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NCSU Parking Problem: A solution to the Parking Woes Faced by People Coming to NCSU Campus

CSC 510 – Apr 21 Presentation

Group M

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Why?

- Parking is a menace
- Searching for parking facilities increase peak traffic flow by 25-40%
- Downtown cars cruising for parking spots - 30%
- Loss of important resources - time, gas, CO_2

Cruising Distance	950,000 miles	38 trips around the earth
Time	95,000 h	11 years
Gasoline	47,000 gallons	177,660 l
CO^2 Production	730 tons	

Table 1: Annual figures in Westwood Village, LA (2007)

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Why… Continued

- Increasing students ⇔ Increasing traffic
- Location
- Visitors
- Game Day events
- We know a few students who park at the Food Lion
- We are glued to our phones constantly.

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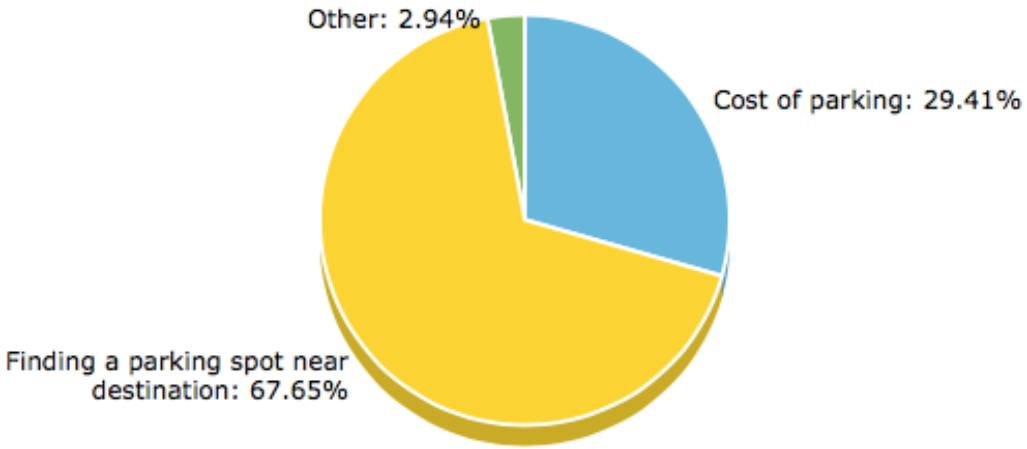
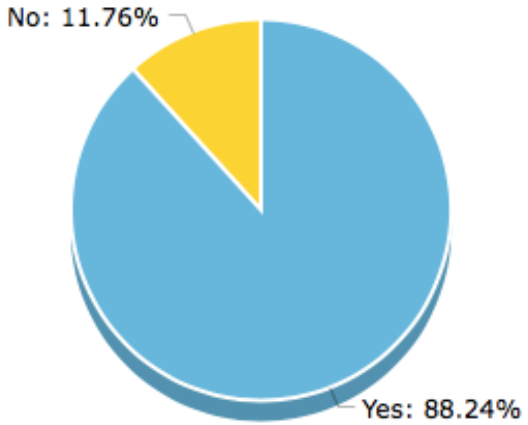
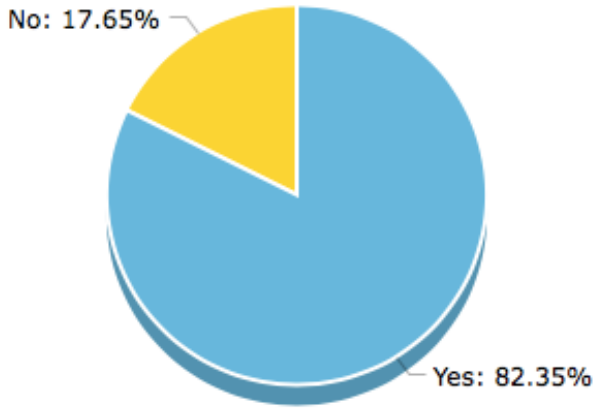
Analysis



Problem with bringing a car to the campus



Is a mobile app required?



Is a parking ticket tracking/payment app required?

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Possible Solutions

- Problem has been extensively studied but solutions are few and far in between.
- No research done for campus specific parking problem.
- According to the survey, we needed to integrate both the parking solution and add feature of tracking parking fines and violations.
- Web app or mobile app?

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Our Solution

- We decided to build an Android app, taking into account the percentage of mobile users and which OS they use.
- 76% of mobile users used Android phone in 2014 in the US.
- We would integrate both the parking solution and tracking of fines and payments into a single app.

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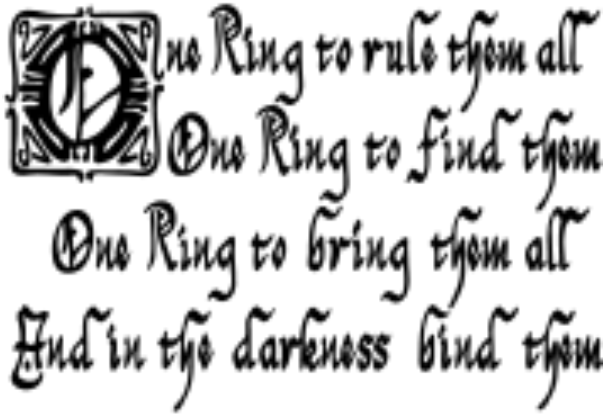
The 3 Solutions

- Now that we had decided to base our solutions on building an Android app, the 3 solutions became fairly obvious based on our Feb 1 results.
- Took inspiration from the TransLoc app for tracking bus routes and real-time bus tracking
- The 3 solutions we decided:
  1. Standalone Android Application
  2. Authorization and Personalization
  3. Parking Management System



