

Design Document

Team 3 – 4

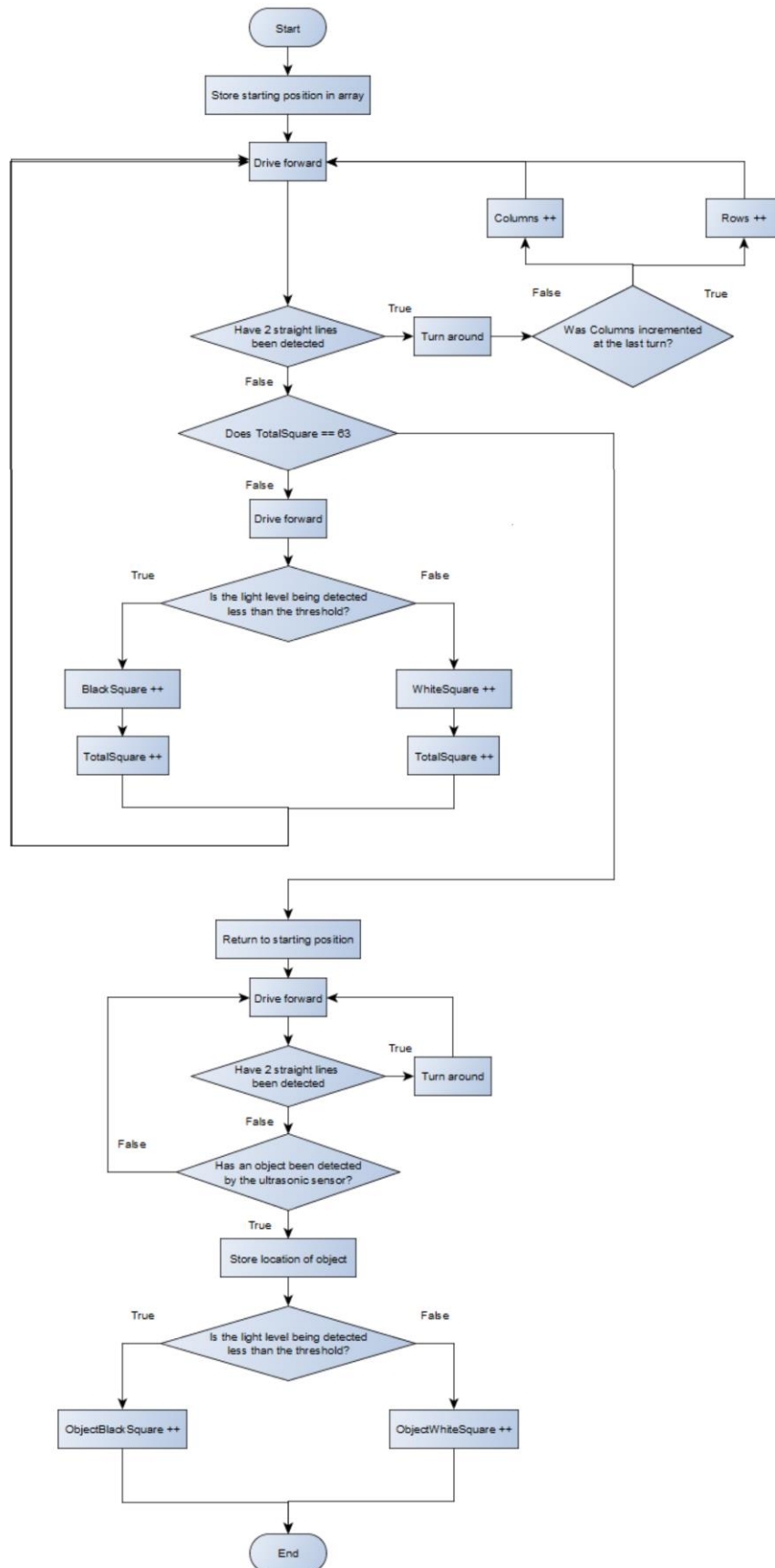
Eoin Lynch

Paul Langtry

Program Description

Our team aims to code our program as simply as possible to satisfy the brief that has been given to us. Firstly, our robot will check whether a square is black or white by using a threshold value in our code as well as the light sensor on our robot. Our team's program will first note the location it started at when the code is executed. The team will then code our robot to start driving, all the whilst noting the locations of the black and white squares that are scattered around the map. The code that the team has wrote will also tell the robot to turn around when it detects the two black lines at the edge of the map in order to stop our robot from falling off the course. The locations of the black and white squares scattered around the course will be stored in two separate arrays. Our code will calculate the total number of squares in the course by using a single integer variable that will be incremented each time a square is detected on the course. Our team's code will also count the number of rows and columns on the course. Our team's code will then return our robot to its original starting position once it has completed the course and has counted all 63 squares. The robot will return to its starting position by using the starting position that was recorded when the code was executed on the robot. Our team's code will also be able to detect an object on the course. In order to detect this object, the team will fit an ultrasonic sensor to our robot. When the ultrasonic sensor detects an object less than a certain distance away it will note the location that the object is at and the location of this object will be noted in an array that will be used solely for recording the location of the obstacle.

Flowchart



Project Task Plan

Week 1

In week 1 we plan to assess the robot and plan our code very carefully to ensure the robot moves in a manageable matter, e.g. won't drive off the table and will follow the maps plan. We will check our GitHub and scan through our code from the labs weeks before with all our tasks in it, from this code we hope to use a good portion to try and implement into our new project.

We will be experimenting with the code to make it work with our new project. For the first task of our project we hope that using the code from the lab weeks before will make the task a very manageable problem and we hope to execute the task with great precision.

We will probably modify the code so that the robot moves slowly through the grids and we can monitor its movement and then gradually increase the speed to a manageable level so that the robot will drive through the grid at a good pace while keeping its accuracy and not going outside the lines. If we have time in the first week we will start the second task and output the map to a file.

Week 2

In week 2, if we are on schedule we hope to have started the second task, outputting the map to a file. We will have successfully implemented the counters and recorded the number of rows and columns, number of white and black squares and the number of squares in total.

