Shell Eco-marathon powertrain sub-team

Overview
The Penn State Eco-marathon capstone team will participate in the Eco-Marathon competition sponsored by Shell. As a larger team of 19 people, the team will build two vehicles: the Urban Concept Car and the Prototype Car. The powertrain sub-team's work is to design and build powertrain for both cars, which includes but not limited to battery, battery management system (BMS), motor controller, wheel hub motor, interface and battery case.

Objectives
The team's objective is to design and build the powertrain system for both cars, which should be safe, efficient and stable. The team chose proper batteries and other accessories, designed and built the diagram and made the battery case.

Approach
- The team begun by reading through the Shell Eco-marathon 2015 Official Rules to understand the requirements and make the plan.
- Then the team went over the documents from the teams of the past semester to get a general idea of what they did, and what we should improve.
- The team tested the two batteries left from before under the help of Professor Sommer, then decided to find and buy two new ones.
- The team manager of the powertrain sub-team along with managers from the other three sub-teams had phone conference with Shell every Thursday.
- The team made research on every piece of the components and bought the DC/DC convertor, circuit breaker, thermal fuse and connectors.
- The team built the circuit with accessories before installing everything to the cars to make sure the design could work.
- Aluminium boxes made by previous team were used for battery cases. The team inlaid the boxes with clear acrylic cut in a laser cutter.
- The space between the batteries and inside walls of the boxes was filled with foam cut with a hot wire.
- The accessories like horn, lights and windshield wipers were tested after the powertrain was installed in the cars.
- The drivers ran the car on the track to test the motor.

Outcomes
- The Prototype Car ranked 8th out of 28 teams.
- The Urban Concept Car couldn't run