EEE305 - Microcontroller Project Report

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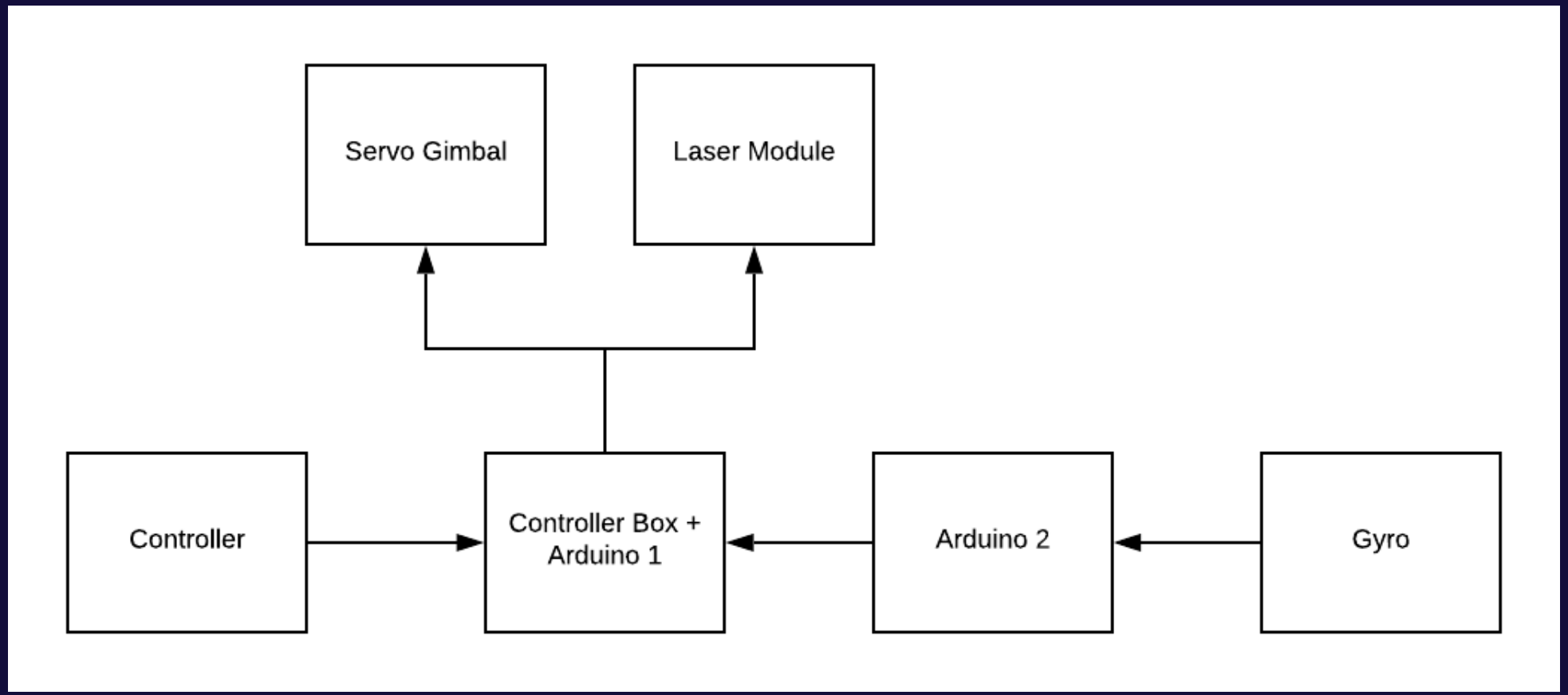
Concept

Here are some pictures of the inspirations behind my project. I was also inspired by some of the platforms I had worked on at my work.

