LFEV - High Level Simplified Block Diagram

Work Breakdown Structure

- WBS
- Schedule
- PSL
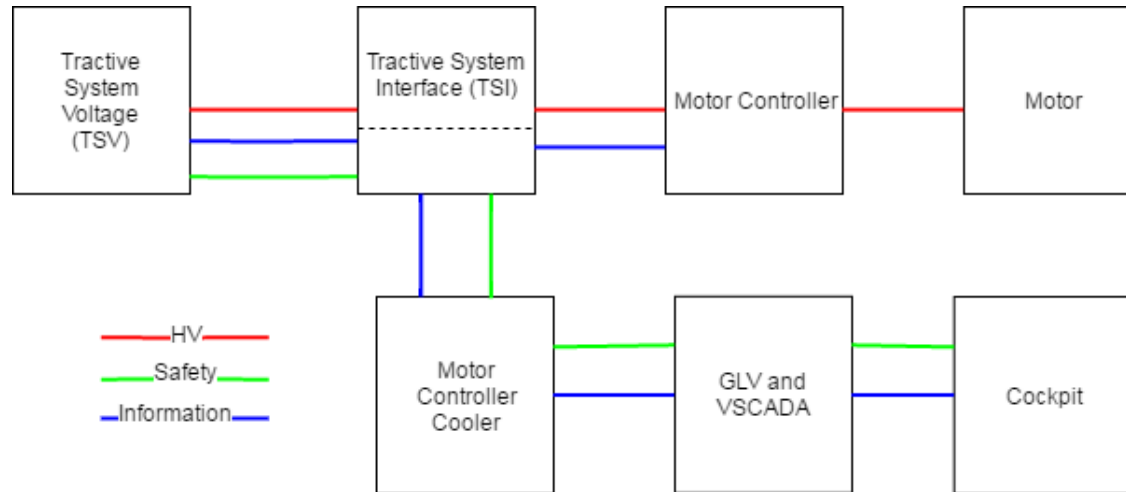
Interconnect / Cabling

- Complete Interconnection of all car subsystems
- Identifying and acquiring/purchasing all required parts for complete integration
- Assembling each cable based on schematic and subsystem specifications
- Cable Testing
- Cable Labeling
- Cable Reworking based on System Diagram Updates
- Acceptance Test Plan Wire Documentation

Interconnect / Cabling

- Wires - gauge based on voltage and current
- Connectors
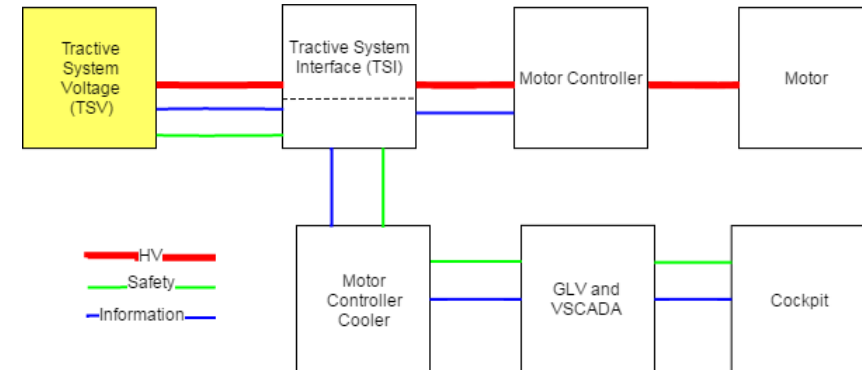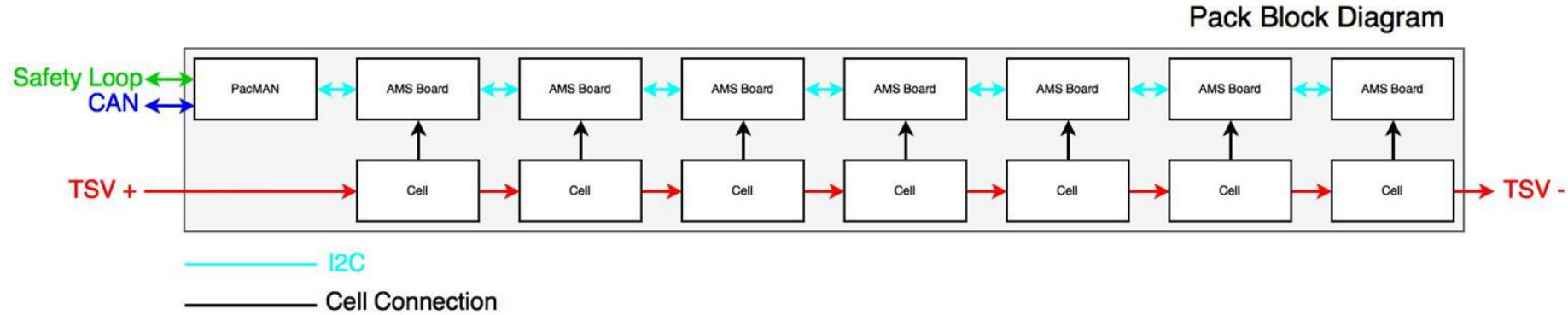   - Deutsch DT Series
   - ITT Cannon PowerLock

