Rehabilitation Driving Simulator

Marissa Alvarez, Geoff Colman, Simon Wroblewski, Jackson Myers

Project Description

Conventional therapeutic simulators don’t provide motion feedback, and full motion feedback from commercial simulators can be too stressful for patients.

This project aims to develop a driving simulator capable of providing haptic feedback that can help rehabilitate drivers who have suffered from, e.g., a stroke..

The purpose of our software is to help manage the simulator hardware and the user sessions by launching user sessions, tracking user data (e.g. times, driving violations, and personal settings), and providing scenarios.

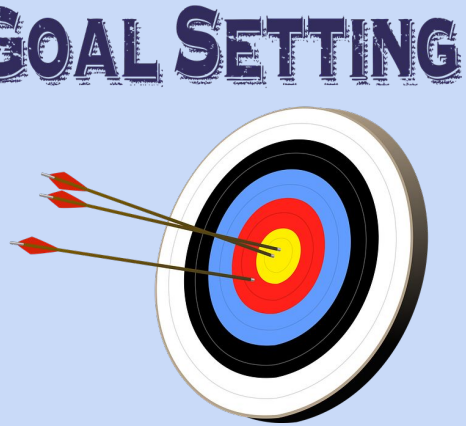
Project Goals

Prof. Smith (our customer) needs a research tool to aid long-term development of therapies and strategies:

- Prof. Smith and our team will run experiments on both injured and able-bodied participants, with and without haptic feedback.
- The customer wants to be able to demonstrate therapeutic effectiveness of the haptics in order to guide future treatment.

The goal of our software is to manage this research project:

- The scheduler client will act as an organizational tool for coordinating trials and handling data collected by our telemetry module.
- We will build training and evaluation scenarios for research purposes.



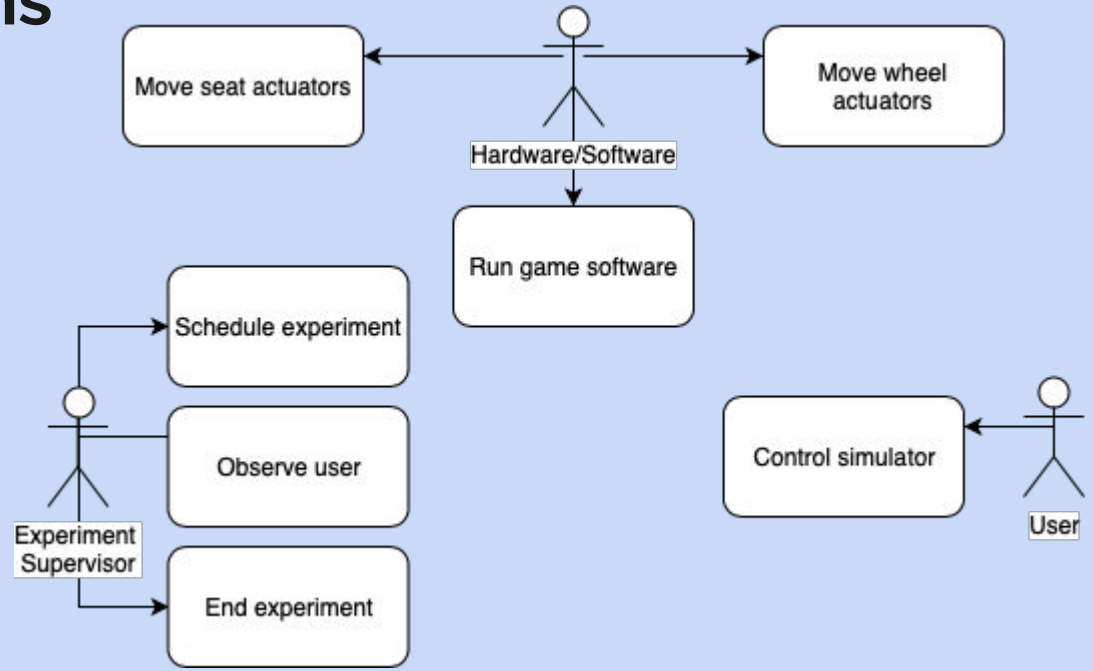
Project Justification

- The long-term goal of the project - aiding in the recovery of people with illness and injury - is for the greater good.
- Mastering the interaction of simulator hardware, controller firmware, and the existing simulator software.
    - We possess all the off-the-shelf software and hardware.
    - Writing relevant custom code blocks to fulfill our needs is within our skillset.
- Combining our programming skills with interpersonal skills.
    - Working with an outside customer and group.
    - Supervising research trials with volunteers.