Plan

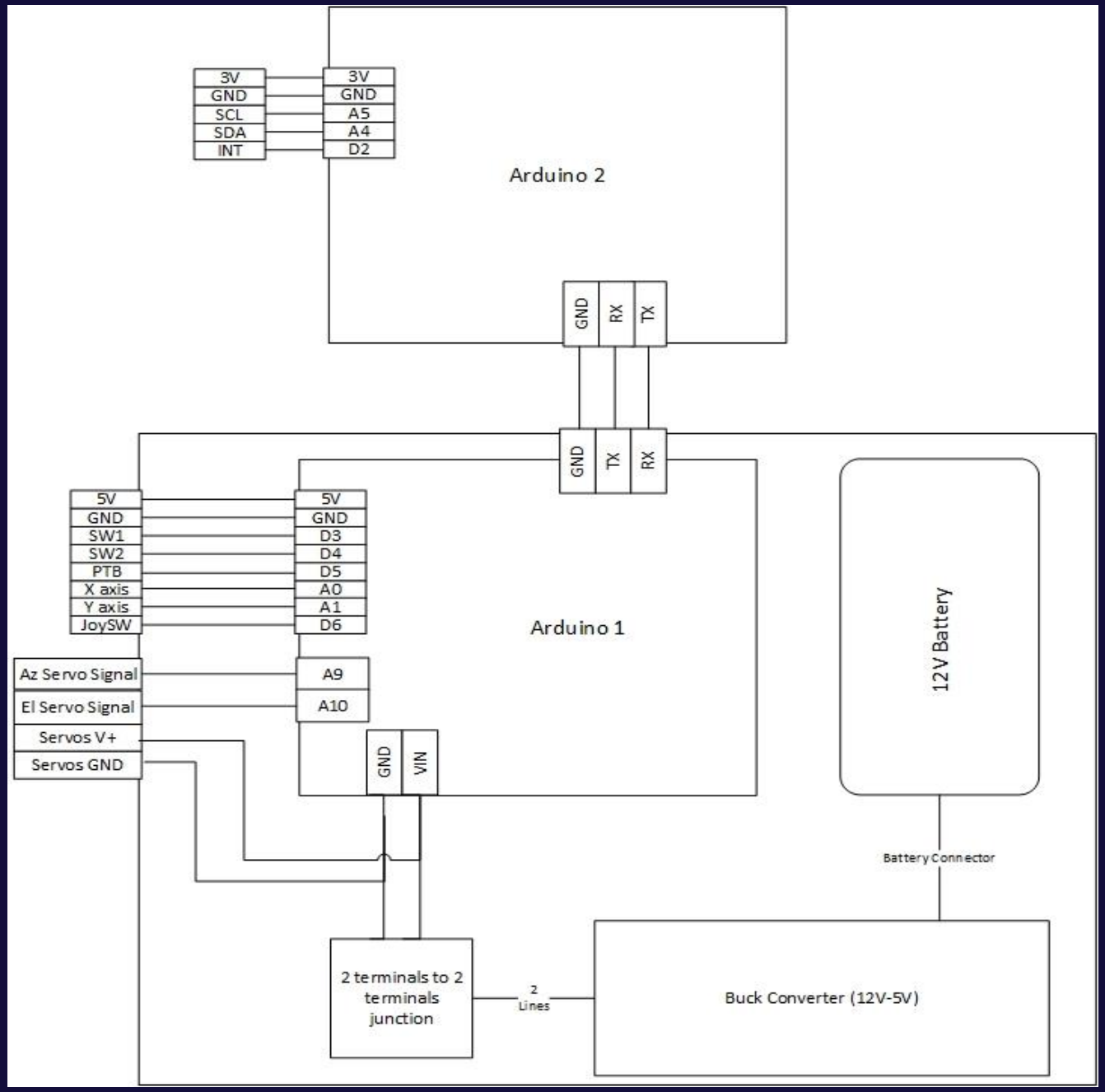
This was my initial concept plan for the project.