PowerLock

DT Series

Tractive System Voltage [TSV]
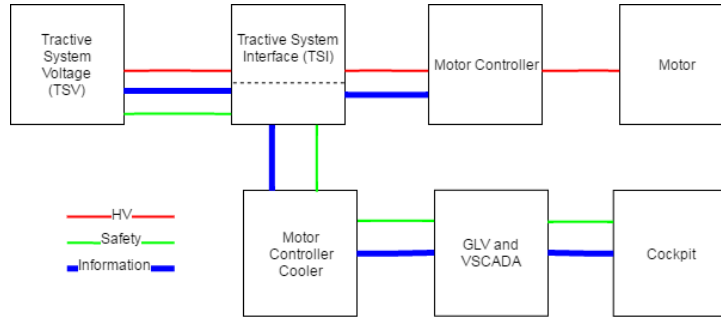

Pack Block Diagram

Tractive System Voltage [TSV]

- Produced 3 Additional TSV Accumulator Packs
  - Maintained the existing TSV Accumulator Pack
  - Recommended slight modifications to PacMAN
- Tested integration of accumulator, dynamometer, GLV, and basic SCADA (up to 160A)
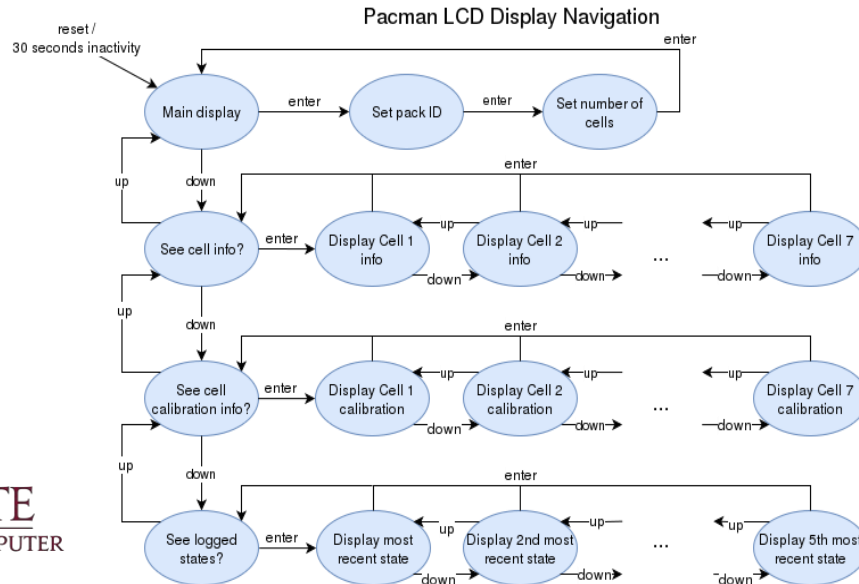- Comprehensive Documentation of TSV Subsystem
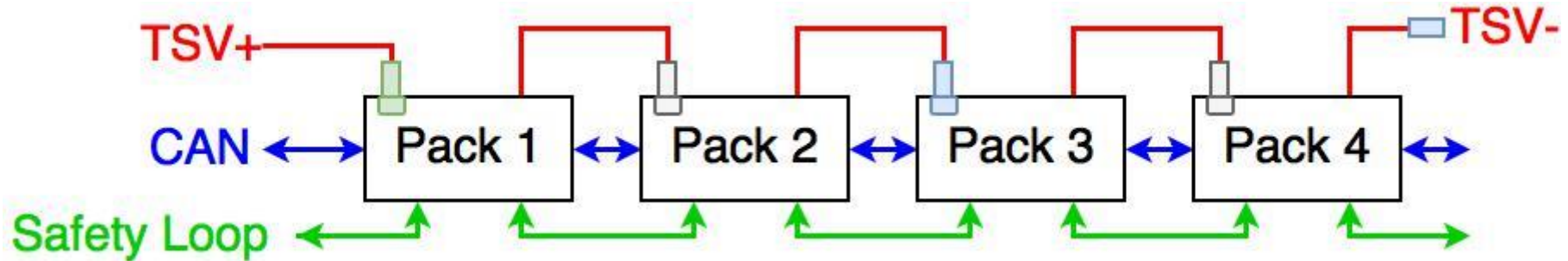
Systems Engineering
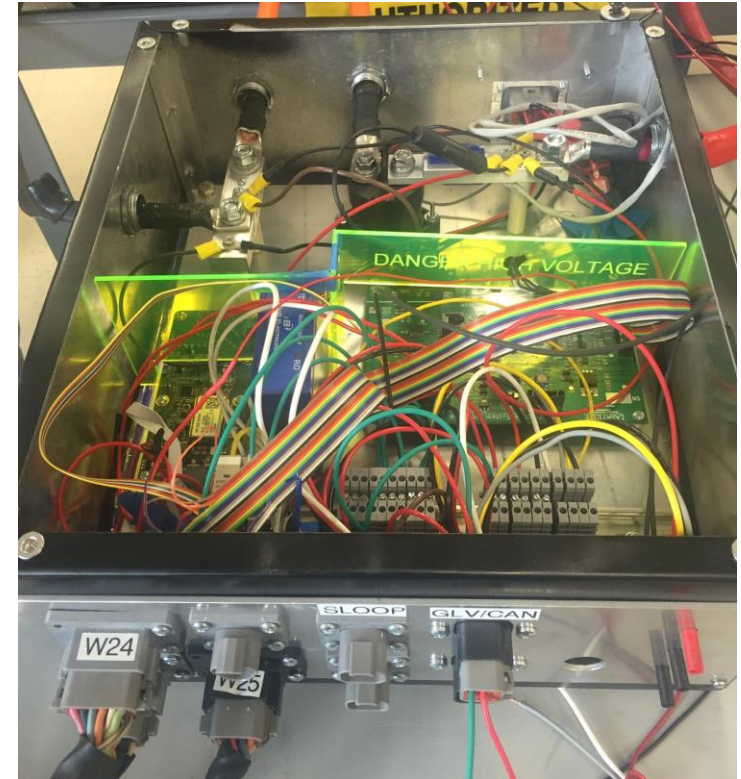

