SCHOOL CATEGORY

FOLLOW YOUR PATH 3.0

Sample Preliminary Design Report

Team Name:	**MAZE MASTERS**
Team Number:	YT-15 (Will be given)
School Name:	
Team Members:	Team Member 1 Team Member 2 Team Member 3 Team Member 4 Team Member 5

Organized By: YarlITHub

TABLE OF CONTENTS

1. Introduction

Our team, *Maze Masters* from *Yarl Tech College, Jaffna* (Team Number: YT-15), is excited to take part in the Follow Your Path 3.0 robot car challenge. Our vision is to design and build a simple, safe, and fully autonomous robot car that can successfully navigate the maze while following all the competition rules. Our goal is to apply what we have learned about robotics, electronics, and programming to create a robot that can accurately follow the line, make correct decisions at junctions, and reach the end of the maze as efficiently as possible. We also aim to work together as a team, solve problems creatively, and represent our school with pride.

2. Components List

Component	**Specification / Model**	**Purpose**
Microcontroller	Arduino Uno	Controls sensors and motors
Chassis	2-wheel drive robot car chassis	Frame of the robot
Motors	2× DC gear motors (150 RPM)	Drives the wheels
Motor Driver Module	L298N	Controls motor direction/speed
IR Sensors	3× TCRT5000 IR sensor modules	Detects the line and junctions
Battery	7.4V Li-ion rechargeable battery	Powers the robot
Caster Wheel	Small plastic caster	Balances the robot
Wires & Connectors	Jumper wires, screw terminals	Connects all components
Switch	Mini toggle switch	To start/stop the robot safely

3. Design Sketch

[Sample Design or the Robot Car]

It can be either an

- 3d model
- Hand-drawn Pictorial reference
- Simple ‘Paint’ jpeg image

4. Autonomous Operation Plan

4.1 How the Robot Will Navigate

Our robot will move on its own after being started, without any remote control or human help. It will use IR sensors to detect the white line on the black background and follow it through the maze. The robot will keep checking the line at all times to make sure it stays on the correct path. When it reaches a junction, it will follow the direction decided by the algorithm based on earlier indicators. The robot will stop automatically when it reaches the end of the maze.

4.2 Algorithm or Flow Description

The process starts by activating the robot, which then continuously checks if the line is detected. If the line is lost, the robot stops briefly and tries to re-detect it. When the line is detected, the robot follows it by adjusting its motors accordingly. If the robot encounters a junction, it determines whether it is an indicator junction or a regular one. For indicator junctions, it reads the direction indicator to decide the final route; otherwise, it decides the direction based on the indicator or continues along the line. The robot also checks if it has reached the finish point to stop the operation. If a dead end is detected, the robot stops, reverses, and rejoins the main path. This cyclical decision-making and motor control enable the robot car to navigate a path with lines, junctions, and indicators effectively.

The following figure 4.2.1 is a step-by-step Flowchart of the Path of the robot.

