



REGENERATIVE ELECTRIC DRIVEN POWER CART

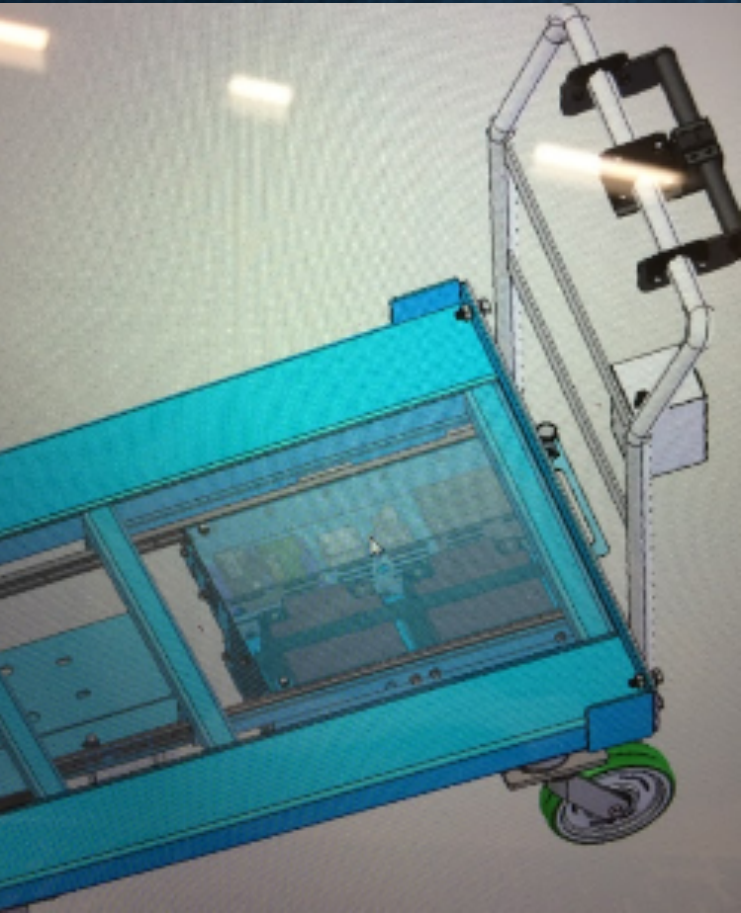


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Introduction

Objective

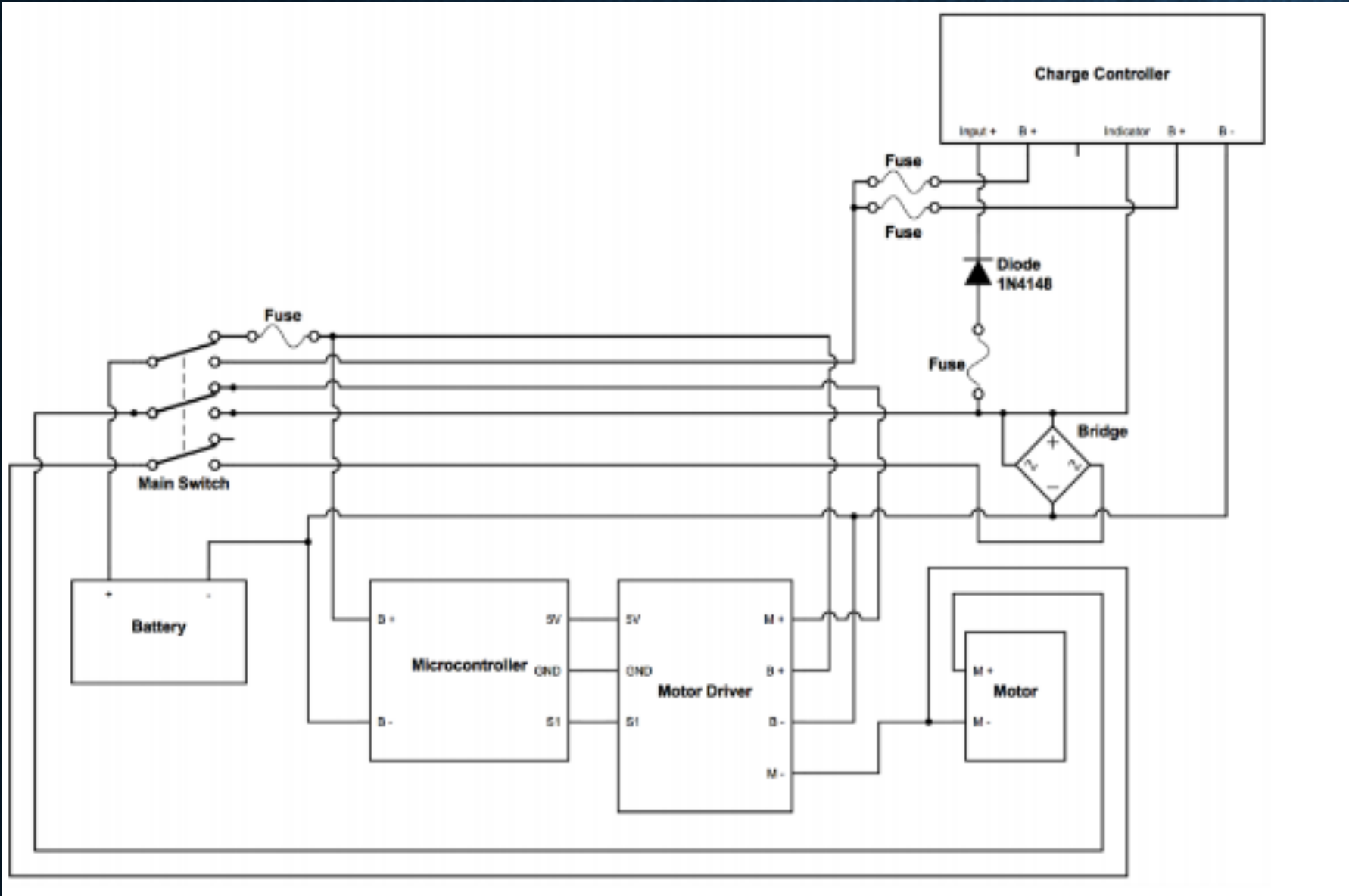
Our objective was to design a power regenerative electric driven cart that allows workers to use the power cart for a full working cycle before having to recharge the cart. The cart has an extra safety stop feature added to ensure that safety is first for the workers.



