University of Arkansas – CSCE Department
Capstone II – Final Report– Spring 2021

Scoot

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Abstract

Navigating through campus or around town can be a breeze especially when you are riding a scooter. However, some problems exist with either the process of having to decide which company to use or within the apps themselves. These problems are having to use multiple apps to access the different scooter companies, the user only focusing on one company to locate scooters, and not having scooters updated or reported so that the user gets a better experience. The objective is convenience. We wanted to allow users to have an application where it makes it easier for them to locate available scooters near them and expand past one company.

Our approach was to create a GUI that can show the locations of scooters and make it so that one application allows a user to carry out the transaction of a ridesharing service. With the help of a real-time map, we were able to display the scooters located near the user. The significance of this project is that it created an easier and better experience for the user when wanting to get a scooter.

1.0 Problem

When you are looking for a mode of transportation other than walking, it can be unpleasant having to switch through multiple apps to find a scooter near you. Having to go through different apps can result in wasting time if you are in a hurry to get somewhere or having the possibility of someone else getting the scooter before you. Scoot aims to minimize the time users spend on finding a mode of transportation by conglomerating multiple services into one application

Going into different apps to locate scooters nearest to you can reduce the chances of you finding one that may be closer to you with another company. For example, a person may only be using one app to find scooters when a scooter from another company may be closer to them. With scoot users can always locate the nearest vehicle no matter what platform it's on. This will save users from the issue of either giving up on their vehicle search, or commuting further by foot to access the scooter they found on a single app.

Another problem that is present is that scooters that have issues may not be updated or not reported. The importance of this problem is that when users get to that specific scooter, they will have to look for other scooters and waste more time trying to find others. The user may have had to walk out of their way to get to that scooter and now must waste time finding another one. User reports, similar to reports found in Waze, create a network of Scoot users that are constantly updating the map with vehicle problems. Issues such as scooters in poor physical condition or low battery can all be reported and will aid in the user's search for a scooter to match their needs

2.0 Objective

The objective of this project is to simplify the process of finding nearby transportation for users and to let them expand their search to different ride-sharing platforms so that they can see what is available to them. By creating an interactive GUI, it makes it easier to locate and carry out the transaction. Users have access to a real-time map of available scooters so that they can select the nearest one to them. To do so, we gathered the locations of the scooters from different scooter companies to navigate the real-time map updates of where the scooters are located.

3.0 Background

3.1 Key Concepts

One of the main technologies that we needed to use for this problem is the use of APIs. API stands for Application Programming Interface and it is defined by an application being able to interact with an external service using a simple set of commands. We used the scooter's locations to able to see where they were as well as being able to get to the e-scooter's application to receive the information tied to a scooter. In order to use an API, you must use endpoints to get the data that you want to use. An endpoint is one end of a communication channel and is represented as a URL of a server or a service. We used endpoints to essentially communicate with the API. For example, in the case of the Scoot app we used endpoints to gather the location information from the APIs from a particular scooter company. The endpoints are usually a specific address and is commonly named by the functionality that it provides.

3.2 Related Work

There is currently another app on the market called 'Scooter Map' that helps users locate scooters in their area [1]. The app can be characterized by two main users. The first user is a rider, and the other is a charger. A rider is someone who can choose a scooter to ride. A charger is someone who can pick up scooters and charge them. A charger has specific authorization from the e-scooter companies to charge their scooters. To become a charger in Scooter Map you must be registered with one of the possible scooter companies as a charger. When logging into the app you're automatically considered a rider. A user can switch between a rider and charger seamlessly; however, the only way to have the proper functionality of a charger, the user must have authorization from a e-scooter company. In addition, the app contains a wide range of

different e-scooter companies. One of the greatest limitations is location of implementation. Currently, in Fayetteville it does not have any implementation. The Scooter Map application is only implemented in San Francisco and other major cities.

Our Scoot application has the ability for users to just ride and check the availability of scooters. It is available in Fayetteville and contains most of the e-scooter companies that are in the local area.

4.0 Design

4.1 Requirements and/or Use Cases and/or Design Goals

The main software requirements of the application will be to:

1. Log into app using username and password
2. Open the application to a map
3. Be able to see all the scooters that are available in the vicinity
4. Have the user click on the scooters that are nearby and see the ability to book a ride
5. If the user decides to book a ride the user will then be navigated to the e-scooter's company app
6. The user will have a username and password
7. User books ride through the company’s app

