ECE153B Project Proposal:
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Goal:
The goal of our project is to create a laser tracking game. We will attach laser pointers onto two pairs of servos. The first pair of servos will be controlled by the computer and act as the target we are trying to track. The second pair of servos will be controlled by the player with a Wii nunchuck. In addition, we will also use an ultrasonic distance sensor to obtain the distance of the wall/surface our lasers will be shined on. Knowing the distance and the angle of the pan and tilt of the servos we can map our laser points with a simple rotation and translation matrix from the 3D world to the 2D coordinate system of wall/surface. Once we get the 2D coordinates we can easily calculate the position of the two laser points and the distance between them. This will then allow us to award points to the player if they can match their laser they are controlling to the position of the target laser within some tolerance range. We will also display game points and info to a Termite terminal.
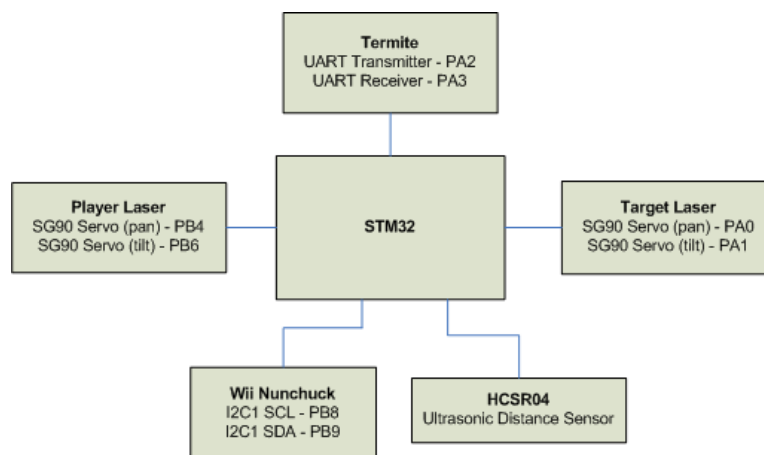
Parts:
- 4 SG90 SERVO MOTORS
- 1 Wii Nunchuck
- 1 HCSR04 Ultrasonic Distance Sensor
- 2 Laser Pointers
- Termite
- Breadboard and jumper wires

Serial Interface Protocols:
- I2C (Wii Nunchuck)
- UART (Termite)

Block Diagram:

Responsibility List:
- Ethan: Servo controls, wii nunchuck, distance sensor
- Simon: Website updates, demo video, Termite setup

Software Structure:
Setup GPIO pins and clocks for servos, wii nunchuck, termite, distance sensor
Randomize movement of target laser by changing PWM of that lasers servos
Create PWM to control user laser's servos based off of input from wii nunchuck
Use readings from distance sensors to calibrate servos to control range of rotation.
Obtain PWM's width and distance reading to calculate angles/distances of both servos/laser points. Then calculate 2D points with rotation/translation matrices. (will need to include `math.h` for cosine and sine operations and matrix stuff)
If 2D points are close enough to each other print points to termite (can also print 2D coords. too)
End Game after ~ 30 seconds

Project Website Link:
https://ethanlee556.github.io/ECE153B-Project/