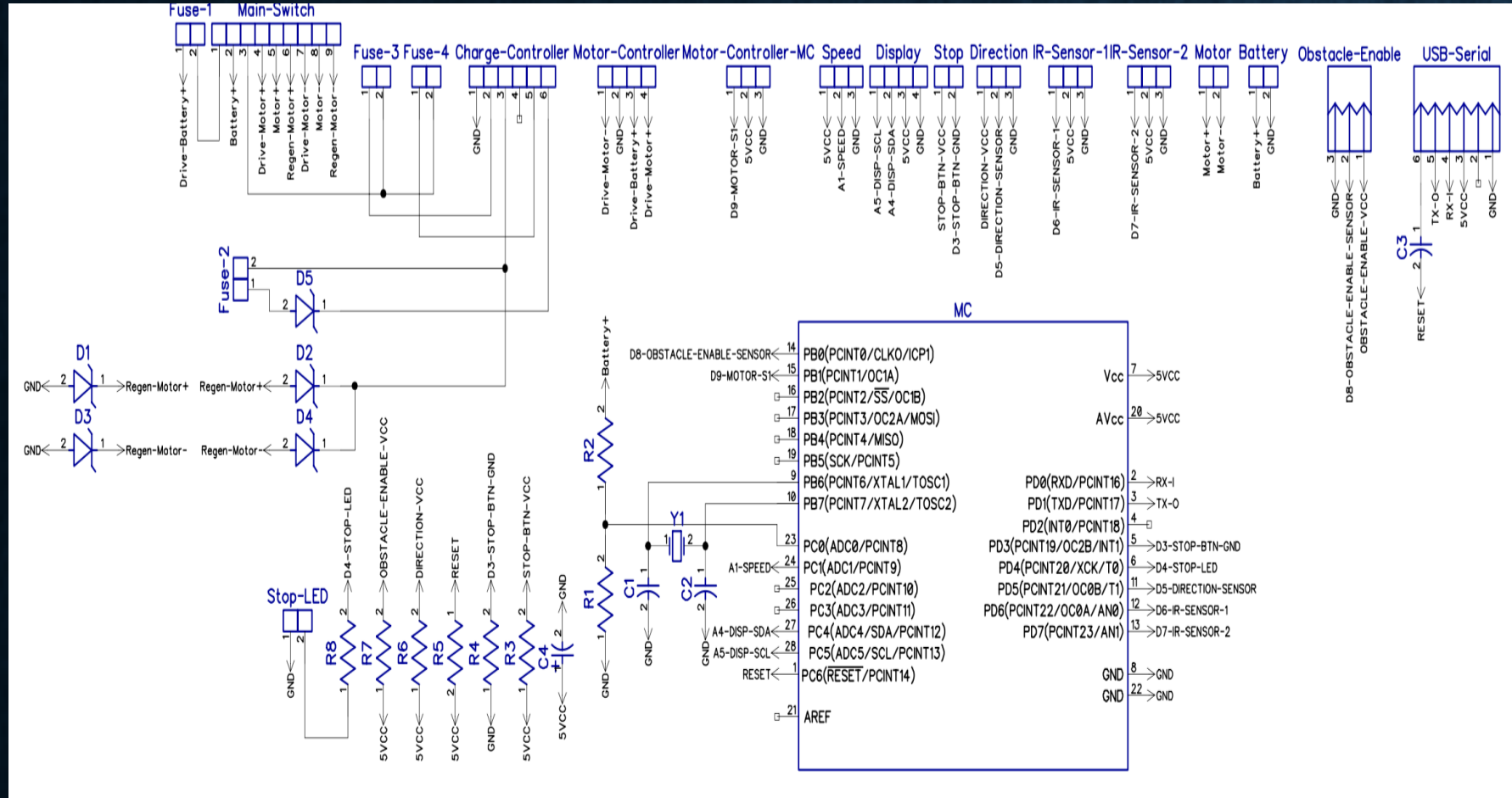
Design specifications

- Driven by a 12V, 40A battery
- The charge controller needs to meet the efficiency requirement
- Emergency Stop for safety
- User-friendly UI