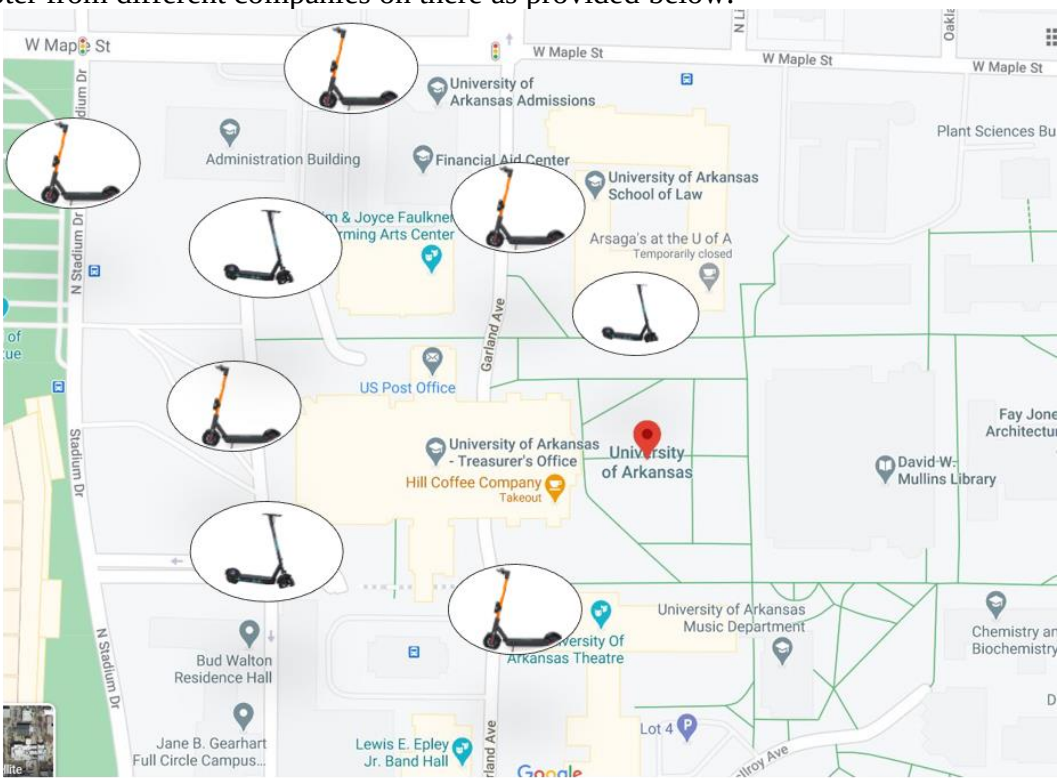
Some of the design goals are made to make the UI as seamless as possible to allow for efficient navigation throughout the application.

4.2 Architecture Overview

For our application architecture, we used React Native as our basic platform to develop our app. React Native uses Java and JavaScript as its base framework which allows our app to be customizable based on our app’s needs. Another reason behind our choice was that React Native is unique where we can use the same base code for both iOS and Android and just change specifications based on requirements which helped us decrease the amount of work needed to do when we finally rolled out to all devices. One of the last reasons for using react native as our personal preference was because half of our team has worked at J.B. Hunt and gained experience as Application Development Interns for their Mobile team which uses React Native for all their apps.

We used Firebase for the backend of the application and used Firebase authentication for the user to create am account and later come back to log in. We also used Google Maps API to embed Google Maps in the app so the user can see where the scooters are. Our app uses the GeoLocation APIs for different scooter service providers and then combines them together on the map. We used a map provided by Google for our app and then accordingly marked the

scooter from different companies on there as provided below.



4.3 Risks

Risk	Risk Reduction
Bugs may come up post-launch	Add a component that allows users to give feedback and report any bugs found while using the app
App security	Simply redirect users to the particular scooter's app/website, so they won't have to input any form of payment/login credentials through this app
API Access	Add information on services not currently supported and provide users with a redirect to a service's launch

4.4 Tasks –

1. Researched and made a list of what scooter companies are in the NWA/Fayetteville area. Download the apps for available scooters and understand what features/information each scooter app provides.
2. Understood how to build and design a mobile app as well as how to integrate the APIs available for the different scooter applications.
3. Set up and installed any required tools for building a mobile app and figuring out/deciding what is most convenient for when the team is working remotely.
    a. To do this, we used GitHub and Visual Studio Code for development

4. We created a list of specific coding tasks, with deadlines, to ensure each teammate is responsible for some portion of the app to be created.
5. We created a “prototype”/skeleton implementation then added in fundamental features if no issues arise
6. Chose UI/UX design for the app (such as color scheme, fonts, etc)
    a. We kept in mind how this app will look on different platforms (Android/iOS)
7. We developed frontend/backend aspects of the app as well as implemented different API
8. We tested the app’s quality as we went along and provided regular updates, to ensure new additions didn’t break the app.
9. We documented any progress to keep track of what had been completed and what was still being worked on.
10. Watched for bugs and documented any that were found, so they could be fixed.
11. Prioritized main tasks, then bugs, and finally UI/UX, in that order.

