

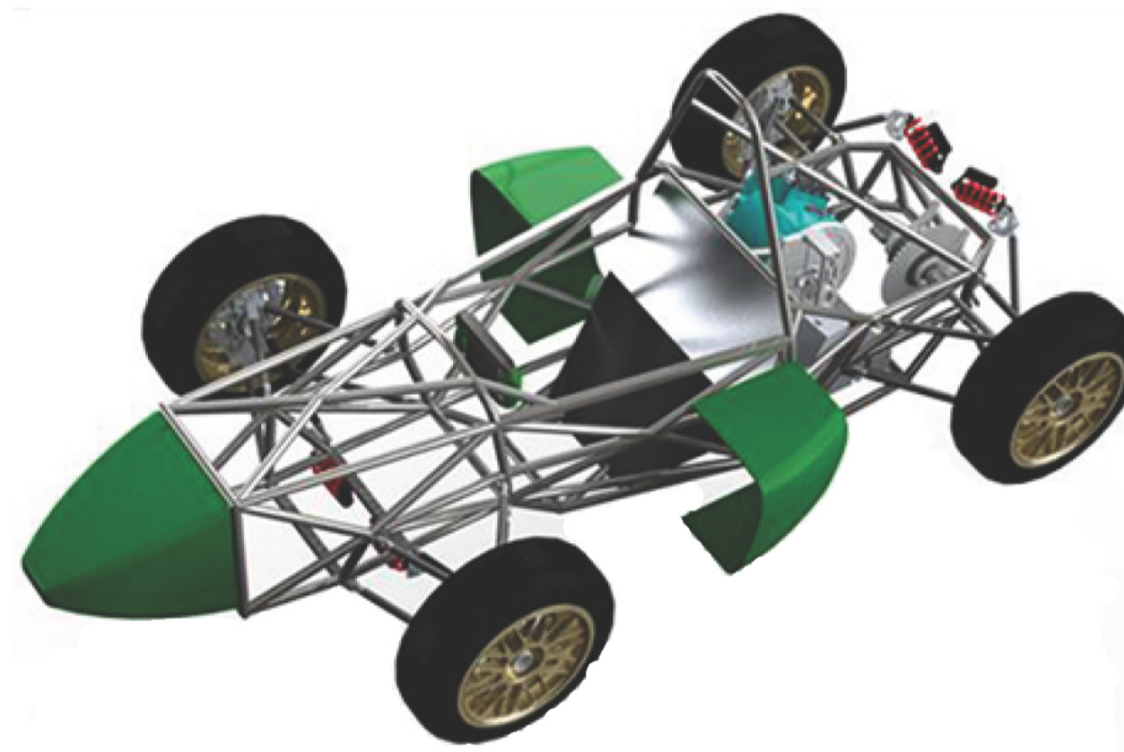
### Introduction

This year's Lafayette Formula Electric Vehicle team set out to use battery pack designs from 2014-2015 as well as other subsystems such as VSCADA and GLV to create a full integrated system with the motor and controller purchased from last year.

Though full integration was not entirely completed, our team was able to build a new data acquisition and more streamlined GLV design as well as our biggest accomplishment a fully functional battery pack.

#### Specs:

RPM Range: 0-4500 RPM	System Efficiency: 84% Efficiency
Maximum Torque: 90 ft-lbs	Full Vehicle Weight: 800lbs
Power Usage: (Max) 19 kW	Top Speed: 76 mph
Power Output: (Max) 16 kW/ 22HP	Most Efficient Speed: 42 mph



### TSV

Tractive System Voltage

#### Overview:

The Tractive System Voltage provides high voltage power to the from 4 identical battery packs connected in series, capable of providing 95V and over 200 amps continuously.

