Shell Team 2 Prototype Car

Overview
The Shell Eco-Marathon is a competition in which team’s design, build, and test lightweight vehicles for maximum fuel efficiency. The current prototype car is operated by a 48V battery powered electric hub motor on its rear wheel. The prototype car was not operational at the beginning of the semester due to a faulty motor controller and inadequate brakes. The car was also not in an inspection-ready state due to some changes in rules, poor wiring within the car, and weak brakes. The prototype team needed innovative solutions to get the car to run and properly function.

Objectives
The prototype team’s main objective was to make the vehicle operational which meant designing and creating a working motor controller, redesign the wiring system, design a foot brake system, and improve the steering system.

Approach
- Gathered rules and specifications from 2018 Shell Eco-Marathon Rule Book.
- The car’s current motor controller, brake system, and electrical components are assessed.
- Concept generation, selection, and AHP matrices were used in the redesign of the braking system.
- CAD models of the braking bracket, brake pedal, and fenders were created using SolidWorks.
- The motor controller was redesigned using Eagle CAD.
- Steering system re-assembled with proper alignment and spacers.
- Motor controller PCB fabricated by OSH Park.

Outcomes
- New motor controller is created, and code is improved.
- New foot-brake system and wiring system are designed and installed.
- Safety of driving the vehicle is greatly improved.
- Vehicle now meets future competition requirements.
- New electrical components and battery are purchased, tested, and installed.