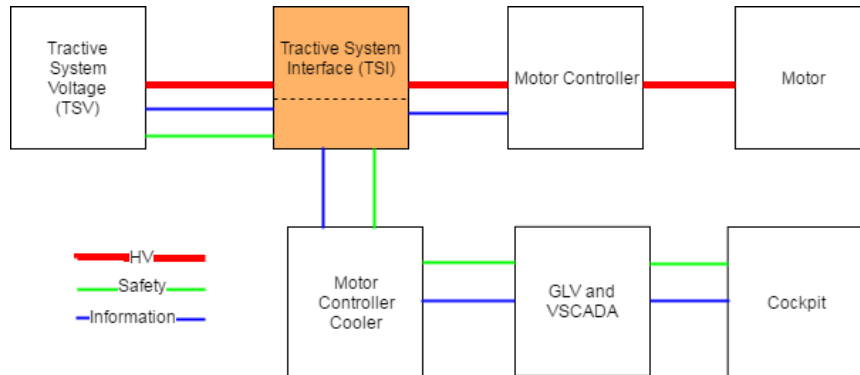
Flow of information throughout the car on the CAN bus

Revamped Pacman control panel and display

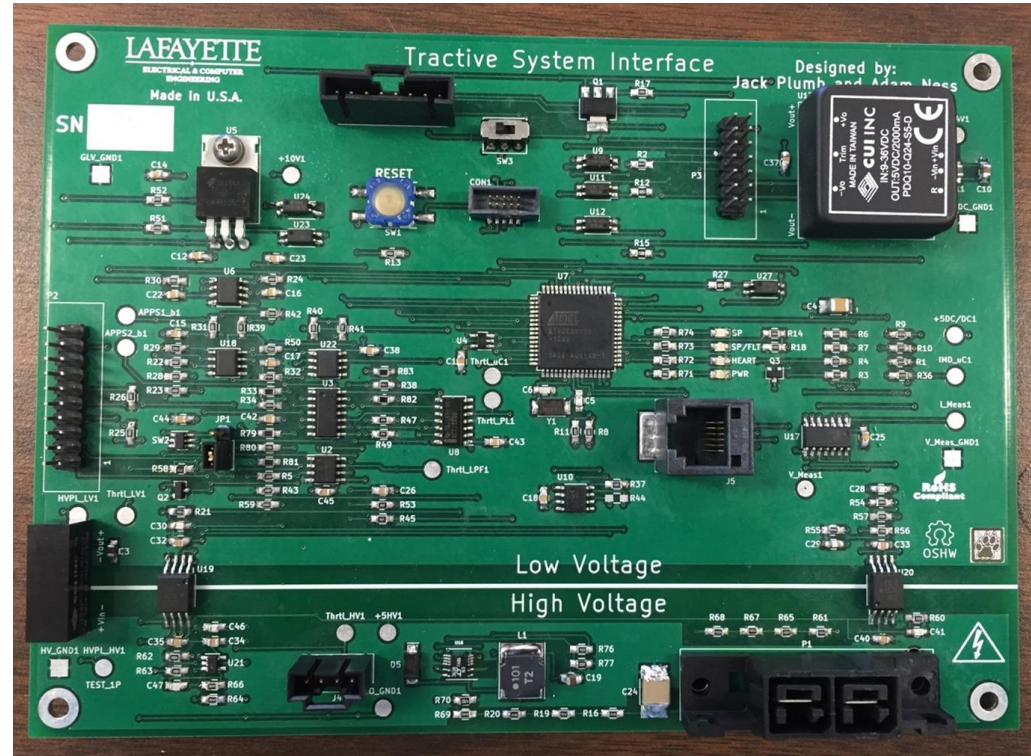# Tractive System Interface [TSI]

- PCB Schematic Design
- PCB Layout
- Box Integration and Wiring

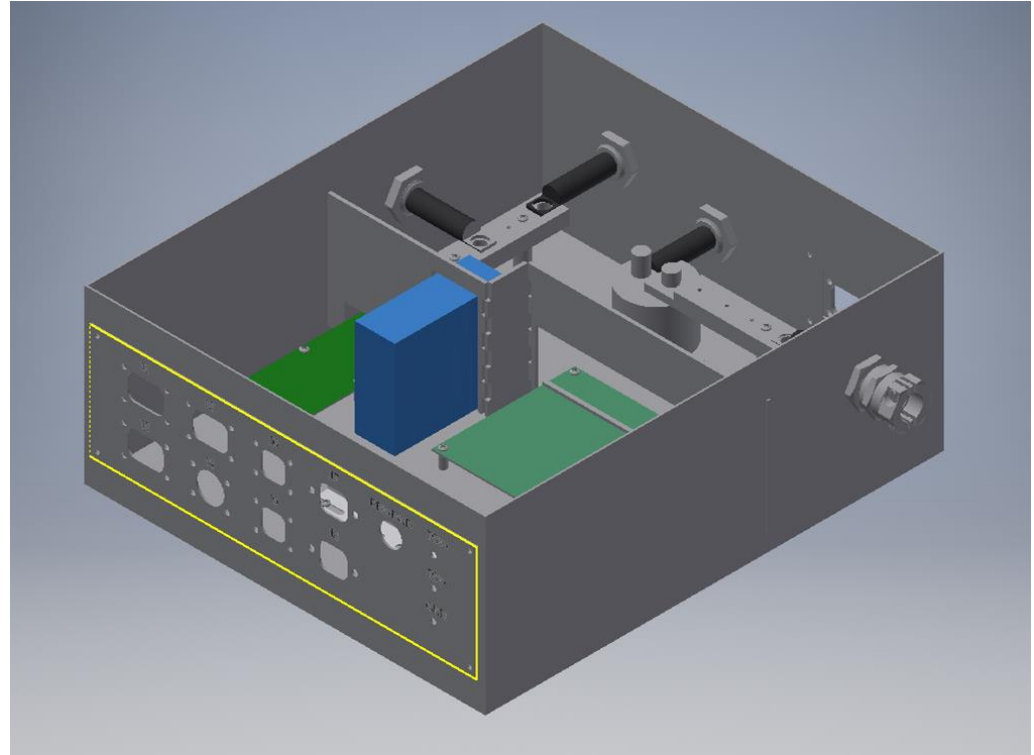# Tractive System Interface [TSI]

