National Institute of Business Management.

Diploma in Software Engineering 23.1F

Final Project Report

Group - H

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Department:	School of Computing.
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DECLARATION

Our project is to create a line following car without an arduino. We used a variant type of IC and sensor to build our circuits.

The purpose of this project is Line following car is automatically follow a predefine line/path which content black or white line. The sensor will detect the colors different and direct the car to the path.

We used an Infrared (IR) sensor to identify the predefine line and adjust the path of the car.

Integrated circuit (IC) is receive the data from the sensor and control the motor and direct the path of the car.

Summary of the project. In this project we can't use the Arduino circuit to build the circuit. This line following car is basic electronic project for beginners to learn about IC, Sensors & other electronic components. In this project IR sensor detect the contrast between predefine line and other background and pass the signal to the IC. IC receive the data from sensor and make decisions & control the motors and direct the car to the predefine path.

Objectives of the project. Research about the basic components and circuits diagram so they can learn about the basic components. They select the component for the circuit and choose the budget for the project. Assembly the circuit using a software and test a safety purpose and build their circuit hands on experience. Car should be capable of taking various degree of turns. Add additional features and component to make the project better.

Result of the project. The design of the car is follow the predefine line/path perfectly.

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Summary

This project purpose is building an automated car which follow a predefine line/path in ground. This circuit build with Integrated circuit(IC), IR sensors and other component & without Arduino circuit. The project aimed to demonstrate the feasibility and functionally of an IC base control system for line following car. IR sensor detect the predefine line and transfer data to the main circuit which include the IC. IC make decisions using data which get from the IR sensors & control the moment of the car using the motors. When the Two sensors are activated the car will stop the moment the point where the predefine line/path is end point.

CHAPTER 01

1.1 INDRODUCTION

In this modern world Line following car is most popular in nowadays. Most of the line following car is based on microcontrollers & arduino circuits but this project is fully based on contolling the line following car using integrated circuits(IC) to achive similar functionality. This line following car is fully automated to follow predefine line/path in ground without human intervention. This project elemenate the use of arduino & microcontroller use and help to understand the fundamental of elctronic components.

This report includes details of the circuits diagrams, components used and usage of components, function of the line following car, methodology, challenges encountered while this project & reference.

1.2 Features of the product

Line following car based on a predefine line/path in ground. It contains the Ic for alternative to Arduino. Ic is a low cost component and efficient for the circuit it achive the arduino similar functions. It's a simple circuit to understand by beginners compare to Arduino circuits. IC's are smaller and light weight to compare then arduino to use. Its consume low power and connect with more component and easy learing logics. We can expand the project and circuit if we use IC.

CHAPTER 02

2.1 CIRCUIT COMPONENTS

a) IR Sensor Moudule
   IR sensor module is used to detect the predefine line/path using IR Emittor and IR receviver.
   1) 10K variable Resistor

      Variable Resistor are widely used to adjust the value of current or voltage.

   2) LM358 IC
      Used as the input signal to decide whether to drive the motoe or not getting the signal from IR RX.
   3) IR RX [IR Transmitter & Emmitor]
      Transmitter Transfer the signa and reciver recive the signal while detect the other colors[except black].
   4) LED[Light Emmitating Diot]
      Indicate the side or IR sensor is workiing perfectly.
   5) Buzzer
      To check the IR working or not and use a signal sound of the car.
   6) Resistors [Fixed value]

      adjust the value of current or voltage.

b) BO Motors
   Used to move the car to the directions.
c) L293D IC/L293NE IC
   Controls the rotation of the BO Motors.
d) KA 7805 Transistor
   Act like a Switch.

e) Black Tape
   To create a predefine line/path.
f) Wheels
   To move the car.
g) 9V Power supply
   To Provide stable electricity.
h) Bread Board
   Include all the component and connect the commonents.
i) Jumpa Wires
   Use to connect all the commponents to the bread board and other connections.
j) Some other necessary components…….
k) Caster Wheel

2.2 IC TRUTH TABLES

S1	S2	S3	S4	Output
0	0	0	0	Motor Coasts
0	0	0	1	Motor Coasts
0	0	1	0	Motor Coasts
0	0	1	1	Motor Move Break
0	1	0	0	Motor Coasts
0	1	0	1	Short Circuit
0	1	1	0	Motor Move Left
0	1	1	1	Short Circuit
1	0	0	0	Motor Coasts
1	0	0	1	Motor Move Right
1	0	1	0	Short Circuit
1	0	1	1	Short Circuit
1	1	0	0	Motor Move Break
1	1	0	1	Short Circuit
1	1	1	0	Short Circuit
1	1	1	1	Short Circuit

S1,S2,S3,S4=> INPUT OF THE LM293D IC [PINS 2/7/10/15].

