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FDP – VCU Data Acquisition Device

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FDP – VCU Data Acquisition Device

ECE403 | **Team members:** Ferdinand Agyei-Yeboah, Tommy Huynh, Charles Nimo, Thomas Oakley | **Faculty adviser:** Dr. Yuichi Motai | **Sponsor:** FDP Brakes | **Sponsor adviser:** Thomas Veilleux

Initial Problem

- Currently, Automotive Test Vehicles apply older technology that is often not integrated with data analytics for the purpose of calibrating stopping distance, number of stops, deceleration and brake squeal.
- Need to monitor critical information during testing to gain more feedback on brake performance
- Currently, drivers fill out forms describing issues with brakes

Requirements

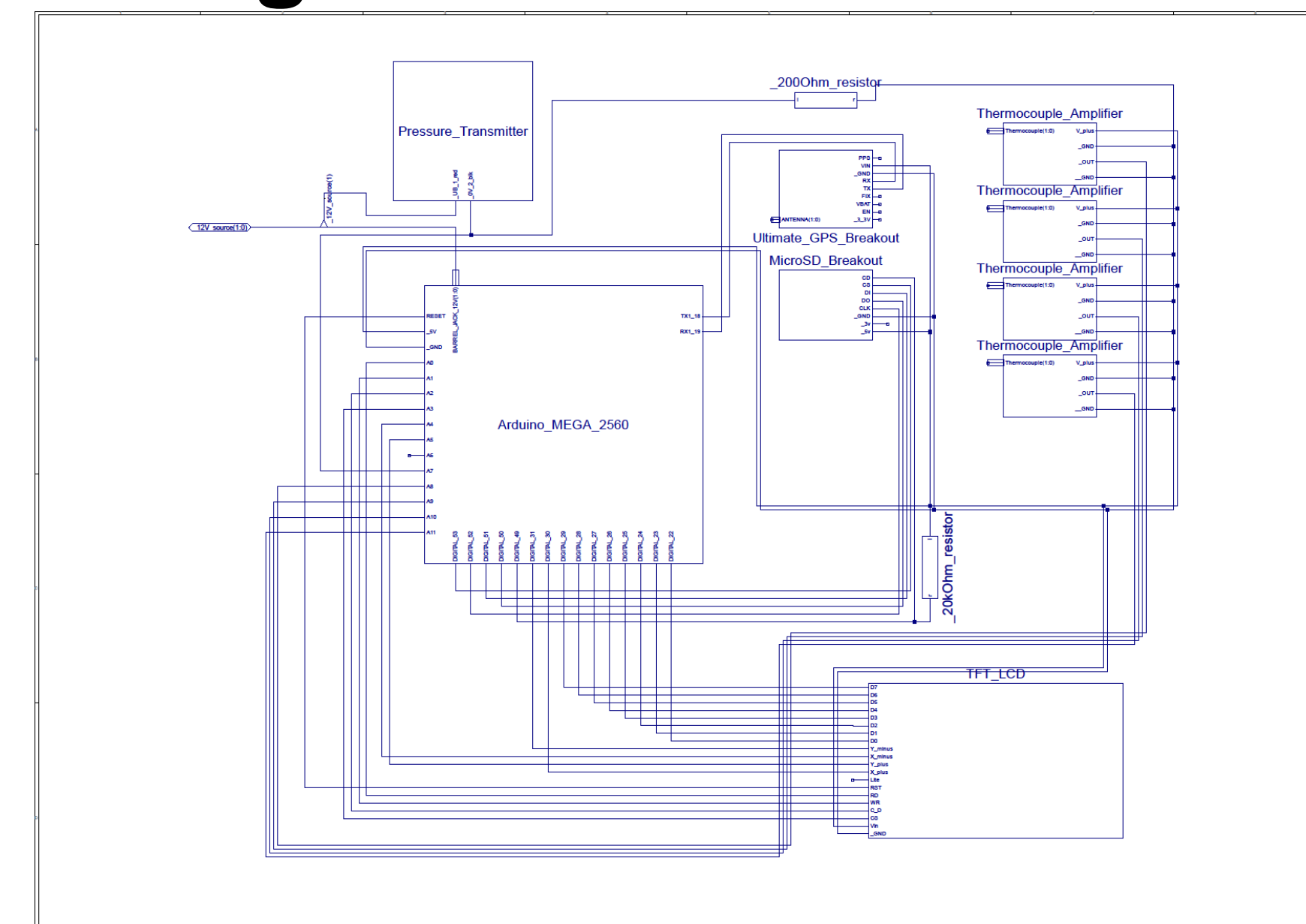
- Data acquisition system (DAQ) to monitor the brake system involving brake line hydraulic pressure and brake pad temperature
- Integration with GPS to track location, speed, and deceleration
- Ability to be installed on a vehicle in less than a day by trained technician
- Reproducible with off-the-shelf products