- PCB Schematic Design
  - Throttle Plausibility
- PCB Layout
- PCB Build and Debug
- Firmware

Tractive System Interface [TSI]

- Inventor Box Layout
- IMD Integration
- HV Bars

Dynamometer

- Ran tests required for other teams
- Fixed communication to the power supply to be able to control power supply and obtain current Amperage and Voltage
- Expanded upon the existing code base to add new functionality and added new calculation parameters
- Assisted other teams in integrating their subsystems into the Dyno system.
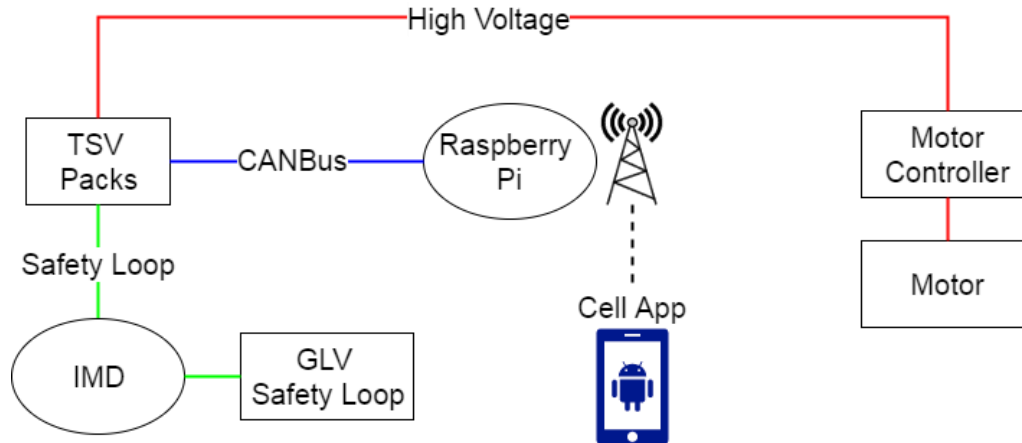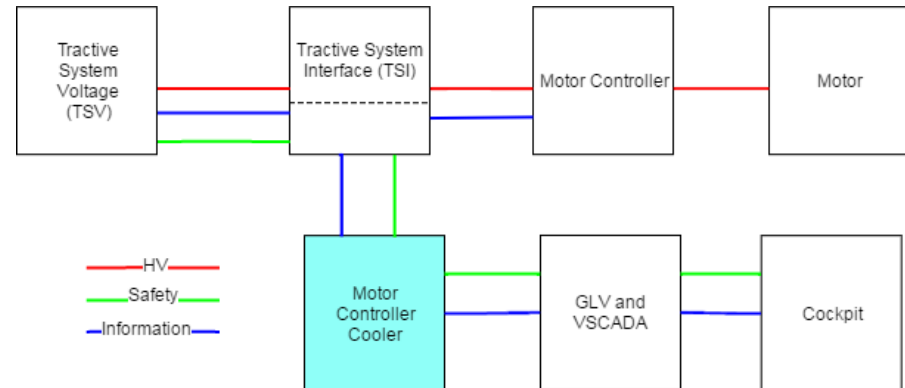
Controller Cooling