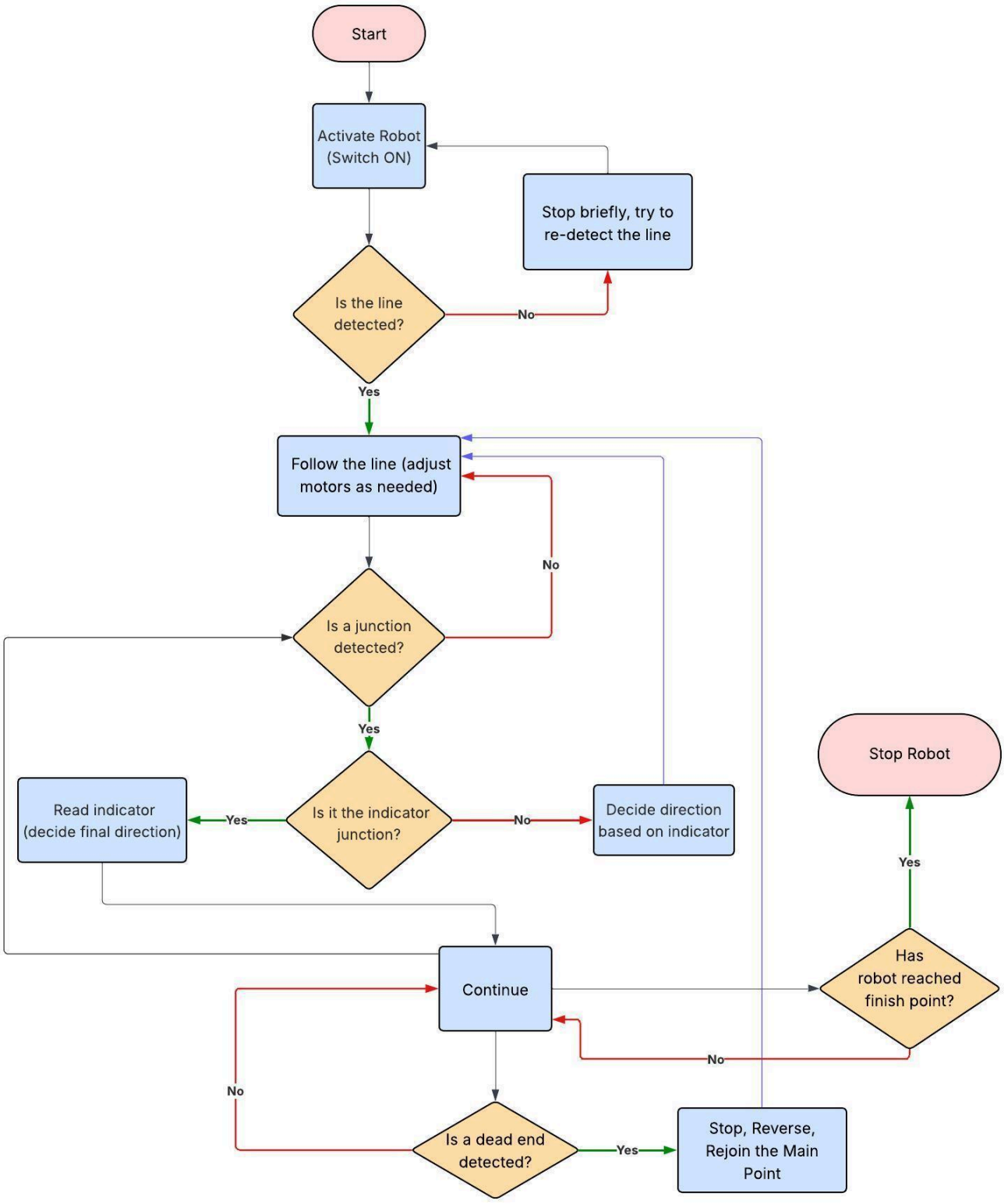

Figure 4.2.1 Flow chart

5. Budget Plan

Component	Specification / Model	Estimated Cost (LKR)	
Microcontroller	Arduino Uno	3,280	
Chassis	2-wheel drive robot car chassis	2,460	
Motors	2× DC gear motors (150 RPM)	2,050	
Motor Driver Module	L298N	615	
IR Sensors	3× TCRT5000 IR sensor modules	1,230	
Battery	7.4V Li-ion rechargeable battery	3,690	
Caster Wheel	Small plastic caster	410	
Wires & Connectors	Jumper wires, screw terminals	820	
Switch	Mini toggle switch	205	
Total Estimated Cost		14,760 LKR approx.	

6. Conclusion Statement

The line following robot car was successfully designed and implemented using an Arduino Uno, DC gear motors, IR sensors, and supporting components. The robot was able to detect and follow a line path accurately, navigate basic junctions, and operate with stable control. Through this project, we enhanced our understanding of microcontroller programming, motor control, and sensor integration. This robot serves as a foundation for more advanced autonomous systems, with potential future improvements such as obstacle detection and wireless control.

7. References

Provide Here the list of

- YouTube Links
- Research Papers
- Documentations
- Referred Websites here