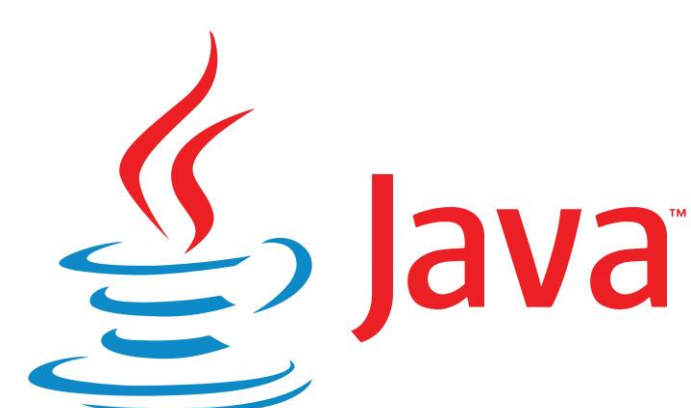


## Abstract

The goal is to create a device, along with a companion app, that can be quickly attached and removed from any type of board and provides the convenience of an electric board. Current solutions are either expensive or require tools to attach. Our device aims to solve those issues while allowing your board's original hardware to stay intact.

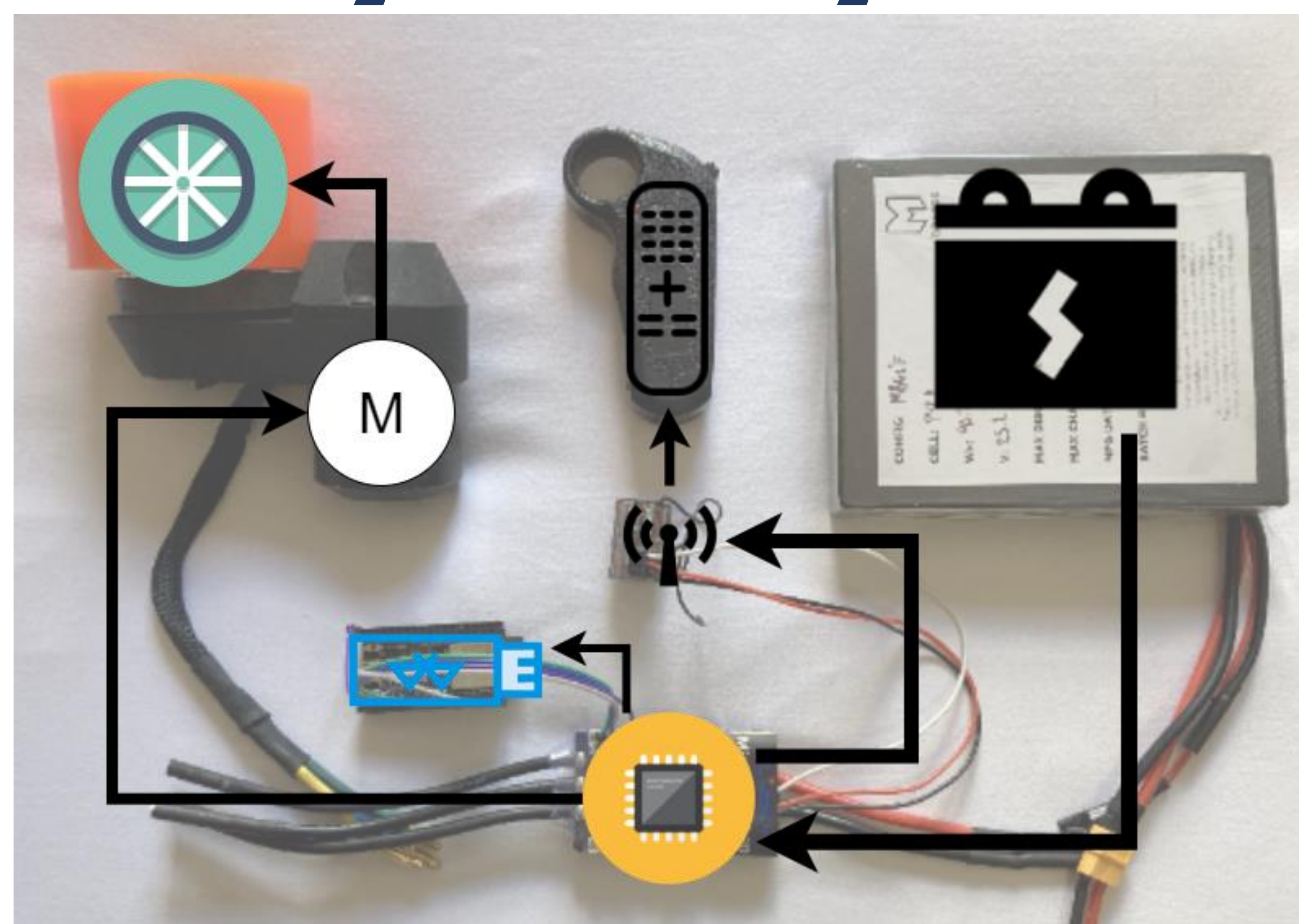
## Software Leveraged



## Solution Implementation

- In interest of time the radio and motor controls were implemented with