

**Goal**

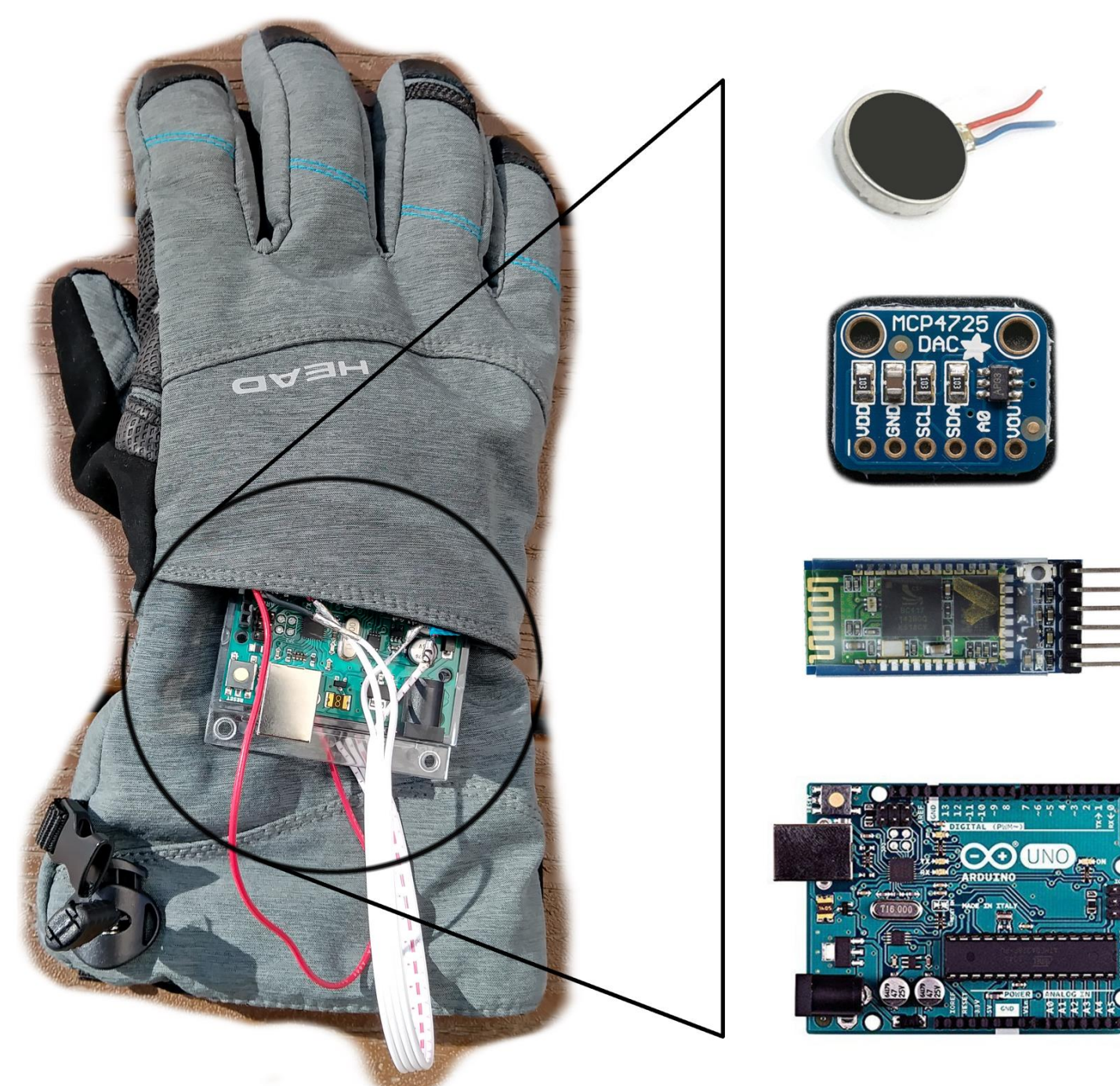
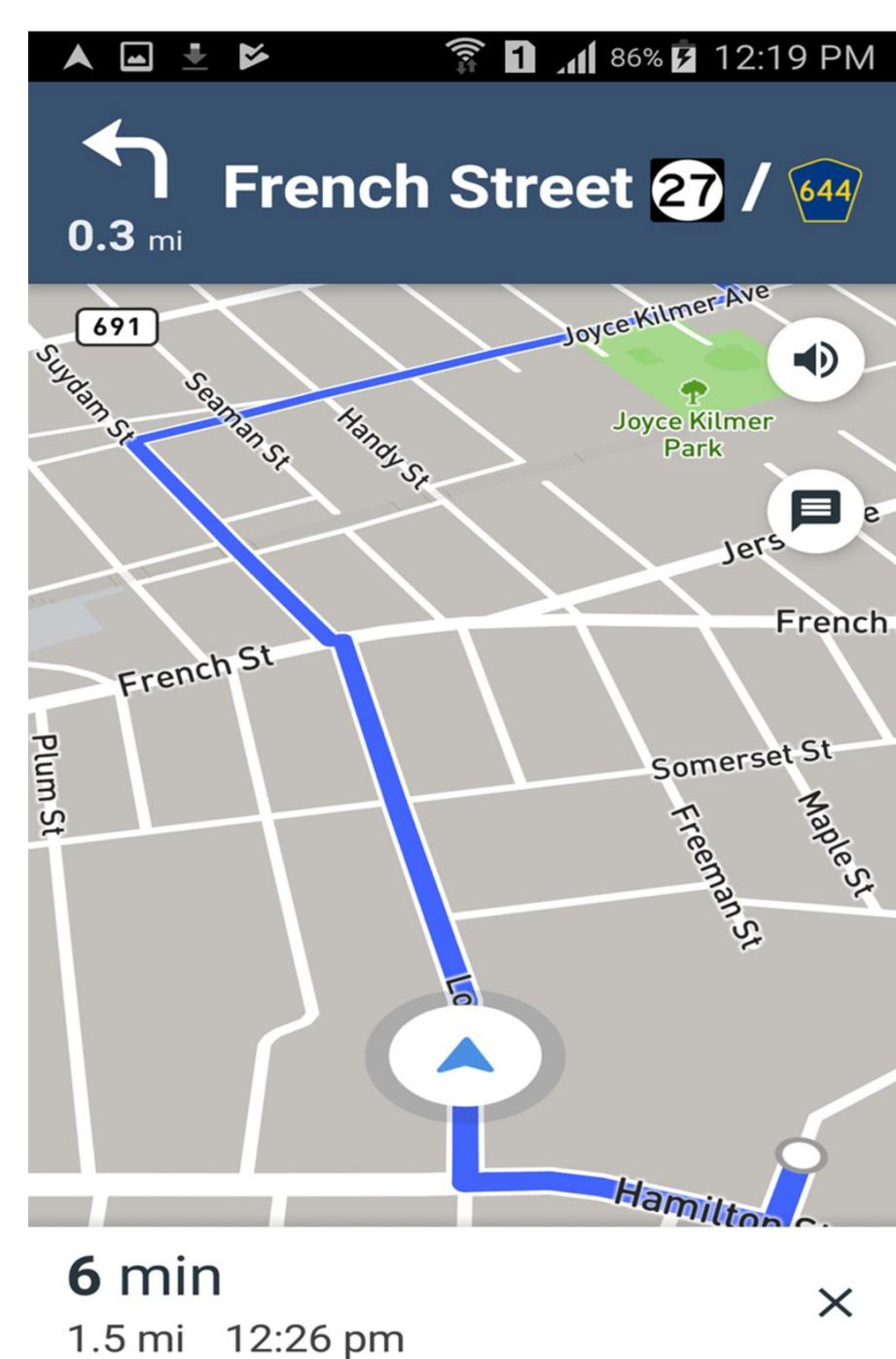
- Safer traveling for cyclists.
- Convenient navigation cues.