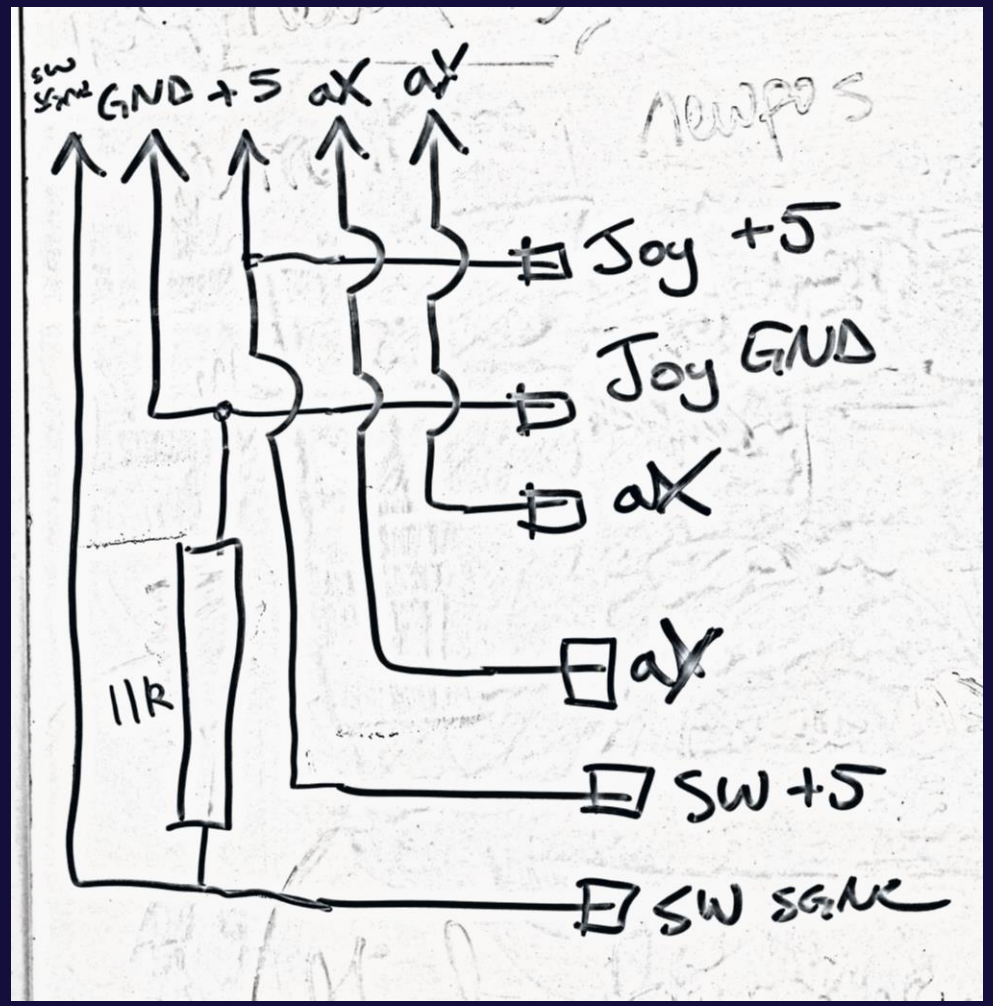
Circuit Diagram

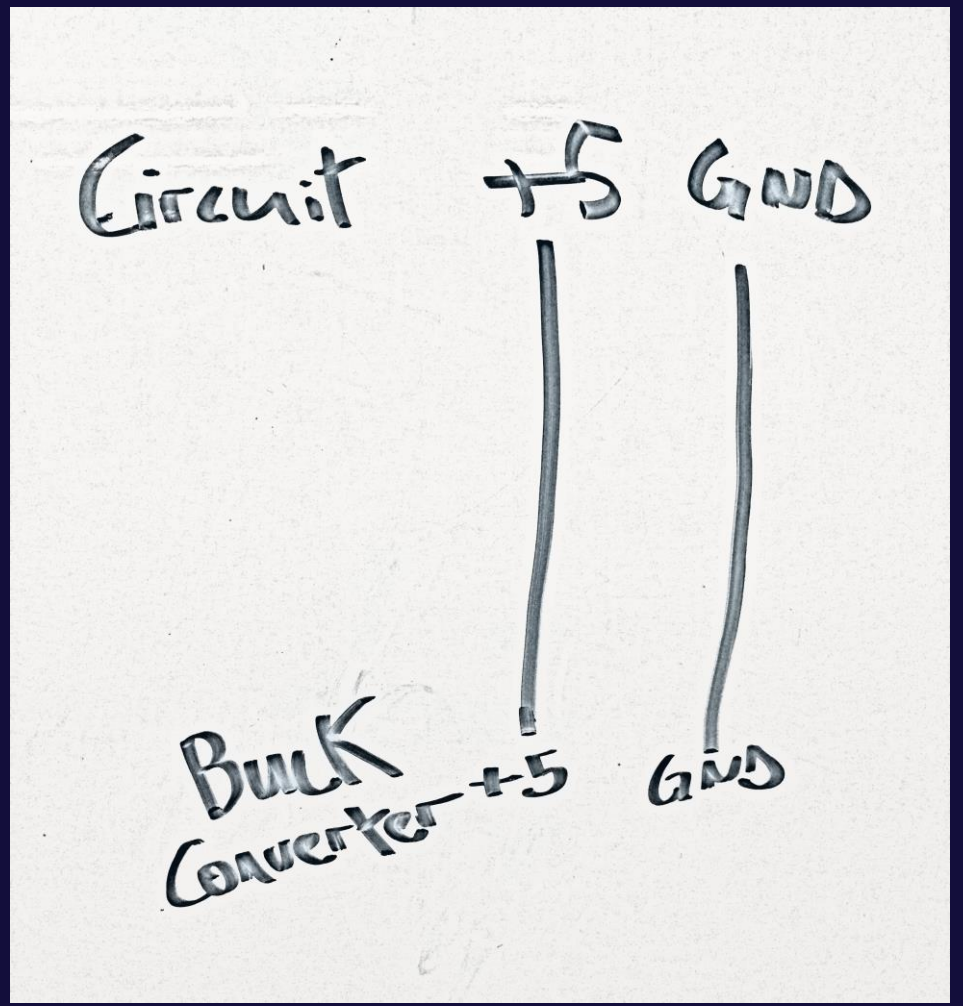
Here is the circuit diagram that I ended up with. The full circuit diagram would include the lasers. This one includes both switches and the push to break switch.

For safety I added a power switch in series with the positive line on the battery connector.



