

# Autonomous Driver Test (ADS) Interface

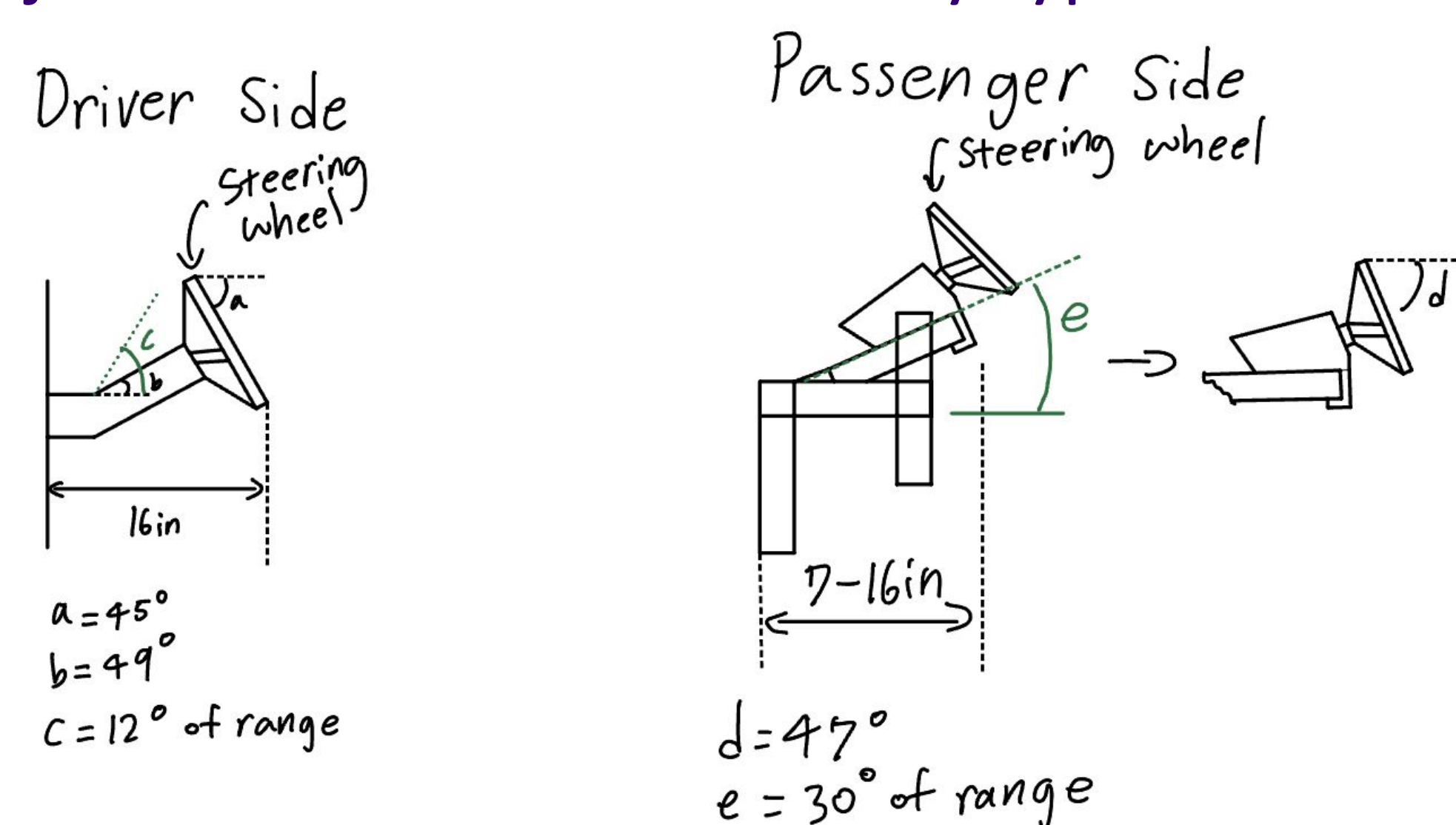


## PROBLEM STATEMENT

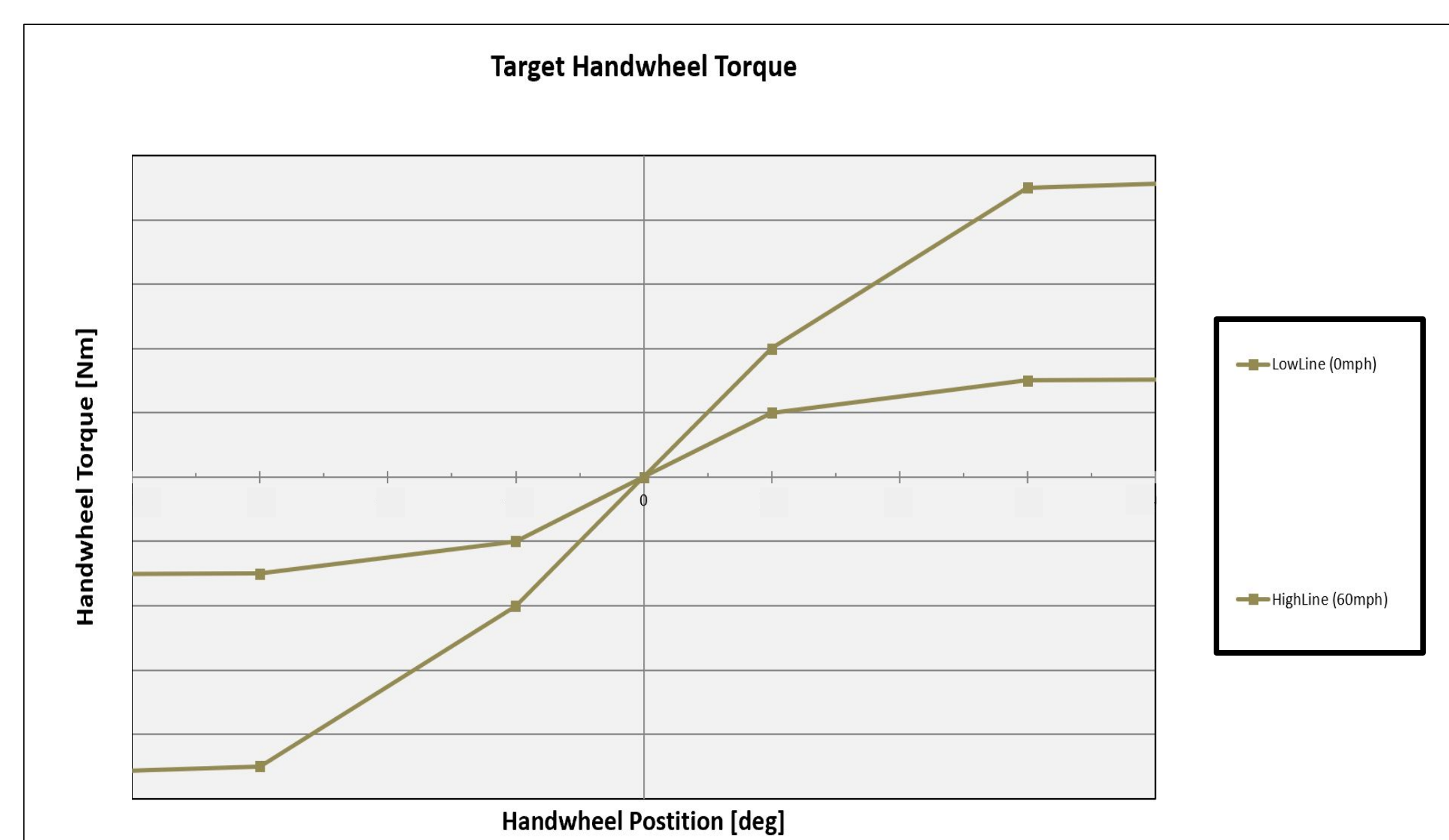
Our project aims to create a mechanical interface that simulates autonomous control software signals through a drive by wire control system with force feedback in the passenger side of a PACCAR test truck. This replicates the driving experience of a mechanically linked control system.