4.5 Schedule –

Tasks	Dates
1.Research and Understanding how to build mobile apps/integrate API/React-Native setup (Whole team)	12/30-1/15
2.Setup/Install tools and plan more specific sub-tasks (Whole Team)	1/15-1/22
3.Setup GitHub repository (Divya)	1/15-1/22
4. Basic React app skeleton implementation: empty screens, empty components, hard coded text (Whole team)	1/25-2/15
5. Develop frontend implementation (Alessandra, Andrea, Ryan)	2/15-3/26
6. Develop backend implementation (Fernando, Gustavo, Divya)	2/15-3/26
7.Create READ ME files (Gustavo)	3/26-4/6
8. Make logo for app (Ryan, Fernando)	3/26-4/6
9.Create icons for app (Alessandra, Andrea)	3/26-4/6
10. Extensive Testing (Whole Team)	4/6-4/13
11.Fix crash points or any minor bugs (Andrea, Gustavo, Ryan)	4/13-4/20

12.Fix Styling issues (Alessandra, Fernando, Divya)	4/13-4/20
13. Document, watch for more bugs, complete app (Whole Team)	4/20-4/29

4.6 Deliverables –

- Firebase: For authentication
- Populus: Data
- Web site code: The PHP code for the web site for our project.
- JavaScript code for our mobile app.
- Final Report

5.0 Future Works

If we had another three months to work on our project, we would add a method that would calculate the distance to scooters near the user and give them the nearest one. This way the user doesn't have to look around in the map to see which one is closer. Improving the user interface could also be another thing to implement so that it makes it easier for the user to navigate through the app. Our app doesn't display the charge of the scooter or the price of the ride. Adding this feature would make it easier and faster for the user to decide on what scooter they would want to take.

6.0 Key Personnel

Alessandra Garcia – Garcia is a senior Computer Science major in the Computer Science and Computer Engineering Department at the University of Arkansas. She has completed relevant courses, such as Software Engineering. She has interned for J.B. Hunt for a few months, working on Application Development as well as Mobile Development. This student was responsible for working on the team together and researching some of the API requirements that are needed to complete the project.

Andrea Donati – Donati is a senior Computer Science major in the Computer Science and Computer Engineering Department at the University of Arkansas. She has completed relevant courses, such as Software Engineering, Database Management, and Mobile Programming. She has worked for J.B. Hunt for about a year and half working on Application Development as well as Mobile Development. This student was responsible for getting the team together and organized, developing software requirements, and researching related work. This student will be responsible for the design and development of the front end of the mobile application.

Ryan Gueck – Gueck is a senior Computer Engineering major in the Computer Science and Computer Engineering Department at the University of Arkansas. He has completed relevant courses such as Software Engineering and Database Management. He has been an intern with Centene Corporation for a year now, working on the asset management team as a software developer. This student was responsible for researching some of the API requirements needed to

complete the project, helped with the necessary front-end development required for completion, as well as monitored existing bugs.

Fernando Mota – Mota is a senior Computer Engineering major in the Computer Science and Computer Engineering Department at the University of Arkansas. He has completed relevant courses, such as Software engineering and Database management and has done outside projects. This student was responsible for researching some of the API requirements that are needed to complete this project and helped with completing group assignments. He will be helping with the front-end development and any other areas that may need help.

Gustavo Perez – Perez has completed courses in both software development and hardware design. He is a current senior in the department of Computer Science and Engineering at the University of Arkansas. He is majoring in Computer Engineering and has acquired a minor in Mathematics. He has completed a summer internship at Centauri as a Technical Intern and carried out work on the physical implementation of a RISC-V RocketCore that will be placed on the SoC design currently in use by the company. This student was responsible for researching API requirements as his peers did and will be primarily focused on front end development of this application.

Divya Singh – Singh is a senior Computer Science major in the Computer Science and Computer Engineering Department at the University of Arkansas. He has completed relevant courses, such as Software Engineering, Database Management Systems and Operating Systems among others. He has also interned for J.B. Hunt like some of his other teammates for the last two summers, working on Application Development as well as Mobile Development. This student was responsible for working on the team to provide enhancements for J.B. Hunt's company specific Driver and Carrier 360 apps as his team added voice assistant features. This past summer Singh's team worked on making robots for order management purposes. This student was responsible for market research on other services and companies involved with this app, as well as its API requirements as his peers did. Moving forward they will be responsible for working on the back end needs for the app. They will also be primarily responsible for maintaining the version control for the app as well as ensuring the final interface styling is appealing, and any other areas that might need help.

7.0 References

[1] Scooter Map, https://scootermap.com/

[2] Authors, "Article in Title Case," Conference or Journal, Publisher, Year