existing solutions: open source VESC project, fsesc electronic speed controller, VANPRO Wireless Remote Control.
- The project was focused on creating a mobile companion app that will communicate with the fsesc over Bluetooth through an ESP32 microcontroller.
- In addition to the natively created software for the Android app and the ESP32 microcontroller, the physical design was prototyped out and all working components were manually connected, wired together and tested.

## Physical Layout

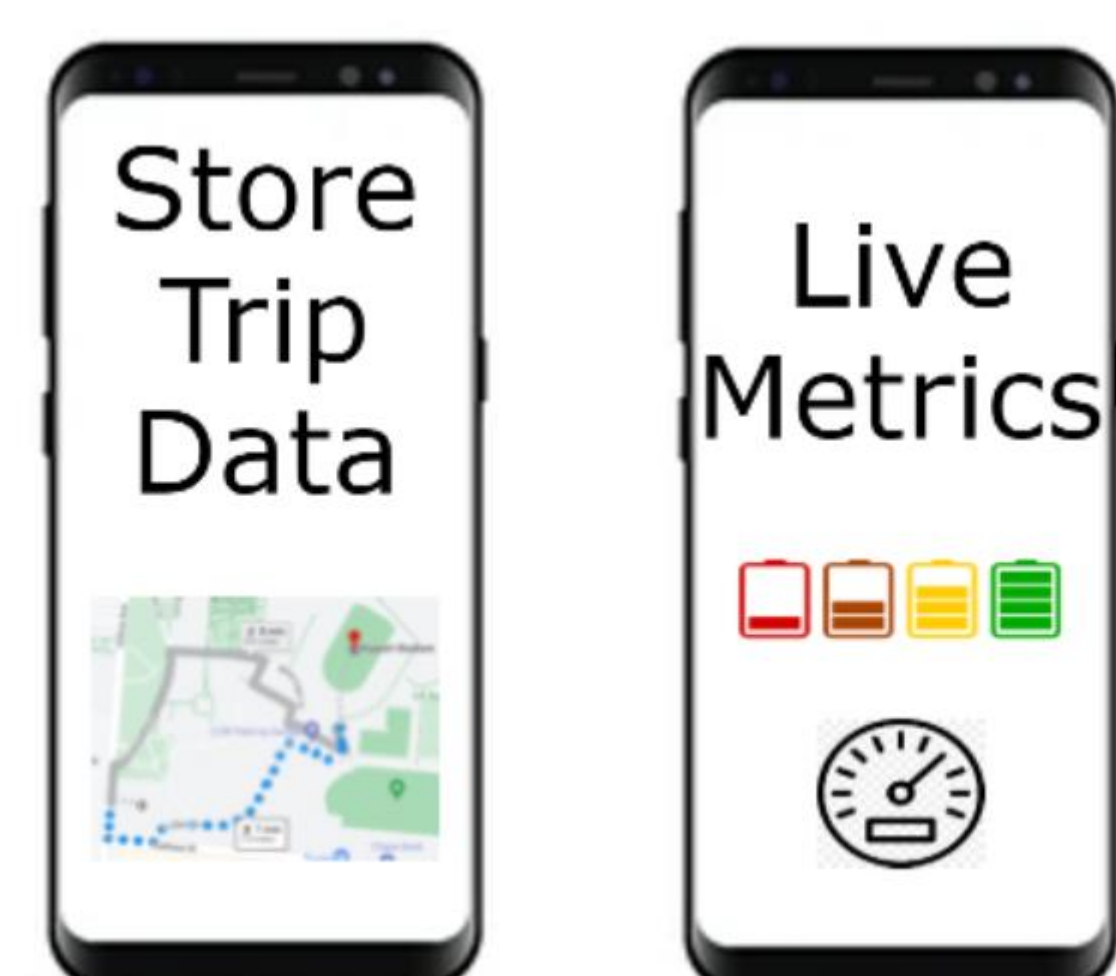


High Level Wiring Diagram.

