

# An Open Data Collection Framework for Improving Neighborhood Safety

2021 Summer ISIS Internship Final Showcase Presentation

By Aadi Bajpai and David Seo

Principal Investigator: Dr. Daniel Balasubramanian, Research Scientist

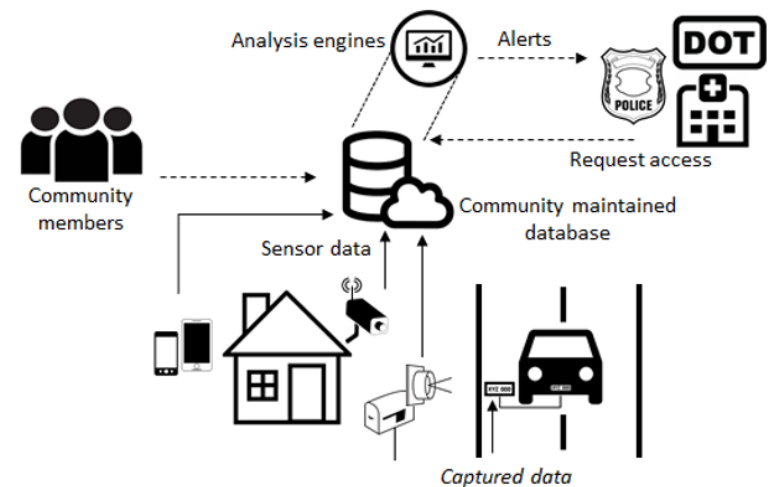
*This work performed as part of the NSF SCC project, “Improving Neighborhood Safety through Open Data Collection”*



# Our project's big picture: improving neighborhoods

**Research questions:** How can technology improve neighborhood safety? What are the social issues?

- Technology: cameras, phones, databases, machine learning
- Social issues: privacy, trust, surveillance, data retention, data ownership



Original vision for technical prototype

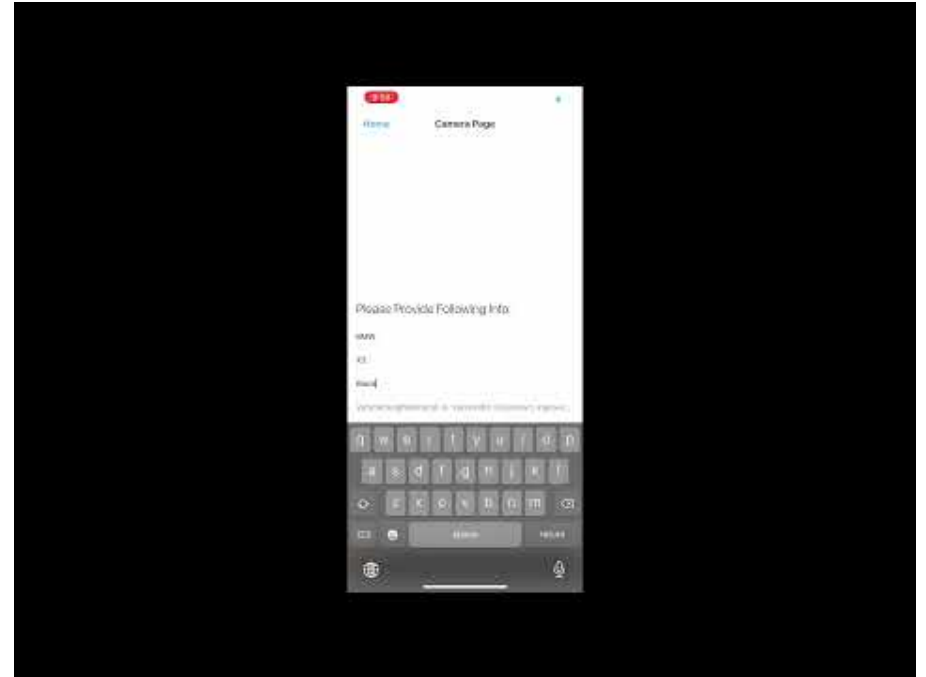
***This summer, we developed a front-end and back-end prototype for neighborhood open data collection!***

