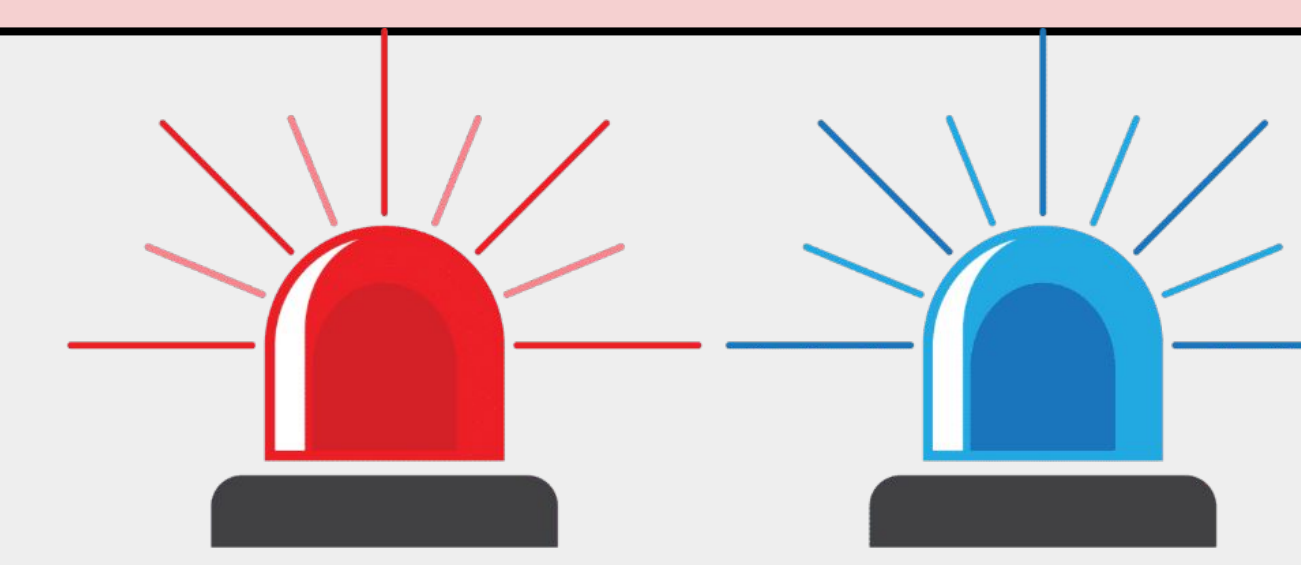


# Team Sourdough's SafeGuard

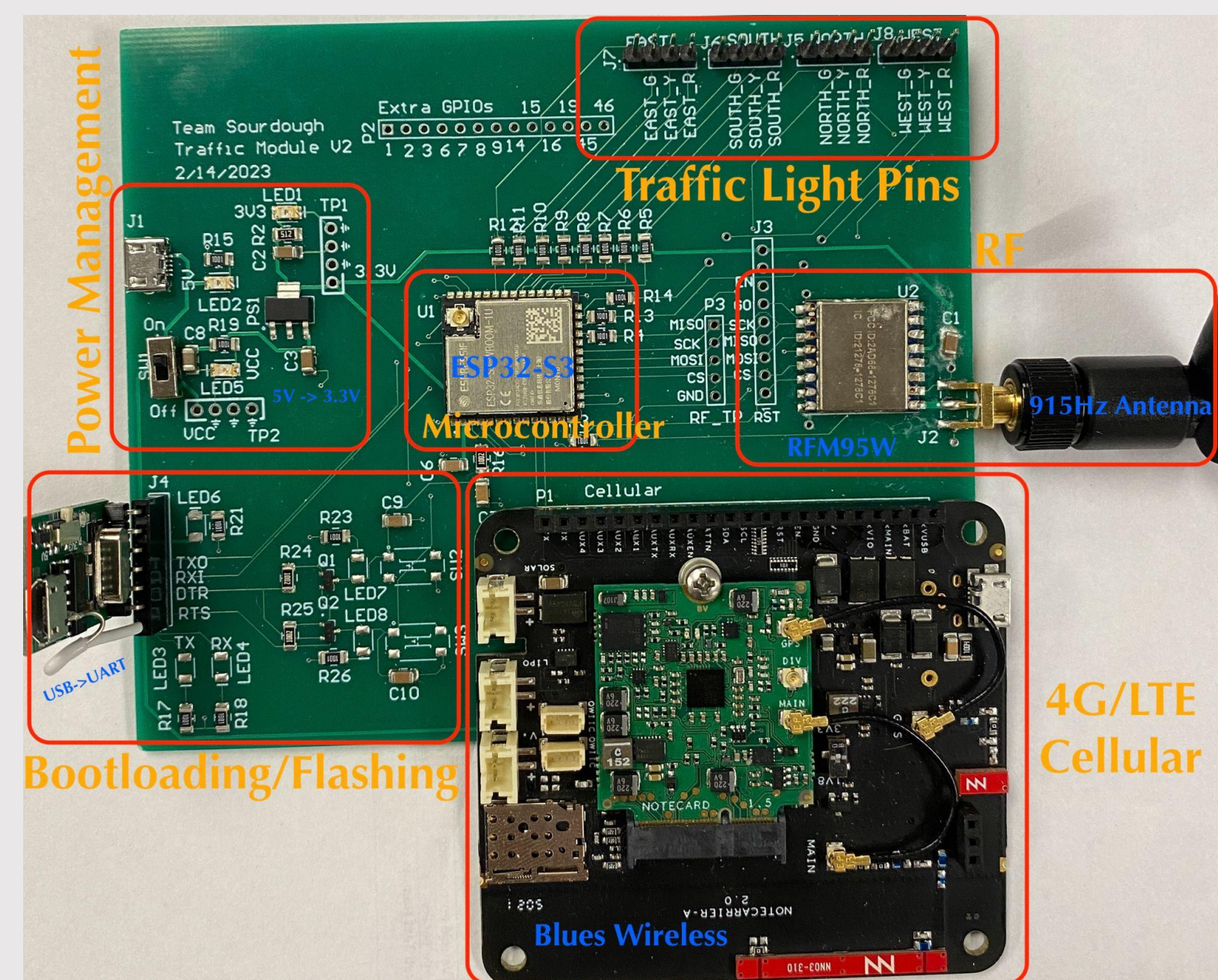


An automated traffic controller that safely escorts emergency responders through intersections