Soldered Connection Boards





Circuit Components

Arduino Nano X2

11K resistor

MPU6050 Accelerometer & Gyroscope

Servo Motor X2

Servo Gimbal Mount

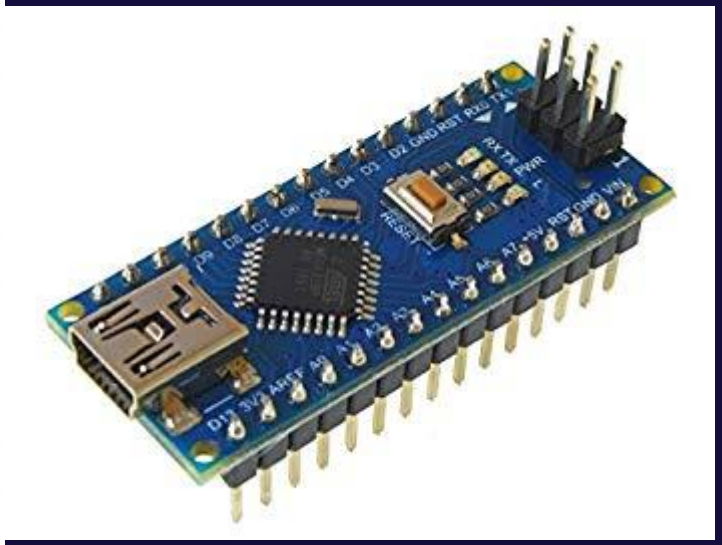
Switch X3

Push to Break Button

XY Joystick

LM2596 DC-DC Buck Converter

MB102 Power Supply Module



Code

In general, the code on the controller box is running through two loops. The entry to these loops is defined from the position of the mode switch. When the switch is operated a interrupt is called. The interrupt function sets a variable which flags the loop to exit and return to the top level loop. Dependant on the state of mode, it then goes into one loop or the other.

The Joystick loop reads vales from the joystick axis, and maps these values to rates. This value is added to the current position of the servo(‘s) axis.

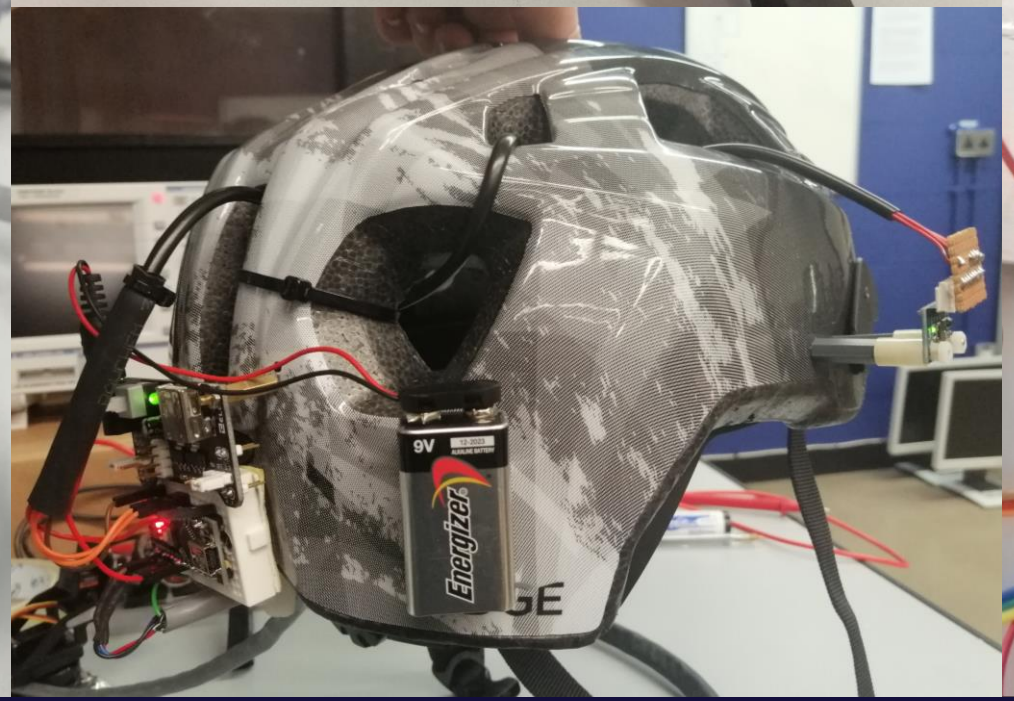
The Gyro loop reads serial output from the headset and writes these values to the servos.