# App Demos

## Animal Dashboard



## License Detection App



## Front-End: Ionic React/React Native

### **Ionic React: Cross-Platform**

- Typescript, HTML, CSS

### **React Native:**

- Javascript

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### **Challenge:**

- Incorporating Front-End with the Back-End

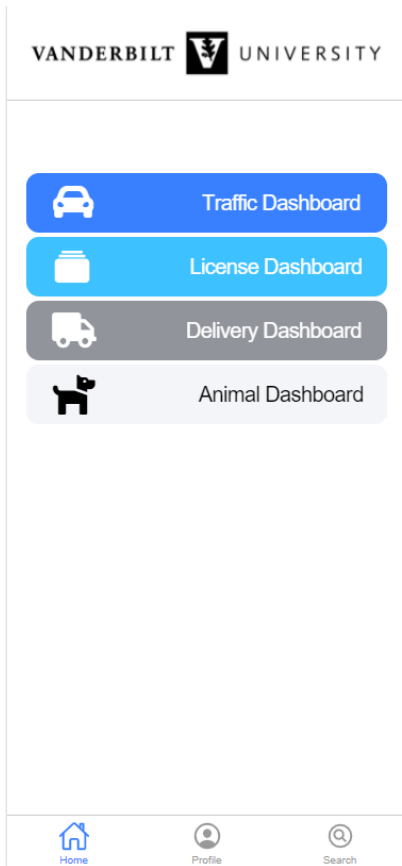
### **Lesson:**

- Persistence with an open mindset

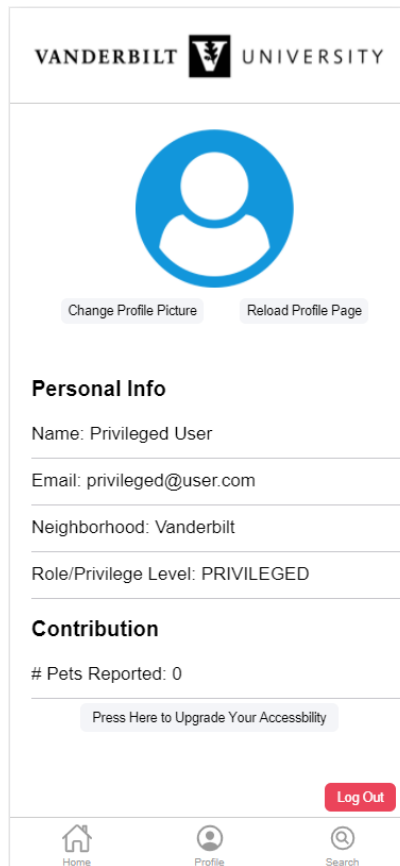
### **What went well:**

- Communication and Teamwork with Aadi and Dr. B

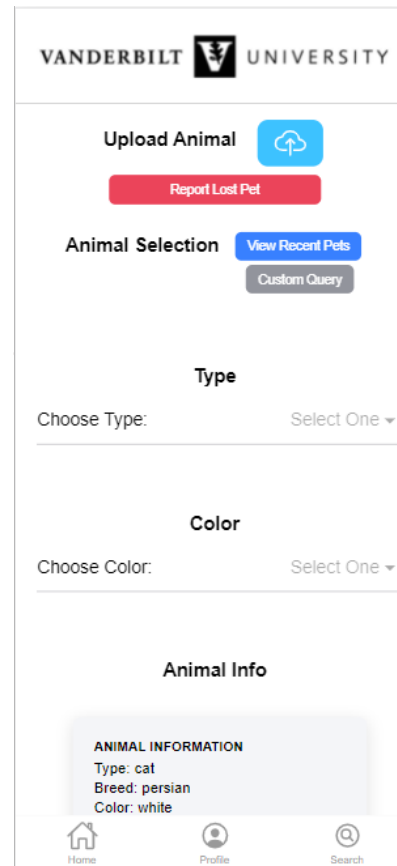
# User Interface (UI) Designs



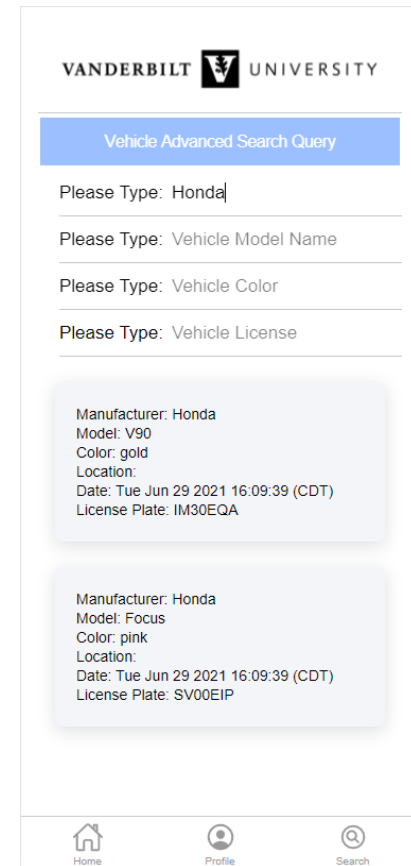
Home Page



Profile Page