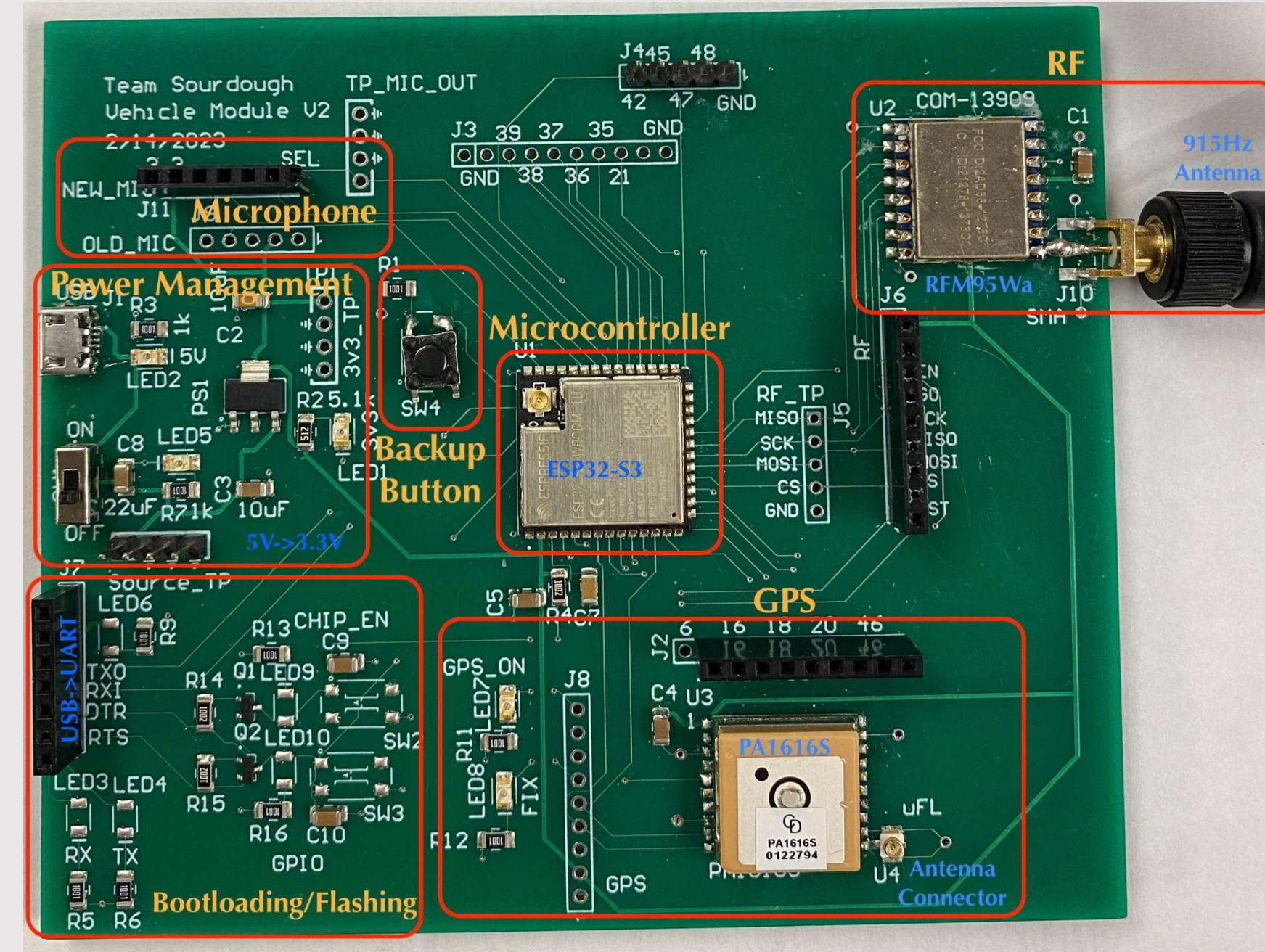
Adam Vitti • Tanner Leise • Henry Saver • Devin Riess • Cyrus Sowdaey • Sam Reyes

