Steven Chang
Skylar Winig
Project Proposal for ECE 153B

<div align="center">F1 Simulator</div>

Overview

For our project, will be creating an F1 Simulator using an STM32L4x6 microcontroller, HCSR04 Ultrasonic Sensor, and an 8x8 LED matrix. The user will have 2 inputs: pressing the gas pedal and upshifting. We will display 15 LEDs in a line to have a rev counter and an 8x8 LED to show which gear you are in. As you push the pedal the LEDs will light up from left to right. Once the LEDs reach the end of the line you upshift, and the LED lights start over from the left. The 8x8 LED will also increment and show you what gear you are in. Once you release the gas the simulator will automatically downshift.

To do this, we will place an ultrasonic sensor at the bottom of a pedal to distinguish how far you are pushing the pedal. We will also have a button that the user can use to upshift. The ultrasonic sensor will use I2C and the 8x8 LED matrix will use SPI.
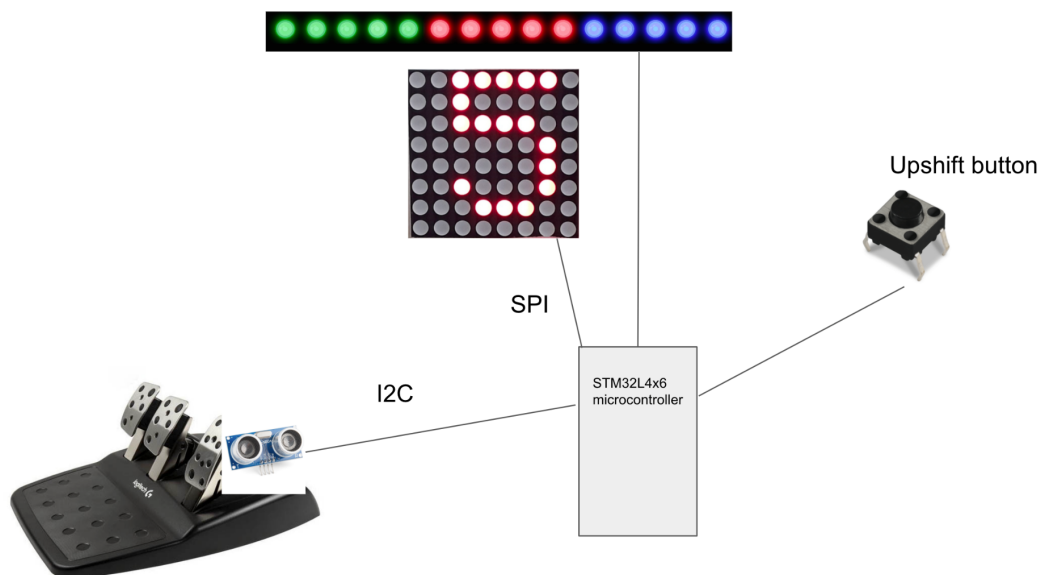
Peripherals

Ultrasonic Sensor
8x8 LED Matrix
Upshifter button
15 LEDs

Serial interface protocols

I2C - Ultrasonic Sensor
SPI - 8x8 LED

Block diagram

Responsibility list for everyone in the group

We are both responsible for working on both the hardware and the software. We will share the load of working with the peripheral, serial interface protocols, and software development.

Software structure

The software will read in the distance given by the ultrasonic sensor. This will set a variable that determines the level at which the gas is being pressed. Once the gas is pressed over a certain threshold the revs will start to increase. This will be shown by the LED string of lights. To know which LED lights to set to HIGH, we will set the max rev to 2000 RPM and divide the rev count by 2000 and multiply by 15. Once the rev count hits 2000 the user should upshift using the button. When the button is pressed the 15 LED lights will be set to LOW and we increment the number shown on the 8x8 LED matrix. The whole process starts over.

Website

https://sites.google.com/view/ece153bproject/home