The battery is wired -> fsesc motor controller, which is wired -> motor, 2.4GHz receiver, ESP32. The receiver reads the radio controls from the handheld remote. The ESP32 talks with the fsesc over UART and then makes use of a Bluetooth connection to any device to display real time data from the fsesc board.

## Application Design

The app was designed as to work alongside the physical device. It serves the purpose of reading real time information such as battery voltage, power usage and speed. Additionally, trip information is recorded like distance traveled and power usage along the trip.



### Main app features:

- Ability to review past trips
  - Distance traveled
  - Power consumption
- Battery level & usage information

## Major Cost Breakdown

	<b>Microcontroller</b>	<b>\$15.00</b>	Esp32
	<b>Motor Controller</b>	<b>\$116.00</b>	Flipsky Electric Speed Controller - FSESC4.20 50A Base on VESC® 4.12
	<b>Radio Controller</b>	<b>\$23.00</b>	VANPRO 2.4G Mini Wireless Remote Control
	<b>Motor</b>	<b>\$80.00</b>	I salvaged the motor for this project for free from a friend, but a comparable motor would cost ~\$80
	<b>6 Cell Battery</b>	<b>\$112.00</b>	Mboards 6s 40T Complete Battery Solution
	<b>Total</b>	<b>\$331.00</b>	

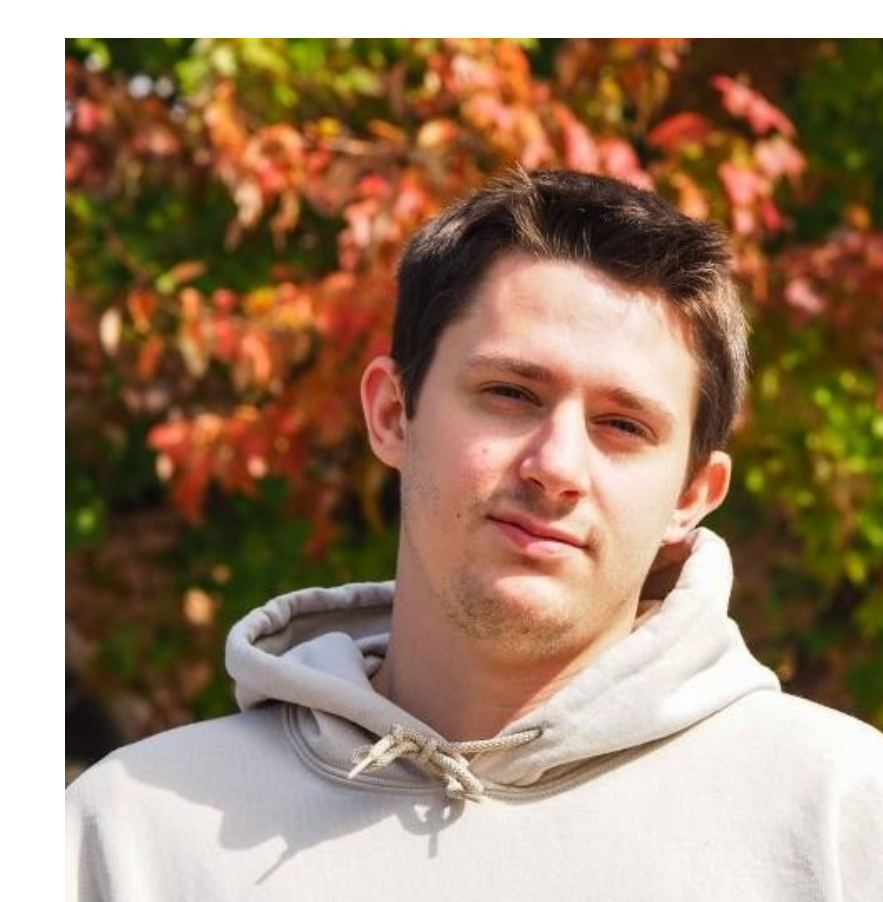
## Challenges

- Low clearance underneath board.
- Android mobile development learning curve.
- Original design planned to make use of an inexpensive HC-05 Bluetooth module but proved to be incompatible with the fsesc motor controller.

## Next Steps

- App UI should be upgraded to look more appealing, and the addition of google maps route tracking.
- More testing needs to be done to improve physical design prototype.
- Implementation of a custom motor controller that replaces the esp32, fsesc and radio receiver would lower costs.

## Team and more info



**Stone Soward (CS)**

**Faculty Advisor: Jason Heal**

Find more information on this project, as well as the source code on

