MICHIGAN STATE UNIVERSITY

Alpha Presentation

Hardware in the Loop (HIL) Vehicle Simulator

The Capstone Experience

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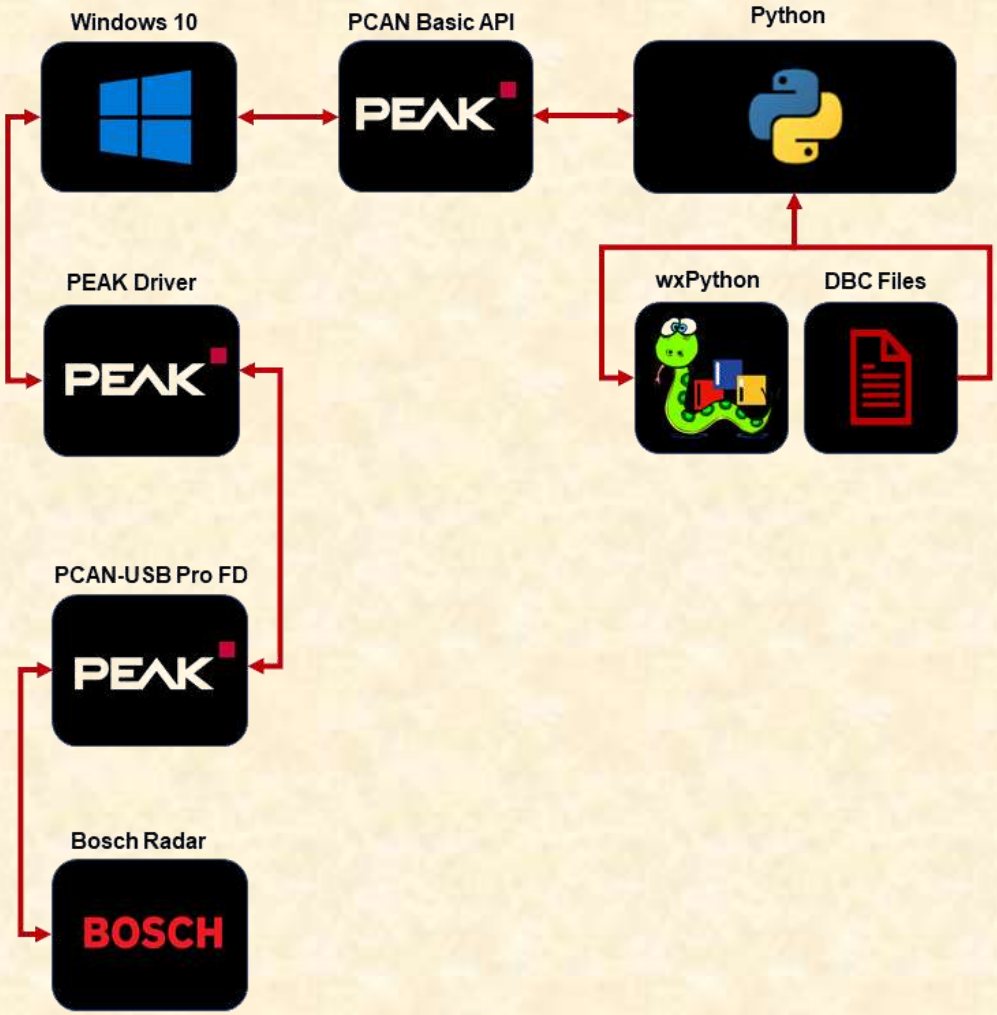
From Students…