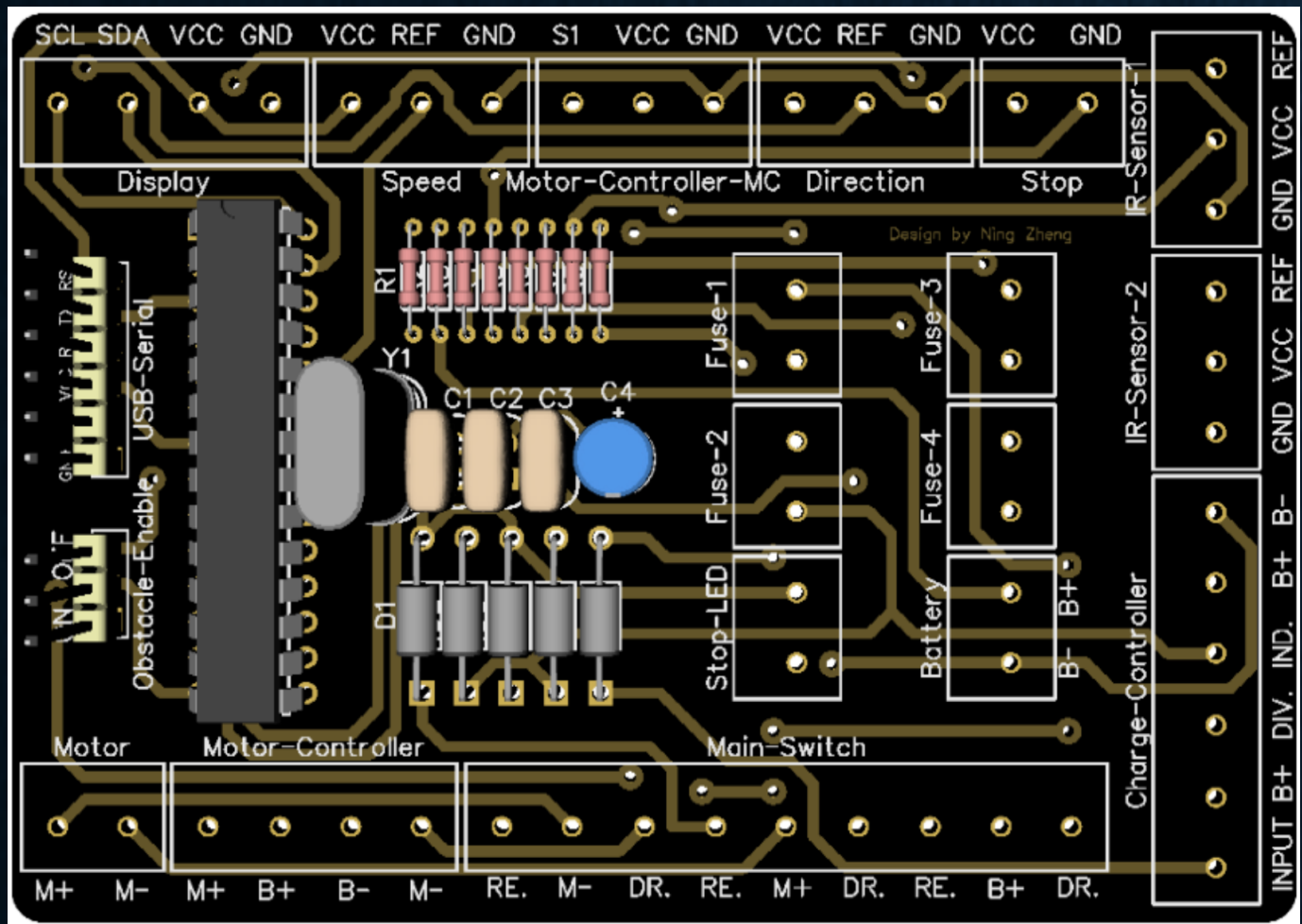
Circuit Schematic



PCB Design



PCB Schematic