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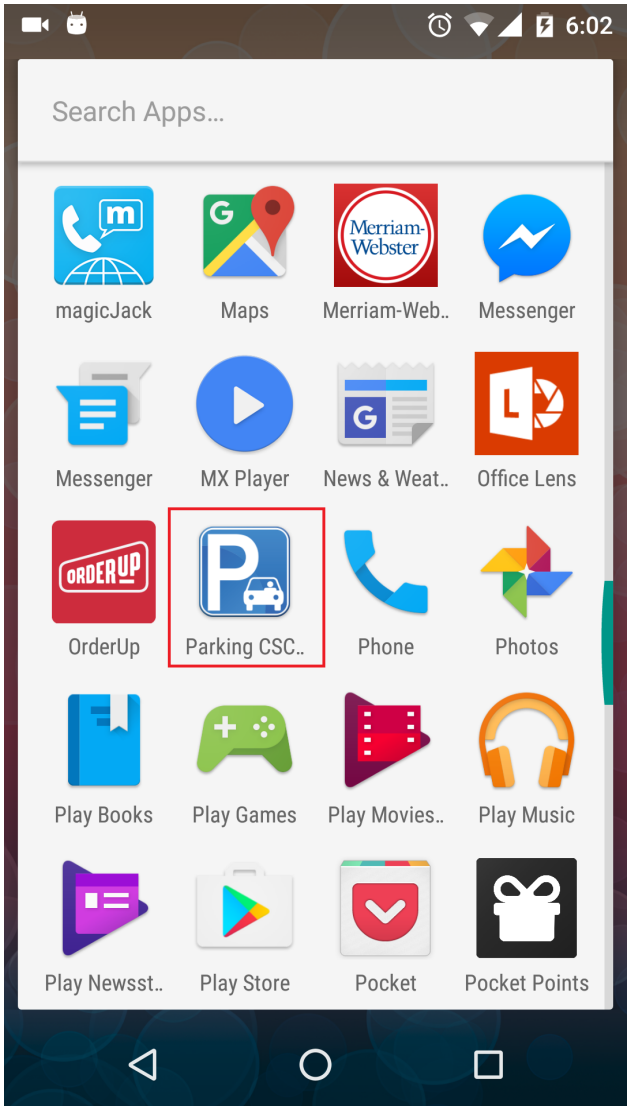
1. Standalone Parking App

- ✓ It includes the basic requirements
- ✓ No need of authorised login
- ✓ App helpful to visitors
- ✓ Use of Google Maps APIs
- ✓ All the NCSU parking lots included by tying into the geo-locations obtained from field survey.
- ✓ Also tied with Google Maps Navigation to find directions to any parking lot you choose.



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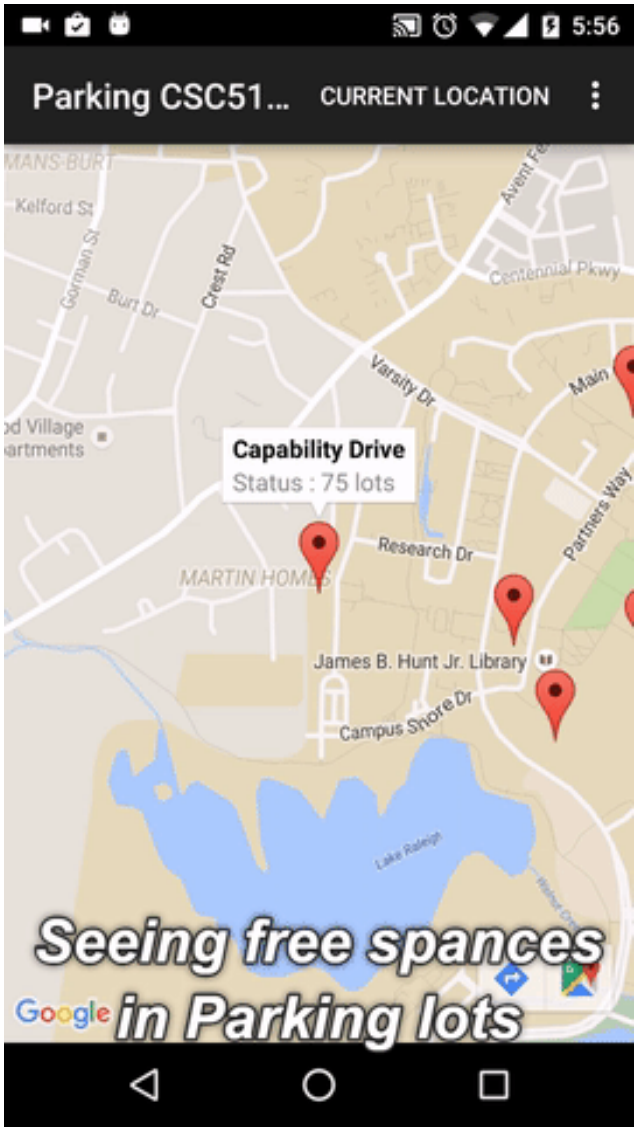

