**Executive Summary**

When an individual experiences a catastrophic event that limits their mobility, they must learn to operate a wheelchair alongside dealing with the frustration that comes with losing their mobility. Specialized staff in disability centers are available to assist in their wheelchair learning process. Meetings with these staff can be frustrating to schedule, especially if there are no nearby disability centers for individuals to train.

Train and Go offers a more convenient solution by supporting a virtual training simulator with orientation tracking and obstacle detection. Train and Go communicates with a virtual reality headset that the user can use to navigate and learn wheelchair operation. To guarantee the connection to the VR headset is consistent, Train and Go incorporated specific distance constraints that were put to the test during prototyping. This use of VR is paired with an obstacle detection system that provides haptic feedback to ensure the user’s safety while operating the VR headset. This obstacle detection system exceeded initial accuracy requirements to maintain the safety that is of utmost importance for Train and Go. Train and Go is able to effectively train its users and increase their confidence while always remaining safe.

Effective training is accomplished by translating a wheelchair’s motion into VR inputs. The wheelchair’s motion is captured using an inertial measurement unit. That motion is then formatted and sent to a VR headset using a microcontroller with on-board Bluetooth. Train and Go also keeps its user safe by notifying them of eminent collisions with haptic feedback from a rumble motor. Train and Go’s object detection is implemented using ultrasonic sensors, which are controlled alongside the rumble motor using a separate microcontroller. The operation of these systems is visualized in Figure 1.

Diagram, schematic

Description automatically generated

Figure 1. Train and Go Overview

Train and Go’s main goal was and is to help people with disabilities by providing a safe environment to learn how to operate a power wheelchair. The success of Train and Go empowers its users to use the skills they develop in VR in the real world.