## Hardware

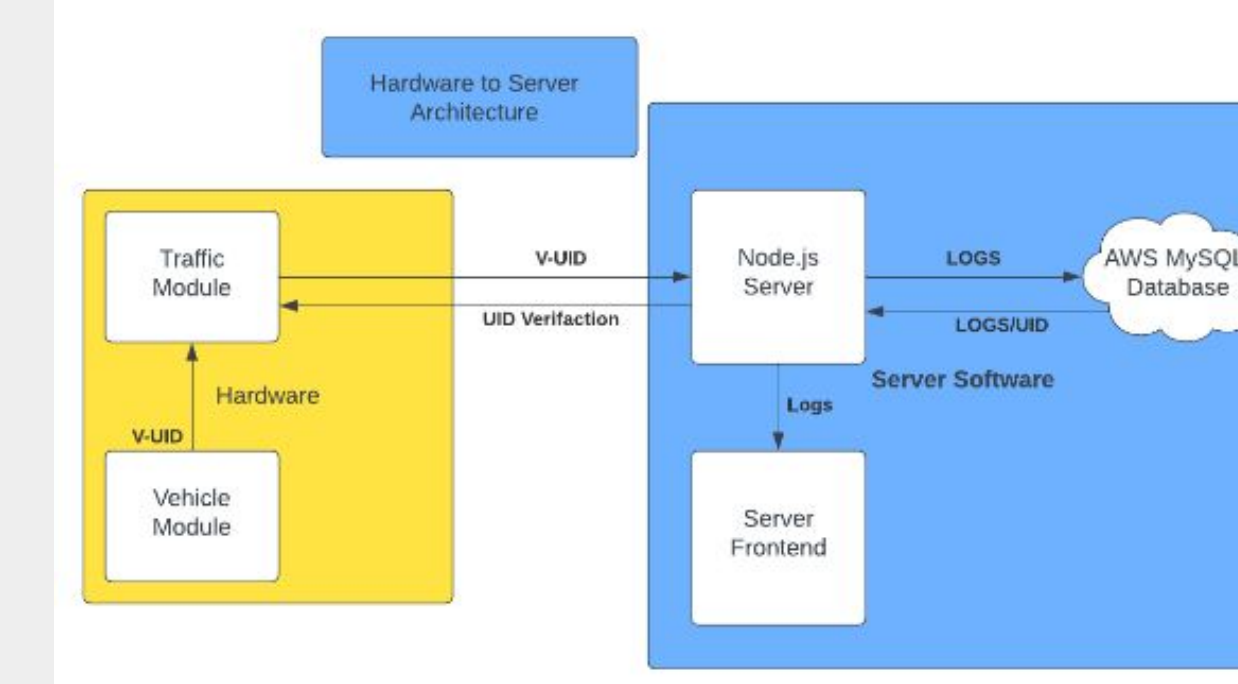
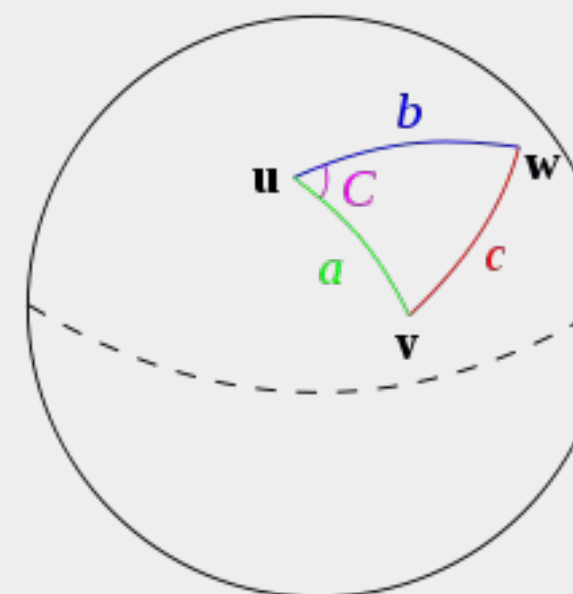