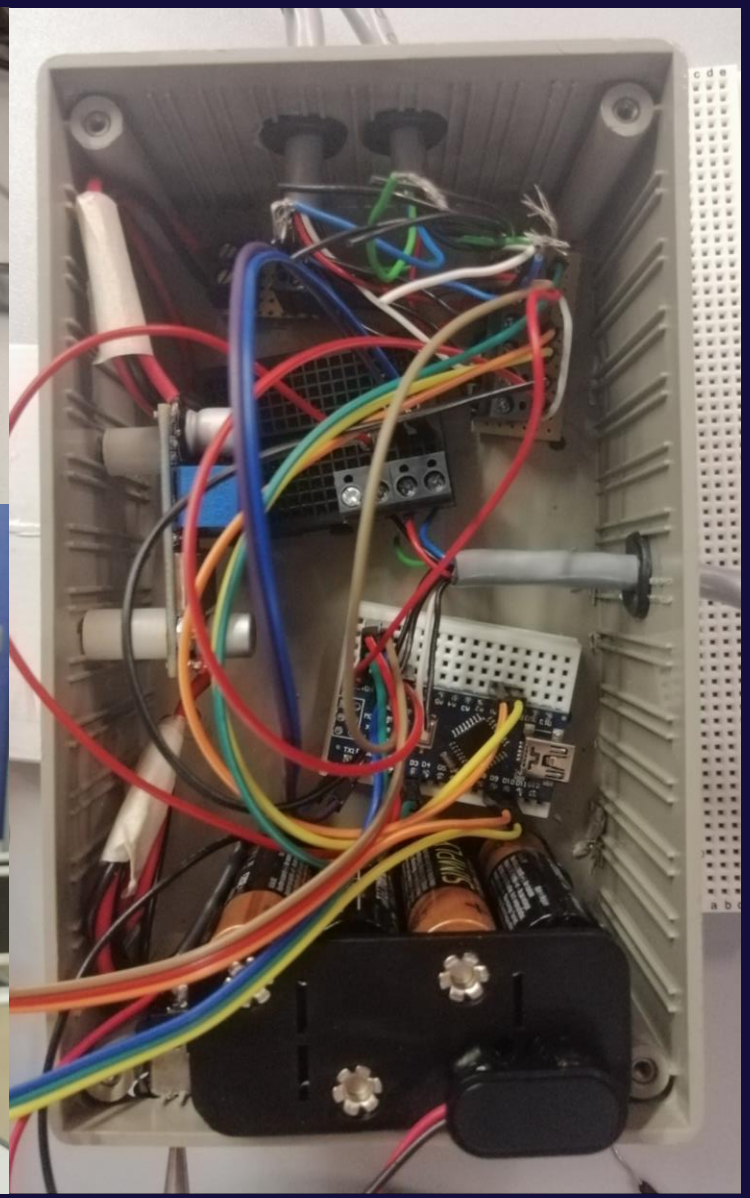
The headset code reads values from the gyro, maps the values and outputs the values over UART.

Both code files have been well commented, read through it to understand specifically what is going on.