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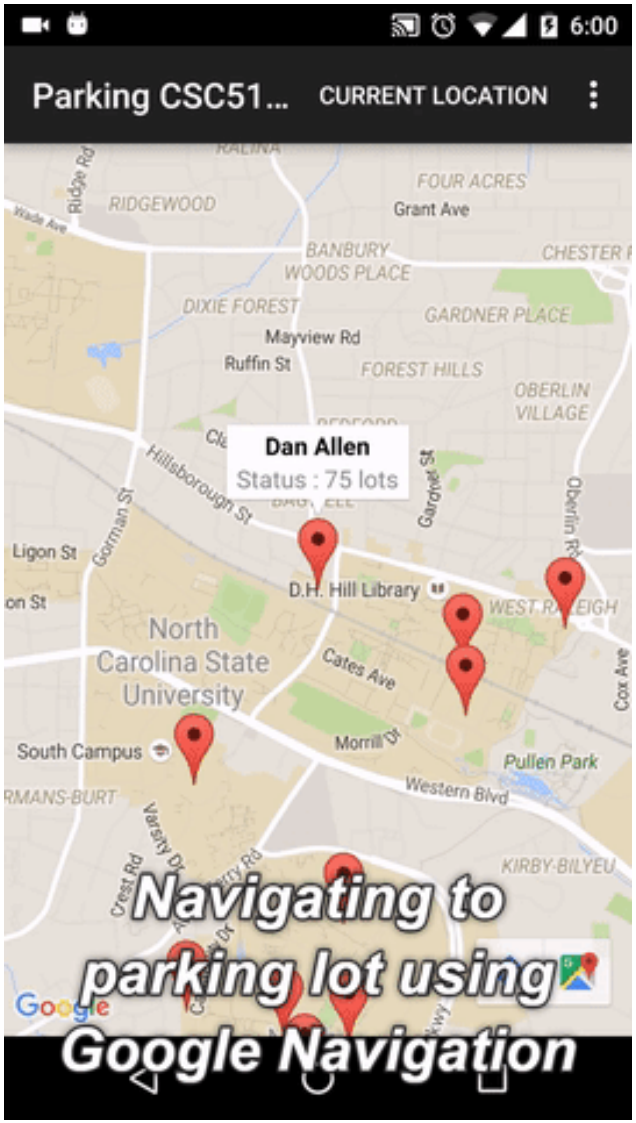

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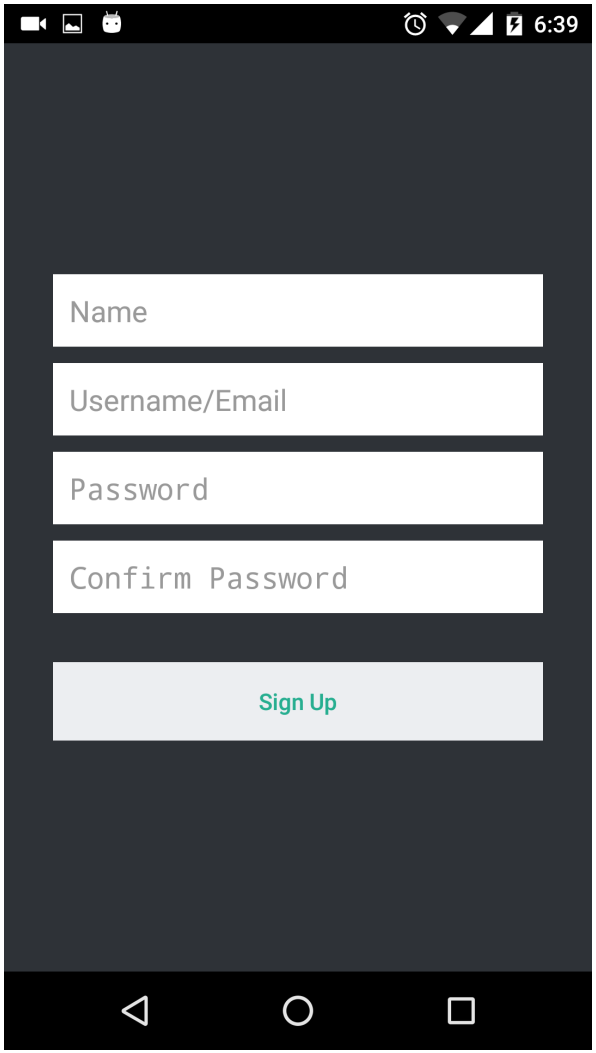
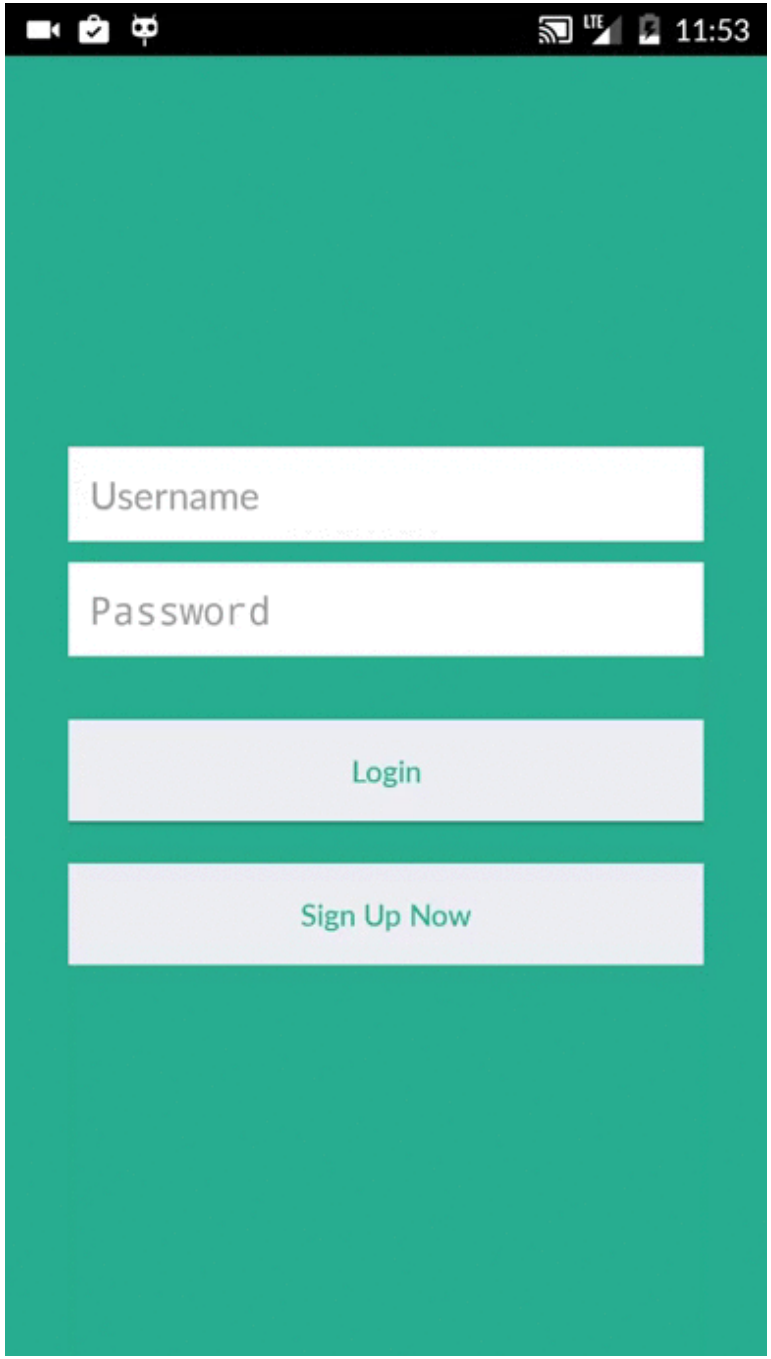
2. Authorization & Personalization