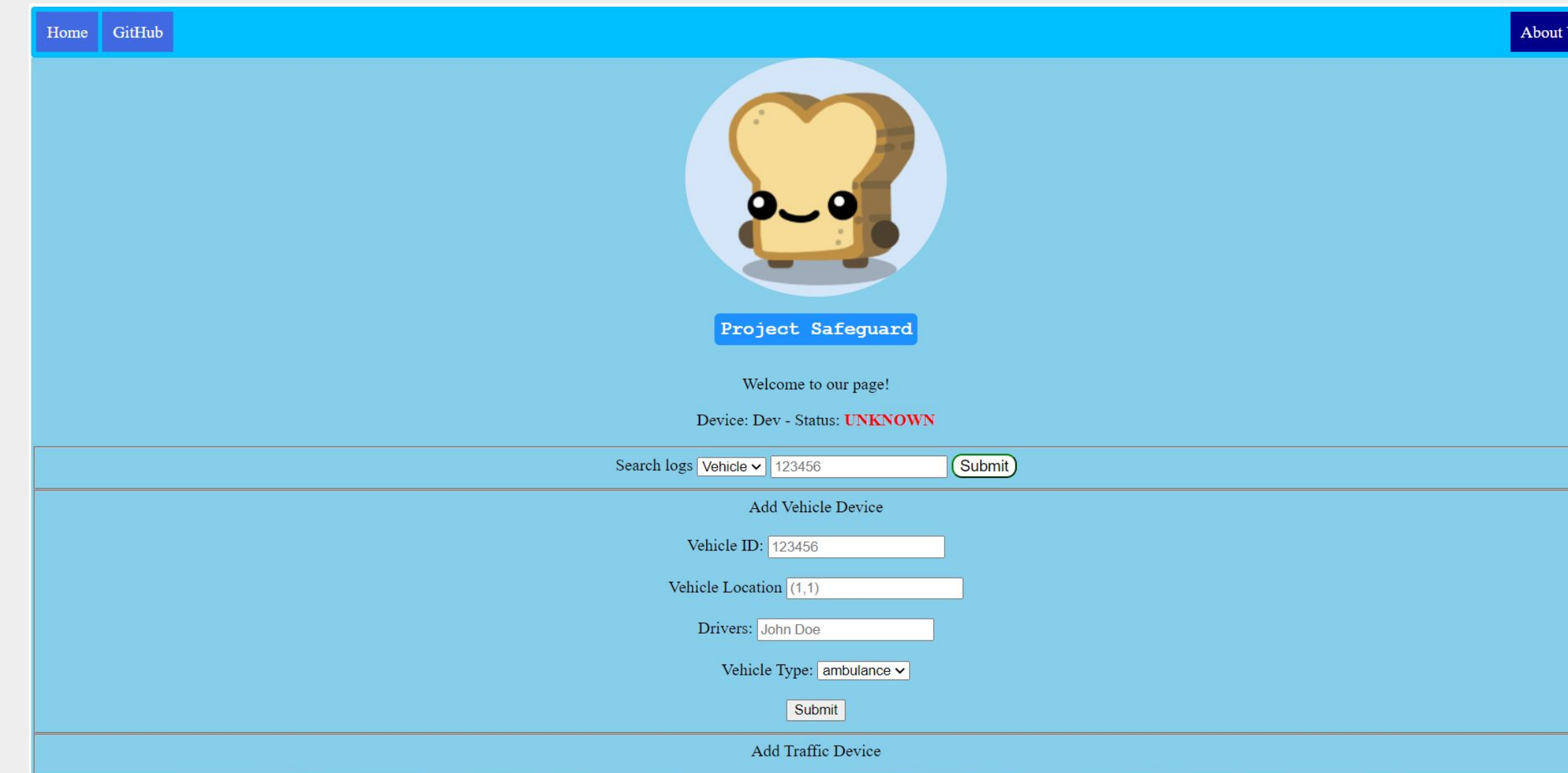
Traffic Module



