SUAP - Students Using Alternative Parking

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Mobile Application Report

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Github Project Link: https://github.com/lilylin3/SUAP_628

Product Overview

SUAP is an android application that focuses on providing a simple and intuitive solution to the parking problem at UMBC as well as other college campuses. SUAP's main purpose is to combine the supply and demand of parking by connecting students who are leaving campus with those who are coming to campus. In doing so, SUAP creates a steady flow of parking spot exchanges which drastically reduce the amount of time spent searching for a parking spot. SUAP connects commuters and allows those who are leaving campus to give their spot to a commuter who is arriving on campus in exchange for a lift to their vehicle's parked location.

Motivation/Problem Statement

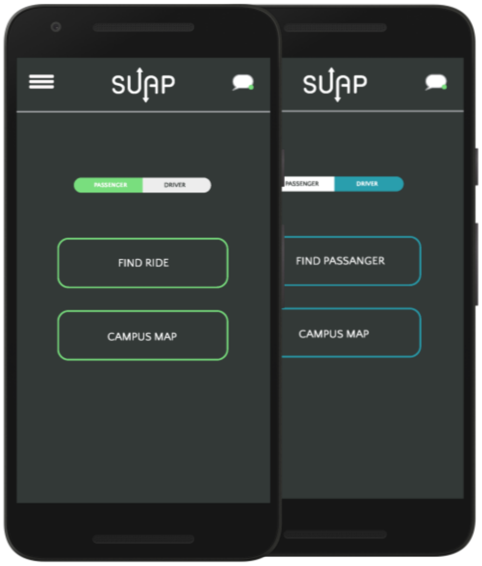
Parking at UMBC and other college campuses is a significant problem to say the least. Regardless of when you show up to campus, there seems to be a constant struggle to find a parking spot. Limited spaces paired with specific zones where only certain permits can park, quickly make campus parking a very stressful ordeal - one that takes place every day for many student commuters.

Yet college campuses are a system of students coming and leaving. Classes start and classes end, people come to campus and people leave. However, while you are making your third lap up the Common's garage desperately looking for a spot with only minutes before class, some person who is **parked in the garage**, **has the same permit type as you**, **and is leaving** - making their spot open - is *slowly* walking across campus from ITE to Common's garage.

SUAP was born out of the simple idea of connecting the supply and demand of parking. By allowing you to connect with that person who is in ITE and ready to leave campus. Once SUAP connects you with that person all you have to do is pick them up from ITE and give them a lift to their car, and in turn, you now have a parking spot without making dozens of circles around campus. Saving you time, gas, and even money.

How It Works

When a student uses SUAP they are designated as either a **Passenger** or a **Driver**. A Passenger is a commuter who is about to leave campus. A Driver is commuter who is coming to campus and is looking for a parking spot.



A Driver goes on SUAP and designates themself as an **active driver**, once they do this, the app begins to track their location in real time while it searches for a passenger to pair them with.

On the other side of the app, a Passenger who is leaving campus and would like a lift from their current location on campus to their vehicle's parked location, can go on the app and designate themself as an **active passenger**.

SUAP displays the number of active Drivers who are coming to campus for the Passenger. The Passenger then sets their pickup location from a list of locations at UMBC and then **confirms the pick up**.

Once the Passenger confirms the SUAP algorithm combines Passengers and Drivers based on their **parking permits and proximity**. Once a connection is made the app shows the Passenger the Estimated Time of Arrival of the Driver. The Driver is then shown a screen depicting the pickup location and name of the individual they are picking up. Both Passenger and Driver have the ability to call one another in order to communicate further if necessary. Once the Driver picks up the passenger, the passenger can mark the pick up as complete.

Backend - Firebase

SUAP utilizes Firebase for both database management and user authentication. We utilize email and password authentication so that we can control email registrations to only umbc.edu handles (future implementation).