Software Design of Cooling Controller

- Sensors integration
- Mode selection
    - Auto - change temp threshold in run-time
    - Manual - change speed % in run-time
- LCD interface
- CAN communication
- 24V Safety-Loop relay control
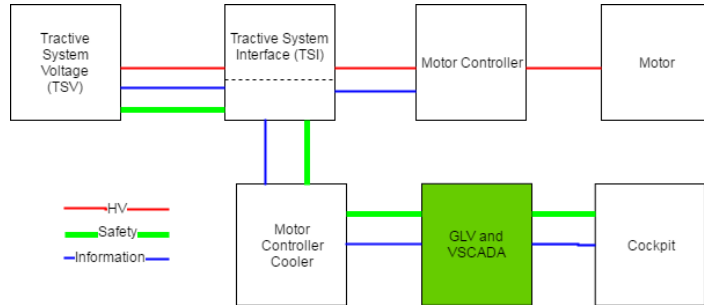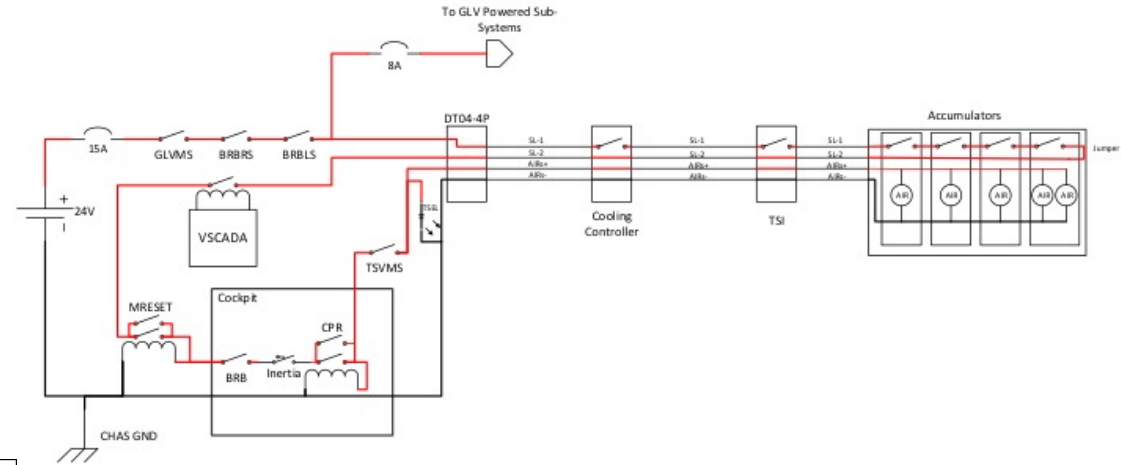
Controller Cooling

- Design and Build the box of cooling controller
  - Mounting of arduino board, circuit board, connector panels, etc.
- Preliminary documentation
  - Drawing of Mounting
  - Block diagram
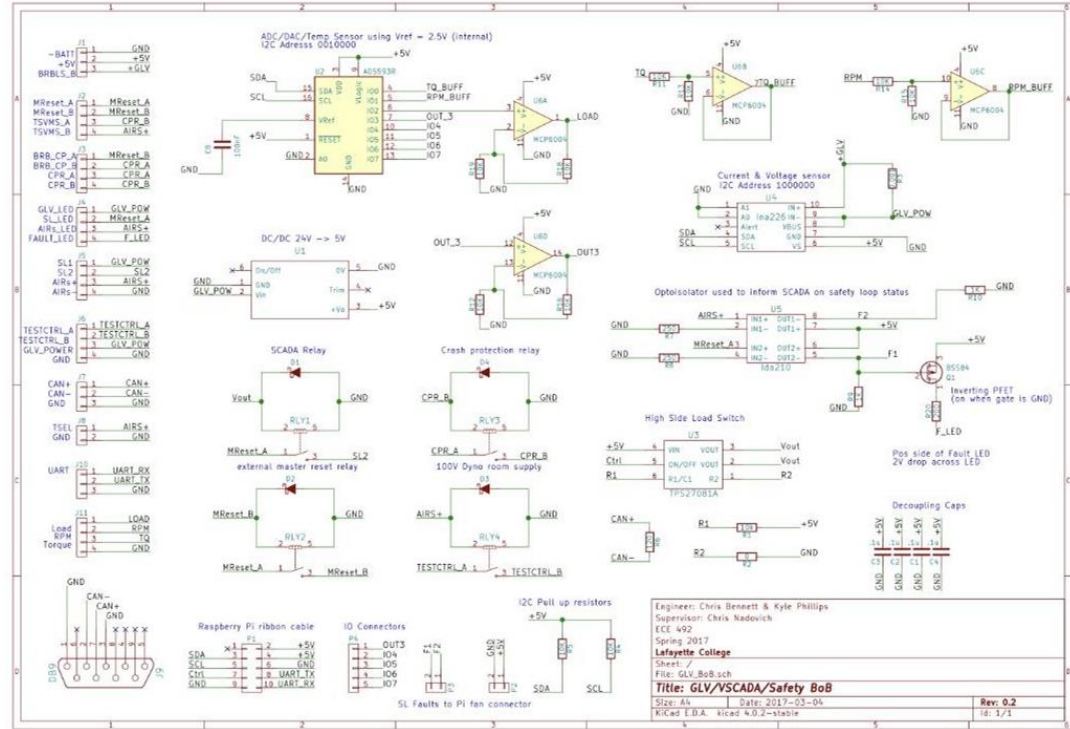 - Electrical schematic diagram
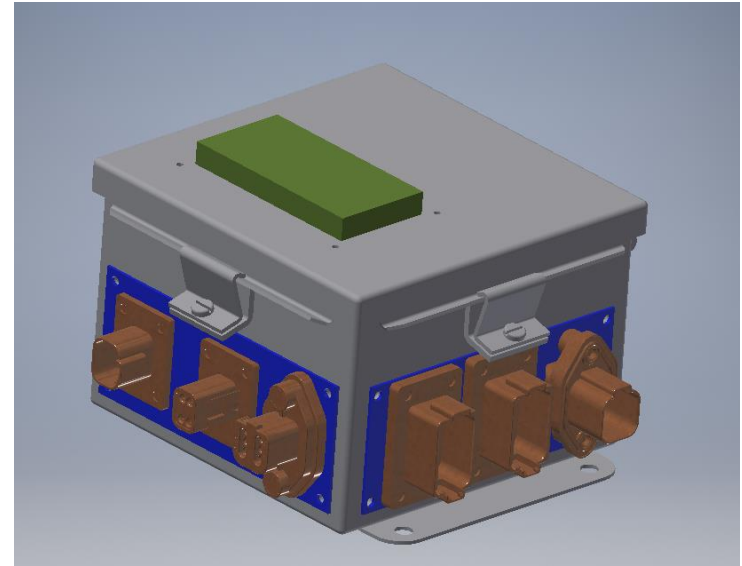
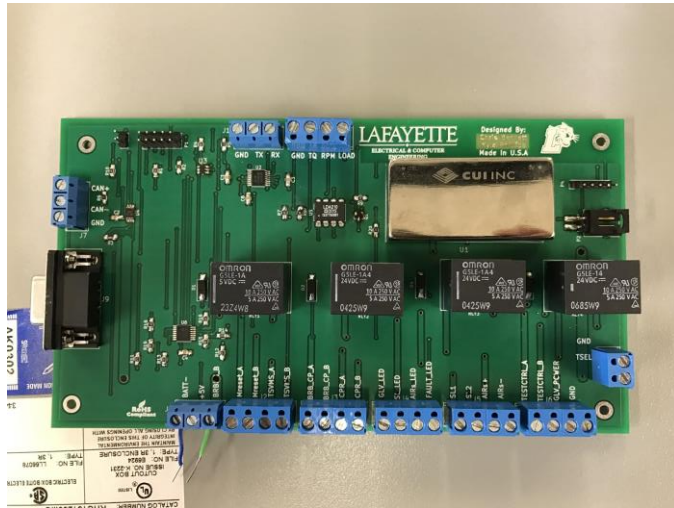# Grounded Low Voltage [GLV]