…to Professionals

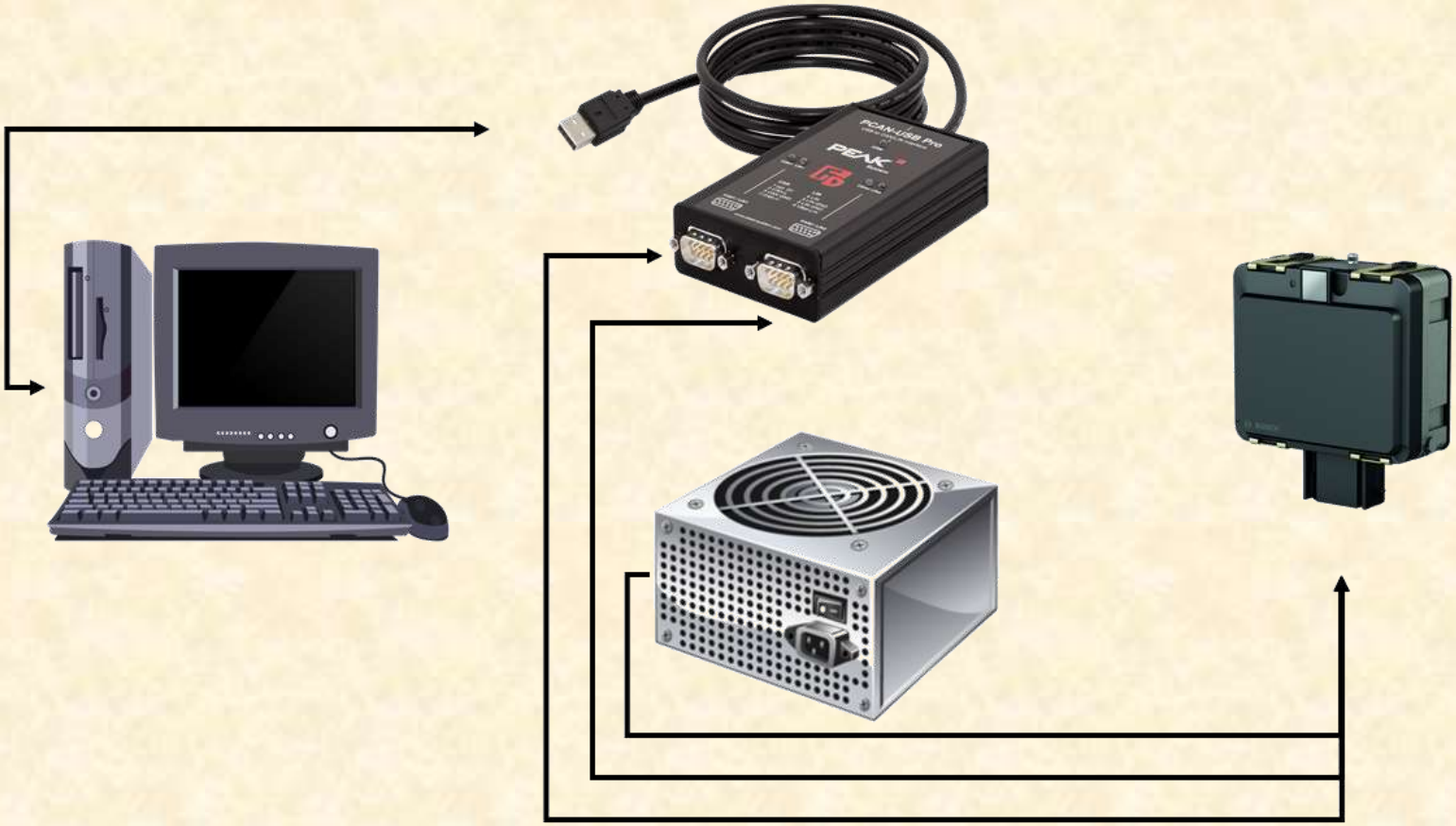
Project Overview

- Windows 10 application that will simulate a vehicle's CAN Bus by using a HIL system.
- Current hardware is too expensive and not available to all of Bosch's engineers at once.
- Simulates vehicle functions such as acceleration, steering, braking, gear changing, cruise control, and more.
- Ability to simulate different variations of vehicles that is configurable by the user.