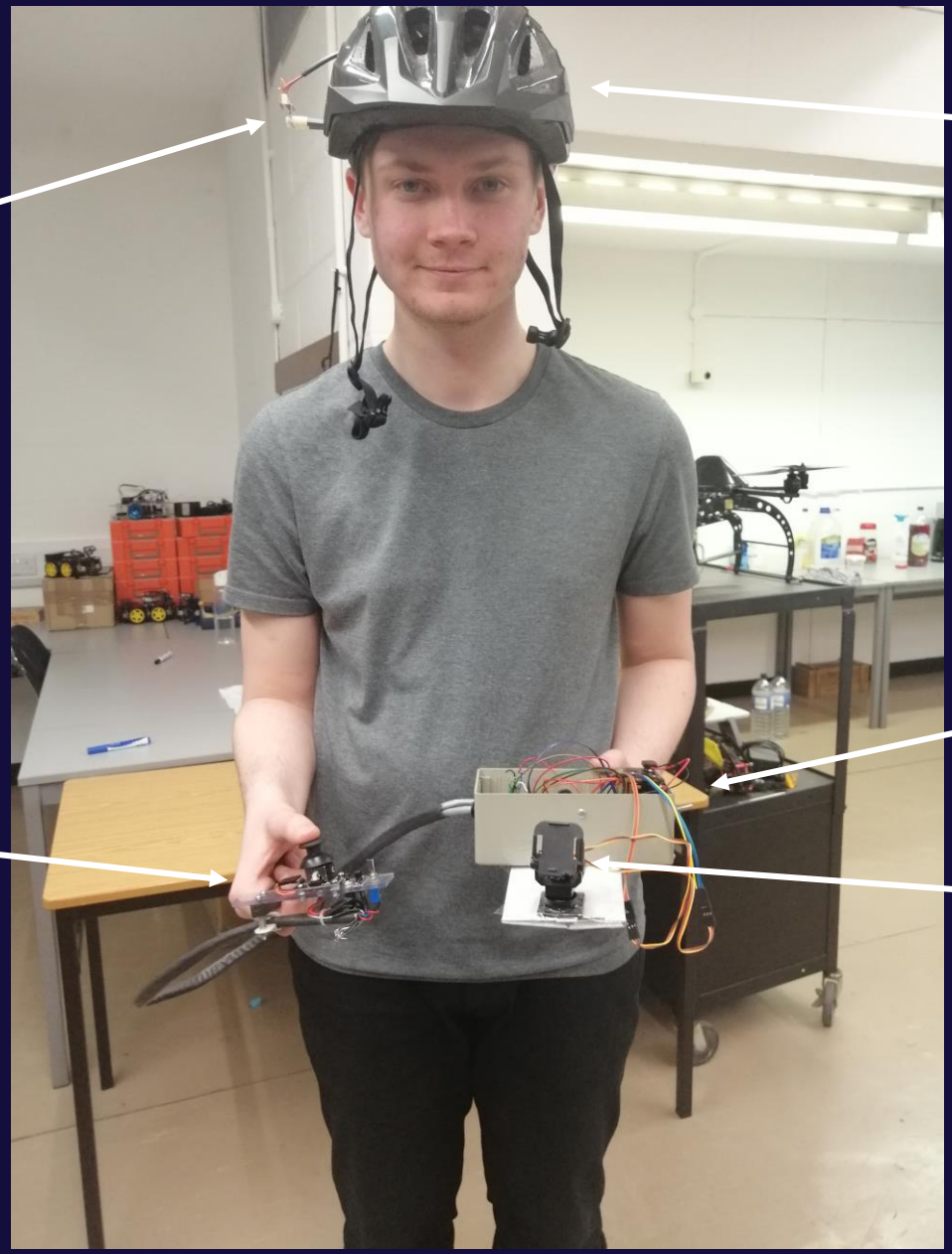
https://github.com/JordanSmart98/Microcontroller-Project

Pictures





Full System:


Gyro
Bicycle helmet
Controller Box
Controller
2 Axis Gimbal

Intentions, Problems & Failures

Intentions	Problem	Solution
Use lasers	Laser safety in uni	Not to use them
Use switch for lasers	See above	Unused, still on controller
PTB Button for gyro reset	Ran out of time	Unused, still on controller
Have full system mounted	Ran out of time	Not done
Gyro mounted on side of helmet	Loss on gyro, centre of rotation	Not changed
Use I2C for communication	Wire too long, coms loss	Used UART instead
Have soldered boards for	Ran out of time	Some boards soldered
Use 1 power supply in controller box	Wire too long, current loss	Separate supply on headset

Miscellaneous Issues:

I had many issues with hardware due to using jumper wires and not soldered wires.

I had a problem where my UART comms was capturing half of my data from the other Arduino. This was by far the hardest issue I faced.

Due to working and studying, I found myself short on time with regards to the other functions.

Future Intentions

I found myself getting really passionate about this project as I was doing it, so I intend to redo all of my project with circuit boards and proper hardware.

The current build will be considered a prototype model.

I also want to make it more aesthetically pleasing, and make body mountable connections for the controller and controller box.

Maybe even a model of the predator cannon to mount on the gimbal.