Dashboard Page



Query Page

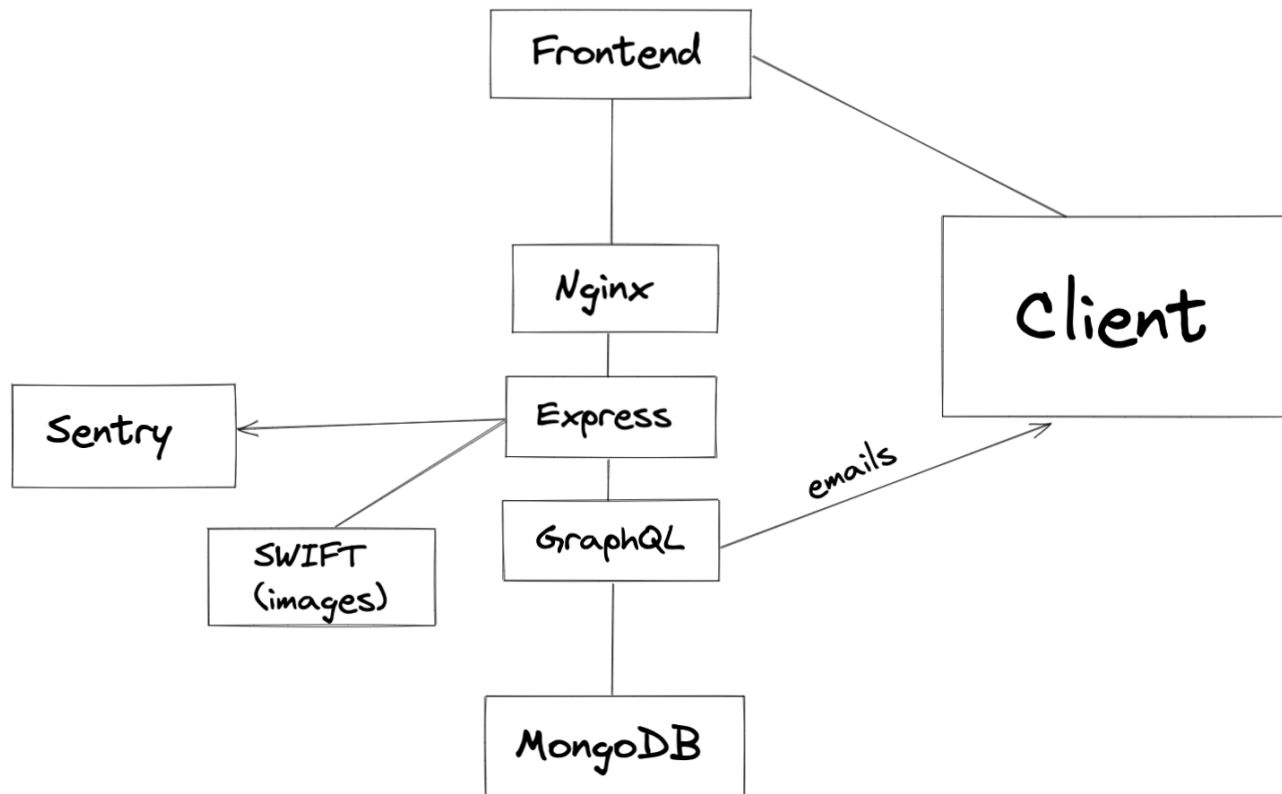
# Backend

**Core Technologies:** GraphQL, Express, MongoDB, Nginx

**Other Stuff Used:** Swift Storage Cluster, Haversine Geolocation, Faker

- Why GraphQL? (And not REST)
- Implementing the hotlist
- MongoDB Document Relations (vs SQL Joins)

# Backend architecture



# GraphQL Playground

nsf-scc1.isis.vanderbilt.edu/playground

neighborhoods createNeighborhood me animals createAnimal vehicles createPartialAnimal login

PRETTIFY HISTORY <https://nsf-scc1.isis.vanderbilt.edu/graphql> COPY CURL

```
1 {
2   neighborhoods {
3     _id
4     name
5     location {
6       lat
7       lon
8     }