- ✓ Aimed towards users who come to campus frequently and hence may use the app frequently.
- ✓ Requires users to sign-up and login to the app.
- ✓ User can “favourite” their frequently used parking spot to automatically open the app to that parking lot.
- ✓ User also enjoys full features on standalone parking app.




11:53
Username
Password
Login
Sign Up Now

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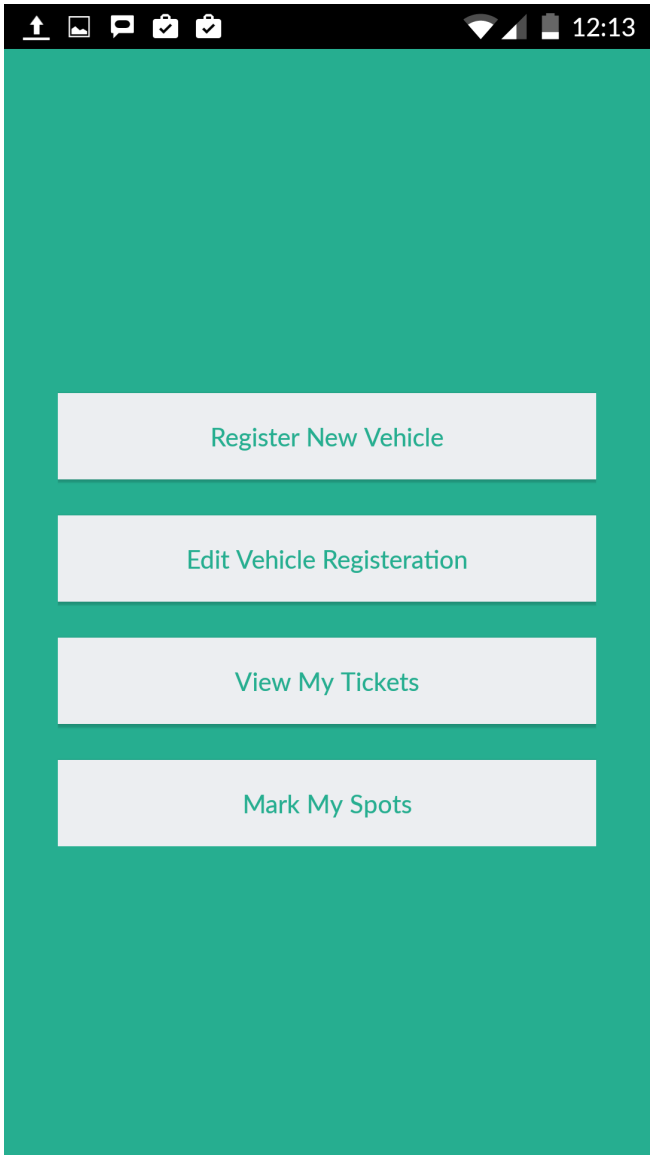
3. Parking Management System

- ✓ Ties into the authorization feature of the app, hence available to users who have signed up for the app.
- ✓ User can register their car with the NCSU transportation department using their license plate.
- ✓ In case a user gets a parking ticket, they can see the ticket and amount in the app.
- ✓ By tying into the Shibboleth system the user can also pay for the ticket, right from within the app.