Hardware Components

Arduino Mega 2560	Pressure Transducer	K-type Thermocouples
Touchscreen LCD Display	MicroSD Card & Breakout Board	Adafruit GPS Module

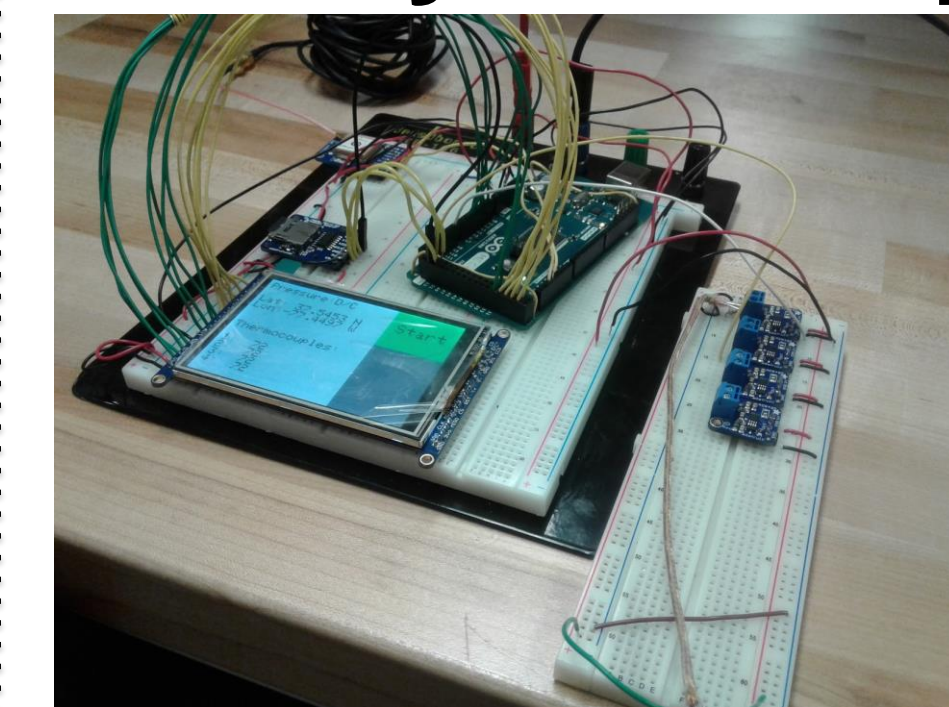
- Arduino Mega 2560 – CPU
- Pressure transmitter, thermocouples – sensor input
- GPS module – location data for CPU
- LCD – HMI input/output
- SD card – bulk storage of data