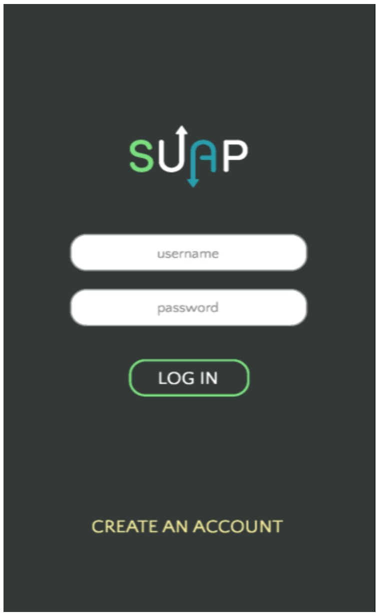
We then maintain a Firebase database for user information such as name, phone number, car make, model, year, and color, and permit type. We then have separate databases for active Drivers and active Passengers and utilize those databases to keep track of who is available and implement our matching algorithm.

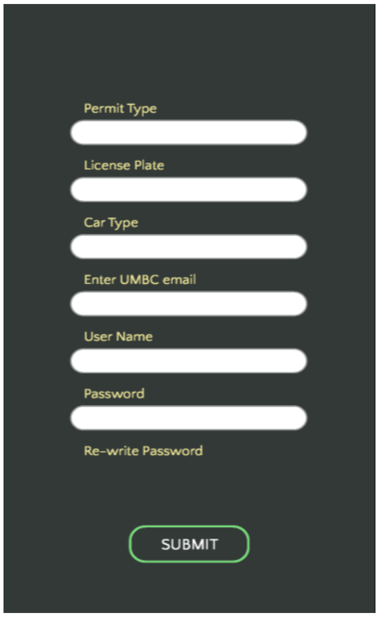
Since we used intents to implement the flow in the app, we used sharedpreferences on every activity to read data from Firebase. Whenever the Passenger confirms the ride, our matching algorithm combines Passengers and Drivers based on their **online status, availability, parking permits and proximity**. Once a connection is made both the Passenger's and Driver's latitude and longitude information is tracked to show the Passenger the Estimated Time of Arrival of the Driver using Google Maps API.

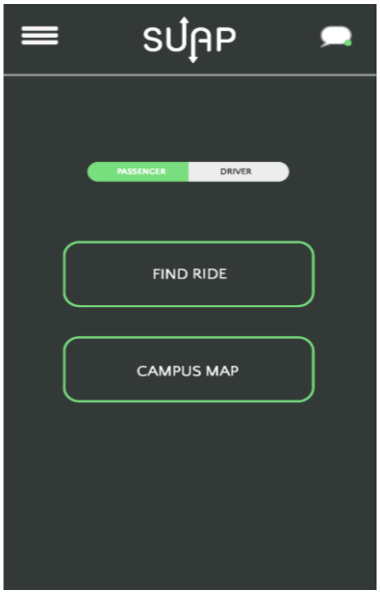
Once the pair is matched, both of them are marked as taken and are put on hold/ongoing status. Once the ride is completed or missed, both the Driver and Passenger are marked available again with a stamp of completed/ missed status which can be used to build their profile. Whenever the user logs out of the app abruptly before or after confirming a ride they go to an offline state with a cancelled status. This way we implemented the matching algorithm.

