**Robotics Documentation**

Hardware Limitations:  
 If very large object is detected, robot will turn and fail to perform object detection again

Possible fixes – Robot move slightly back then progress movement

Object Detection, when picking a side to turn, usually the right side, this affected time results and efficiency

Object Detection takes 1 sec approx.

Goals (Intro):

We were assigned with the task to get a robot that everyone was assigned with, though an obstacle course. Said obstacle course consisted of 5 black lines which were 2 tiles wide, and a number of different placed obstacles which will differ for every time the course is run. In addition, each robot will be placed at a different orientation in the beginning and we were tasked with correcting said orientation. The end goal would be to reach the end of the course in the most time efficient way possible. To reach this goal we used multiple different tools that came with the robot set, these include using the ultrasonic sensor in order to be able to avoid the objects in the course, the gyroscopic to set the robot to always move in the correct forward direction since the robot’s wheel motors tend to go off the correct direction and as such it needed to be corrected, and the line tracking module in order to identify whenever the robot is on a black line. Combining all of these modules would allow us to reach the end goal as required. During the testing and building of the code we encountered multiple different errors and inaccuracies which we needed to alter and correct, however as we found out, certain inaccuracies simply came down to hardware limitations from the robot itself. Certain alterations were implemented in order for said limitations however some of these were out of our hand, or were discovered at a late time and as such time constraints simply did not allow us to find any possible fixes.

Relevant Literature:

We were presented with the Elegoo Smart Robot Car v4.0 for our assignment. This robot is assembled with multiple different components such as a gyroscope, ultrasonic sensor, camera and much more. Said components of were all connected through a Elegoo UNO R3 Board along with an I/O Expansion Board. An Elegoo UNO R3 Board is exactly the same as an Arduino UNO R3 Board however the difference being that it is made by the company Elegoo, and it doesn’t support the Arduino Project and does not include the Arduino IDE [1]. An I/O Expansion Board is often used to expand the number of pins available to most microcontrollers as they usually come with a very limited number of pins, and hence a limited number of interfaces with the outside world. An I/O Expansion Board takes a few of those pins and then fans them to more pins [2]. Through the use of these boards, we were able to connect all the required modules together.

[1] - <https://www.educba.com/elegoo-vs-arduino/>

[2] - <https://forum.arduino.cc/t/what-is-an-i-o-expansion-board/106832>