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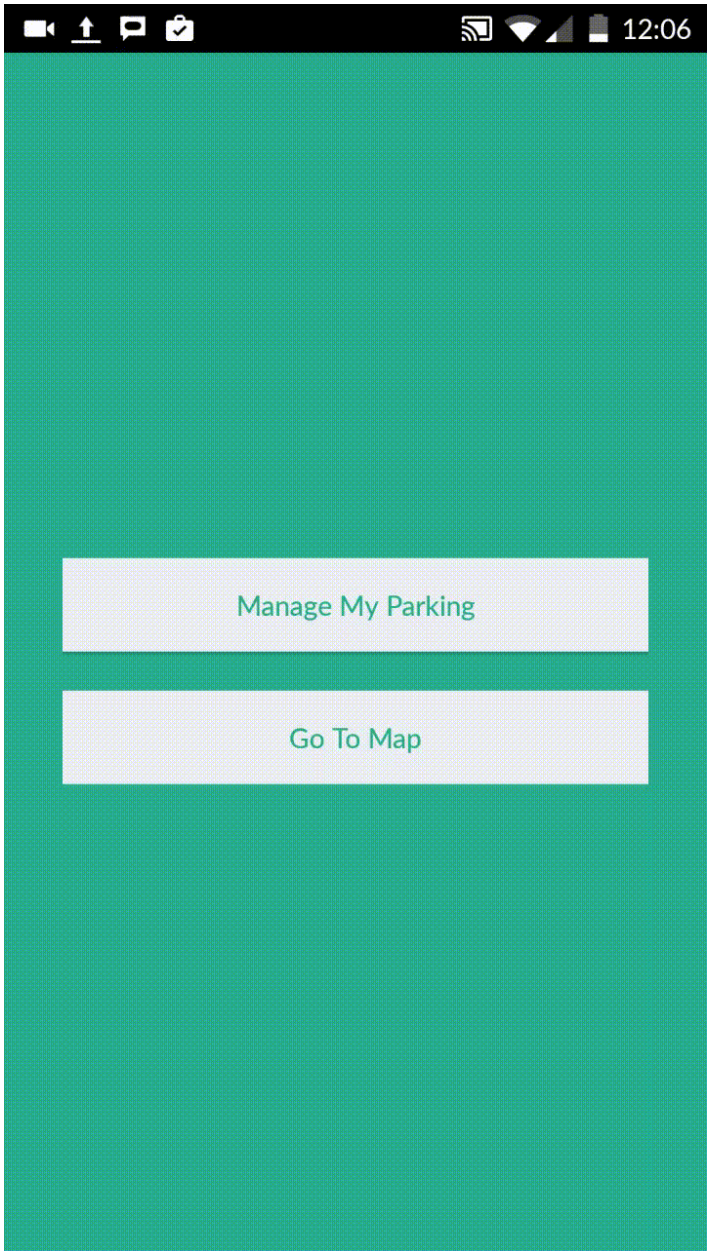

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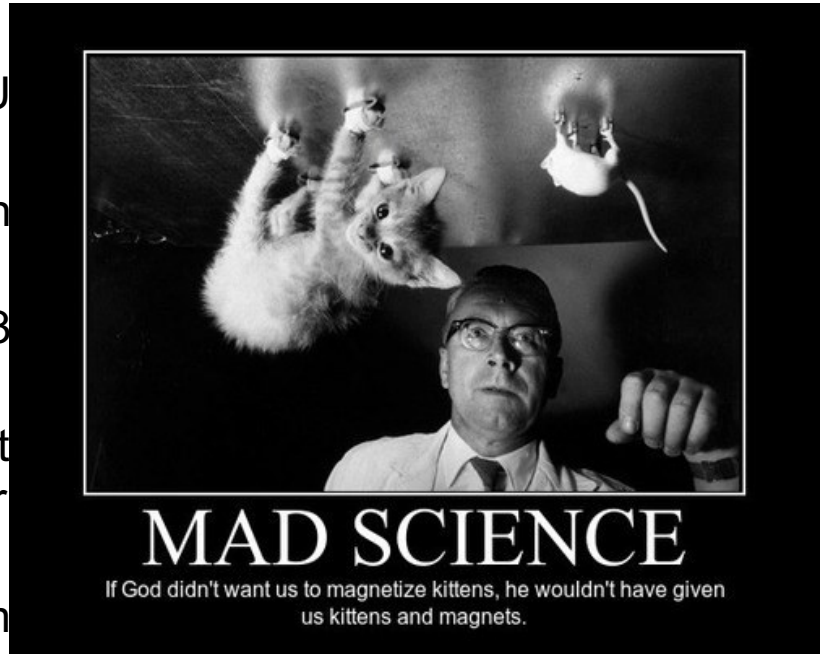
Testing the Application

Test metrics:

- We presented our app to 16 NCSU students.
- Explained the problem we are working on and the 3 solutions we've proposed.
- The students used our app and saw all 3 of the solutions we've developed.
- We then asked them to give us a short survey about what they thought about our app.
- We also collected some telemetry from the app by using a combination of log files and Google Analytics.



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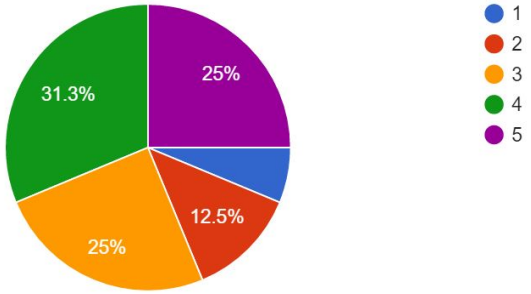
How would you rate solution 1 on a scale of 1-5 (16 responses)



Please tell us what you liked about solution 1 (7 responses)

- The ease of use as well as the usefulness of the app is really commendable.
- The implementation is nice and addresses an actual need for many students on campus.
- I like the concept but I don't find it very useful seeing as I don't own a car
- It's a wonderful idea and serves to car users what Transloc does for Wolfline users.
- looks simple and light
- The app behaves very similar to Transloc which I really like
- nothing much looks a mockup of google maps

Please tell us what you disliked about solution 1 (6 responses)

- It seems a lot like Google map, doesn't have a lot of distinguishing qualities.
- It covers only NCSU parking lots and doesn't serve for other parking lots around the campus area
- The functionality seems very similar to GMaps but the speciality of adding NCSU car lots is really good
- not too much functionality, kinda boring
- It's a good app and I wouldn't change anything
- i would prefer to use google maps