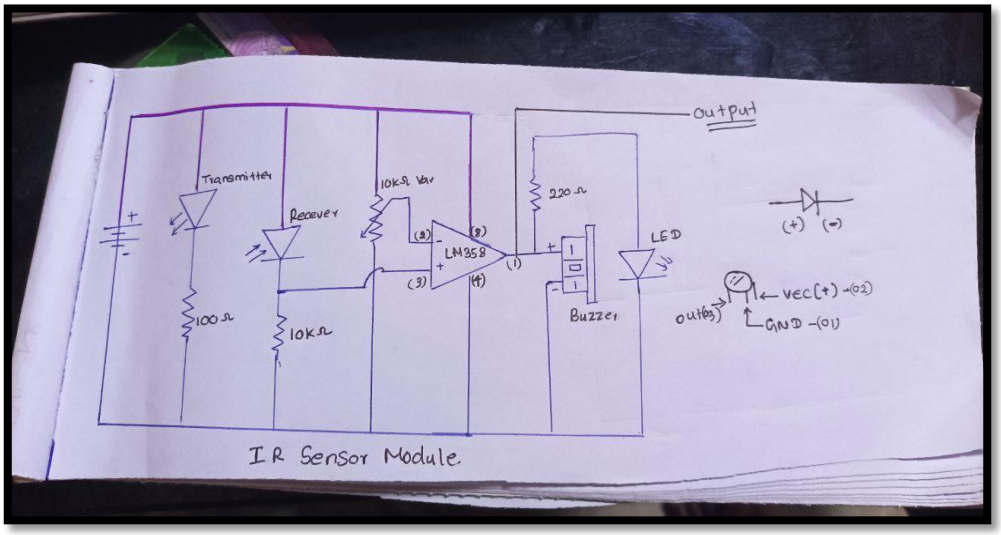
OUTPUT=>MOTOR WORKING CONDITIONS[PINS 3/6/11/14].

2.3 K-MAP

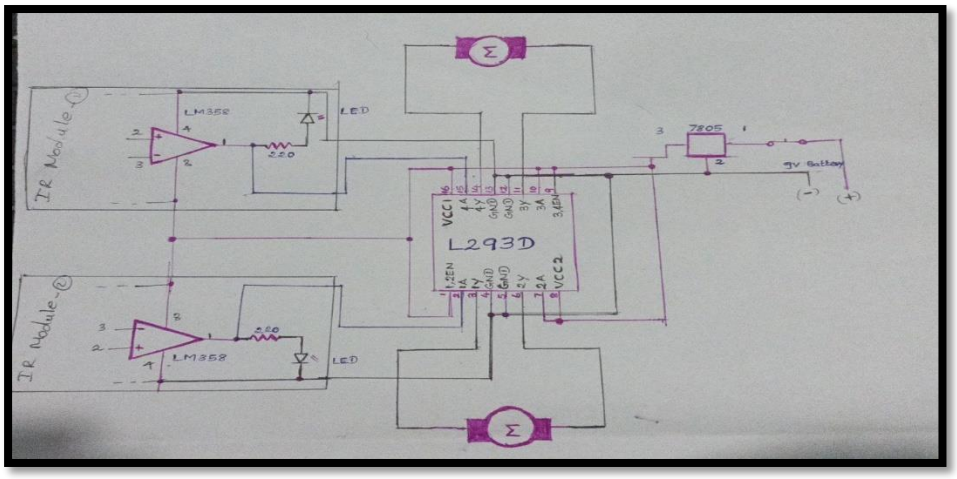
S1,S2/S3,S4	00	01	11	10
00	1	1	0	1
01	1	0	0	1
11	0	0	0	0
10	1	1	0	0

SOP method=> Y=(S2'S3')+(S1'S4')

2.4 CIRCUIT DIAGRAM.



We need Two IR sensor module to detect the the predefine line/path. Above the circuit diagram is to create the IR Module sensor circuit. We can also buy this circuit module in electronic store.