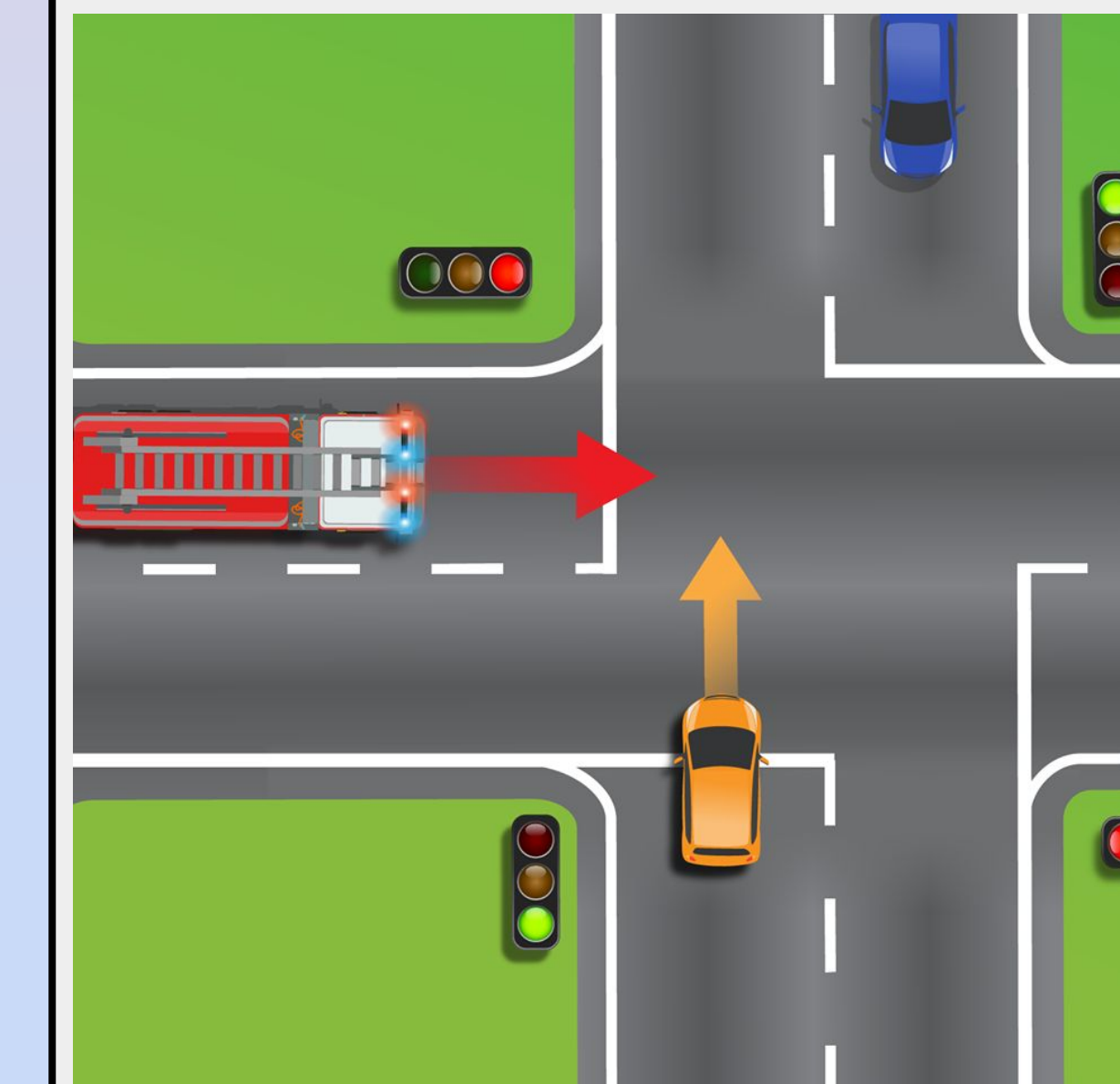
Vehicle Module



## Software

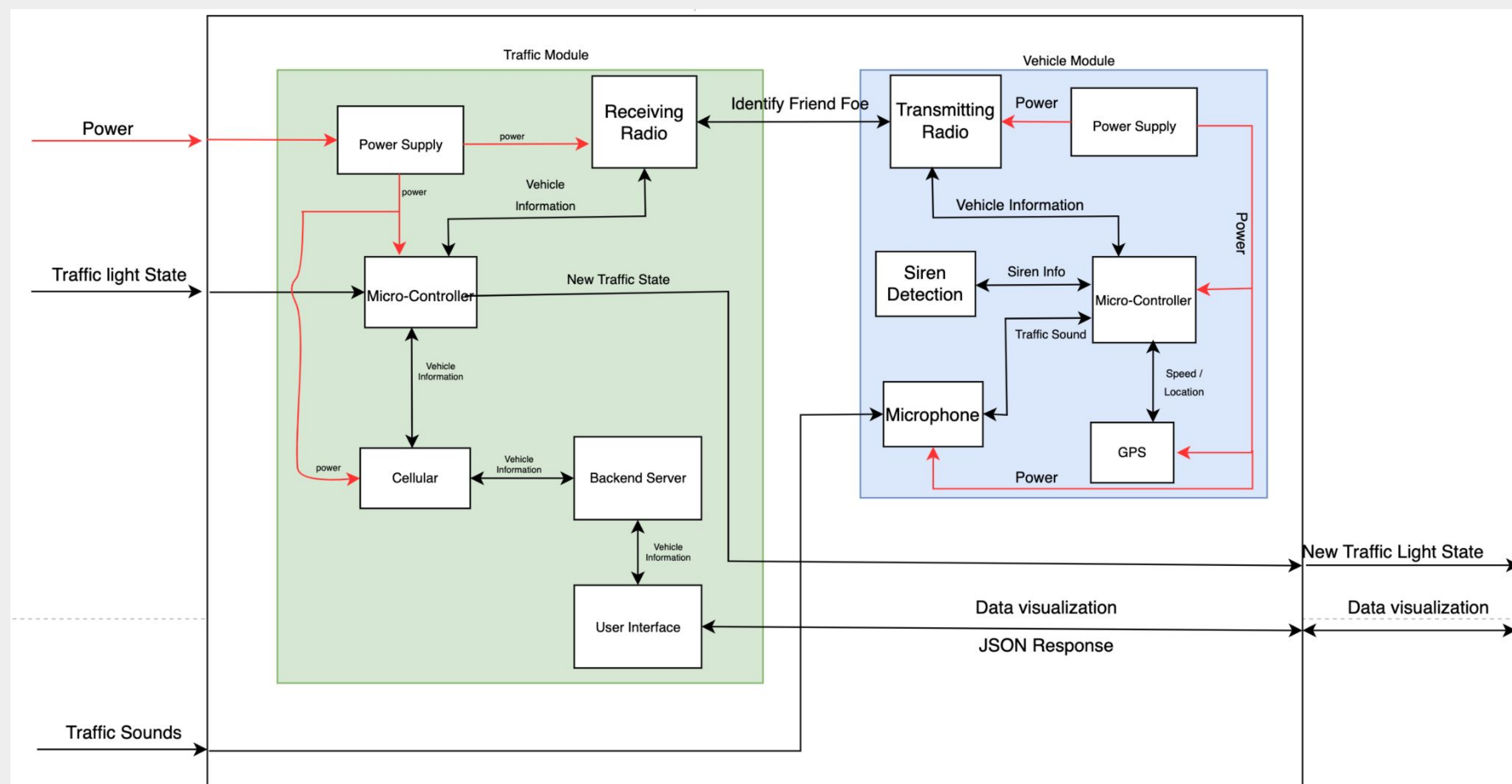


## How it Works



1. Identify active siren
2. Vehicle sends: position, speed, unique ID
3. Intersection validates vehicle
4. Intersection calculates distance and direction of vehicle
5. Cycles traffic lights for responder

## System Overview



ESP32-S3	Microcontroller: 3.3V, 2 Cores, TensorFlow Lite Compatible	
PA1616S	GPS Module: UART, 10Hz update rate, ±30ft precision	
RFM95W	Radio Transceiver: SPI, ~2000ft, easy integration	
Blues Wireless Notecard	Cellular Module: 5V, UART, 4G/LTE	
FreeRTOS	Custom firmware with real time operating system	
Database	AWS Hosted, MySQL, Logs/VID	
Web Dev tech	Node.js Server, Ngrok Hosted	
ML Tech	Audio Neural Network through Tensorflow (MircoTF)	

## Journey

1. Original idea was to use strictly sound to identify vehicle data
2. Switched to a 2 module system. One mounted in the car, other at traffic light
3. Moved the microphone from traffic module to vehicle for siren accuracy
4. Implemented plan B button as backup for siren detection

### Lessons:

- Audio is difficult
- Setting up IDE/Compiler takes time
- TFLite is very new and unreliable
- Integrating between multiple technologies is challenging

Special Considerations to: Rick Sundahl and Tyler Davidson Without you guys we couldn't have done it :)