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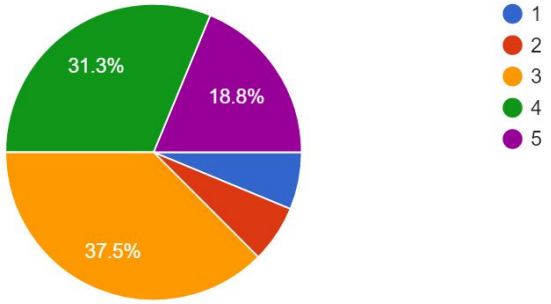
How would you rate solution 2 on a scale of 1-5 (16 responses)



Please tell us what you liked about solution 2 (6 responses)

The feature it adds is very useful and saves me some time before I find my parking lot
The ease of use when a user signs up is very good. A user doesn't have to hunt for his parking spot when they open the app- it automatically opens the favorite parking spot which is a good feature.
N/A
The user login and favorite feature is the best one and I love it. It's something I can see myself doing every day.
integration with cloud seems a good idea
kind of better, i like the personalization it provides

Please tell us what you disliked about solution 2 (5 responses)

More features could be incorporated with this feature.
The additional step to login can be a hassle for a user who quickly wants to see the available parking spot in any other lot.
I feel the additional hassle of singing up and logging takes away from the experience of the app
Nothing much
this app looks like experiment and not the final version, somthing is missing

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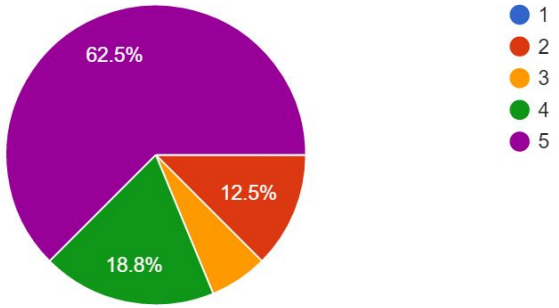
How would you rate solution 3 on a scale of 1-5 (16 responses)



Please tell us what you liked about solution 3 (6 responses)

- The amount of features added are extremely useful and helpful for students like me.
- This is a very good feature for tracking parking fines and knowing if your ticket is paid or not.
- This is something I can get behind and I find the idea intriguing
- This is a neat feature and I would totally use it to track my tickets.
- is like transloc, wish transloc had few of these features
- ya this one is winner, i guess you could use it like transloc

Please tell us what you disliked about solution 3 (6 responses)

- It's not completely functional yet but the planning is good.
- N/A
- It's currently not connected to actual server, so it's more of a demo.
- Nothing much
- lack of actual data is a concern
- the app is not as smooth as it should be

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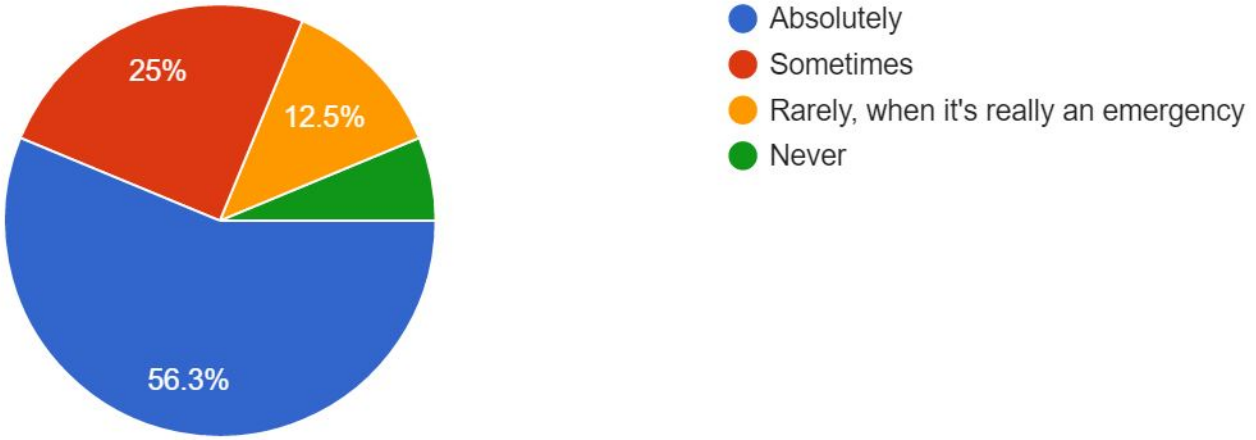
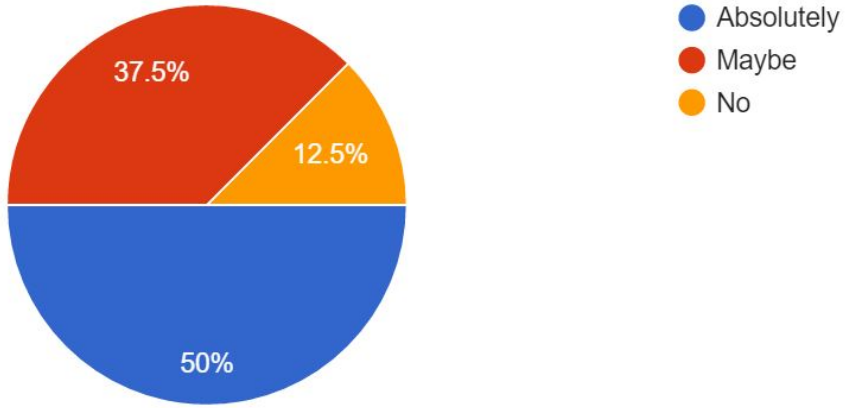
Would you like to use this application in your daily life? (16 responses)



Would you like to see this app scale up to include other universities in the United States?

