153B Project Proposal

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February 14, 2022

1 Overview

The goal of our 153B project to create an app-controlled motor. With the app, the user should be able to virtually set different 'gears' to the motor to control the max RPM. Also, the user should be able to control the speed/direction the motor moves via a virtual joystick programmed into the app. The purpose of this project is to create a wireless interface that can control motor output. Beyond the scope of the class, we believe that we could scale this project into any embedded system that needs wireless motor control and it maybe useful for our Capstone Project next year (ex: rover, drone, etc).

Website:https://sites.google.com/view/lightspeedmotor/home?authuser=1

2 Parts List

- STM32L4 Nucleo board.

- HC-05 Bluetooth Module. (may need to change to higher quality module)

- Gearmotor 12V DC, 600RPM

- DC Motor Driver Module.

- LCD Display.

- 7-Segment Display.

3 Serial Interface Protocols

UART: We will setup UART to communicate with our LCD Display and to interface with the hall effect sensor on our motor. The LCD Display will receive rpm and throttle data through the micro controller and output the data as moving bars. The Hall-Effect Sensor will send RPM and directional data to the micro controller.

SPI: We will setup SPI to communicate with the Bluetooth module. With SPI we can both transmit and receive data at very high speeds. With the HC-05 Bluetooth module, we will connect our phone to transmit PWM data on the STM32L4 Nucleo board to control the motor output. At the same time, we will be receiving motor direction/RPM from the motor.

4 Block Diagram
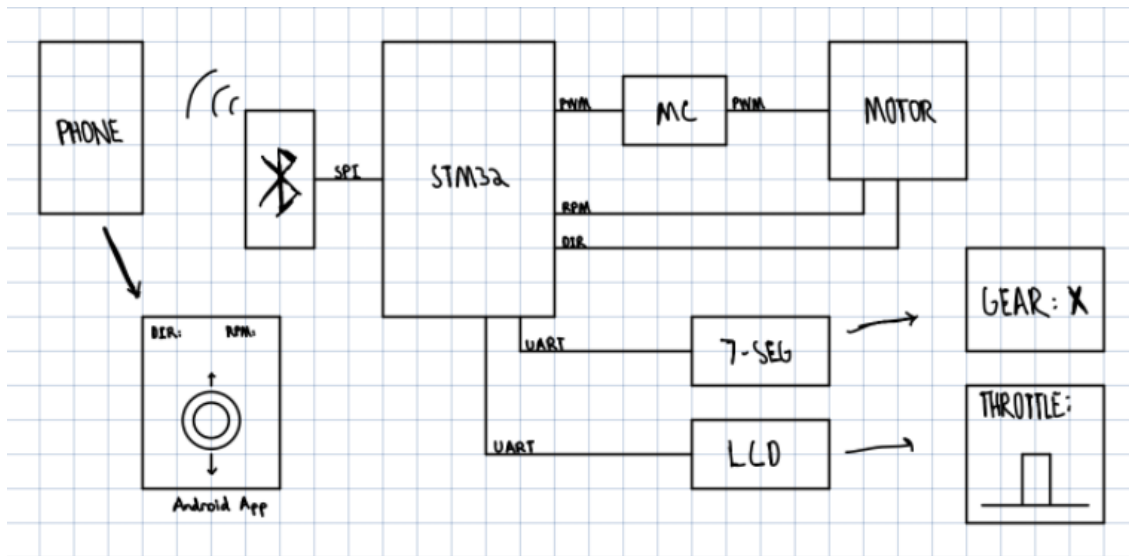
5 Responsibility List

Ryan Chau	Sachen Sampath
STM Code	STM Code
PWM	Bluetooth
LCD	Android App

*Specific Roles to be determined later

6   Software Structure

1. **STM Code:**

   (a) Setup

       i. UART
       ii. SPI
       iii. PWM

   (b) Interrupts

       i. Gear Shifts (Up / Down)

   (c) Methods

       i. Main: Adjust ARR and CCR values based on Gear and Throttle.
       ii. Bluetooth Send/Receive: Receive throttle response. Send RPM and Directional data.
       iii. Hall-Effect Receive: Receive RPM and directional data.
       iv. Motor Driver: Send PWM data to motor controller.
       v. LCD Display Driver: Update LCD Display depending on RPM and Directional data.
       vi. 7-Segment Driver: Translate gear number into 7-segment signals.