Connect the component using the above circuit diagram. And check the IR sensor module and fix the range for the IR module.After completing the circuit build the outlook. Make predefine Black Line/path with black tape and check the circuit.

CHAPTER 03

3.1 RESULTS OF THE OPERATIONS

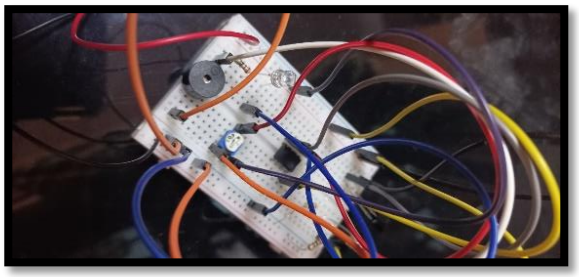
Our project is an innovative idea of an intelligent system which has basically line detection on features and will provide help in various fields. The sensors in the system are a type of IR sensor that senses the line and gives the feedback to the circuit.

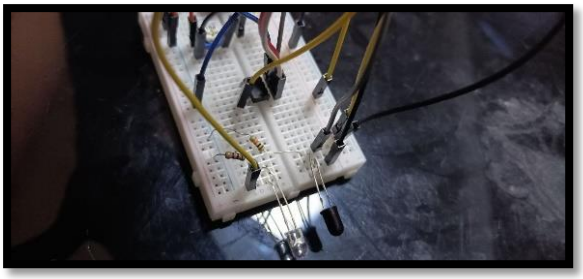
The line following car using an IC circuit tracking and detect line shapes, angles, and junction and Start/End point. IR Module sensors detect the line and sent the data to the LM358 IC and LM358 IC transfer the data to the Motor driver IC L293D [H bridge] and control the Motors.

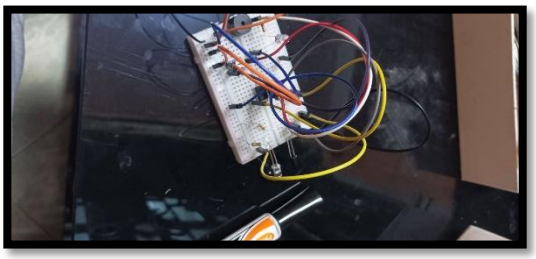
The project Line following car is follow the Black line which is predefine by human. Car is perfectly follow the Predefine line and find the angles & junction.

PRACTICAL RESULT OF AN IR SENSOR MODULE

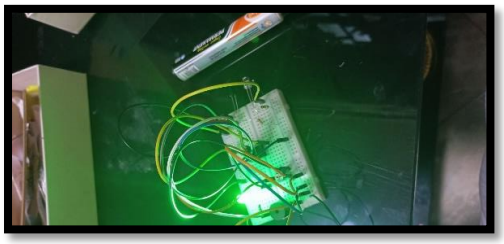
IR sensor module made with LM358 IC, IR RX, Resistor, Buzzer & 10K variant resistor.





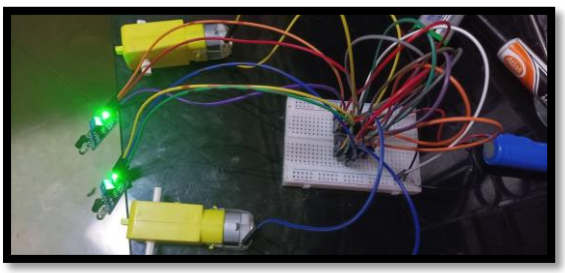


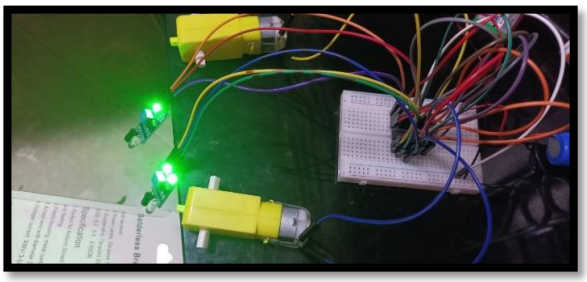
IR sensor module circuit didn't detect the black color and detect other colors and indicate with LED bulb glow and buzzer sound. So the function of the IR sensor module is similar to the IR sensor module. The circuit is working perfectly as IR sensor module.