## REQUIREMENTS

- Durable and reliable to minimize repairs
- Installable in under 5 hours
- Installable and adaptable between Kenworth and Peterbilt trucks
- Similar user experience to driving a standard truck
- Adjustable to fit different body types

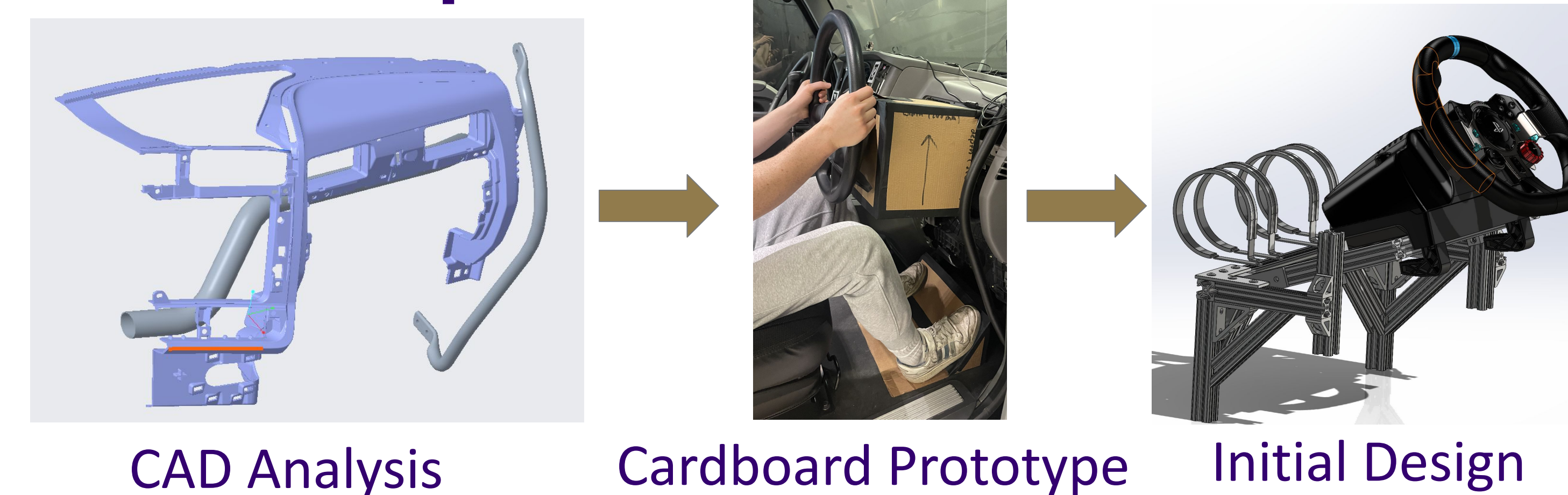