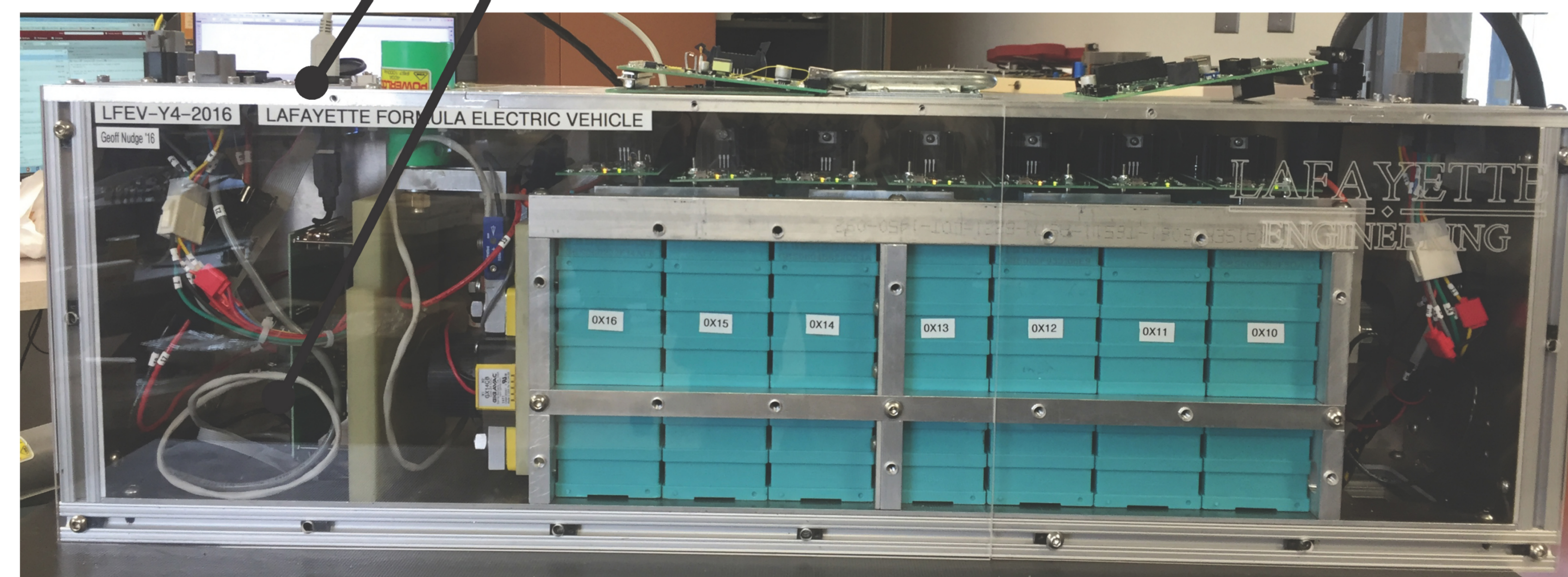


The battery display reads the packs state of charge status of the safety loop and time it has been running



