

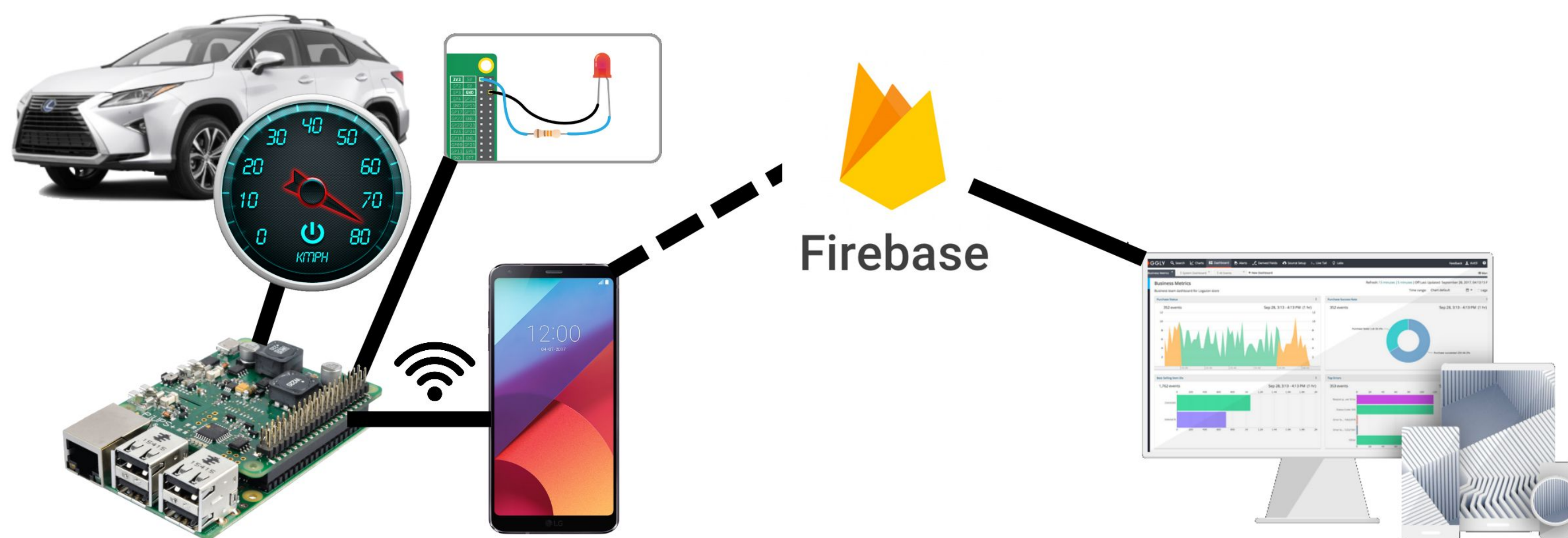
Introduction

We developed an IoT device to connect to a car's On Board Diagnostics (OBD) system, enabling in cabin alerts when speeding is detected with a red LED indicator. All events are forwarded to a database, where we've also created a front end application to provide reports and visualizations of the users driving habits and vehicle health

Motivations

- Allowing the driver to know when they are speeding, in areas where the speed limit may not be clear.
- Giving driver information on the vehicle health
- Increased awareness of users driving habits.

System Overview



<http://Street-Smart.xyz>

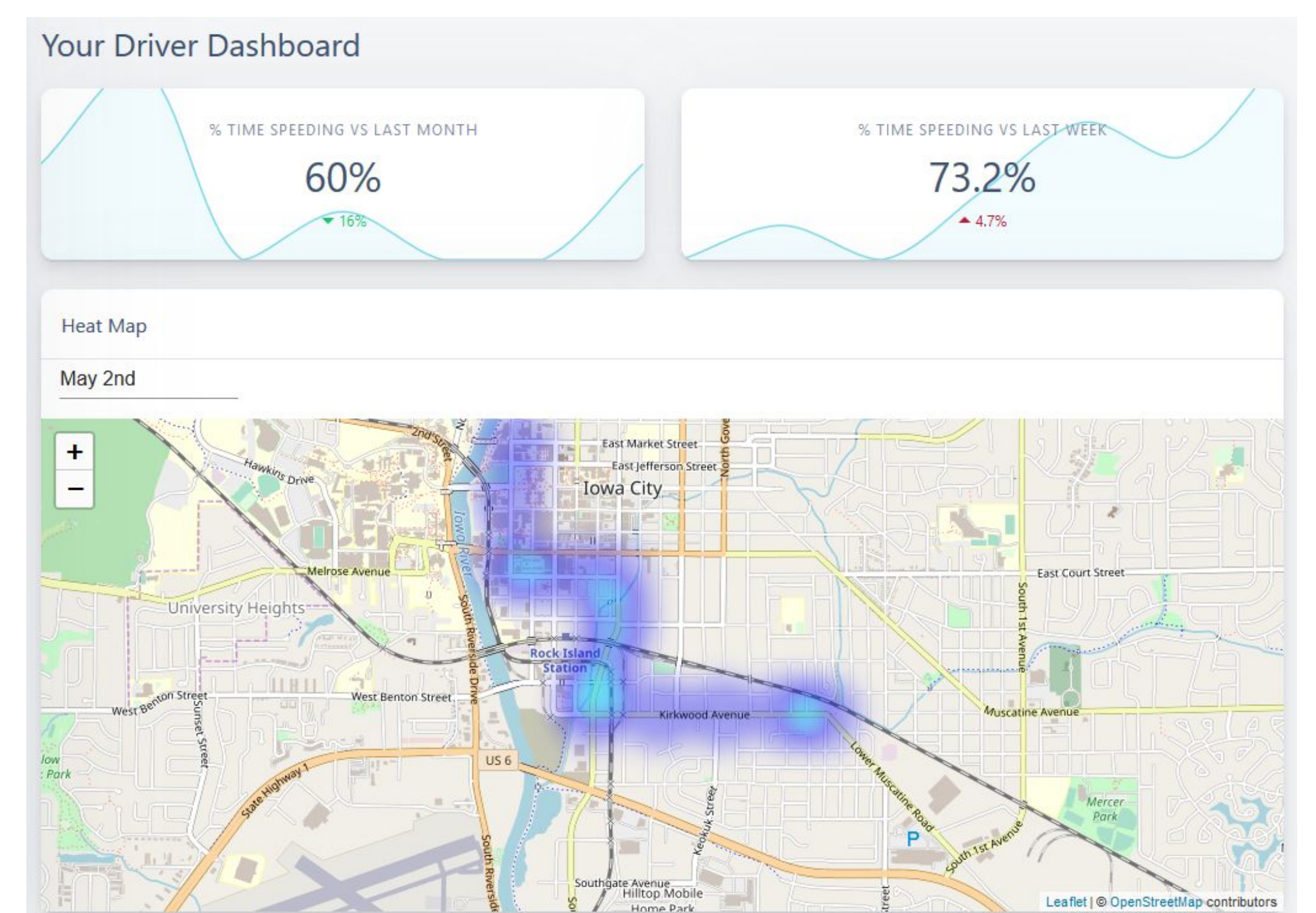
Our web application is publicly available at the above URL through Heroku for hosting our Express API and React pages. The Raspberry Pi itself is connected within the cabin through automatic pairing with a phone hotspot in order to push to Firebase.

