the back-end server programming, make up the majority of this project and present our largest challenges thus far.

# Feature list

## A list of features that will be completed by the end of the semester

Google Chrome Compatibility

Web Application Support

Interactive Map of APSU

### In Map View

Grey-out unavailable lots

Different color-coding options

* by permit
* by availability
* by walking distance to your desired location

List View: All available information on all lots organized like a table

Quick Directions – in the drop down on the Map View page, there is an option for directions linking to google maps

Detail View: The view when you click into a lot

Real-Time Spot Availability

## A list of features that will be completed if there is time

GUI Dashboard

Graph of Best Times to park for specific parking lots.

Favorite Lots – ability to favorite lots most relevant to a user

Report tow trucks

iOS downloadable application in Swift

Report parking enforcement

## A list of features you would like to implement but cannot be completed this semester.

Low Availability Notifications – users can receive notifications if a specified lot is running low on spots

Report Tow Trucks

Notifications to designated admins when there are more cars in a lot than it can fit for longer than a specified time (to avoid notification spamming when students who aren’t using our app (why??) are circling lots)

# Technology

## Platform

Web Application with a focus on compatibility with Google Chrome

## Operating system

No specific operating system requirements

## IDE

[WebStorm](https://www.jetbrains.com/webstorm/)

Xcode

## Programming languages

HTML/CSS

JavaScript

Swift

## 3rd party libraries and tools

Wireframes and Functional Demo Tools

Figma

[Bubble](https://bubble.io/)

### Map View Libraries and Tools

[Leaflet.js](https://leafletjs.com/)

[Google Maps](https://developers.google.com/maps/documentation/maps-static)

[DataMaps](https://datamaps.github.io/)

## Server software

[SupaBase](https://supabase.com/)

## Communication software

Discord

# Server Information

We will utilize Supa base, a platform that offers server support for PostgreSQL databases.

# Data sources

We will need to have some sort of sensor or reader deployed at each lot that we plan to offer our services to. This device will need to have the capability to send packages of data to our server.

# Team members’ backgrounds.

Provide a short background of each team member’s familiarity levels with the technology used on the project.

You should also include descriptions of each member’s primary responsibilities in the project.

## Jnaria

### Project Management

I have experience managing large scale projects from my full-time job. The biggest issue I work to solve is network connectivity to remote locations. The solution varies based on environmental factors and use cases. I took Systems Design and Analysis last semester and worked with a team to build a storefront for a discount retailer.

### Networking

I troubleshoot networking issues daily. I'm familiar with servers, switches, access points, etc.

### Development

I have taken courses in HTML/CSS starting with Notepad++ and ending with Dreamweaver. I am currently taking Mobile Software Development (focused on android development) and UX Design (designing GUIs, learning Photoshop, and developing in Dreamweaver).

### Primary Responsibilities

I have never worked on the backend of a website or used Swift. I am reading a book on JavaScript. I would like to focus on keeping the project organized, the backend, and making the interface look good.

## Mitchell

**Development**

I have no prior experience with HTML, CSS, and JavaScript, but I am currently taking Client-Side Web Development here at APSU, which uses those three languages. While taking this course, I am obtaining knowledge that will make it easier to contribute to the project.

**Primary Responsibilities**

This will be my first time working on a website and I will be focused on learning HTML, CSS, and JavaScript to help contribute towards the back end and development of the application.

## Connor

### Development

I have ample experience in the Swift programming language. I have taken previous courses in web-development as well as a course on Graphical User Interfaces. I have a little over 2 years' experience in Java, and around 6 months experience in JavaScript, HTML, and CSS. I build and diagnose older computers in my spare time, so any physical device issues should be easy to deal with if they occur. This is not my first project as I built a game in my previous course last semester that ran in Unreal Engine 5. The experience that I attained from using Git in that course, should surely help our group when using it for this course.

**Primary Responsibilities**

My primary responsibilities will be ensuring Git is working appropriately for all members, creating graphical user interfaces for the software, and working on implementation of front-end functionality components. I will also be tasked with the development of an iOS application for download on iOS devices if we have enough time towards the end of the semester.

# Dependencies, limitations, and risks

## Dependencies

The application is dependent on the Supa base for the functionality of the code and storage. If at any point in time Supa base goes down, it could potentially impact the application.

## Limitations

Not every member has had experience JavaScript, this could potentially put some limitations on the project. This is because it will take time for members to learn a new language, which could delay or impact the project's overall timeline.

## Risks

Not all team members know how to use the coding languages for the projects.

May be vulnerable to scope creeps.

## Mitigation

Our team will handle these issues by watching YouTube videos and looking for study aids on the internet to help us study coding languages faster in our free time. Also, to prevent an unexpected delay in the Supa base application, our team will have regular backups of our code and have an alternative application in mind, in case Supa base goes down. To prevent scope creep, our team will have clear goals and regular meetings to see our progress and make necessary adjustments if needed. By implementing these methods, our team’s goal is to ensure that it will not affect the timeline for our project.

# Timeline

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | All | Jnaria | Connor | Mitchell |
| 1 | Ensure GitHub and IDE working appropriately for all members. |  |  |  |
| 2 | Integrate Supa base with parking web application. | Develop GUI for web | Develop GUI for mobile | Work on back-end set up for web |
| 3 | Integrate Supa base with parking web application. |  | Test mobile GUI and GPS functionality on mobile. | Work on back-end set up for mobile |
| 4 | Integrate Supa base with parking web application. | Help where needed | Develop interactive parking map (Scroll and click parking lots) and Integrate Google Maps API | Work on back-end code and functionality. |
| 5 |  | Help where needed | Add parallel parking spots.  Add feature to allow addition and removal of parking lots.  Add low availability notifications. | Work on back-end code and functionality. |
| 6 |  |  | Add report feature that sends e-mail to APSU parking.  Add feature to report tow trucks. |  |
| 7 |  |  | Add Favorite Lots – ability to favorite lots most relevant to a user |  |
| 8 |  |  | Add blog/chat section where users can post about parking lots. |  |
| 9 |  |  | Add blog/chat section where users can post about parking lots. |  |
| 10 |  | Help where needed | Add blog/chat section where users can post about parking lots. | Work on any deficiencies in the code. |
| 11 | Bug Testing and Refactoring on all software |  | Polish GUI and map integration |  |
| 12 | Bug Testing and Refactoring on all software |  | Extraneous Bug Fixing and refactoring. |  |