(16 responses)



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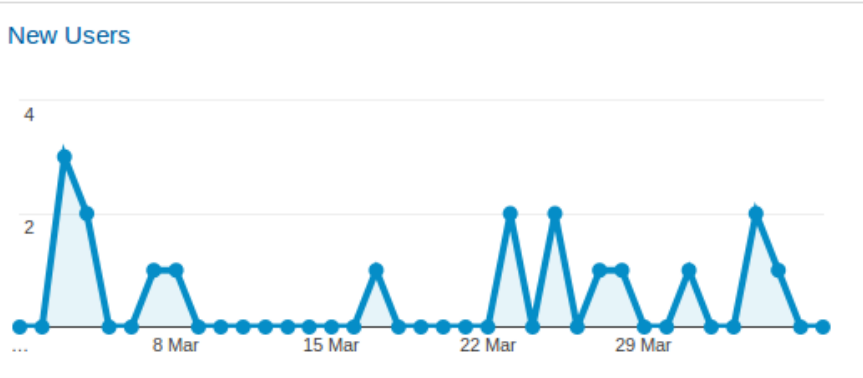
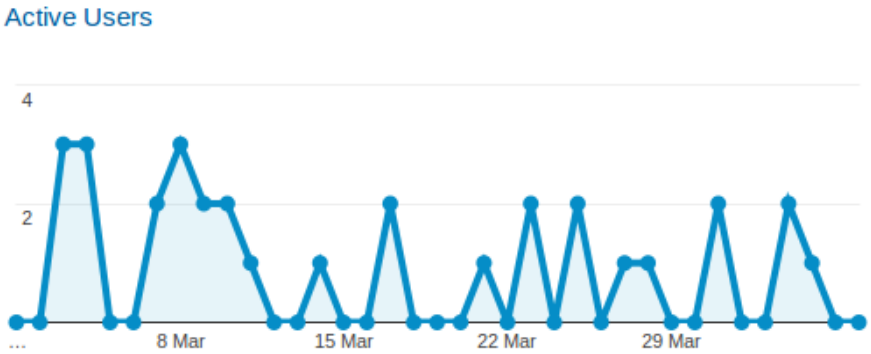
Telemetry

- We used Google Analytics to obtain telemetry for the app, and also logged the latitude, longitude and the frequency of clicking the “Show Current Location” button.





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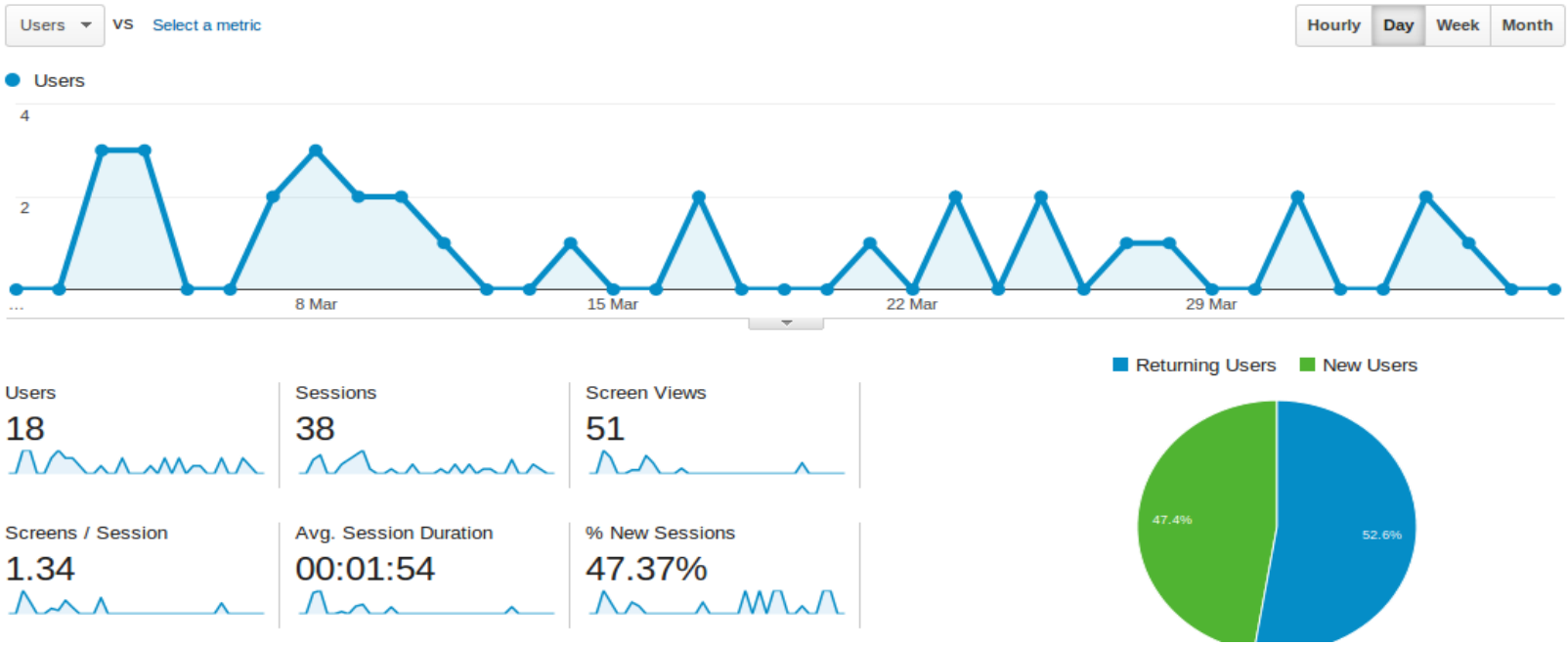