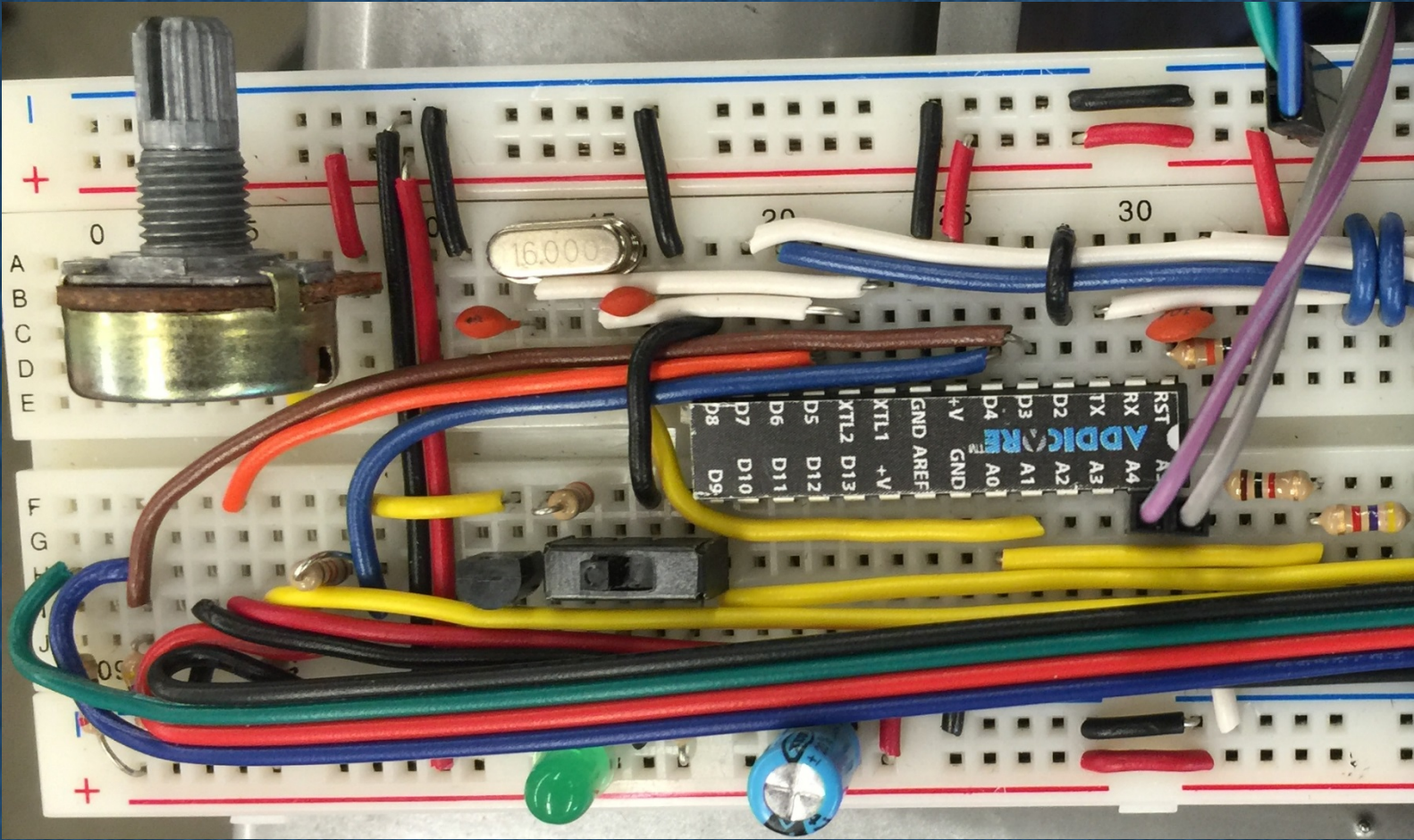


Final product

Design

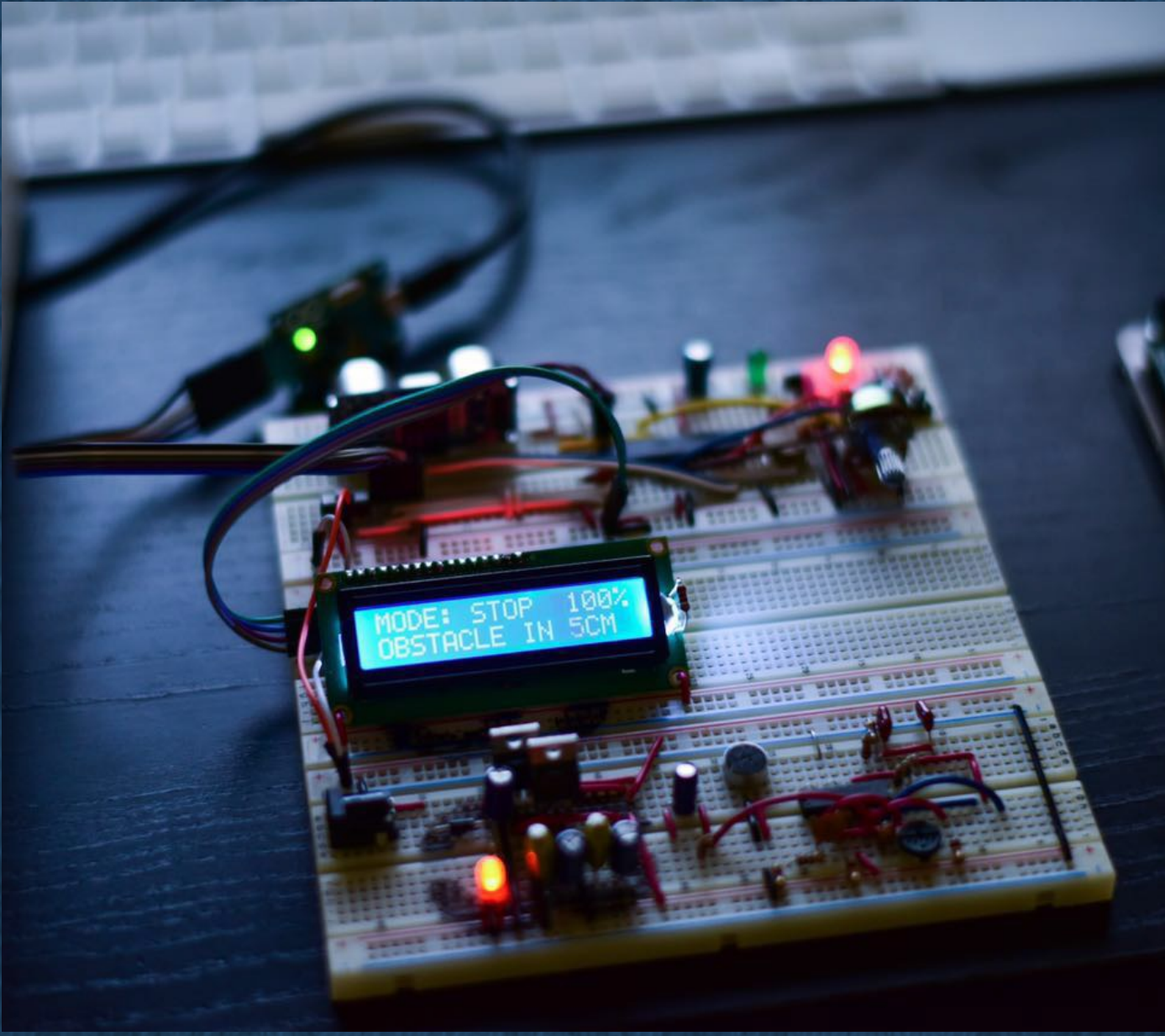
The cart was designed to have two systems: a charging system and a driving system. They are connected using a 3DPT switch.