#### PacMan:

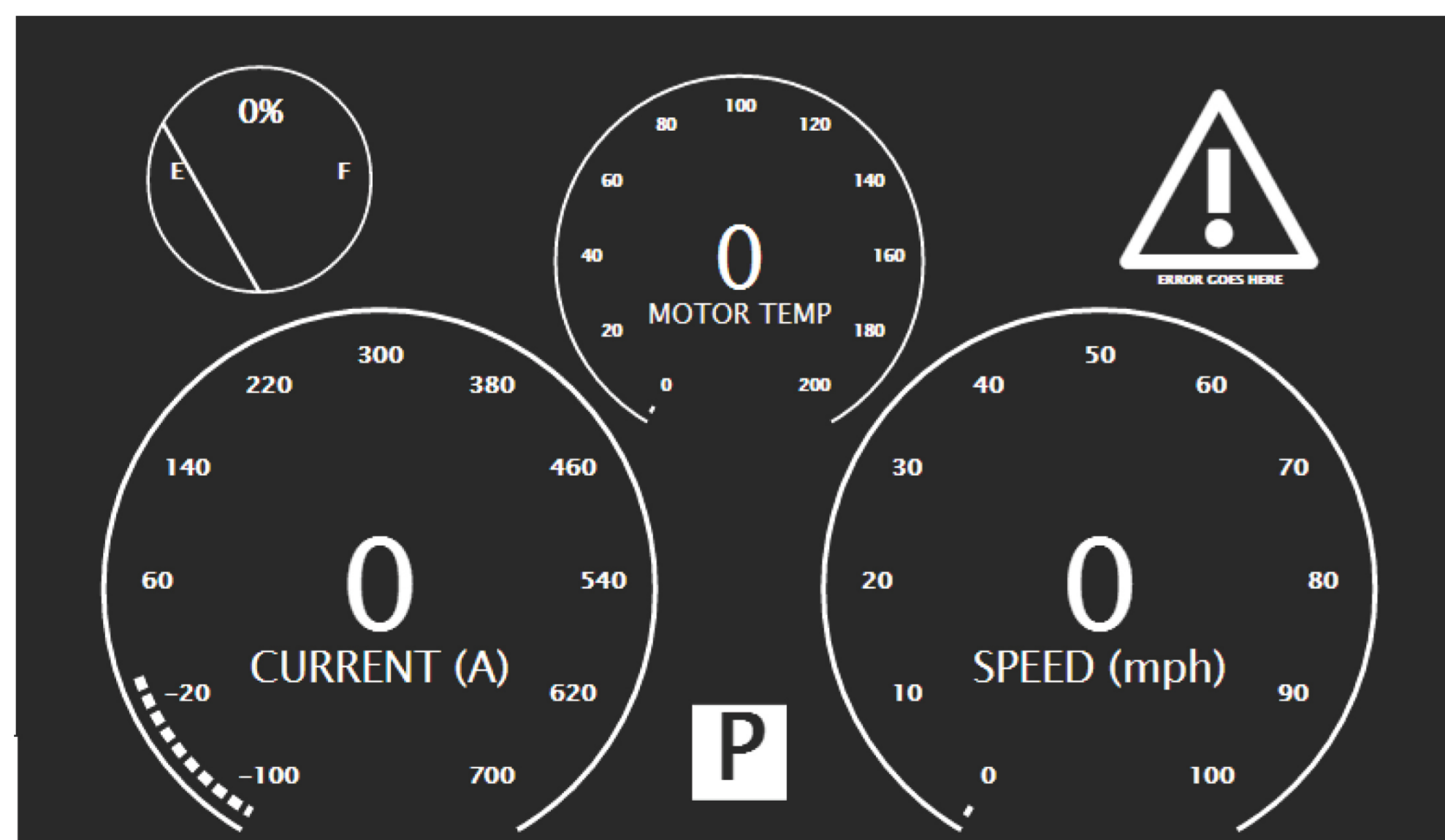
The pack manager computer, PacMan, underwent 2 major revisions. To minimize wiring in the pack, components were consolidated onto to the current version (including a current sensor, charging relay, and safety loop relay).



### VSCADA

Vehicle System Control and Data Acquisition

The VSCADA acts as the brain of the car, collecting, recording, and display data from the various other vehicle subsystems.



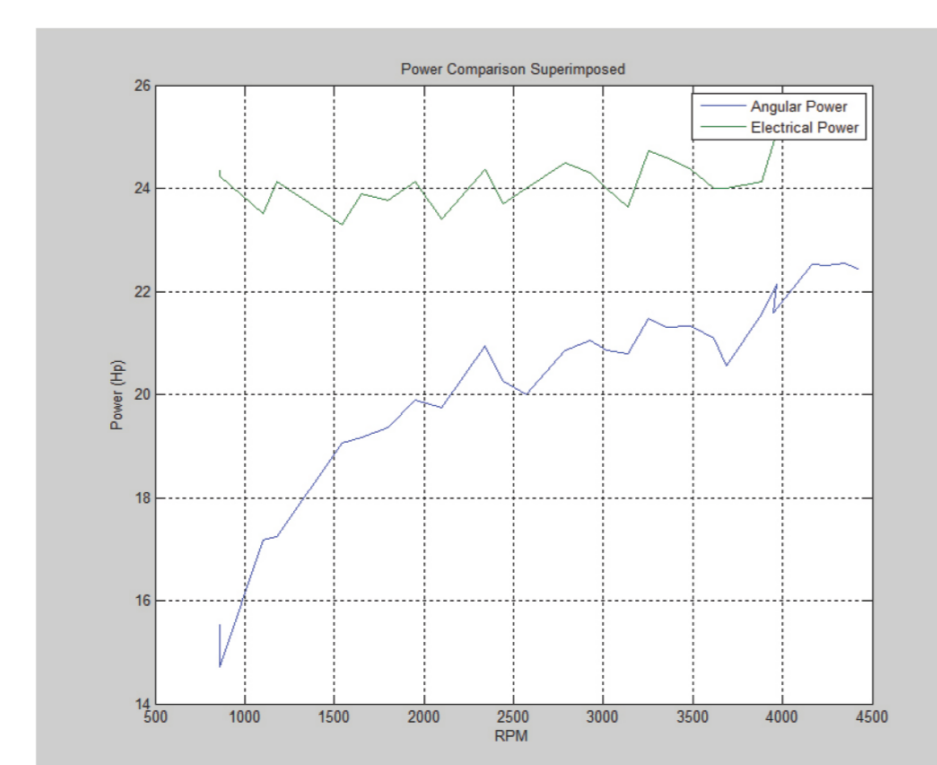
The dashboard for the vehicle displays the current being drawn from the battery packs, the battery state of charge, motor temperature and vehicle speed