9   }
10 }
```

▶ {
 "data": {
 "neighborhoods": [
 {
 "\_id": "60ecadfe13c7e4a4168e46e8",
 "name": "Sylvan Park",
 "location": {
 "lat": "36.1430",
 "lon": "-86.8446"
 }
 },
 {
 "\_id": "60ef24a798c85e3b7a61283a",
 "name": "Vanderbilt",
 "location": {
 "lat": "36.14455609440181",
 "lon": "-86.80260145836806"
 }
 },
 {
 "\_id": "60ef5d9d8f7b2b44d3c5b01d",
 "name": "12th South",
 "location": {
 "lat": "36.125382912389945",
 "lon": "-86.78066484620505"
 }
 }
 ]
 }
}

QUERY VARIABLES HTTP HEADERS (1) TRACING

DOCS SCHEMA

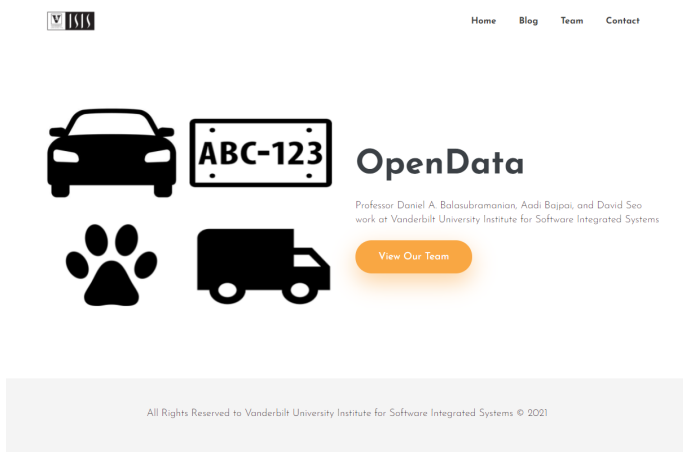


# Website Using Hugo

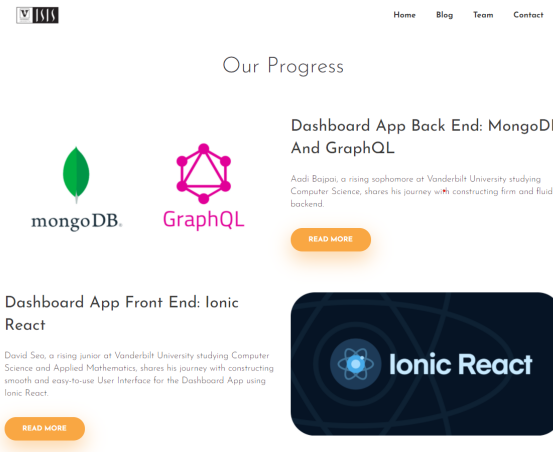
We also developed a website for the project