**Motivations and Objectives**

- Motivations
  - Navigation is necessary for daily transportation.
  - Large marketing demand for navigation aides.
  - Increasing navigation safety.
- Objectives
  - Use vibration to give directions to riders.
  - Fashion a pair of gloves embedded with vibration modules.

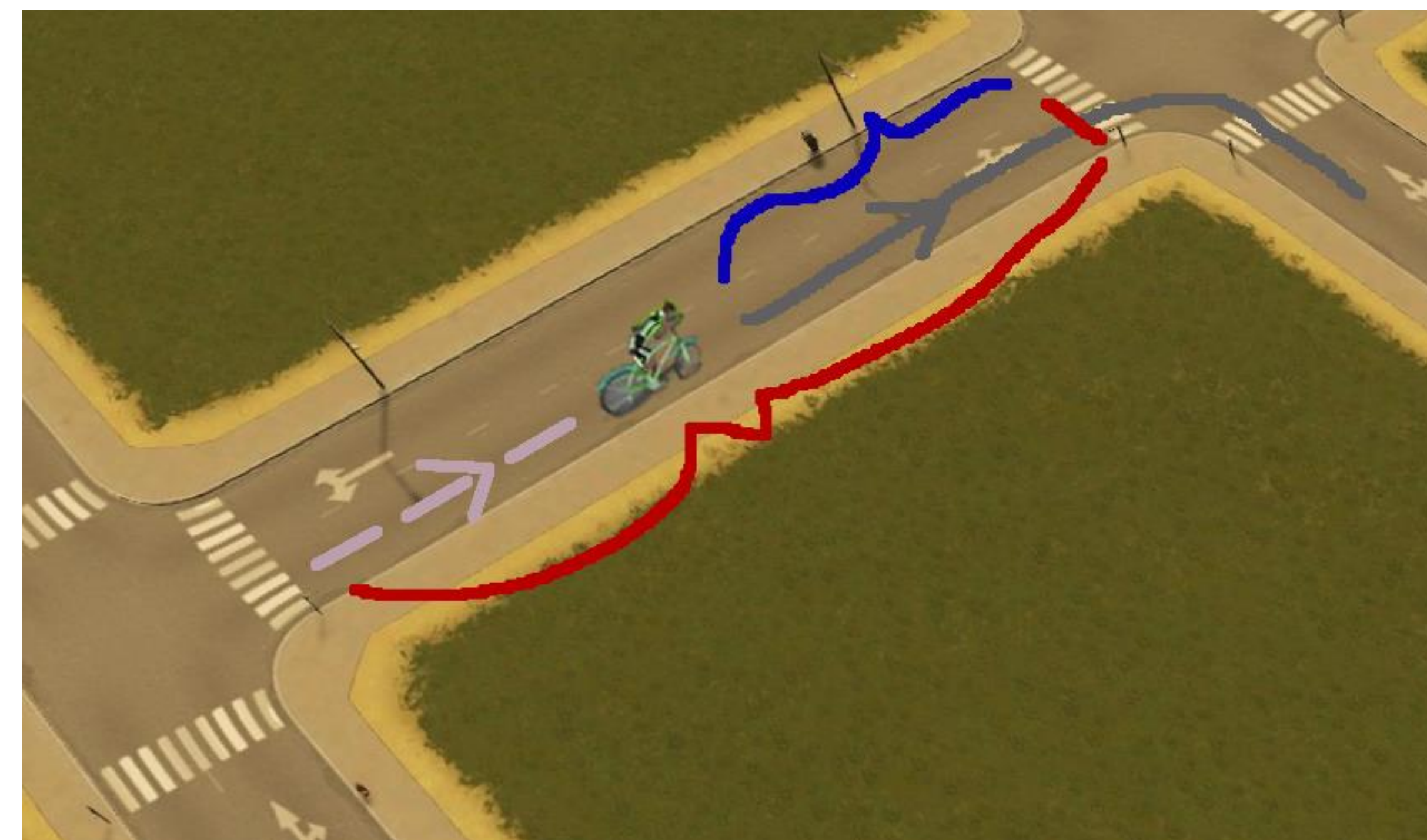
**Research Challenges**

- Building the navigation app with Bluetooth function.
- Embedding the vibration modules into the gloves.
- Establishing communication between the app and one of the gloves.
- Acquiring a steady, but changeable output from the Arduino.
- Establishing communication between one glove to another.