### Motor Modeling & Characterization

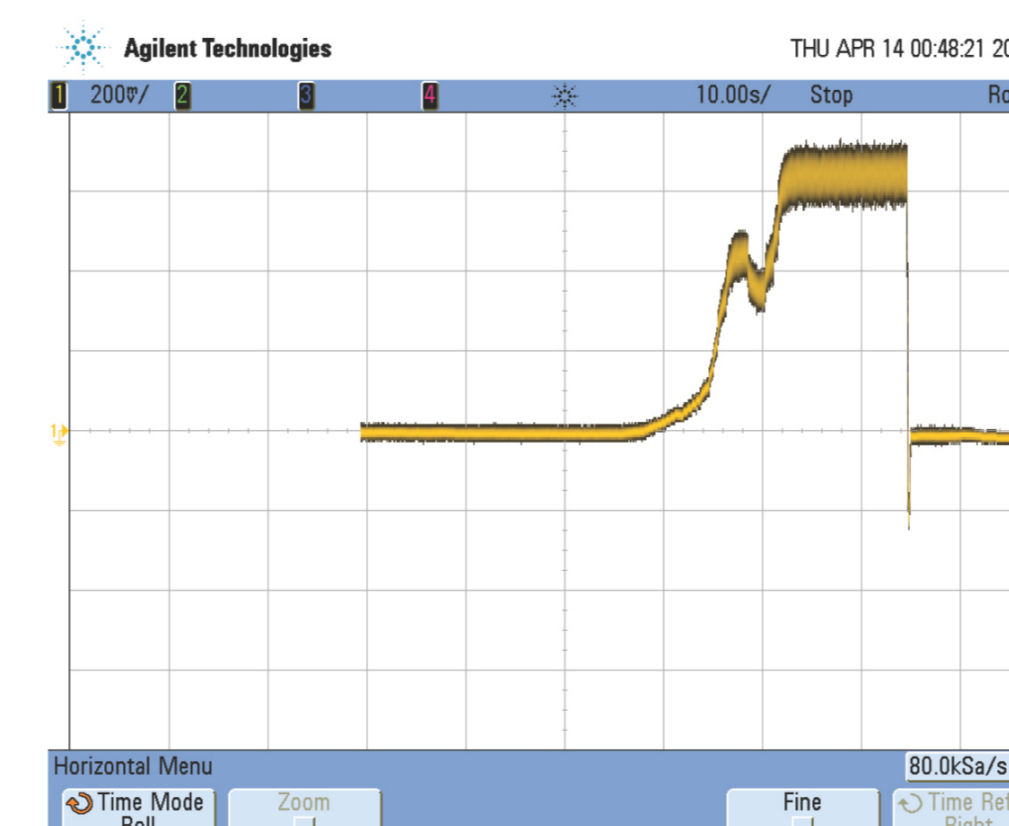
#### Goals:

The motor characterization and modeling team set out to characterize the motor performance trying to answer questions such as