-GLV Power

-Safety Loop

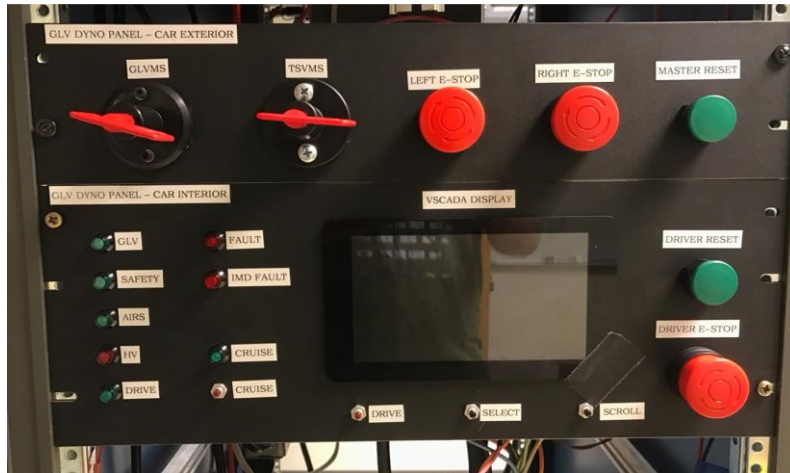-Vehicle Computer Interface

-Vehicle User Interface

Grounded Low Voltage [GLV]

- Battery research and acquisition
- GLV_BOB schematic, layout, parts acquisition and testing
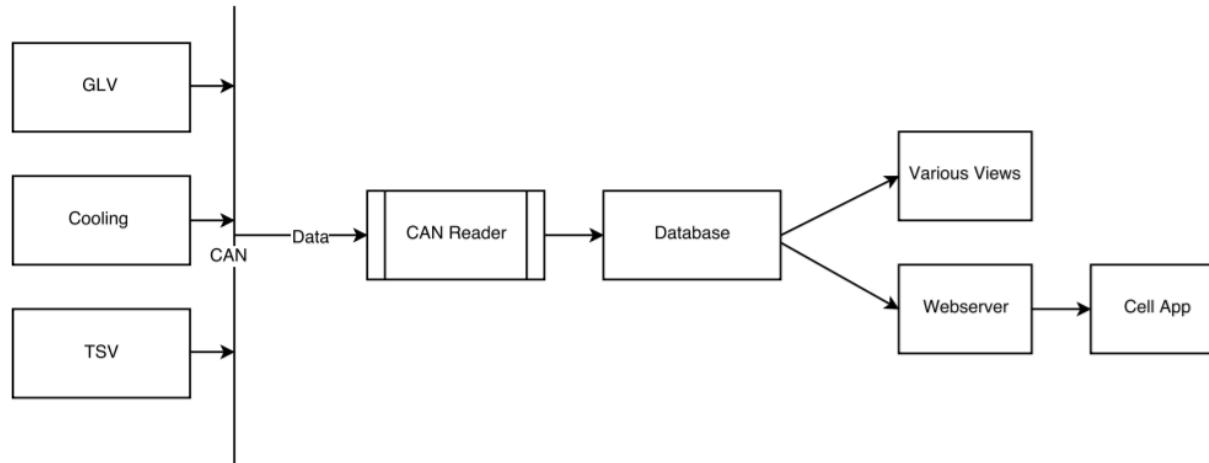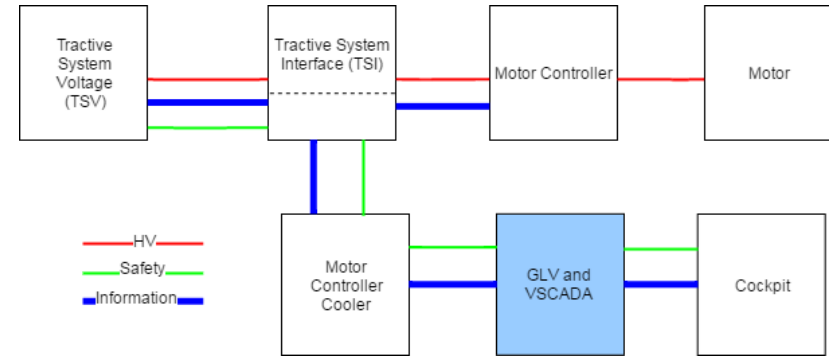- Car Integration