- Force feedback accurately recreates steering torque



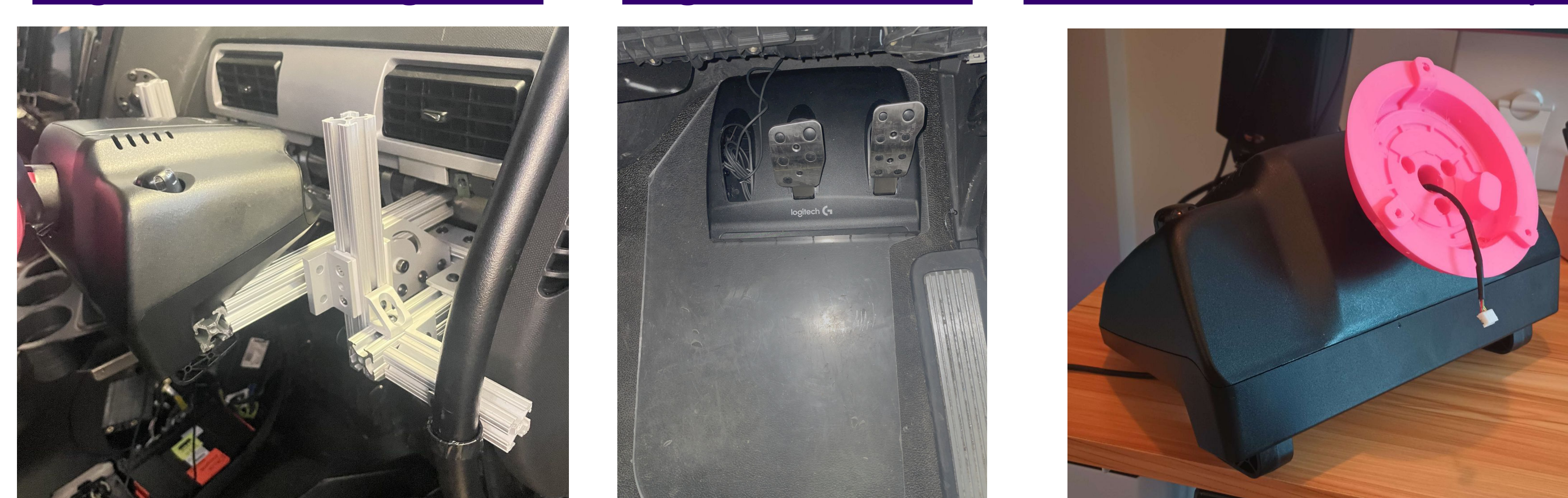
## DESIGN AND DEVELOPMENT

### Initial Development



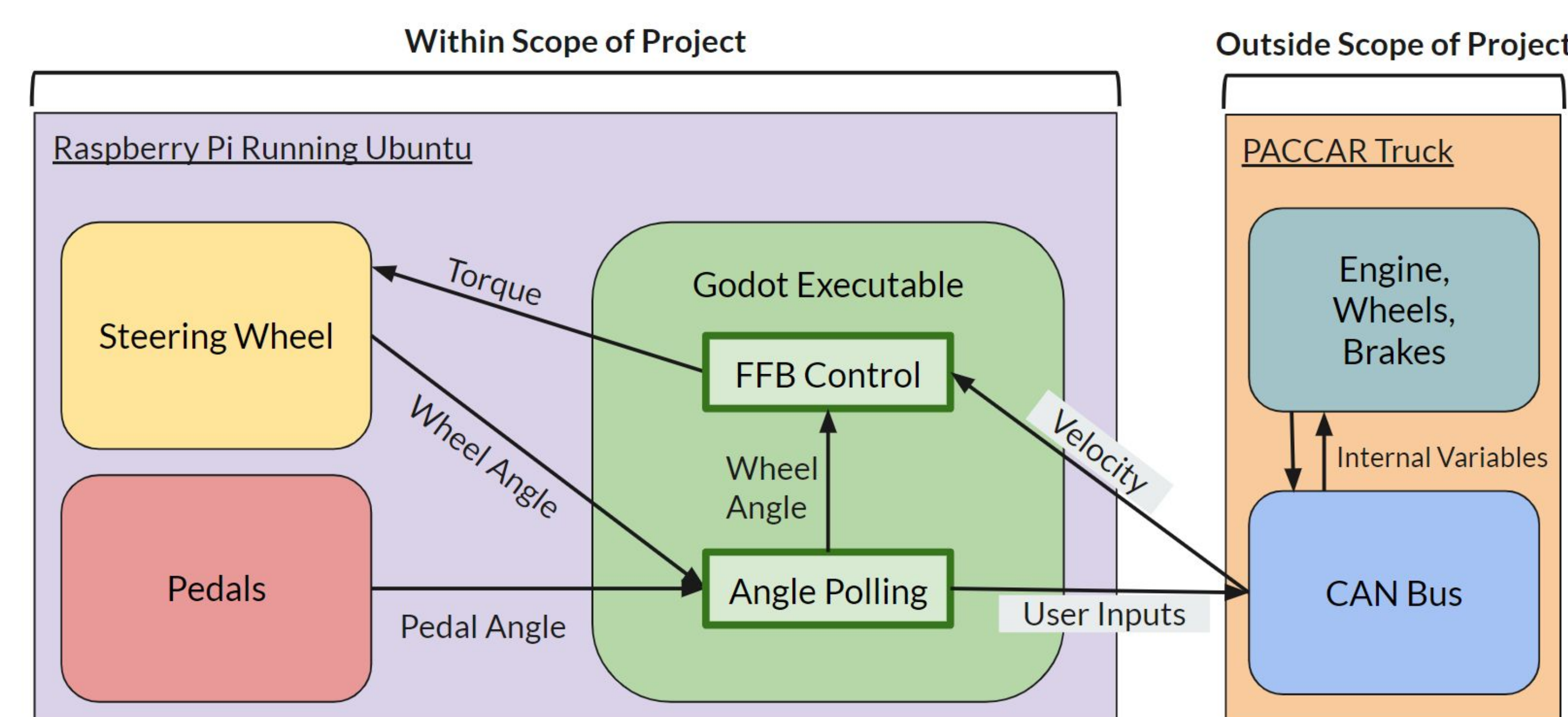
### Mechanical Design

- Ensured similar functionality to the driver side controls using:



- Each subsystem design was iterated upon to best replicate an accurate truck driving experience based on user feedback

### Software Design



- Godot Executable processes user inputs, generates force feedback for the steering wheel.

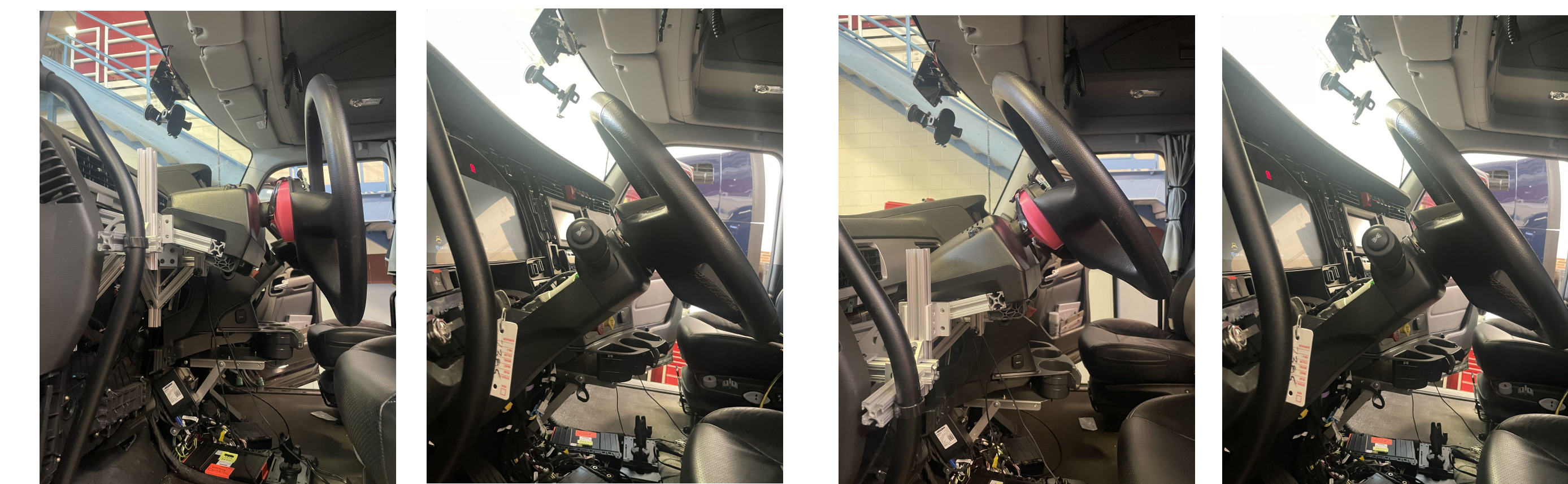
## VERIFICATION AND VALIDATION

### User Testing

- Conducted user study of 8 CDL holders with varying levels of driving experience
- Round 1: Hardware design ergonomics and force feedback performance
- Round 2: Force feedback performance improvements



User testing of driver interface.



Lowest Tilt  
Same tilt angle achieved as standard driving controls.  
Highest Tilt

## FINAL DESIGN

### Next Steps

- Establishing connection between our Godot Executable and PACCAR's CAN bus to allow for drive by wire.
- Further development of executable to allow it to run automatically on a Raspberry Pi.



**SPECIAL THANKS TO ELI PATTEN, JACOB RUDGE, AND MATT FITZPATRICK FOR THEIR SUPPORT ON THIS PROJECT!**

**Mechanical Engineering Capstone Exposition**  
May 29<sup>th</sup> 2024, Husky Union Building, University of Washington, Seattle