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User Location Logs

A	B	C	D
id	latitude	longitude	frequency
0	35.7875685	-78.6700427	2
1	35.7707381	-78.6947808	36
2	35.7703173	-78.6938947	102
3	35.7739463	-78.6895529	63
4	35.7782147	-78.6839702	417
5	35.7876163	-78.6695246	25
6	35.7686692	-78.6749212	12
7	35.7664267	-78.6974722	18
8	35.7707191	-78.6944363	7
9	35.7720734	-78.6919917	23
10	35.7714142	-78.6751012	18
11	35.7824156	-78.6682842	11
12	35.788007	-78.6764806	31

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Results

- From the user survey results, Solution 3 comes out as the “best” solution.
- Users thought that solution 3 offered the most comprehensive solution to the problems they faced.
- It was our assumption that Solution 1 or 2 would come out as the best solution, as we felt it was the most simplest and feature rich solution.
- However the users felt that solution 3, although not fully developed due to the tie-ups required with a number of external agencies offered a more promising solution.

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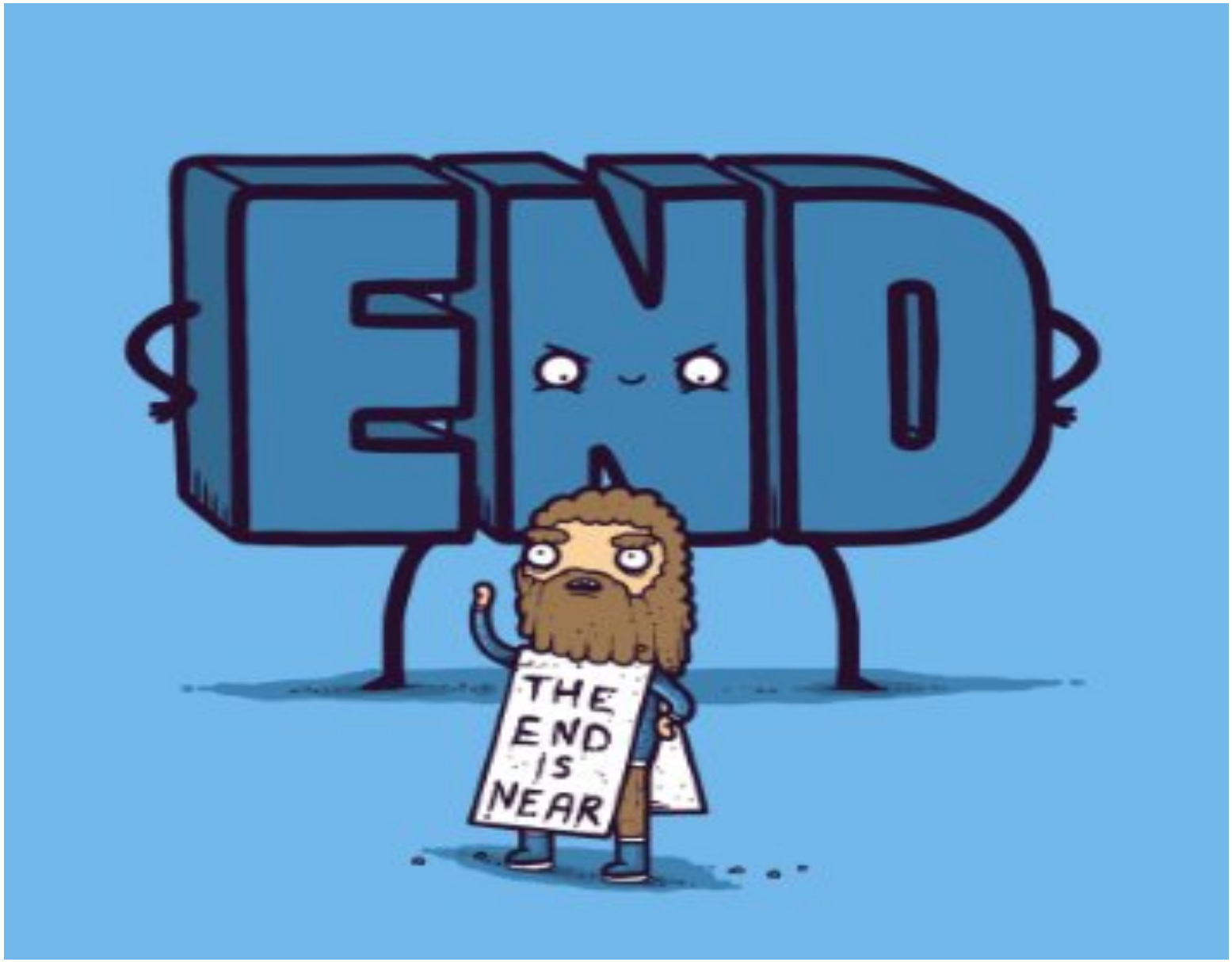
Limitations

- Our idea of building the parking app is not the perfect solution, nor the most comprehensive.
- The more we thought about the problem, the more the scope of the project increased.
- Our solutions involved connecting to multiple external agencies; NCSU transport department and Shibboleth authentication system are just 2 examples.
- We have used mock data to replicate the data obtained from external agencies.
- We have NOT connected our app to any NCSU server or used any of these services.
- We need both hardware and software support to implement all our ideas into the app.
- The point of the project was to find and test the solutions to a problem we've identified, NOT to get into the nitty gritty of connecting to these services.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