Project 1: EV3 Robot Football Individual Report

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**ABSTRACT**

# INTRODUCTION

The task presented to our group during this project was to design, build and code an autonomous, light following robot to play football. The robot was required to locate and navigate towards an infrared beacon (the goal), evading any obstacles that may have been inhibiting it from completing the task. The robot then had to stop 40cm in front of the beacon and shoot a football into the goal. The robot was required to start and stop at the sound of a clap and had to include a ‘kill switch’ in case of a malfunction causing a collision with an object. The way in which this task was completed was to be decided by the group but had to use the LEGO Mindstorms EV3 robot building kit and coding software.

Before creating the robot, we were required to perform research on a wide range of topics relating to light following robots. We were then required to analyze the scientific properties of various components used in this form of robot. After completing the task, we were finally required to create a formal presentation, technical group report and individual report. Our group leader was Vibooshan Nanthakumaran, with the other members being comprised of Umer Chaudhri, Klodian Synaj, Muaz Ferati and I.

# PERSONAL CONTRIBUTION

I feel that I contributed a lot to the group, beginning with the research at the beginning of the project. My research was conducted on the common applications of light following robots and different types of light following robots. I then moved onto an analysis of the scientific properties of light following robots, analyzing how autonomous robots ‘think’, communicate, avoid injuring human beings and what damage to the environment such robots may be causing. I also conducted research on ultrasonic sensors, detailing how they function and what ultrasonic sound is.

I was coding leader, focusing on this because of an interest in computer engineering. Because of this, I was also responsible for creating the coding flowchart. I assisted the other group members with the design and build of the robot, with my focus being sensor placement. This was due to being responsible for most of the software coding, allowing me to place the sensors in the most beneficial way for the code to function correctly. An issue that the group also ran into was what components to use for movement (e.g. wheels, tracks, etc.). There were some issues with traction from the wheels with our first design, so I suggested using tracks instead. This is because I felt that this could rectify the traction issue by providing more grip on carpet, which was the surface that we were required to use when presenting the finished robot. I tested this idea, but found that, through adjustment in the coding, the wheels provided a suitable amount of traction for the required tasks, so we decided as a group to keep the wheels.

When coding, I was able to make the robot do all the required tasks but had many issues with attempting to perform the tasks simultaneously in one program. I attempted to use stacks of loop and switch blocks within the coding software to rectify this issue, but this was ultimately unsuccessful. I was able to make three of the four sensors work together, for example the ultrasonic, sound and touch sensors worked together and the infrared, touch and sound sensors worked together, but I had a lot of trouble attempting to make all of the sensors work in unison. Eventually, due to lack of time, we as a group made the decision to use the lines of code separately rather than together. If I were given more time, I would have performed research on how to effectively use the software to make all the sensors work at the same time.

I assisted my group members with the design of the PowerPoint for the presentation by writing four of the slides, whilst also writing the problem solution for the group technical report. I performed most of the testing when coding the robot, which was necessary because much of the success when coding was through trial and error. I, along with Vibooshan ran the group. Vibooshan was our group leader, but I was responsible for organizing a lot of meetings and keeping track of completed work. I used the software development platform ‘GitHub’ for file organization and version control.

# CONCLUSION

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