- <https://nsfopendata.github.io/>

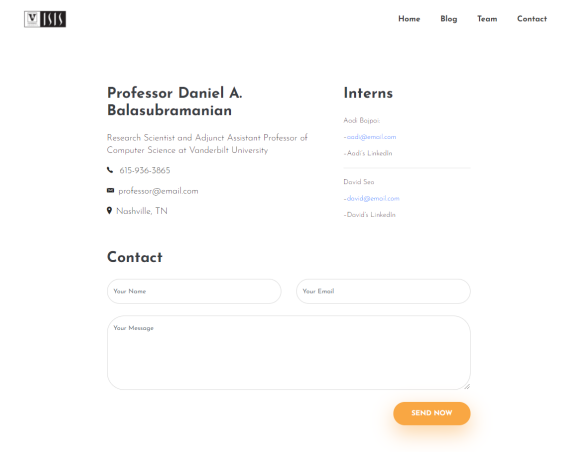
- Used a Hugo theme



The screenshot shows the 'OpenData' page of the website. At the top left is the VVSI logo. A navigation menu at the top right contains 'Home', 'Blog', 'Team', and 'Contact'. The main content area features four icons: a car, a license plate with 'ABC-123', a paw print, and a truck. To the right of these icons is the heading 'OpenData' and a paragraph: 'Professor Daniel A. Balasubramanian, Aadi Bajpai, and David Seo work at Vanderbilt University Institute for Software Integrated Systems'. Below the text is an orange 'View Our Team' button. At the bottom of the page, a grey footer contains the text: 'All Rights Reserved to Vanderbilt University Institute for Software Integrated Systems © 2021'.



The screenshot shows the 'Our Progress' page. It features the VVSI logo and navigation menu at the top. The heading 'Our Progress' is centered. Below it, there are two columns of content. The left column has the mongoDB logo and GraphQL logo, followed by the heading 'Dashboard App Front End: Ionic React' and a paragraph: 'David Seo, a rising junior at Vanderbilt University studying Computer Science and Applied Mathematics, shares his journey with constructing smooth and easy-to-use User Interface for the Dashboard App using Ionic React.' Below this is an orange 'READ MORE' button. The right column has the heading 'Dashboard App Back End: MongoDB And GraphQL' and a paragraph: 'Aadi Bajpai, a rising sophomore at Vanderbilt University studying Computer Science, shares his journey with constructing firm and fluid backend.' Below this is an orange 'READ MORE' button. At the bottom right, there is a dark blue box with the Ionic React logo.



The screenshot shows the contact page. It features the VVSI logo and navigation menu at the top. The heading 'Contact' is centered. Below it, there are two columns of content. The left column has the heading 'Professor Daniel A. Balasubramanian' and a paragraph: 'Research Scientist and Adjunct Assistant Professor of Computer Science at Vanderbilt University'. Below this is a phone icon with the number '615-936-3865', an email icon with the address 'professor@email.com', and a location pin icon with the text 'Nashville, TN'. The right column has the heading 'Interns' and a list of names: 'Aadi Bajpai', 'Aadi's LinkedIn', 'David Seo', and 'David's LinkedIn'. Below the list is a 'SEND NOW' button. At the bottom, there is a contact form with fields for 'Your Name', 'Your Email', and 'Your Message', and a 'SEND NOW' button.

## Conclusion

- We had a great summer working on a fun and exciting project!
- There are lots of opportunities to get involved with future work:
  - Social work: upcoming focus groups and community surveys
  - Technical work: develop new machine learning models, expand the current prototype, deploy in local neighborhoods
- Email Dr. Daniel if you are interested!
- [daniel.a.balasubramanian@vanderbilt.edu](mailto:daniel.a.balasubramanian@vanderbilt.edu)