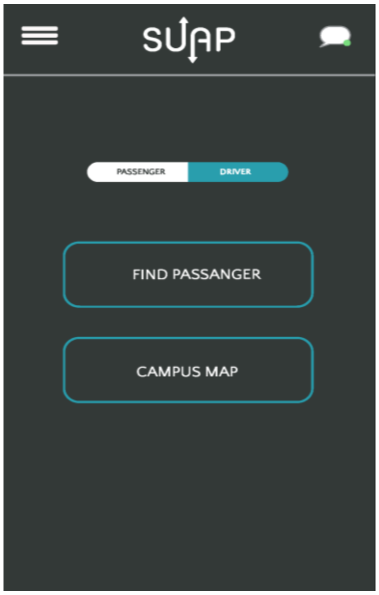
UI

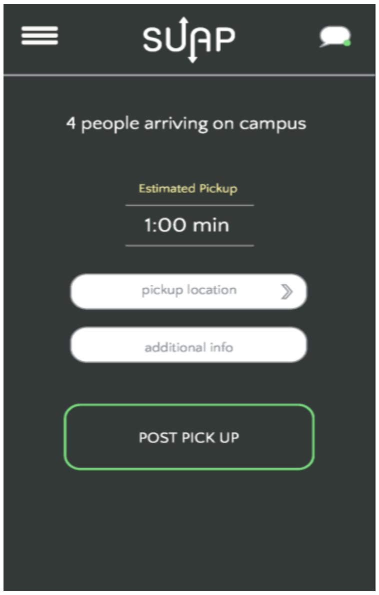
In order to remain in sync with our concept of simplicity, SUAP opted for a very minimal and simple user interface. One that is easy to follow and does not require much effort. To achieve this we utilized a very simple main menu that lets you choose between Passenger or Driver. From there only a few clicks get you connected with an active Driver or Passenger and get you on your way to claiming a parking spot or getting a lift to your car. During our demo and presentation numerous people complimented the simplicity of the UI. To view our UI please follow the youtube link above.





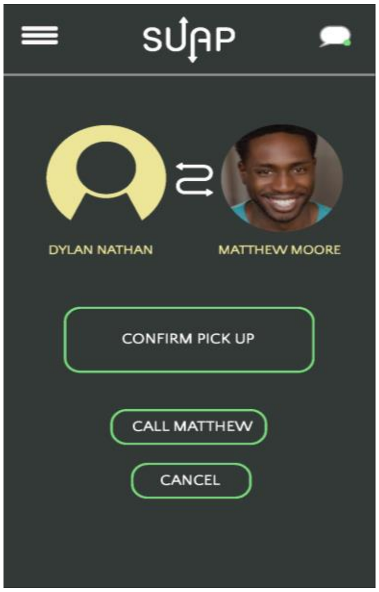


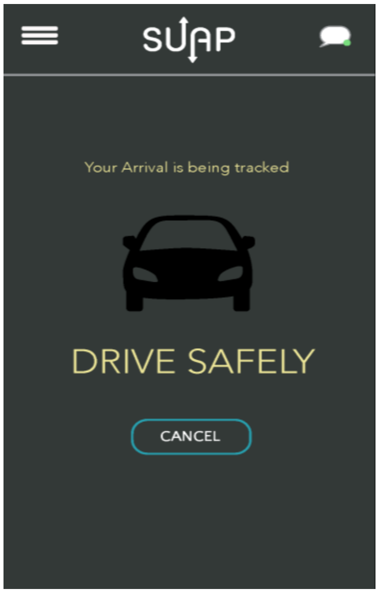


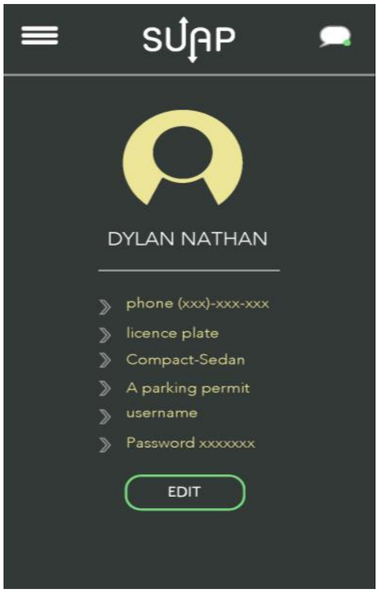

4 people arriving on campus

Estimated Pickup

1:00 min







Future Scope

For the initial development of SUAP we focused on only the core functionality of the application. This core functionality included the login and registration features, main menu with distinct passenger and driver options, and lastly the matching logic and algorithm. This allowed us to have a functioning application that solved our problem statement. However, application and software development involves further development of the product while incorporating new features and functionality, which is something that we intend to do.

Our future development goals for SUAP include the following:

- **Polishing our user profile functionality**
    - Allowing users to edit their information as necessary.
    - Incorporating pictures of users for verification and security purposes.
    - Showing completed rides and missed rides to hold users accountable (merit system).
- **Showing location of passenger and driver on a mapview**
    - This will make the application more attractive and intuitive by showing real time location updates on a map. Similar to Lyft and Uber
- **Displaying Vehicle information with sample vehicle image**
    - Similar to the Lyft and Uber feature that shows a small image of the vehicle that the driver is arriving in.
    - This will allow for smoother pickup process and less confusion
- **Additional Security Features**
    - Ensuring that only students can pick up student by verifying student IDs and having reporting functionality to report inappropriate behavior in order to hold users accountable.
- **Push Notifications**