

# ECE 153B Final Project Proposal -- Vision Test

<https://sites.google.com/view/ece153b-visiontest/home>

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## Overview:

The goal of this project is to create a vision test. A user stands a certain distance away from a 16x16 LED matrix. This distance is gauged using the Ultrasonic Distance Sensor. The matrix will glow green when the user is at the proper distance. The LED matrix will show an “E” rotated in different directions, similar to an actual vision test. The user has to indicate the orientation of the branches of the “E” using the joystick on a Wii Nunchuk. As the user gets these correct, the “E” will get smaller. The Bluetooth Module will be used to connect to Termite to display the user’s “vision score.”

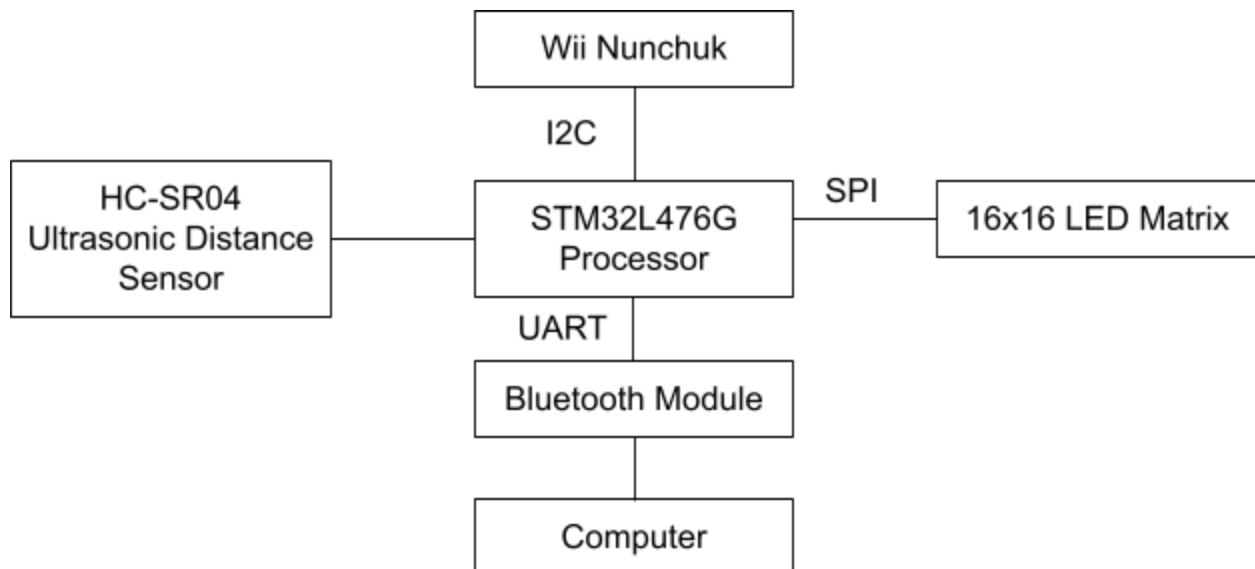
## Peripherals:

- HC-SR04 Ultrasonic Distance Sensor
- 16x16 LED Matrix
- Wii Nunchuk
- HC-05 Bluetooth Module
- Computer (used for Termite)

## Serial Interfaces:

- UART
- I<sup>2</sup>C
- SPI

## Block Diagram:



**Software Design:**

Our software will be coded in C. Using the UART serial interface, we can have the user communicate to the board through Termite to start the test. Once received, Termite will display a message to tell the user to stand at a certain distance, which can be confirmed by the Ultrasonic Distance Sensor. With SPI, the LED display will indicate when the user is at the correct distance. Then, certain LEDs on the display will light up to form Es in various directions. The user will communicate with the board at a distance by inputting what he or she perceives to be the correct orientation with the Wii Nunchuck, which uses an I<sup>2</sup>C serial interface.

**Goals:**

- Program the 16x16 LED matrix to display with E's of different sizes and facing different directions
- Connect the Wii Nunchuk and read its joystick inputs
- Connect to Termite via the Bluetooth Module
- Implement the motion sensor to ensure the user is at an appropriate distance

**Responsibilities:**

Sydney will order the parts. Brian will be primarily responsible for the software aspect of the project. Sydney will be responsible for the hardware aspect of the project, and will assist Brian with the software. Both will post weekly updates to the project website.