COAL PROJECT REPORT

Logic Line Follower Robot

Abstract

The research describes a project in computer organization with group which integrated both topics assembly language and hardware design. The project involves the implementation using assembly language to make a logic for an Autonomous Line Following Robot.

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INTRODUCTION:

The Line Following Robot detects a black line on a white surface and moves forward following the line. If a black line is not detected, the Line Following Robot moves forward searching for a black line to follow.

A machine that can follow a path is known as a line follower. On a white surface, the path can be seen as a black line. A basic yet effective system is formed by sensing a line and moving the robot to stay on course while constantly correcting erroneous moves utilizing feedback from the sensor.

OBJECTIVES:

The sole purpose of this project is that:

1.The robot must be capable of following a line.
2.It should be capable of taking various degrees of turns.

PROBLEM STATEMENT:

Line follower robot is one kind of autonomous robot which follows a line until that line exists. Generally, the line is drawn on the floor. It can be either black or white.

Components

- Modules:
  - 1.IR Sensor Modules
  - 2.L298N
  - 3.Arduino UNO
- Others :
  - Jumper Wires 2.Male Headers / Connectors 3.LEDs 4.IR LEDs 5.Photo Diodes
  - Battery

- Breadboard
- Wires
- Switch(on/off)
- 3-Wheels

COMPONENTS DESCRIPTION:

- **Battery –** The battery provides the power to the robot.
- **IR sensors –** are used to detect the black lines on the surface for the robot to follow.
- **DC Motors –** The output from the ICs are connected to the motors and the motor rotates the wheels.
- **Switch (on/off) –** The switch works to make and break the circuit of the robot.
- **L298N Motor Driver –** is used to convert the voltage of the battery supplied to the motors of the robot.

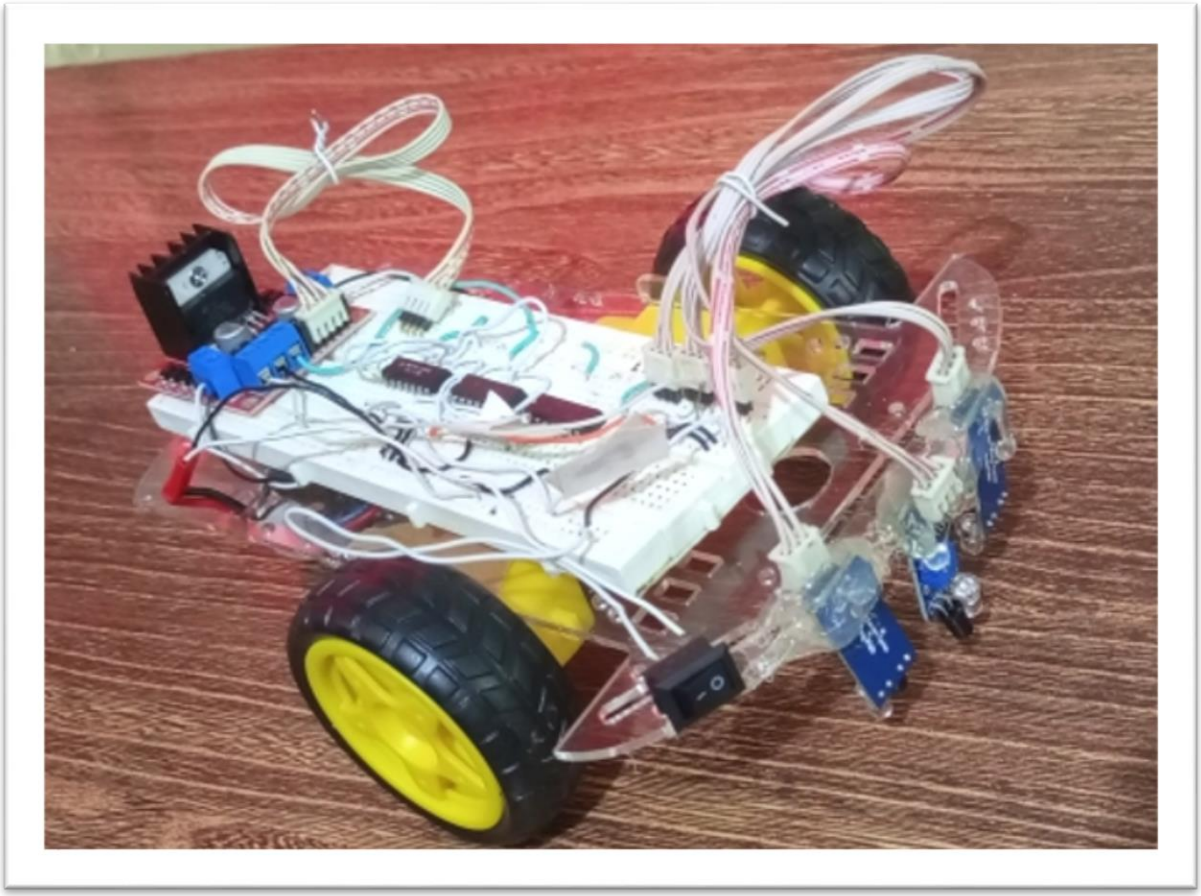
PROJECT MODULE:

- Arduino : The Arduino UNO is a widely used open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board features 14 Digital pins and 6 Analog pins. It is programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts.
- IR Sensors:

An IR sensor is a device which detects IR radiation falling on it. There are numerous types of IR sensors that are built and can be built depending on the application. An IR sensor is basically a device which consists of a pair of an IR LED and a photodiode which are collectively called a photo-coupler or an opto-coupler. The IR LED emits IR radiation, reception and/or intensity of reception of which by

the photodiode dictates the output of the sensor. If the object is reflective, (White or some other light color), then most of the radiation will get reflected by it, and will get incident on the photodiode.

DIAGRAM:



LITERATURE REVIEW:

1. When the right IR sensor detects the black line, the Arduino are designed in a way that the robot moves in the right direction towards the line.
2. When the left IR sensor detects the black line, the Arduino are designed in a way that the robot moves in the left direction towards the line.
3. When the middle IR sensor detects the black line, the Arduino are designed in a way that the robot moves in the forward direction on the line.
4. When the middle and right IR sensors detects the black line, the Arduino are designed in a way that the robot moves in the right direction towards the line.
5. When the left and middle IR sensors detects the black line, the Arduino are designed in a way that the robot moves in the left direction towards the line.
6. When all the sensors detect the black line, the robot moves in the left direction.
7. When the sensors do not detect any black line, the robot moves in the right direction in search for the black line.

SOURCE CODE:

Part 1:

```
extern "C"{
  void start();
  void logic();
  }
void setup() {
  start();

}

void loop() {
  logic();

}
```

Part 2:

```
#include "avr/io.h"
#define __SFR_OFFSET 0x00


.global start
.global logic


start:
CBI DDRB, 2   ;Right Sensor
```

```
CBI DDRB, 3   ;middle sensor
CBI DDRB, 4   ;left sensor

SBI DDRD, 2
SBI DDRD, 3
RET

logic:
state0
state1
state2
state3
state4
state5
state6
state7



state0:
SBIS PINB, 2
SBIS PINB, 3
SBIS PINB, 4
SBI PORTB, 2

State1:
```

SBIS PINB, 2

SBIS PINB, 3

SBIC PINB, 4

SBI PORTB, 2

State2:

SBIS PINB, 2

SBIC PINB, 3

SBIS PINB, 4

SBI PORTB, 2

SBI PORTB, 3

State3:

SBIS PINB, 2

SBIC PINB, 3

SBIC PINB, 4

SBI PORTB, 2

State4:

SBIC PINB, 2

SBIS PINB, 3

SBIS PINB, 4

SBI PORTB, 4

State5:

SBIC PINB, 2

SBIS PINB, 3

SBIC PINB, 4

SBI PORTB, 2

State6:

SBIC PINB, 2

SBIC PINB, 3

SBIS PINB, 4

SBI PORTB, 3

State7:

SBIC PINB, 2

SBIC PINB, 3

SBIC PINB, 4

SBI PORTB, 2

SBI PORTB, 3

CONCLUSION:

This project aims to implement the algorithm and control the movement of their robot by proper tuning of the control parameters and thus achieve better performance. In addition the LCD interface is added in order to display the distance travelled by the robot. It can be used industrial automated equipment carriers, small household applications, tour guides in museums and other similar applications, etc.