Grounded Low Voltage [GLV]

- Mechanical components of the GLV system
  - Enclosure Layout
  - Enclosure panels
  - Dyno room panels
- Dyno room integration

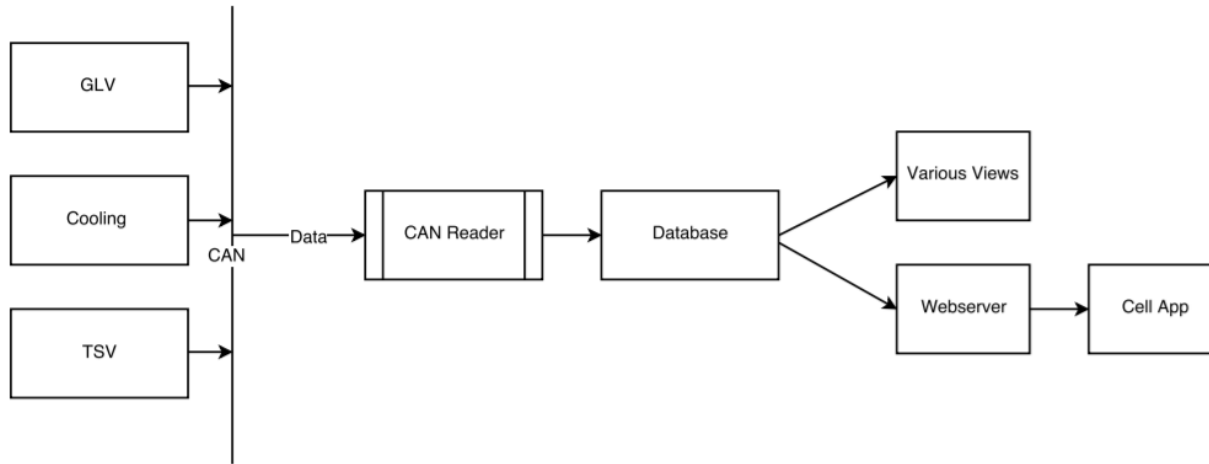# Vehicle Supervisory Control and Data Acquisition [VSCADA]

- Backend database
  - Can dump -> database
- User Interface
  - Graphics

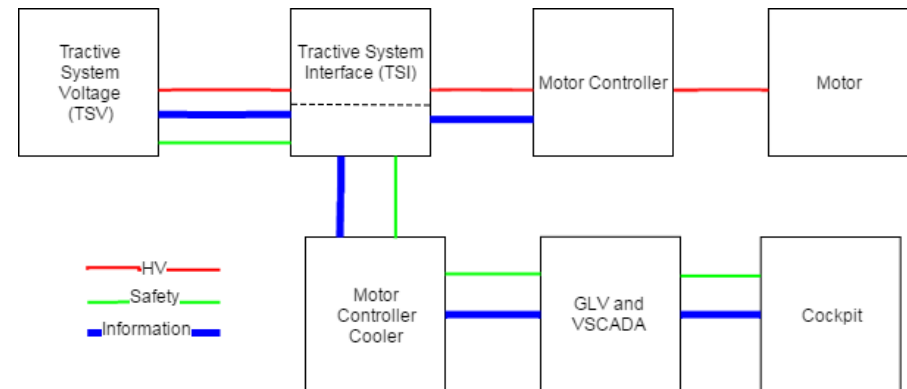# Vehicle Supervisory Control and Data Acquisition [VSCADA]

- Webserver
  - Handles GET requests
  - Can query based on parameters
- User Interface
  - More graphics

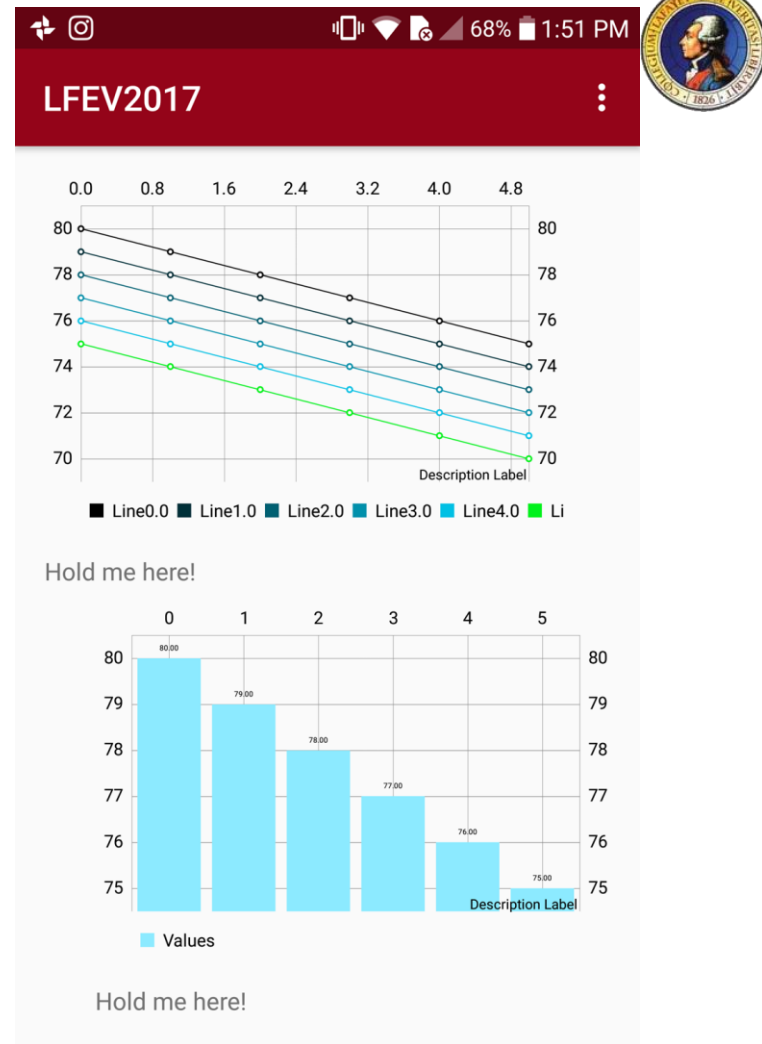# John Gehrig Board [JGB]

