

Integrated Project

by Rizwan Chishti

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Y Drindod Dewi Sant

UNIVERSITY OF WALES

Trinity Saint David

SWANSEA - ABERTAWE

University of Wales Trinity Saint David

School of Computing

Foundation year

Integrated Project M4X01506

Rizwan Chishti

1806547

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Introduction

In this project we were given a task as a group in which we have three participants. We were given a task to build a robot and perform multiple tasks with that robot to complete the task. In this task I will be discussing how we manage to build a robot and how we divided the tasks between three of us .

We had a discussion before we started the task between us that how we can manage to achieve the best results by divided the task between us. So Osvaldas decided to take responsibility to build the robot and Jericho decided to do the computer bit as my job was more to do with mathematics and angles. Such as how many degrees we need to move the robot to stay in lane when we are following the line and how many degrees we need to turn when we enter the maze so we don't crash into walls.

Looking at the task

As I said in the introduction that the task was divided into three parts and I decide to do the calculations which I am strong. The main task we were given was to build a robot to perform multiple tasks with it. After building a robot we have to perform a task in which we have to make a program to move the robot to follow the line and move an object out of the way. That was Jericho's part and in the second part we have make sure that after following the line our robot enters into maze and out of the maze and stop as the sensors pick yellow colour which was my part to do.

To achieve the best results when following the line we have to use the colour sensors so our does not go out of line. And when detects the green colour the programming for maze will start and navigate through the maze until it detects the yellow colour and will stop.

What I did:

I did my job by doing the calculations about the turnings and angles and speed. Then to perform the maze part which was a part of my task. I done my job by having feedback from Osvaldas and Jericho as well as Jericho was doing the programming bit on the computer while I was operating the robot and observing that what sort of angles and speed we need to perform the task accurately.

I preferred my job as a mathematics person because I am quite confident in that part. The programme we were using was Lego mind storm EV3, according to mind storm [1]. Almost all of my help came from my lecturers Gaynor Thomas and Mabrouka about how to use the software for programming for mind storm. I did not have to ask again about this certain task again, as I already knew how to use the true and false loop.

Overcoming the problem:

I did have so problems while performing the task, for example when it was in the maze, it was not doing the turn I wanted it to do so have to work on angles and speeds to achieve the desired results. While it was turning around the corners wheel was only spinning on one side which was stopping the robot to move and creating friction with carpet.

So I decided to add another smaller wheel under the robot to support the front bit of the robot, as there was more weight on the front part and there was only one small wheel on the front of the robot. By adding that small wheel solved the problem and we achieved the desire results as you will be able to see in the video shared along with flow charts and programming codes.

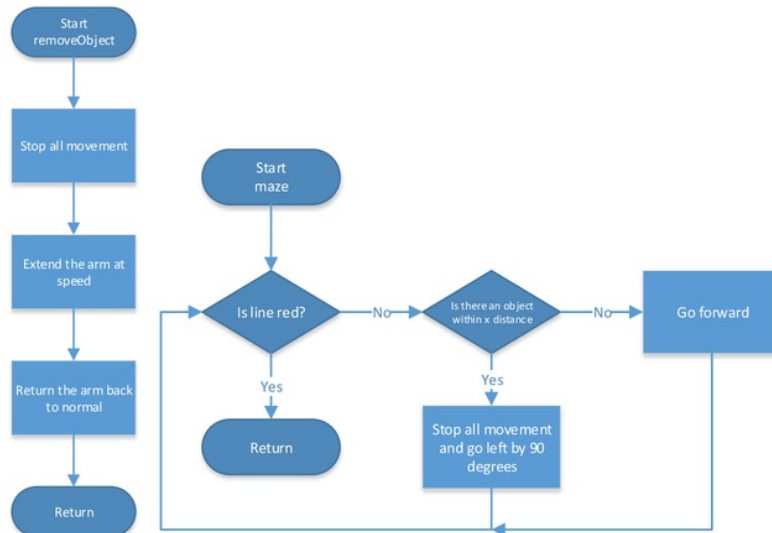
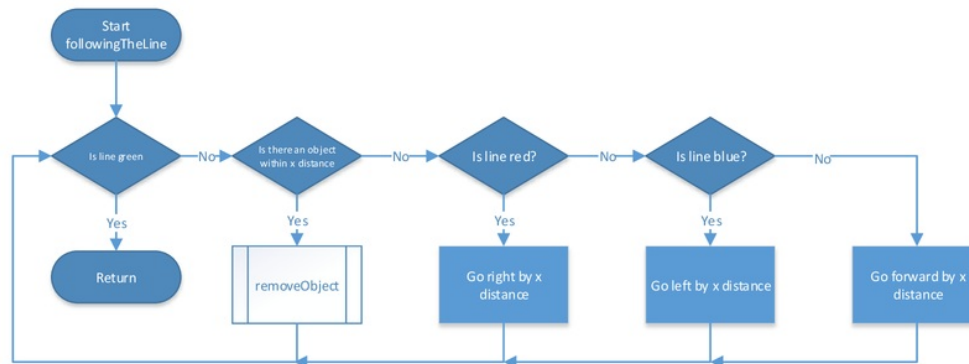
Doing the task