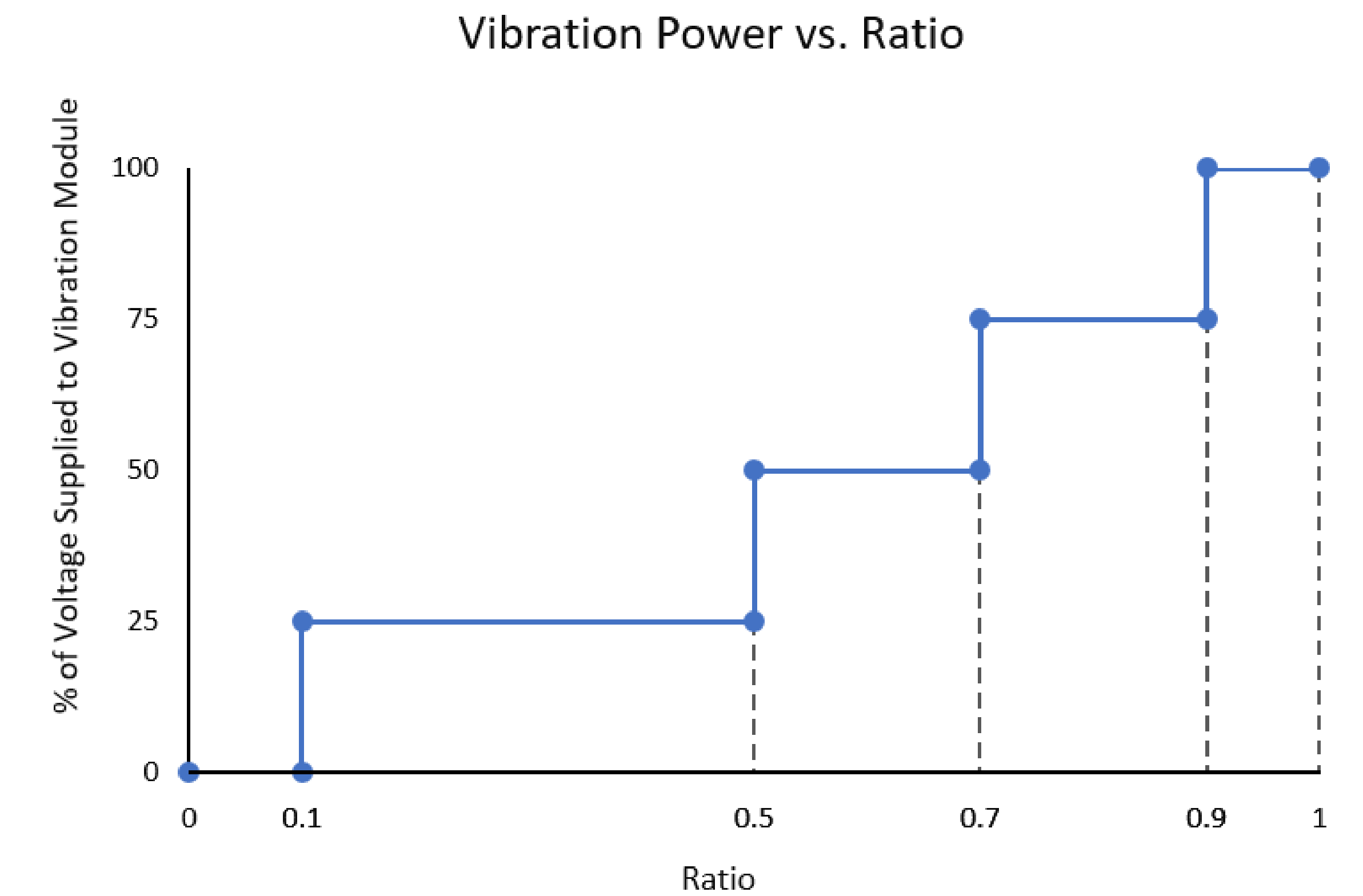


**Methodology**

- Design/Implement the app using Mapbox navigation API.
- Retrieve data about the trip's upcoming bends.
- Send data via Bluetooth to the gloves.
- Take the data and convert it to an analog signal.
- Route the signal to power the vibration module



— The total distance to the next turn.  
— The current distance to the next turn.  
**Ratio = Current/Total** as the indicator of power supplied.



Gray Code	Signal	Hex
0000	Straight	0
0001		
0011	Left 25%	3
0010		
0110	Right 25%	6
0111	Right 75%	7
0101	U-turn 25%	5
0100	U-turn 75%	4
1100	U-turn 100%	C
1101	U-turn 50%	D
1111	Right 100%	F
1110	Right 50%	E
1010		
1011	Left 50%	B
1001	Left 75%	9
1000	Left 100%	8

(Direction Power%)

The codes sent to the Arduinos, each representing the cutoff border.

**Results and Acknowledgement**

- The navigation app runs smoothly.
- The communications between app-master glove/master glove-slave glove are stable.
- The gloves can give cyclists clear navigational instructions.
- Portrayed on the left is the finished system.

We would like to thank Professor Roy Yates for his continued support and guidance throughout the project.