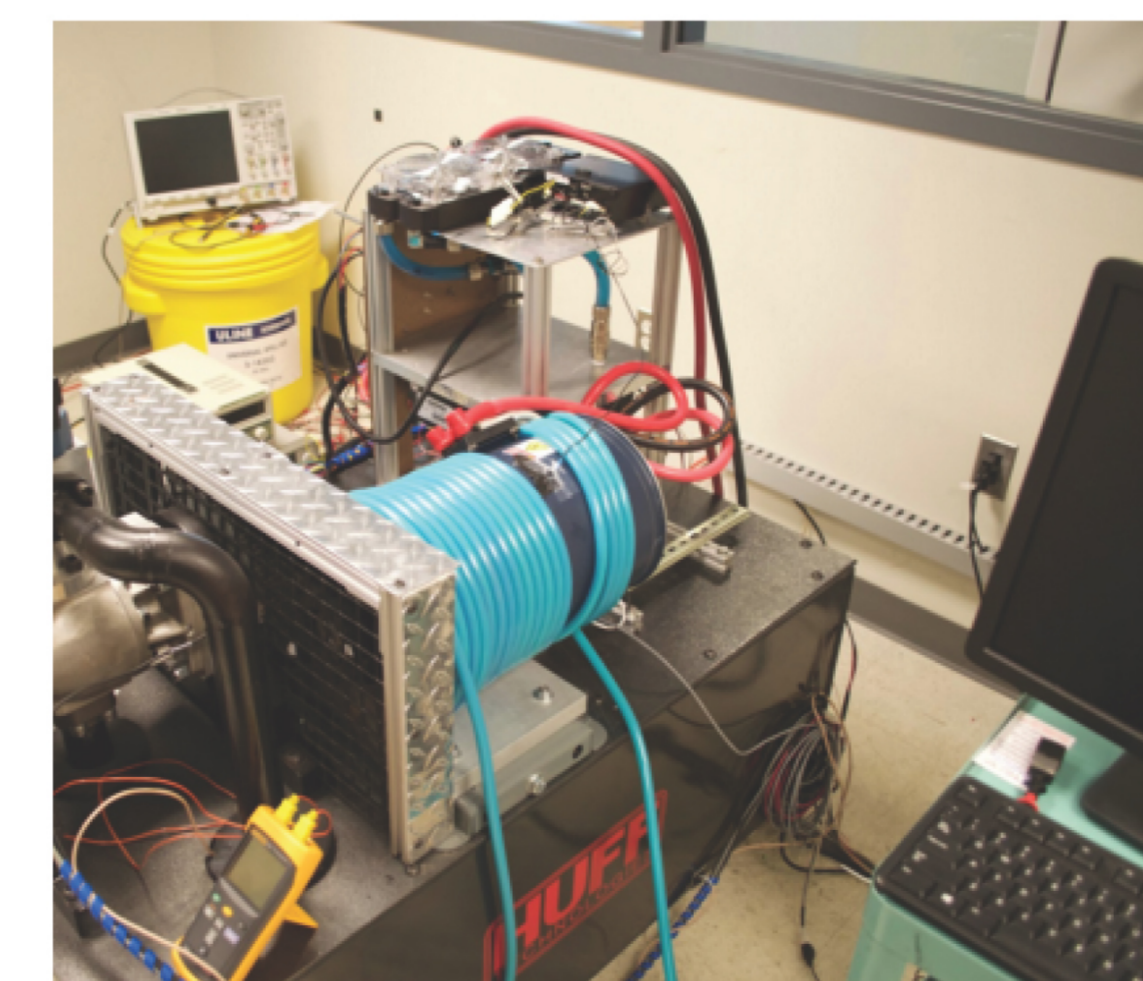
- What is the normal operating range of the car?
- What is the max speed of the car?
- What is the most efficient speed for the car?
- How long will it take to discharge the batteries?
- What is the best gear ratio for the car?



