LAFAYETTE
ELECTRICAL & COMPUTER ENGINEERING

Formula Electric Vehicle

ECE 492- Spring 2017
Tractive System Interface

Project Website:
sites.lafayette.edu/ece492-sp17

Engineers:
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Overview

The overall goal of the Tractive System Interface is to safely connect high voltage from the packs to the motor controller.

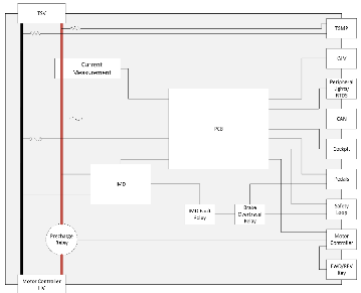

Fig. 1: Simplified system block diagram

TSI Board

All logical control of the TSI subsystem was processed by the PCB. This included monitoring of throttle, brake, and driver input, to determine appropriate drive state and action. The board is capable of interfacing with VSCADA to send observed data, as well as the reception and transmission of remote throttle control to the motor controller. Additionally, various status lights and signals are controlled by the board.

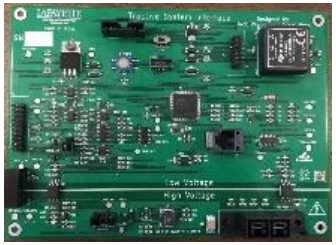

Fig. 4: Fully populated TSI board

Functionality

The system was designed to facilitate a number of other functions based upon rules described by FSAE.

This included:

- Throttle Plausibility
- Brake Interface
- Voltage Measurement
- Current Measurement
- Motor Controller Interface
- Drive State
- Insulation Monitoring Device (IMD)

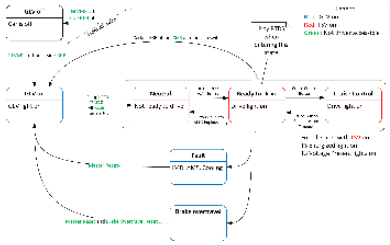

Fig. 2: Detailed shutdown conditions and states of the car.

Testing and Integration

Testing of the TSI subsystem largely revolved around functionality of the board. At the completion of this semester, many of the designed abilities of the board remain unimplemented. As the semester progressed, efforts were directed towards drive-critical components of the subsystem, so that a functional car could be realized.

Figure 5 (left) shows the test panel that was built to test the subsystem's driver interface prior to integration. This was able to simulate the two throttle potentiometers, allowing for throttle plausibility checks, as well as brake press and over-travel. These signals were used to confirm drive state operability.

Figure 6 (right) is the fully integrated subsystem mounted on the car. Here you can see the high voltage connections entering and leaving the enclosure, as well as the motor controller connections.

Fig. 5: Test panel of driver interface

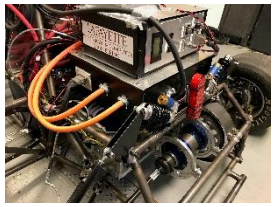

Fig. 6: TSI integrated into car

Enclosure

The TSI Enclosure was designed to neatly house all systems needed to safely operate the vehicle. Electric insulation was needed to protect the parts from the metal walls. Panels were fabricated separately to allow for adaptability if new ports were needed.

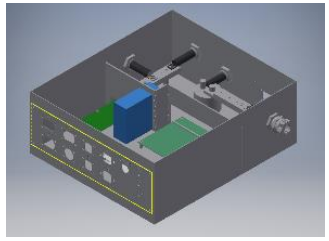

Fig. 3: Assembled Inventor file of TSI enclosure

The Team

The Tractive System Interface consisted of somewhat working components, and hardly working team members, fueled mainly with the promise of breakfast pastries and low priced beers at the local tavern.

Acknowledgements

A special thank you to Marv Snyder, Robert Layng, and Adam Smith for helping build our many components. Also thank you to the entire Mechanical Engineering team.