- The charging system consists of 3 parts: fuses, a charge controller and a Wien bridge.
- The driving system has a motor driver and an Arduino microcontroller.



We chose the Atmega328p as our main control unit because it provides more GPIO pins and the response is much faster compared to the Raspberry Pi. Also the Atmega328p consumes less power which is critical to the battery powered system.

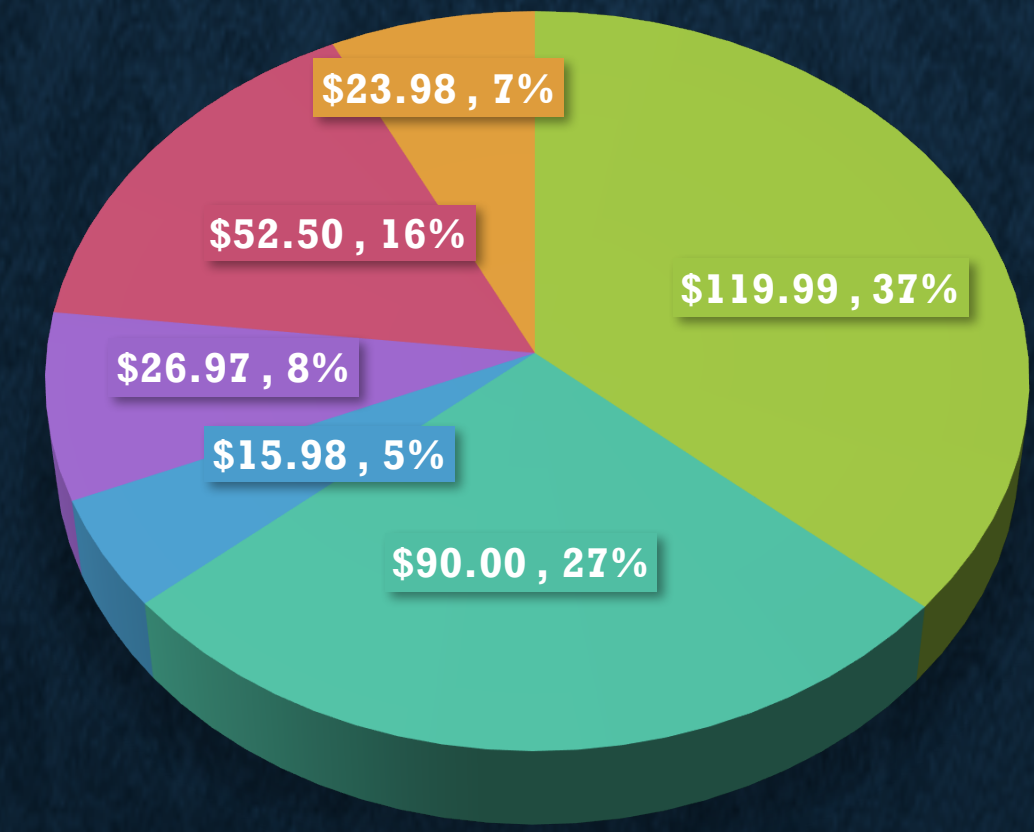
Prototype



Charging Efficiency

Time duration	Input voltage/rotate speed	Battery voltage increase
1 min	5V input/ low speed	0.01V
1 min	5V input/ low speed	0.005V
1 min	10V input/ high speed	0.038V
1 min	10V input/ high speed	0,048V

Budget



- 50A Regenerative Motor Driver
- Charge Controller (NC25A-12)
- Infrared sensor
- Switches
- PCB Manufacture
- Terminal Connectors/adapters/fuses