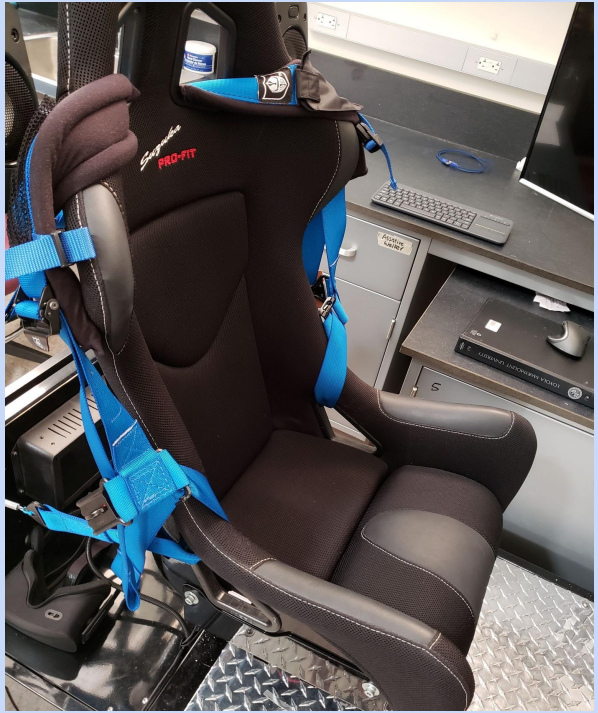
How It Works

- One or more team members will conduct a session with an individual.
- Our software will tailor the session experience to the individual via their user profile.
- Each session will consist of training (through track and open road driving) and test scenarios.
- Data will be collected during each session and analyzed afterward.
- Results of this data analysis will be used to determine driver’s progress.