Efficiency graph comparing mechanical power vs electrical power

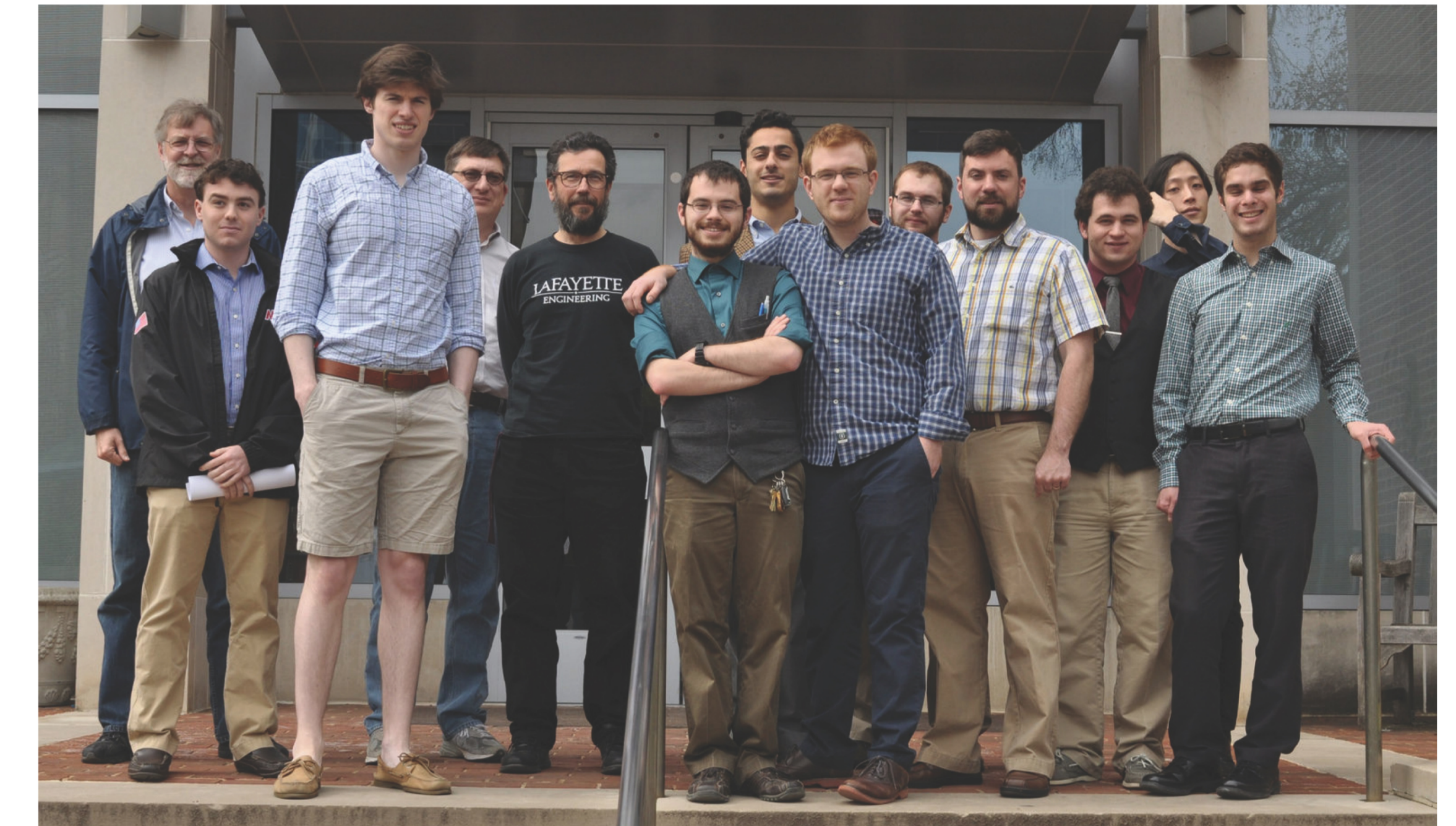


Acceleration testing found the motor to have regenerative braking capabilities



Dynamometer setup for motor testing and data collection. Note: Blue coils used for adhoc water cooling for the motor.

#### Our Team



From Left to Right: Prof. Nestor, Josh White, Brendon Carroll, Prof. Helm, Prof. Nadovich, Brandon Martinez, Armen Mkhitarian, Tim Andrews, Domenick Falco, Geoff Nudge, Joe Cericola, Jae Joon, Dan Bolognini

### GLV Grounded Low Voltage

The GLV systems consist of four separate subsystems:

- The Safety Loop
- GLV power
- Vehicle Computer Interface (VCI)
- Tractive System Interface.

These subsystems are responsible for maintaining safe operation of the vehicle and interfacing the other vehicle systems together.

Rules of Operation for these systems are outlined in the Formula EV Hybrid rules.



Integrated VSCADA and GLV system

### Acknowledgements

A special thank you to the Mechanical Engineering team who worked with us to make these accomplishments possible Josh White, Bennett Crawford, Calvin Murr, Ted Coffman and Professor Helm