Data Visualization

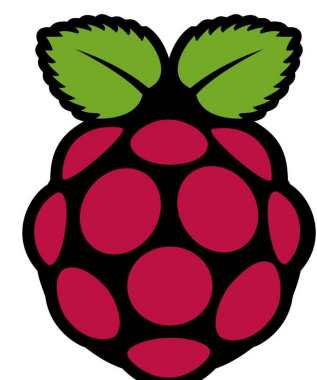
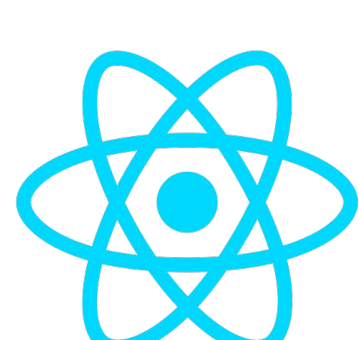
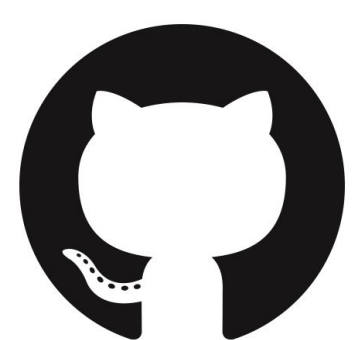
All data from our Express API routes are able to be filtered in a table based on origin, speed, and location.

In addition, we have a heat map that updates from simulation or real driving events in real time as our database is being populated.

| Event Log | | | | | | |
|----------------------|--------|----------------------|---------|-------|-------------|--------------------|
| Time | Driver | Location | Battery | Speed | Speed Limit | Speed Status (+/-) |
| Apr 28, 2019 6:48 PM | Tyler | 41.139393,-91.057927 | 100% | 48MPH | 70MPH | -22MPH |
| Apr 28, 2019 6:48 PM | Tyler | 41.162346,-91.108680 | 100% | 58MPH | 70MPH | -12MPH |
| Apr 28, 2019 6:48 PM | Tyler | 41.162346,-91.108680 | 100% | 63MPH | 70MPH | -7MPH |
| Apr 28, 2019 6:48 PM | Tyler | 41.319933,-91.285448 | 100% | 64MPH | 70MPH | -6MPH |
| Apr 28, 2019 6:48 PM | Tyler | 41.319933,-91.285448 | 100% | 65MPH | 70MPH | -5MPH |
| Apr 28, 2019 6:49 PM | Tyler | 41.319933,-91.285448 | 100% | 65MPH | 70MPH | -5MPH |
| Apr 28, 2019 6:49 PM | Tyler | 41.319933,-91.285448 | 100% | 66MPH | 70MPH | -4MPH |
| Apr 28, 2019 6:49 PM | Tyler | 41.892000,-91.074772 | 100% | 69MPH | 70MPH | -1MPH |
| Apr 28, 2019 6:49 PM | Tyler | 41.903282,-91.090436 | 100% | 69MPH | 70MPH | -1MPH |
| Apr 28, 2019 6:49 PM | Tyler | 41.903282,-91.090436 | 100% | 68MPH | 70MPH | -2MPH |
| Apr 28, 2019 6:50 PM | Tyler | 41.903282,-91.090436 | 100% | 65MPH | 70MPH | -5MPH |



Technology



Acknowledgements:

Shards Dashboard: <https://github.com/DesignRevision/shards-dashboard-react>

Firestore-js-sdk: <https://github.com/firebase/firebase-js-sdk>

Create-React-App: <https://github.com/facebook/create-react-app>

React-Leaflet: <https://github.com/PaulLeCam/react-leaflet>

Conclusion

Although we successfully created and implemented a complete path from collection to real time visualization, there are still plenty of additional improvements we'd like to pursue. While simulating driving provided very precise GPS data, actually driving was at times inaccurate. We'd also like to build a more secure and flexible API, with better parameter combinations in Express filtering from Firebase. With these features for increased reliability, we could help improve public safety for cities using traffic congestion data and speeding reports. We believe this could have major effects on city planning and infrastructure as well as increase police productivity.