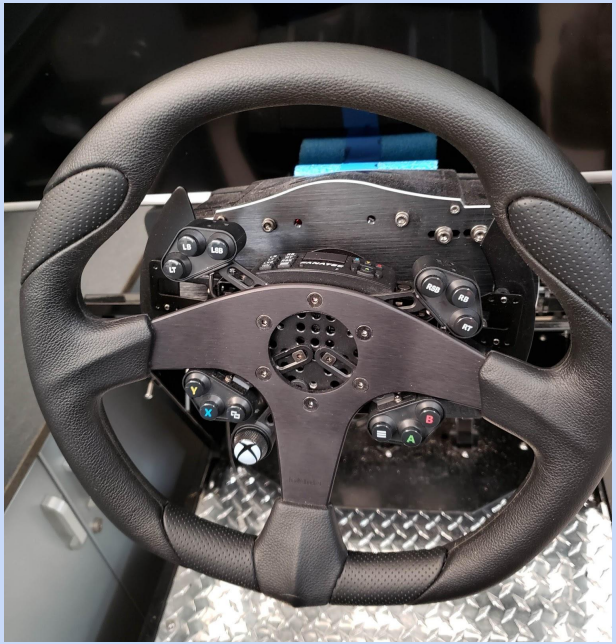
Use Case Diagrams

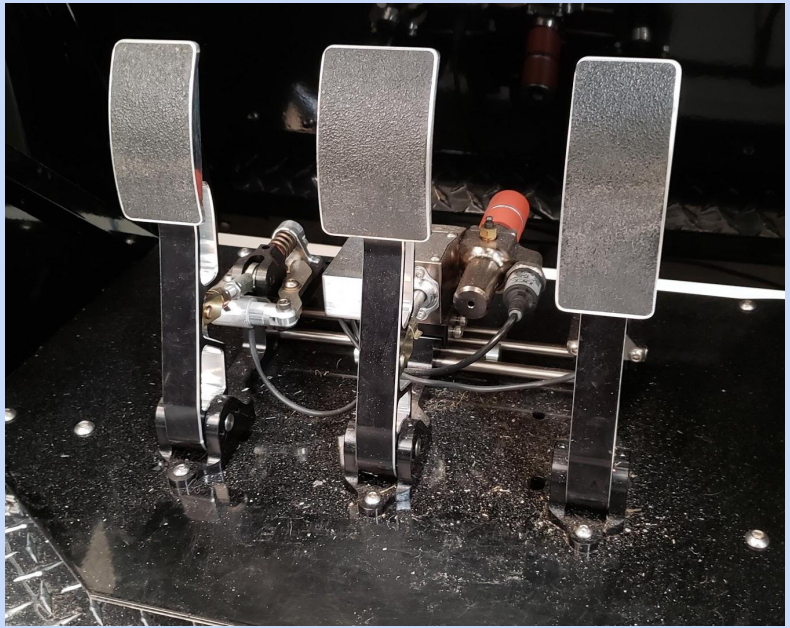


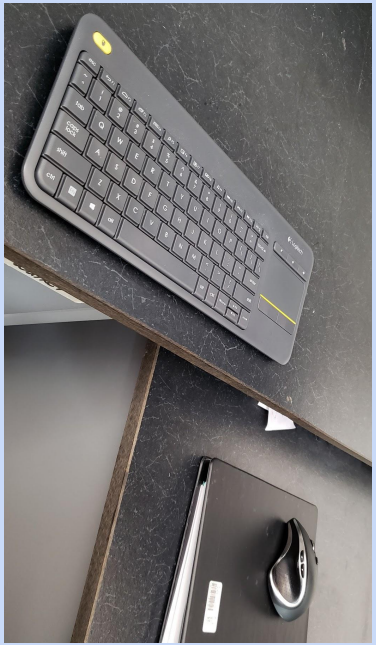
User Interface



User Interface, cont.'d

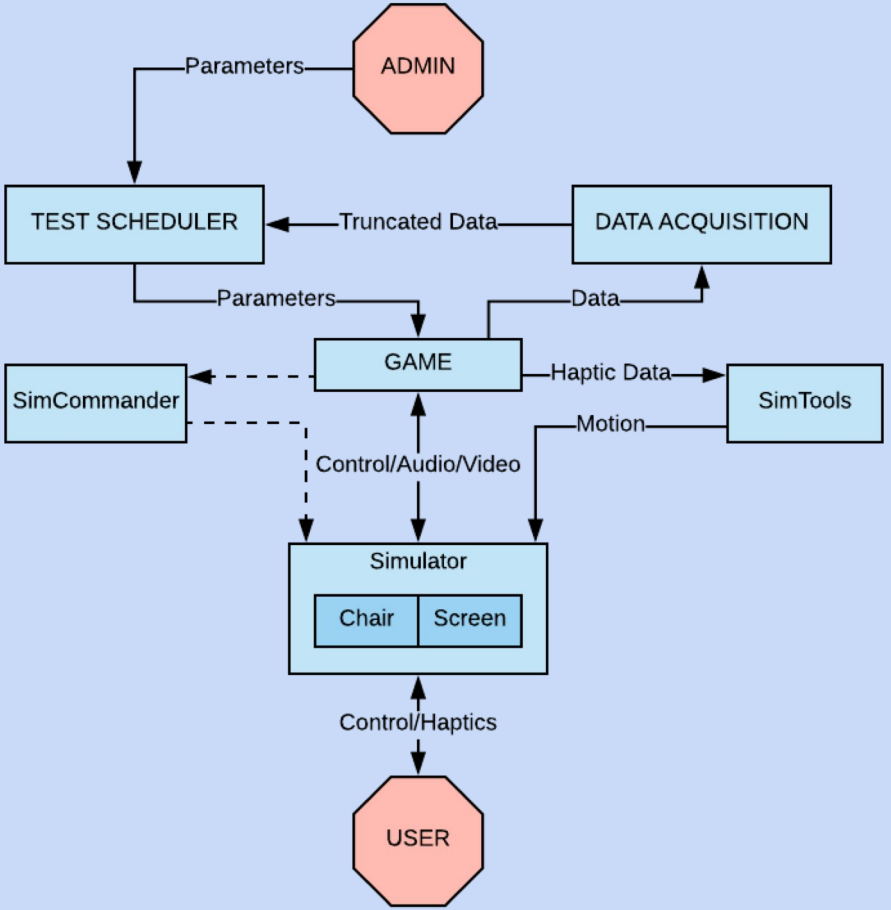




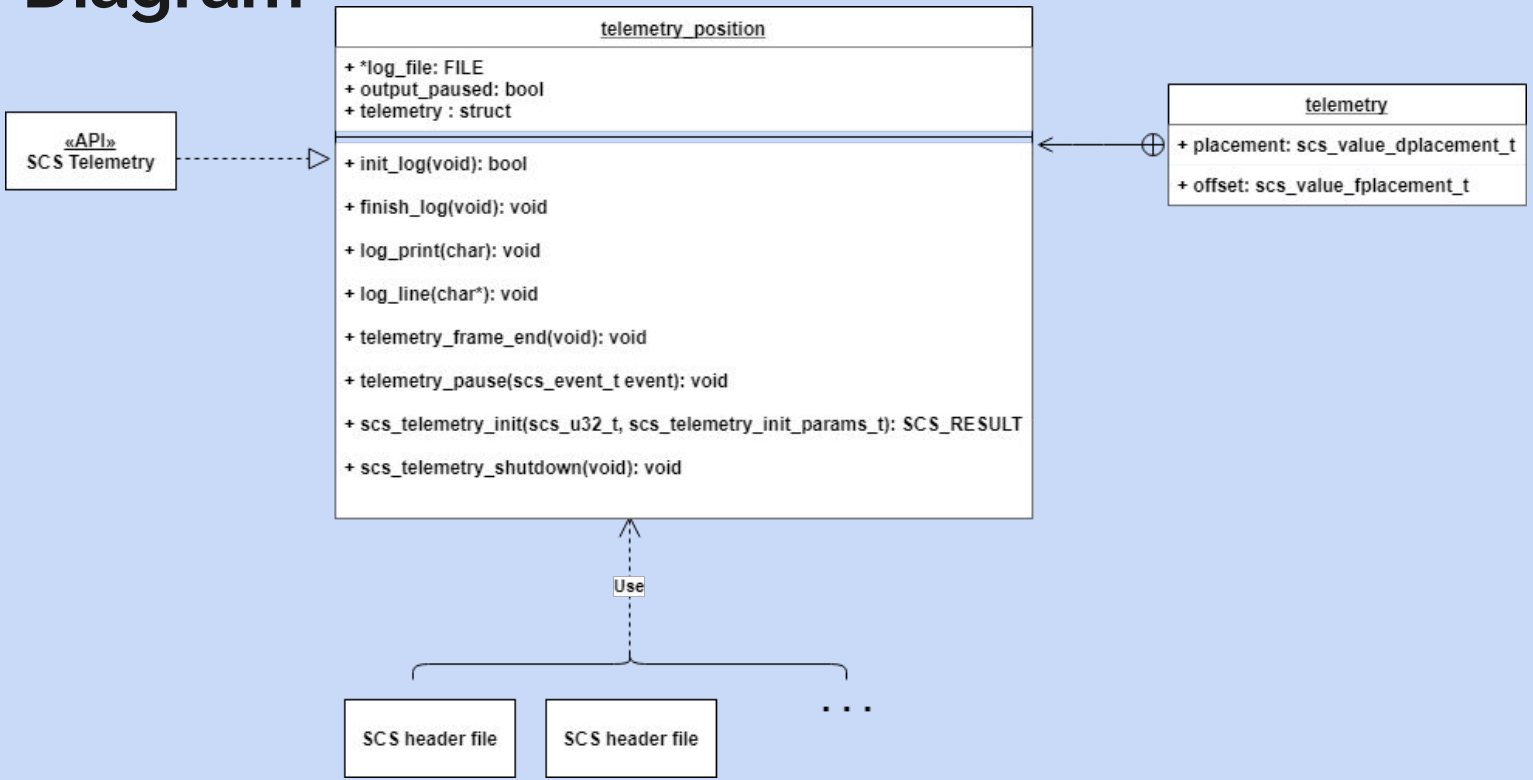


User Interface, cont.'d

Detailed Diagram



Detailed Diagram - Telemetry Class Diagram



Demonstration

Ask us if you would like to participate in next semesters’ experiments

Challenges

- Realizing we would not be working on open-source software
- Difficulty with development environment; ¾ team members unfamiliar with Windows
- Coordinating full-group meetings with Dr. Smith and Will Hohorst (Dr. Smith's grad student team leader)
- Mediocre documentation for some tools, APIs, and SDKs

Status Update

• Telemetry system is functioning nominally • Have been fine-tuning experiment protocol with Dr. Smith and his team. • Started running preliminary training experiments with members of our team using OTS software.	• Minor issue with pedal input not being recognized by Sim Commander telemetry system ○ Dr. Smith's team hasn't figured it out, and Geoff spent an hour trying to figure it out week before last • Difficulty in testing telemetry DLL that can only operate within the top-level software by calling telemetry API.
• Need to work on fine-tuning it in order to build a template for "ideal" map	• Might need assistance from hardware and software vendor regarding the pedal issue

THANK YOU!

Questions

?

??

?⁇