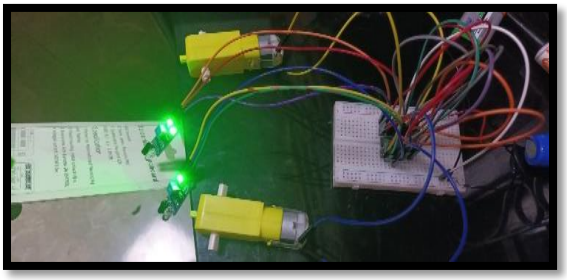


RESULT OF THE MAIN CIRCUIT [PROTYPE CIRCUIT]

Our main circuit result is when the IR module is getting black line as a input(0) the IR module will sent a data to the IC and IC will stop the motor so the wheel will be stop and car is turn to other side automatically. When the IR sensor module getting other color or object the input will be 1 so the motor is run and car will be move. Here we add a few pictures of our project main circuit and function pictures. There are 2 IR module for 2 BO-motor which IR module get the black line/path that time which BO motor is connected to that IR module that motor will be stop.







CHAPTER 04

4.1 LIMITATIONS, RECOMMENDATIONS & CONCLUSION

Limitations The line following cars are designed to operate a predefine line/path if the path is not clear then the car will be struggle to move. They can't move without a predefine line/path struggle in a clear environment. It has a limited speed because of the using IC if we use arduino we can program the speed. IR sensor only detect the line IR sensor can't avoid any obstacles to solve this problem we need an arduino and other some sensors and components. IR sensor has a limited sensor range to detect the line. It only follow the predefine line does not make a decision in a junction. Small predefine line/path is difficult to find the path. Lighting is affect the IR RX it will affect the circuit. Limited Power supply is affect the circuit working function.

Recommendation Choose the High quality Sensors and components to better performance. Select the suitable power supply for the circuit which not affect the circuit components. If the voltage is increase then the components are damage**.** Select the Perfect voltage DC motor. Constract the base and outlook with using high quality component to make better strong prototype. Before assemble the components check them individual if it's working properly or not. Check the safety purpose. Try to add new features to upgrade the project like obstacle avoiding, LED chaser design, Bluetooth or Wi-Fi control and etc.

Conclusion Our primary goal is build a Line following car without Arduino which is follow a predefine line/path. In this project we studied about making the line following circuit without using Arduino and implement the circuit & principles of the components and circuit. IR sensor module tracking the line and transfer data principles and connection of IC and other components. We can improve the circuit like obstacle avoiding, joystick control etc.

Advantages & Disadvantages Automated movement car, Cost effective, simple and basic circuit easy to build & there are some disadvantages to it has a limited range and power supply, It need a predefine path to make movement & limited speed.

References

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APPENDIX

1. IR SENSOR MODULE

IR sensor module widely uses to detect the object, remote control & etc. IR sensor module has IR Transmitter [This part emits infrared light], IR Receiver [Detect the infrared light], IC circuit [convert received analog signal to digital signal] and output interface [provide digital signal 0/1]. The IR Transmitter emits an infrared light beam towards an IR light reflects off the object. The IR receiver detects the reflected IR light. The comparator circuit processes the received IR signal. If the reflected IR signal is above a certain threshold, the module typically provides a digital output to indicate the presence of an object. Applications of IR module proximity sensing, object detecting, line following, remote control, security system, and automotive application.

2. KA 7805 TRANSISTOR

This is a voltage regulator IC. It has 3 terminals which are Vin, GND, and Vout. Output voltage is 5V. This is a positive voltage Regulator. It supply maximum 1A current to the circuit. It designed to supply stable 5v output voltage. It often includes built in overheat protection to prevent damage due to excessive heat. It take 7-25 V voltage as input. It use to low the power to the circuit.

3. L293D IC

This is a current enhancing IC. It can also act as a switching device. It 16 pins IC. There are 2 input pins, 2 Output pins, 1 enable pin for each motor. It as a wide supply voltage 4.5v-36v. Output current 600mA per channel. Internal Electrostatic Discharge (ESD) protection.

Pins

- 1, 9 -Enable1,2/3,4
- 2, 7, 10, 15 -Input
- 3, 6, 11, 14 -Output
- 4, 5, 12, 13 -Ground (-)
- 8,, 16 -VCC (+)

Applications Dc motor drivers, two phase motor drivers, relay drivers, stepper motor drivers.