So maze was part of the project, basically we decided when the robot's colour sensor picks the green colour it will beep and the maze part will start after follow the line. We were using the sensors to detect the walls of the maze, when the robot will detect the wall within 15cm it will stop and turn left by 1.6 wheel rotation and carry on straight.

It will do the same every time it detects anything with in 15cm it will turn 1.6 wheel rotation, until it detects the yellow colour which we use for the end of maze and end of our task. As it shows in the video below you can see the desired results were achieved successfully and accurately.

Results

Flow Charts



YouTube video

<https://www.youtube.com/watch?v=h4V3AgH2Bk>

Conclusions

Did it work? How can you improve it? What was good about it? After doing the project as a group we have found out that it can be a tricky one. Because if you try the robot on the carpet you need to rotate more than normal. It's due to the friction caused by the carpet. We have tried in the hallway outside our class so we can compare the both rotation and work something out. It really worked and we achieved the desired result. You can improve adding more parts to the robot, but it will require more time than normal and then you have to make sure that all the sensors are working fine so you can get the desired result. It was a good experience working as a team as I had good team mates. We really enjoyed the company of each other.

I liked working out the angles and rotations, because it was quite a fun. If you really know what you are doing, I believe you would like this project. Time flies as you work in a group and everyone is coming out with different ideas about how the robot should be built and how it should operate.

References

- [1] <https://education.lego.com/en-gb/support/mindstorms-ev3/compatibility>
- [2]. Gaynor Thomas [University Of Wales Trinity Saint David] (lecturer)

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GRADEMARK REPORT

FINAL GRADE

57 / 100

GENERAL COMMENTS

Instructor

Report (60%) overall: 40%

Introduction - 3/5

introduction was okay but could have been improved by adding more details of the hardware and the software used. the task is described. the individual work is defined well.

Background research - 7/15

very limited reference list. there is no in text citation. the research activity is limited with gaps in the knowledge.

Project plan - 4/10

The project plan in combined with the design process. Which made it harder to identify.

Design Process - 16/40

The design process is of a good standard but the information provided is quite limited. Good flowcharts standard.

Evaluation and Results - 10/30

There is no real result analysis or outcome evaluation of a qualitative or quantitative data, in order to develop lines of argument and make sound judgement in accordance with basic theories and concepts of the task.

There is a summative statement in the form of conclusion.

Demo (40%) - 83% overall

Technical knowledge/skill - 17/20

Analytical and problem-solving skills - 15/20

Quality of result - 51/60

Good negotiation of the corners at speed on the line follower. Obstacle is removed well. Maze negotiated successfully, but some adjustment to avoid close encounters with walls might be good from the side sensor so it would work with mazes of differing sizes - this would mitigate any problems with precision of turn.

Overall mark for module: 57%

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