Design

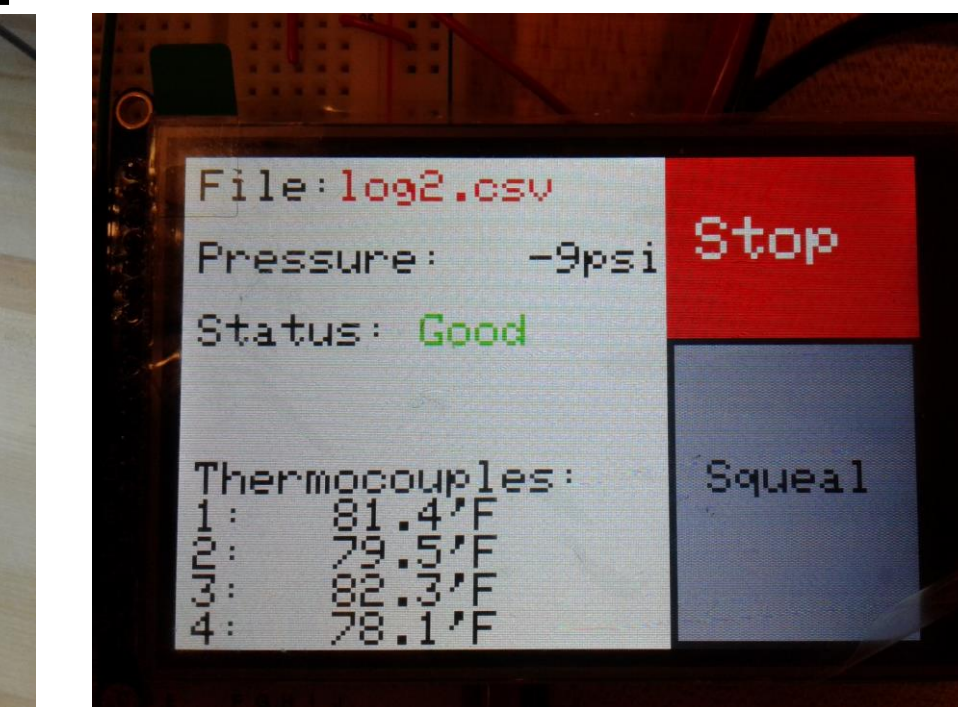


Circuit Schematic of Device

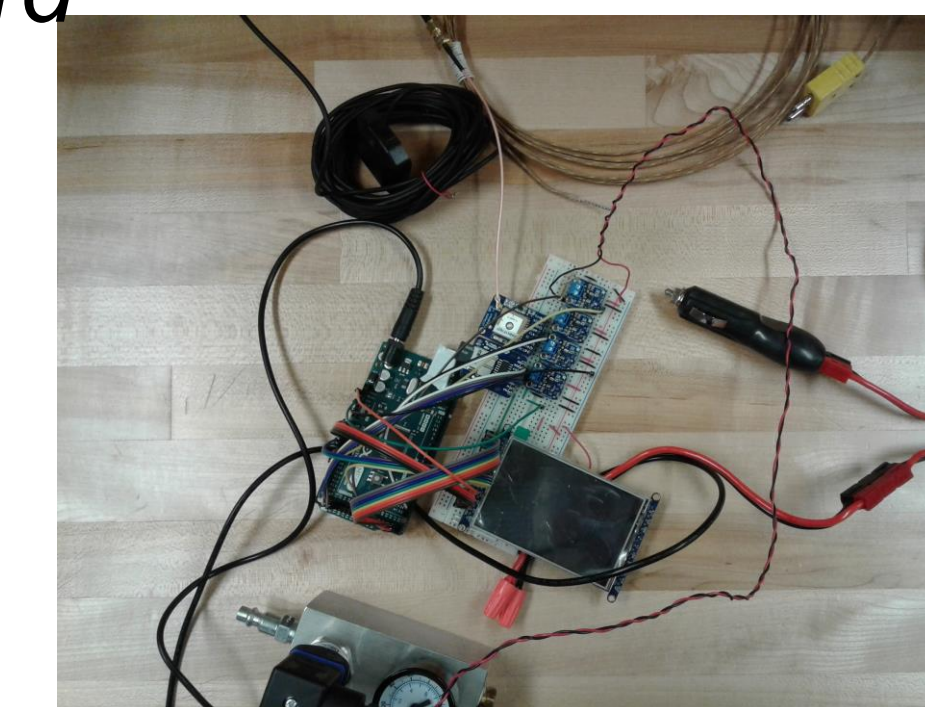
Early Development



DAQ device on breadboard

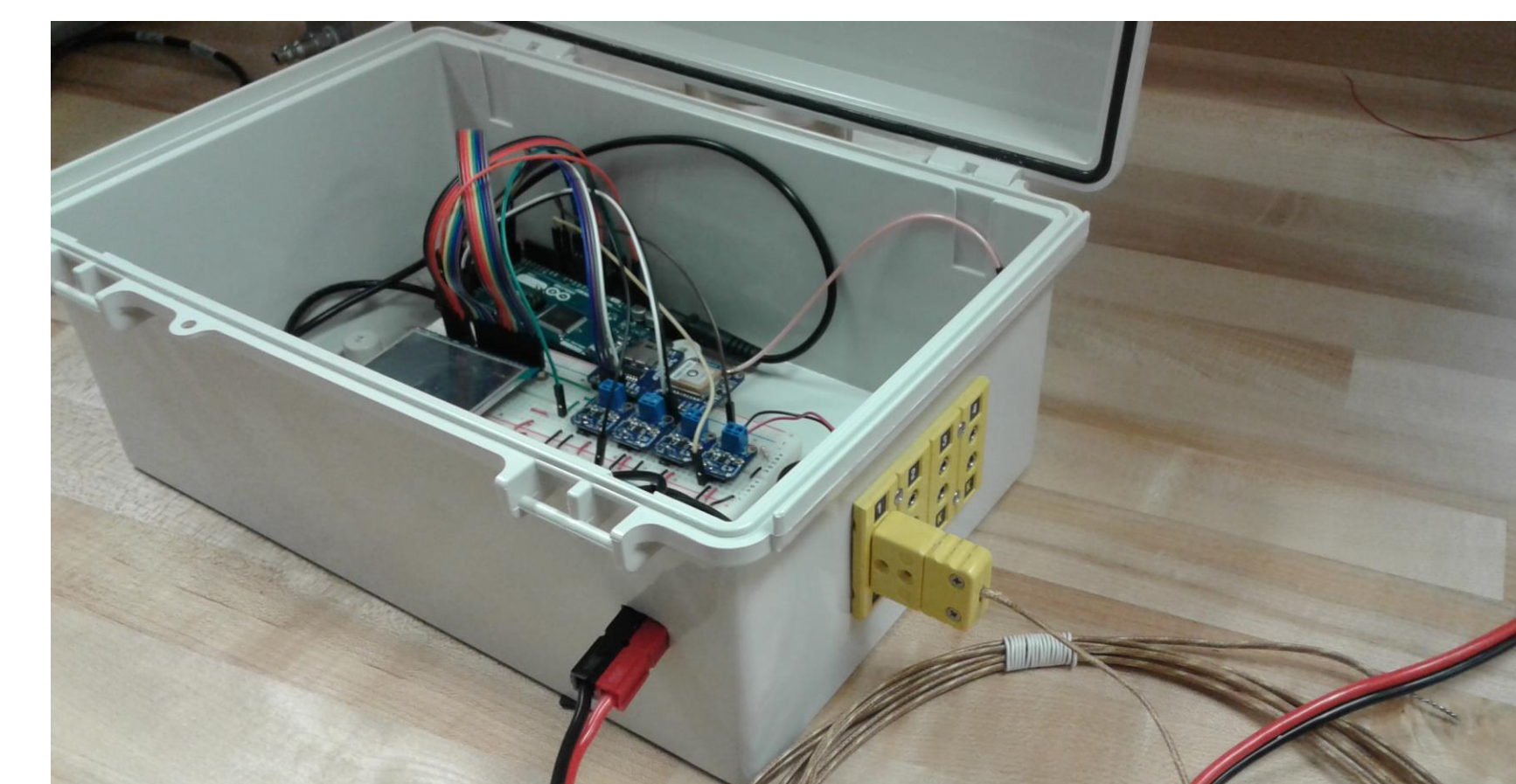


LCD touchscreen interface



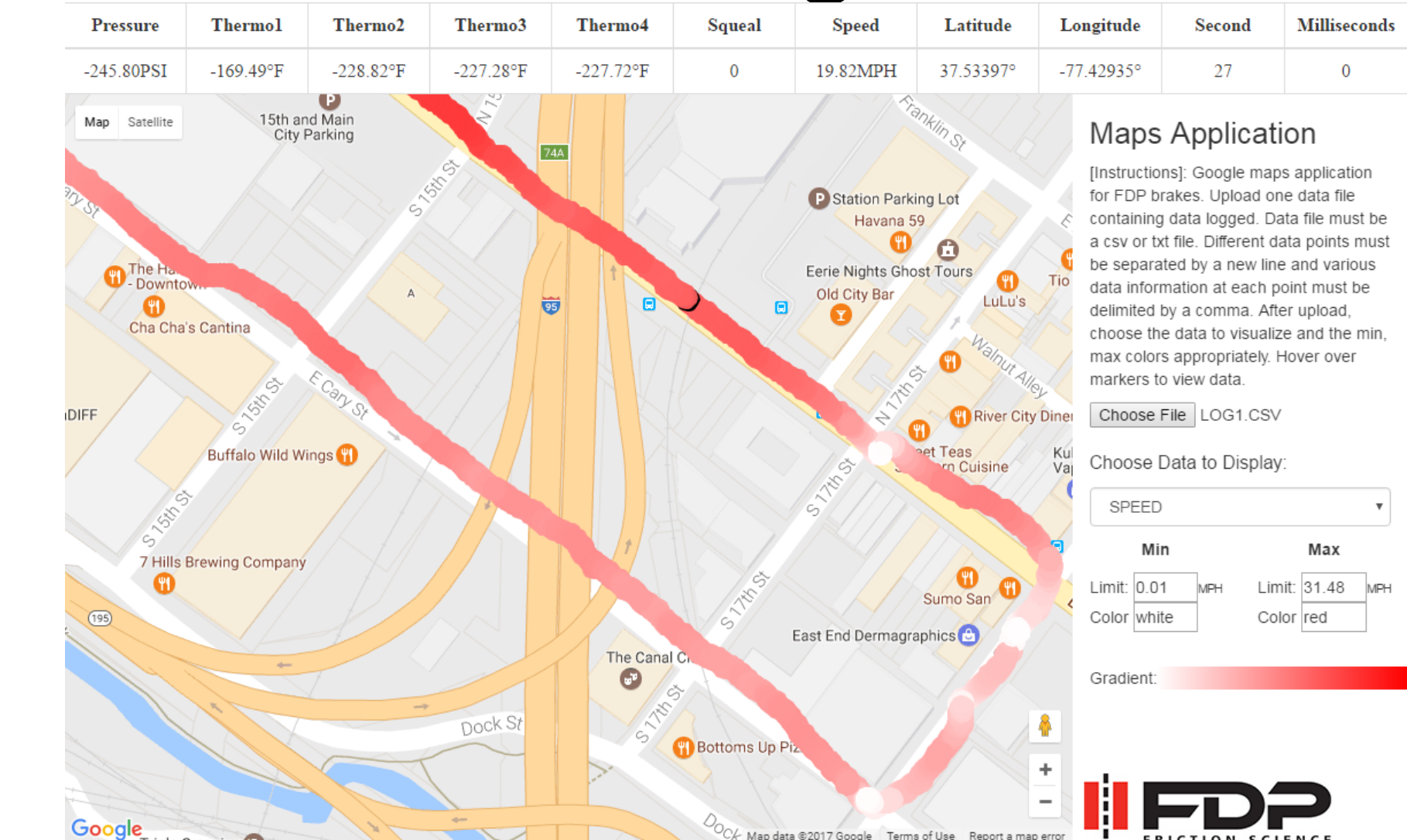
Downsized to smaller breadboard

Ease of Use



- In-the-box approach
- Detachable sensors, display
- Unit removable from test environment

Post Processing



- Mapping app translates DAQ logs
- Visualization of brake temperature & pressure, speed, acceleration, or squeal events
- Interactive map of traversed routes

Impact

- Shortened time-to-market of brake pad products
- Quicker, more effective feedback to testing

Future Work

Ways Project can be improved

- Automatic squeal event capturing
- Generation of graphs in the maps application relating data in the log file
- Real-time transmission of data to server containing mapping application.
- Automatic analysis of squeal data