- UART
  - Fixed and modified original library
  - Implemented two way communication

- CAN Bus
  - Implemented receiving
 - Keyboard to CAN / CAN Dump using UART

Cell App

- Android Application (Version 4.0.3+)
  - Connection to VSCADA through web server
  - Display of data with various views
    - Automatically updating data and views
  - Fully customizable interface

Physics Modeling & Cruise Control

- Research of physical relation of integration of Formula Electric car
- Research of theoretical physical behaviour of MCM system
- Experimental determination of:
  - Mathematical relation of MCM I/O
  - Electric motor plausibility for Formula Electric car
  - Dynamic and Static Model lookup table
  - MCM system efficiency
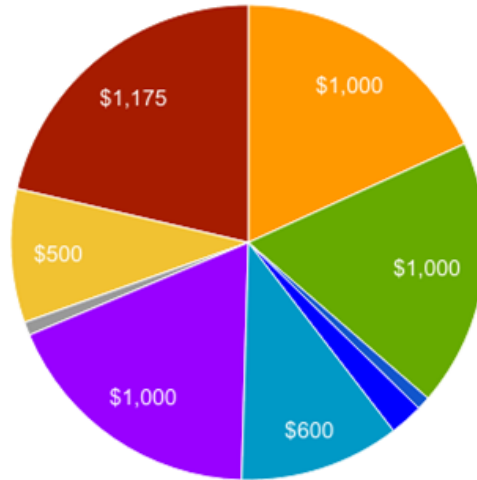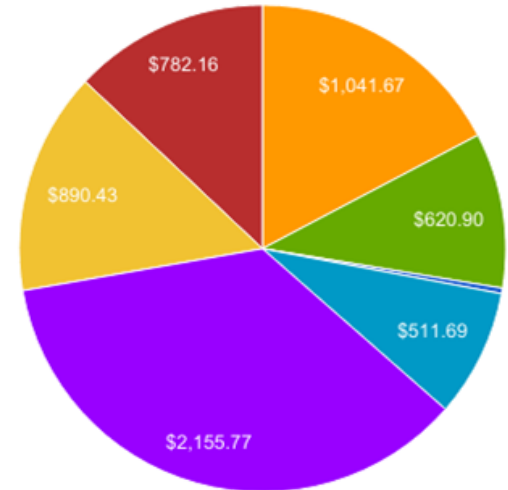 - Accurate foundation for cruise control
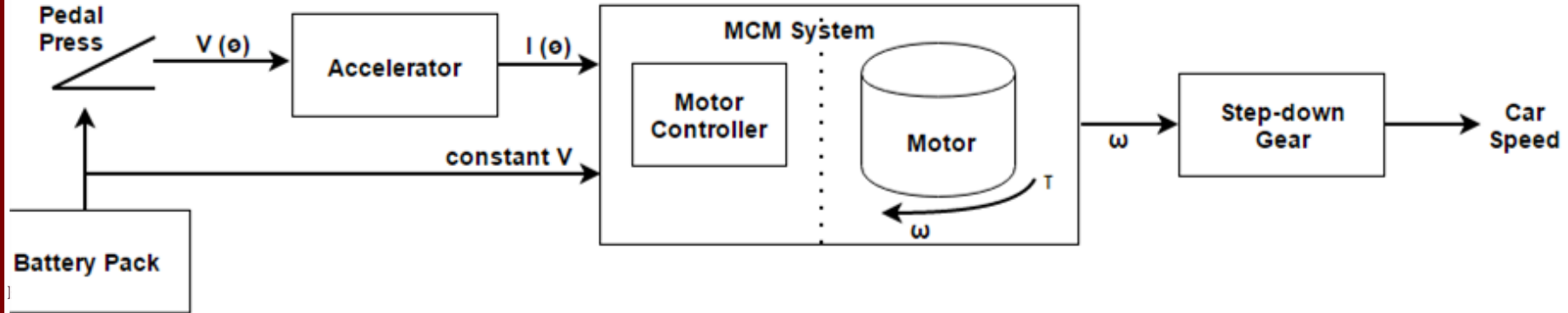
Budget

Allocated Budget Breakdown

- TSI
- GLV
- VSCADA
- Cell App
- Controller Cooling
- Interconnect
- Dyno
- TSV
- Shipping / Tax / Misc

$1,000
$1,000
$600
$1,000
$500
$1,175

Overall Spending Breakdown

- TSI
- GLV
- VSCADA
- Controller Cooling
- Interconnect
- TSV
- Shipping / Tax / Misc

$782.16
$1,041.67
$620.90
$511.69
$2,155.77
$890.43

Communications

- Worked to raise awareness of the work being done on campus
- Documented throughout the semester the work being done and produced overall video summary documenting the "essence" of the project
- Research Proposal for what the next big ECE 492 project should be
- User Manual Videos