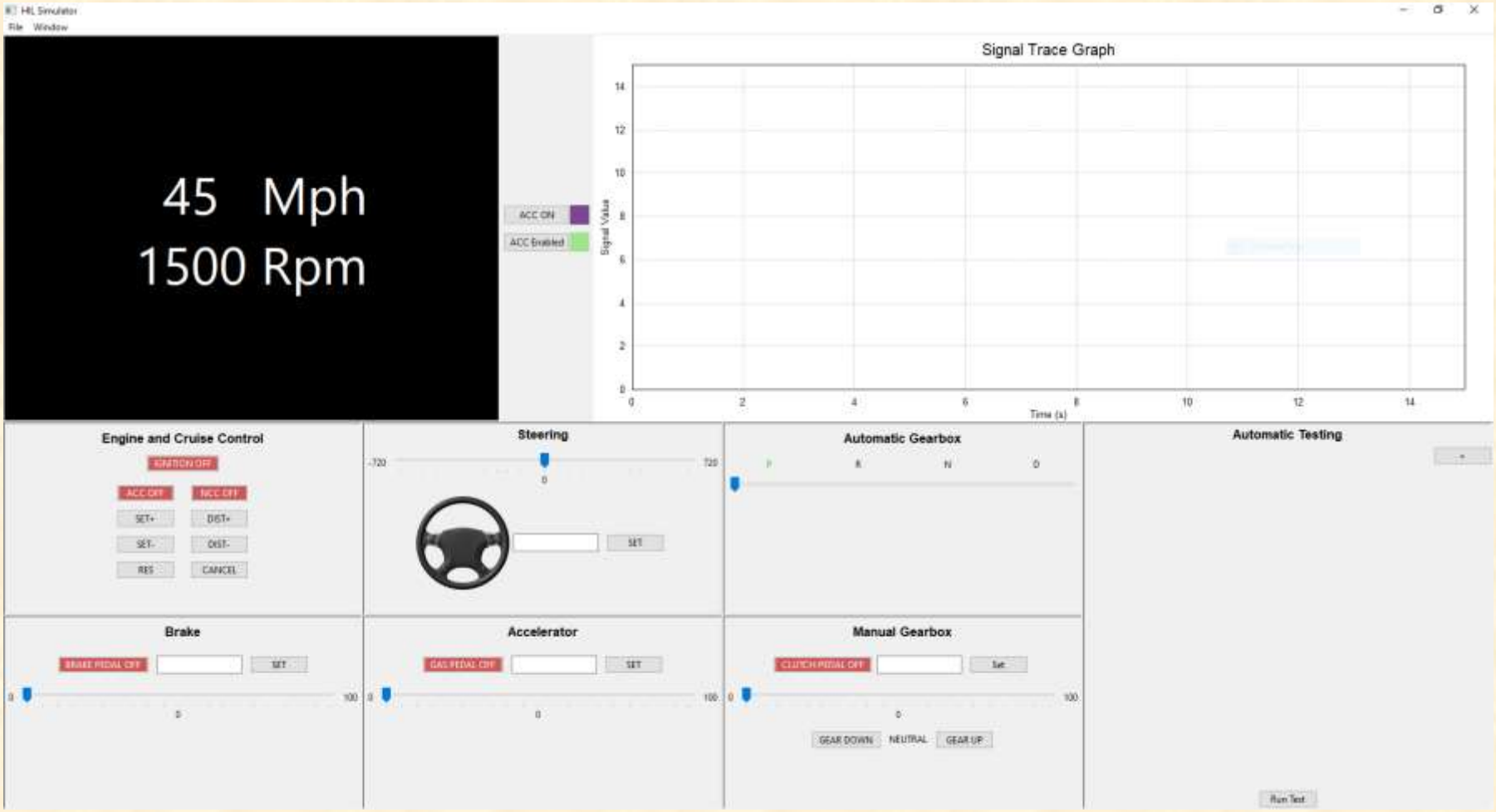
System Architecture



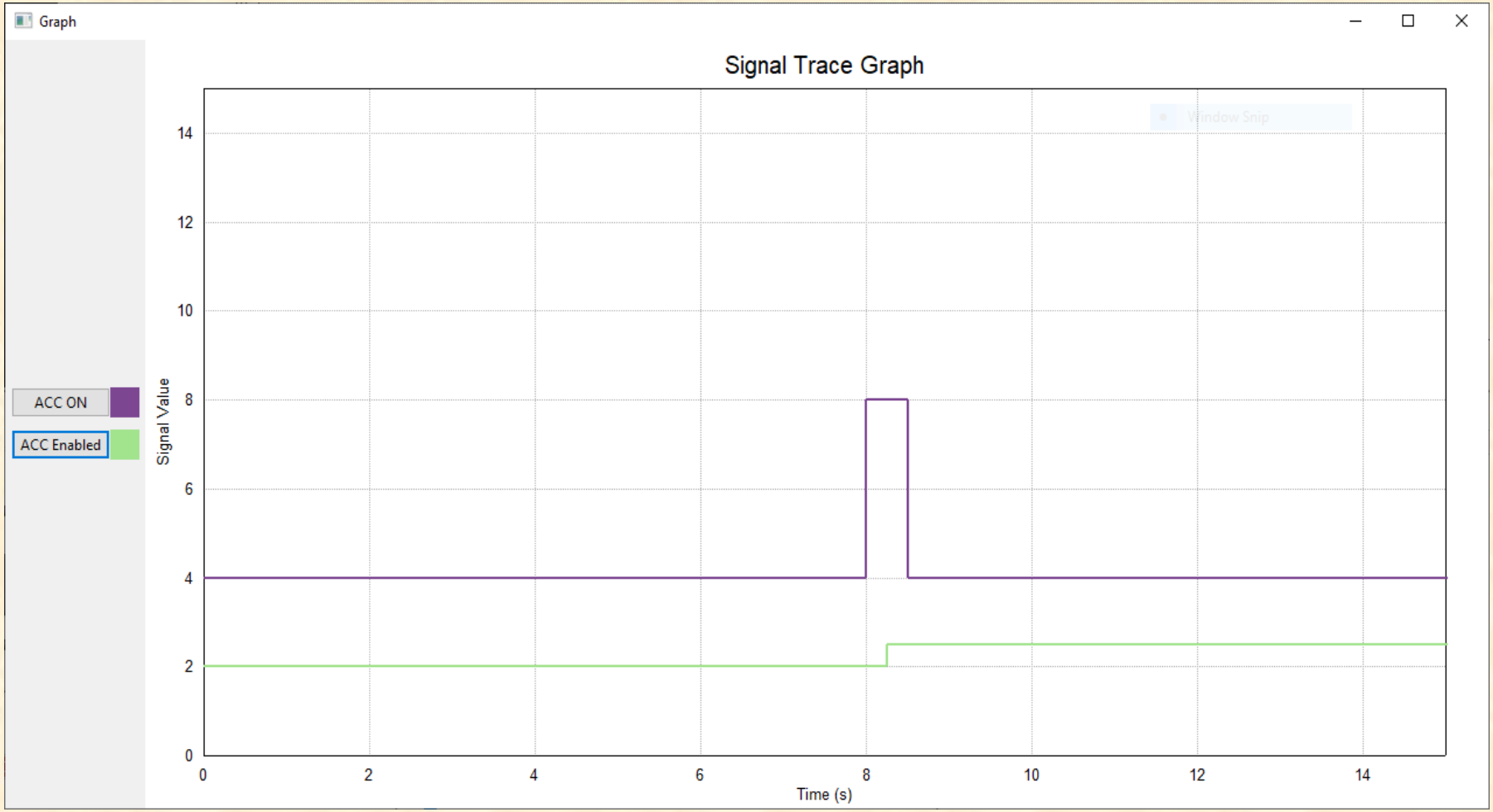
Hardware in the Loop Diagram



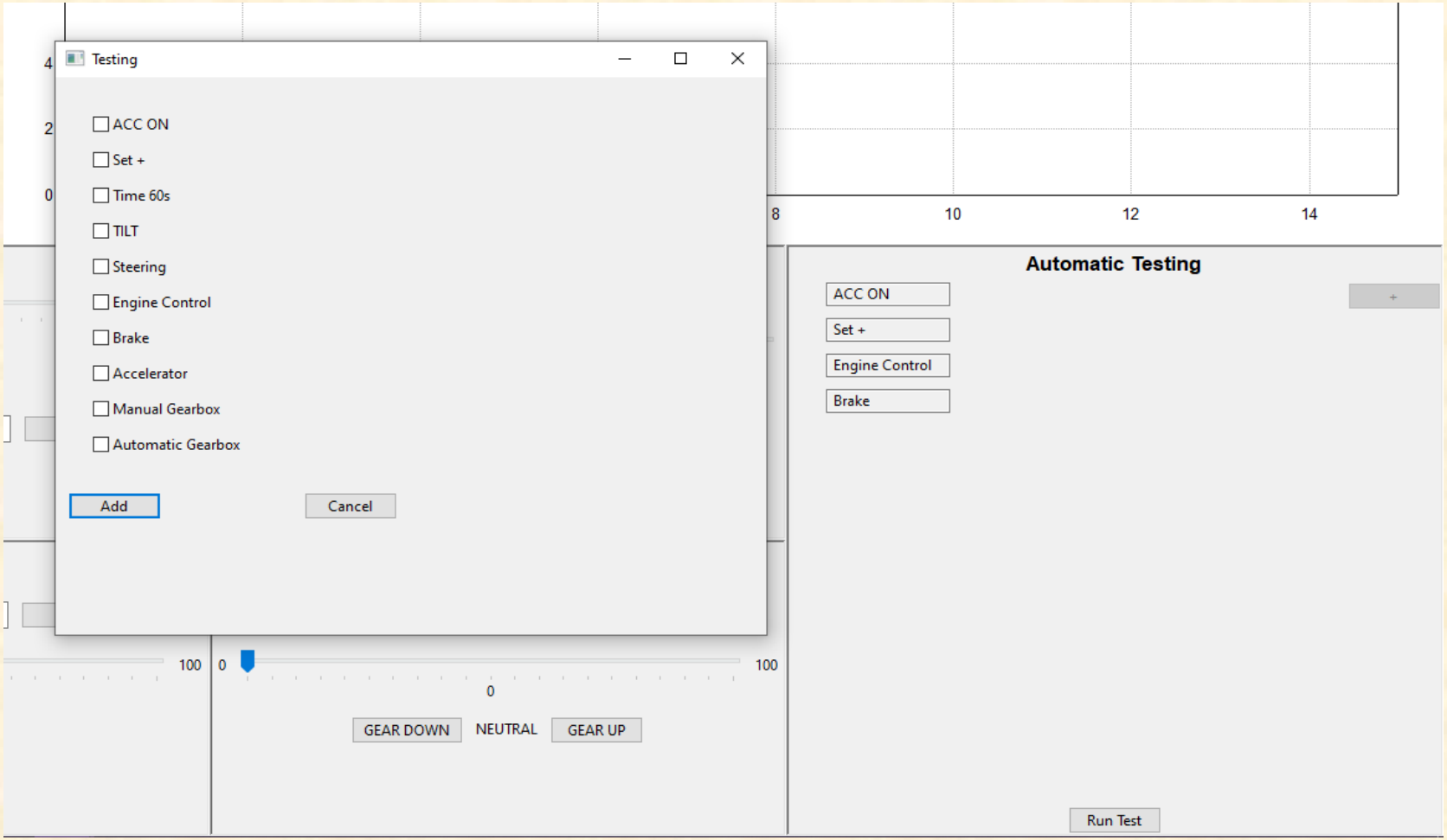
Main Frame


HIL Simulator
File Window
45 Mph
1500 Rpm
ACC ON
ACC Enabled
Signal Trace Graph
Signal Value
Time (s)
Engine and Cruise Control
IGNITION OFF
ACC OFF
NCC OFF
SET+
DIST+
SET-
DIST-
RES
CANCEL
Steering
-720
720
SET
Automatic Gearbox
P
R
N
D
Automatic Testing
Brake
BRAKE PEDAL OFF
SET
Accelerator
GAS PEDAL OFF
SET
Manual Gearbox
CLUTCH PEDAL OFF
Set
GEAR DOWN
NEUTRAL
GEAR UP
Run Test

