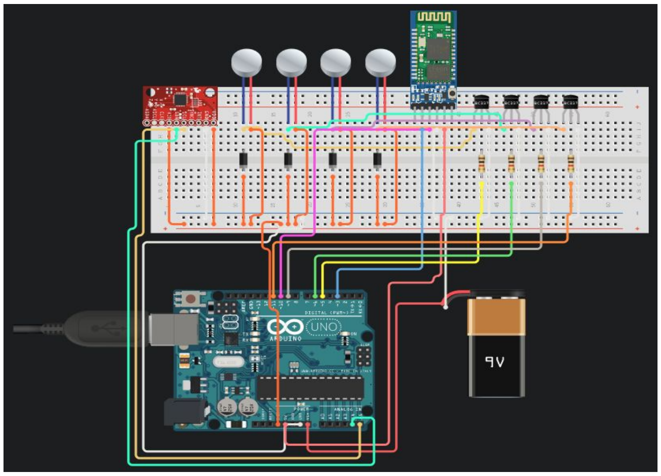
Comp140 Assignment 2 Report – Project Proposal

Thomas O'Leary - to231922@falmouth.ac.uk – 1903716

The main design for the controller will be a simple box. When the box is tilted (forwards, left, right or backwards), it will tilt the maze within my game (depending which direction it is tilted). The aim for the player is to tilt the maze to allow a ball to get from it's starting position to the finish. If the ball collides with a wall within the maze, a short haptic vibration will occur within the controller - notifying the player that the ball has collided. This haptic feedback will occur where the ball collided (front side, left, right and back).

Components Required:
Arduino Uno (68.6mm length × 53.4mm width)
MPU-6050 Accelerometer (21.2mm length × 16.4mm width × 3.3mm height)
Vibrating Disk Motor × 4 (3.4mm length × 10mm diameter)
HC-05 Bluetooth Module (26.9mm length × 13mm width × 2.2mm height)
9V Battery Connector
9V Battery (27mm length × 17mm width × 48mm height)
Solderless Breadboard (170mm length × 65mm width × 10mm height)
TIP120 Transistor × 4
2.2k Ohm Resistors × 4
1N4001 Diode × 4

- As a user, I can control the pitch and roll of the maze by changing the pitch and roll on the controller.
- As a user, I want to have some sort of feedback when the ball in the maze has collided with an object.
- As a user, I want the controller to be Bluetooth so that it can be wireless.



Hardware of the Controller

The main hardware component required for this controller to work is the Arduino Uno itself. Without this, it would make it very hard for myself to make sure that all other components integrate with each other and overall much harder to interact with Unity. The Arduino Uno, supplied by the Games Academy, allows me to control all my other components, also allowing me to utilise them to what I deem necessary for the project.

The MPU6050 component is a simple 3-Axis Gyroscope, Accelerometer and Temperature module that will allow me to calculate Pitch & Roll for real life movement in my game. This small component is a very important module for my project as it will control the movement for my maze in the Unity Project.

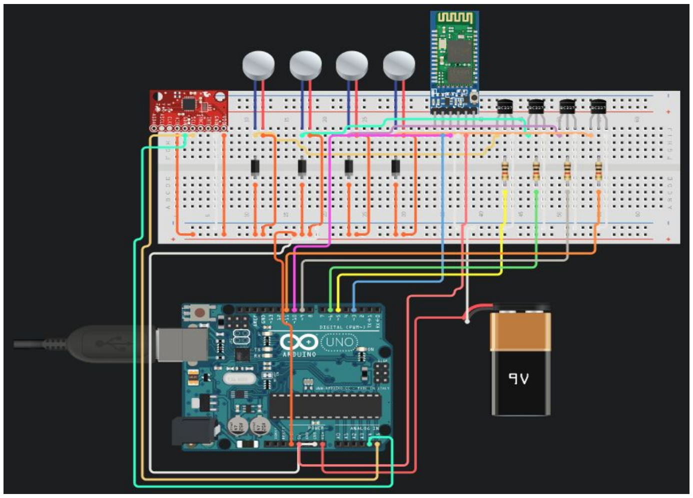
The HC-05 Bluetooth module is a small Bluetooth module that is able to transmit and receive Serial data. Because of this, I will be able to use the module to communicate over serial communication without a USB cable – allowing it to be wireless and handheld.

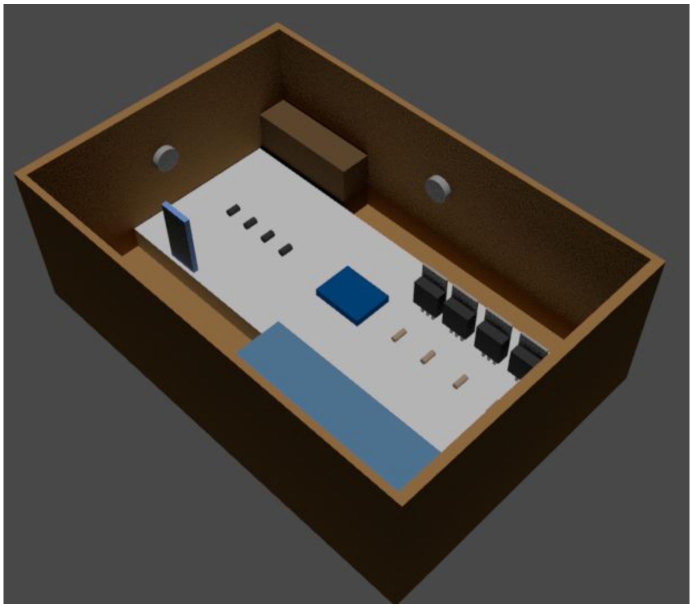
To control the haptic feedback for the controller, I am using 4 separate 3.3v Vibrating Motors. The starting current of these motors are ≈85mA, which exceeds what the Arduino Uno can supply. To resolve this issue, I will use TIP120 transistors to allow me to supply an external power (9V Battery) to my motors.

Other hardware in my controller consists of:

- Breadboard
    - To allow me to connect all the components together with jumper wires
- 2.2k Ohm Resistors
    - This will control the flow that goes through the Arduino Uno from the TIP120 transistor
- 1N001 Diodes
    - This will make the ground (negative) of the motor’s electrical current flow in one direction

Design of the Controller





The controller itself has a very simple design as the overall casing is just a simple enclosed box that all the components are placed into.
One possible issue with the design itself will be the jumper wires as there would be so many required for each component and it will be easy to be confused on which jumper wire is for what.

The wiring will not be overly complicated in the controller. The most confusing part that I will encounter with is having to use the TIP120 transistors as I have never experienced in having to use these with my limited experience overall in electronics.

In the casing of the controller itself, the 4 separate 3.3v motors will be stuck to the sides of the box (this can be done with the motor itself as it has an adhesive back). This will allow the player to know directly on the controller where the haptic feedback is coming from.