Attachable Parking Sensor
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Overview
This project will combine the use of ultrasonic sensors as well as PWM to create an attachable parking sensor module. There will be 2 boards, one interior to the car and one on the exterior. The exterior board will handle the distance measurement and the interior board will handle displaying that data through RGB LEDs.

Peripherals
- HC-SR04: Ultrasonic sensor module
- HC-05: Bluetooth module
- TLC59711: Adafruit 12-Channel 16-bit PWM LED Driver - SPI Interface (Link)

Serial Interface Protocols
- UART - communication with bluetooth
- SPI - communication with PWM LED driver

Member Responsibilities
- Steven
  - setup UART communication
  - send activation/deactivation message to external board for ultrasonic sensor
- Sawyer
  - setup SPI communication
  - send distance measurement to internal board
- Both
  - setup ultrasonic sensor to read distance
  - setup PWM expansion board (hardware)
  - calculate data to send to PWM expansion board to determine which LEDs to light up and what color
Block Diagram

Software Structure

- Internal Board
  - send "activate" message via bluetooth (UART)
  - send "deactivate" message via bluetooth (UART)
  - receive distance via bluetooth (UART)
  - calculate discrete number of LEDs to light up (0 - 4)
  - communicate to PWM expansion board to control LED color (RGB) and brightness (SPI)
  - stop reading distance

- External Board
  - receives "activate" message via bluetooth (UART)
  - begins reading distance via ultrasonic sensor
  - receives "deactivate" message via bluetooth (UART)
  - interrupt on new distance measured
  - send distance via bluetooth