Autonomous Driver Test (ADS) Interface

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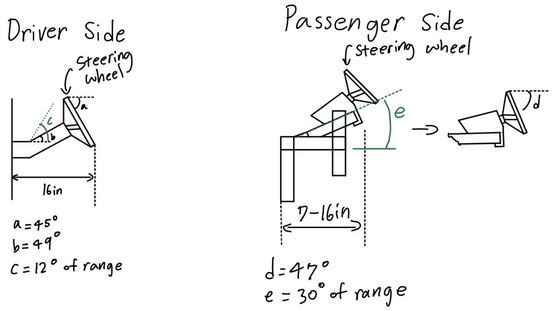
PROBLEM STATEMENT

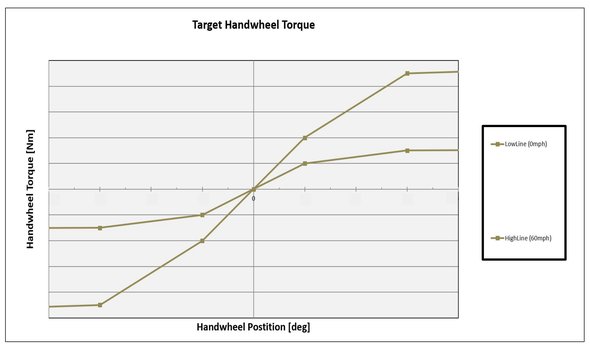
Our project aims to create a mechanical interface that simulates autonomous control software signals through a drive by wire control system with force feedback in the passenger side of a PACCAR test truck. This replicates the driving experience of a mechanically linked control system.

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

CAD Analysis — Cardboard Prototype — Initial Design

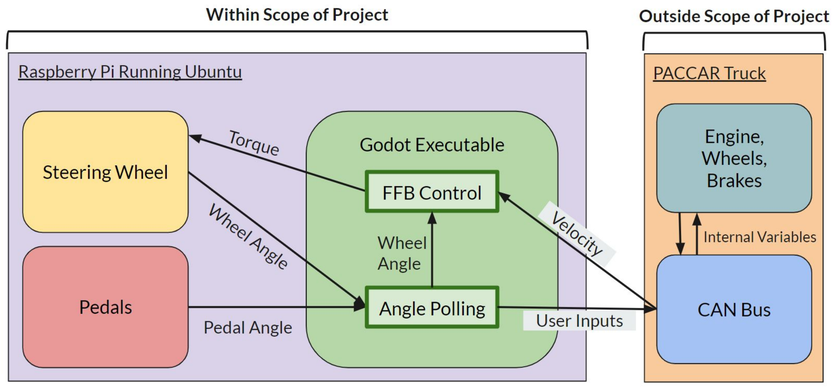
Mechanical Design

- Ensured similar functionality to the driver side controls using:

Logitech Steering Base | Logitech Pedals | 3D Printed Wheel Adapter

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

Software Design

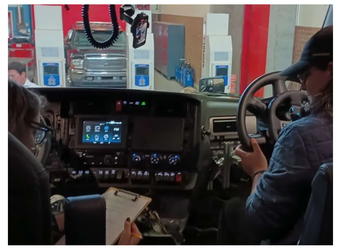


- Godot Executable processes user inputs, generates force feedback for the steering wheel.

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.

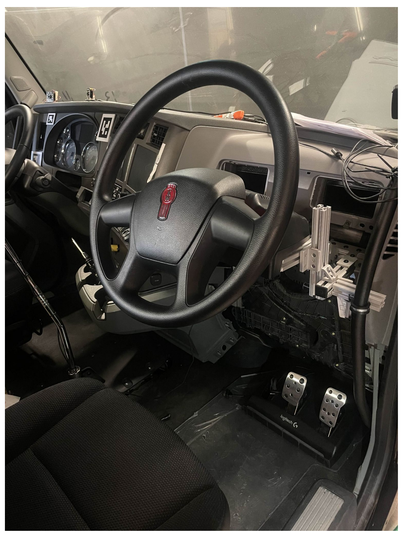
Lowest Tilt — Highest Tilt

Same tilt angle achieved as standard driving controls.

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 29th 2024, Husky Union Building, University of Washington, Seattle

MECHANICAL ENGINEERING
UNIVERSITY of WASHINGTON