

Rami Dabit (6056485)
Kyle Kam (3416682)
ECE 153B

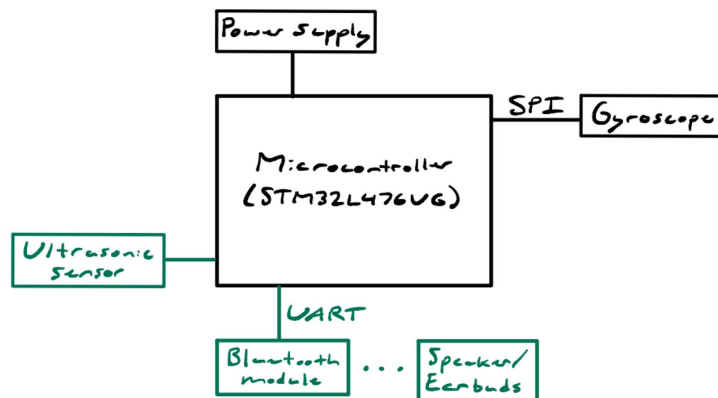
Project Proposal: The Ultrabucket Pro

Abstract: The Ultrabucket Pro is a bucket hat designed to prevent the user from walking into objects. Using an ultrasonic distance sensor to monitor the distance in front of the user, the hat will play a series of beeps with frequency inversely proportional to the distance. As the user gets closer and closer to an object, quicker and quicker beeps will be transmitted to either a bluetooth speaker or earbuds. If there is too much distance remaining, then no noise will be played. The device can be turned on and off by spinning the hat quickly in any direction, and the onboard gyroscope will be used to measure the spin and determine whether it crosses a certain threshold.

Peripherals: HC-SR04 Ultrasonic Sensor, HC-05 Bluetooth Module, L3GD20 Gyroscope

Serial Interface Protocols: UART, SPI

Block Diagram:



Responsibilities:

Rami

- Acquire bluetooth audio device
- Weekly progress reports
- Construct hat with internals
- Connect bluetooth audio to HC-05
- Use gyroscope to turn hat on/off

Kyle

- Acquire bucket hat
- Software structure
- Help Rami construct hat
- Initialize ultrasonic sensor
- Use PWM to create faster beeps

Software Structure:

Initialization

- HC-05 bluetooth module uses 4 pins, 2 for transmitting and receiving, 2 for 5V and GND
 - HC-SR04 ultrasonic sensor uses 4 pins, 2 for trigger and echo, 2 for 5V and GND
- The sensor also uses pulse width modulation with timers

Running state of device

- Continuously measure distance using ultrasonic sensor
- Translate distance to frequency for beeps
- Play beeps via bluetooth using HC-05 as master
- Enable/disable functionality given interrupts from onboard gyroscope

Project Website: <https://ramidabit.github.io/ultrabucket/>