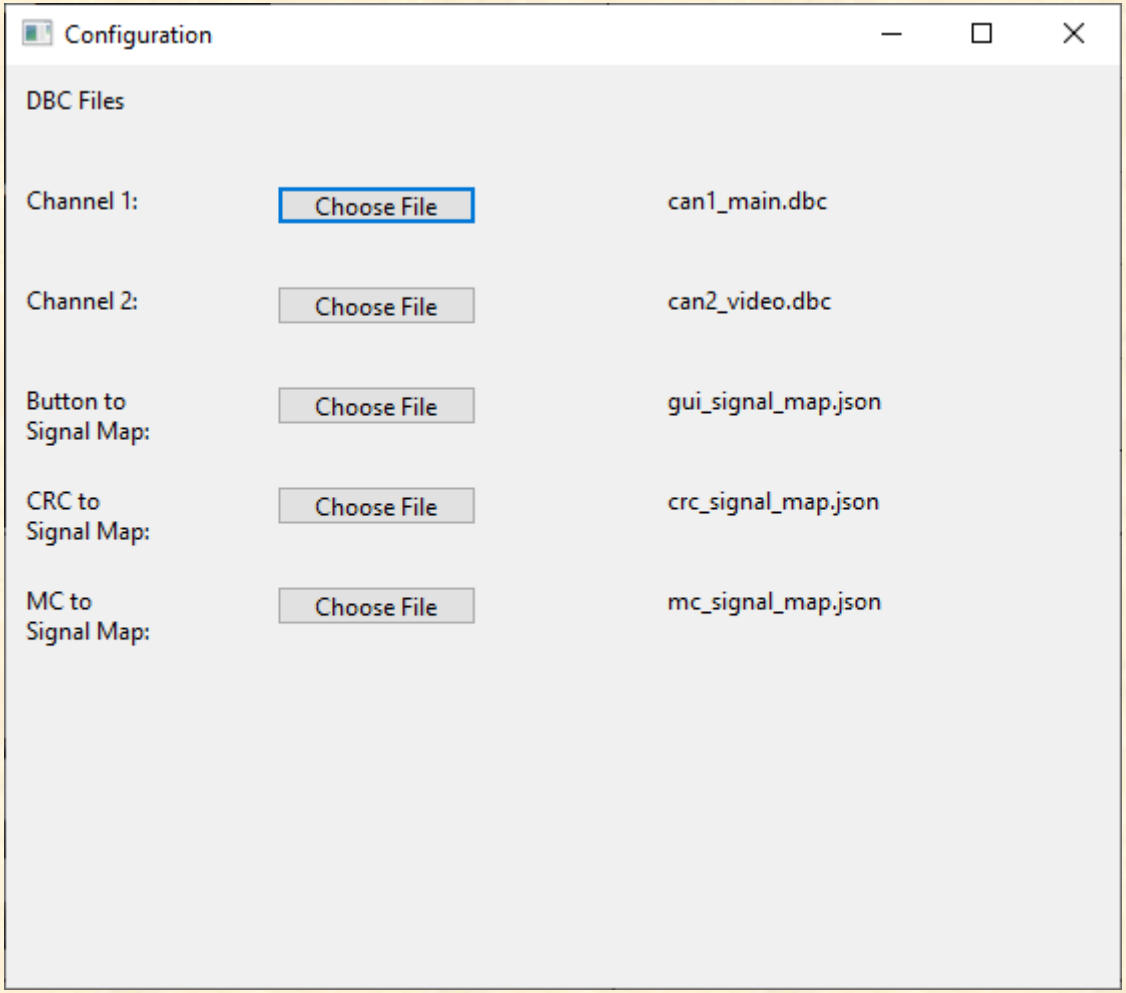
Graph Frame


Graph
Signal Trace Graph
ACC ON
ACC Enabled
Signal Value
Time (s)
0
2
4
6
8
10
12
14

Automatic Testing Frame



Configuration Frame



What's left to do?

- Have the GUI update in real time with the relative signal values.
- Have the graph update in real time with the relative signal values.
- Implement the automated testing section.
- Implement the master signal list section.
- Implement the configuration section to edit JSON files.

Questions?