We hope to use some code from the labs before such as using the various sensors involved in sensing different colours and implementing a successful counter to count various differences between line thickness and colours.

We feel that trying to get the counters to work accurately and count the right lines will be a timely operation and we will probably need the full lab to complete this section of the project.

Week 3

In week 3 we hope to complete the task requiring us to scan the grid and input it into a second file that contains the position of the object on the grid and the colour of the cell occupied by the object.

We hope to finish this task fairly quickly and will proceed on with the following tasks. We will then take a small amount of time out to study our robot and adjust its speed the best we can while maintaining the robots accuracy until we reach a certain speed that we cannot go over, or the robot will lose its control.

By this stage we are hoping to still have some time left in the lab and we will start to look back over our work done and tidy up any messiness in the code.

Project Task Plan

Week 4

In week 4 we hope to have all our work done and checked and we will be ready to look back over our code and think about ways we can modify our code to enhance it and make it more efficient. We will do out a rough plan on paper of how we are going to enhance the project and search various ways to make it better with some possibly new movements and motions to make each maneuver of the robot smoother.

We hope to have at least 1 hour left by the end of the last step, in this hour we hope to scan back over our code and re-check everything we did and tidy it up using spaces and commenting each relevant piece of code.

Week 5

This is our final week, in this week we hope to have everything completed and this is just to convert our “prototype” robot into a fully functioning robot capable of completing all the tasks that are asked of it and complete them perfectly and to the best of its ability.

We will check over our journal entries and compare them with each other and discuss how we tackled each part as a team and write down how we divided the work for clarification and clear view in our heads of how we completed the project and how our robot has been completed together as a team.

Overall we hope to have learned many lessons from building the robot and getting it to carry out various tasks and how working as a team benefited us with the work we will represented and hopefully have a great mark at the end.

Robot Setup

The robot build I plan to use is a simple build with the following sensors, ultrasonic sensor, light sensor and gyro sensor. The robot will be a basic build, I will not include the rest of the sensors on my build unless they are required. I will not include the front arm, all these different sensors not included will decrease weight on the robot and less friction, meaning the code might have to be slightly modified to counter the new weight balance.