Wheelchair Automation and Instrumentation Platform

Project

- **Problems**
  - Powered wheelchairs often fail to communicate their status to their users.
  - Every chair is customized to a user’s needs, but this does not always work as it is hard to translate the commands to a different layout.
  - Status of the chair is unknown to caretakers/clinicians (has to go to the factory to be analyzed).

- **Goals**
  - Provide an interface where one could read off easily basic data about the chair’s environment (altitude, pressure, humidity, etc.).
  - Build an API to allow for the interfacing of basic movement of the chair itself; this way alternative methods of control would be easier to implement.
  - Implement a way to save and log chair data so that it can be analyzed so that steps can be taken to help the users.

Methods

- Integrated open-source libraries to build a CAN bus for data transmission.
- Used ROS nodes to send chair commands based on sensor data and ROS messages.
- Implemented ROS on an Arduino to convert messages into R-Net (proprietary CAN bus) commands for wheelchair control.
- Used ROS’s logging system to store data about the chair for the current user of the chair so that they can be played back to replicate an error if need be.

System

Conclusion

- We learned that planning and designing before hardware arrives is important to accomplishing the project in time, as well as making sure no mistakes are made.
- Using the ROS topics, one can now read sensors and send the chair commands.
- A user can log in and all of the actions of the chair are stored so they can be analyzed later.
- Further research would allow this platform to expand into a user accessibility project, where devices are made to correspond to what the user needs while still allowing full movement of the chair using ROS.

Thanks to Don Cripps, Jolynne Berrett, and Cal Coopmans for the help for completing this project.