

**Micro Processors(MPS) Project**  
Report

# Line Following Robot

Submitted by

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## *Declaration*

This is to certify that this is a bonafide record of the project presented by the students whose names are given below during Spring 2018 in partial fulfilment of the requirements in MPS Line following Project .In addition this work has not been submitted to obtained another degree or professional qualification

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# Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
<b>2</b>	<b>Hardware Components</b>	<b>2</b>
2.0.1	Microcontroller . . . . .	2
2.0.2	5 IR Sensor and Obstacle . . . . .	2
2.0.3	DC Motors . . . . .	4
2.0.4	H-Bridge L298N . . . . .	4
2.0.5	12V Rechargeable Battery . . . . .	4
2.0.6	Power Bank . . . . .	5
<b>3</b>	<b>Literature</b>	<b>6</b>
3.1	Literature Survey . . . . .	6
<b>4</b>	<b>Work Done</b>	<b>7</b>
4.1	Working of Project . . . . .	7
4.1.1	Motor Driver Functionality . . . . .	7
4.1.2	Sensors . . . . .	7
4.1.3	Circuit For Optocoupler . . . . .	8
4.1.4	12V Battery . . . . .	8
<b>5</b>	<b>Future Work</b>	<b>9</b>
<b>6</b>	<b>Conclusion</b>	<b>10</b>
	<b>References</b>	<b>11</b>

# List of Figures

2.1	Tiva Microcontroller . . . . .	3
2.2	Optocoupler . . . . .	3
2.3	DC Motor . . . . .	4
2.4	Motor driver . . . . .	5
2.5	Power Bank . . . . .	5
4.1	IR Sensor . . . . .	8

## **Abstract**

This document describes how to use the TM4C1233H6PM Tiva Microcontroller to implement the black line following car. Tiva is abbreviation of proportional-integral-derivative. The present study aims at developing a LINE FOLLOWER ROBOT or a LINE TRACING ROBOT which is programmed using TIVA. This Robot follows the black line which is drawn over the white surface or it follows the white line which is drawn over the black surface. The infrared sensors are used to sense the line.

# Chapter 1

## Introduction

A line following robot is a versatile machine utilized to detect and take after the dark lines that are drawn on the white surface. As this robot is produced utilizing a breadboard, it will be exceptionally easy to build. This system can be fused into the Automated Guided Vehicles (AGV) for giving the simple method for activity.

By and large, the AGV is incorporated with the chip and PCs for controlling its framework. It likewise utilizes a position input framework for going in the desired way. Furthermore, the electric signs also, RF correspondence are required for speaking with the vehicle and framework controller. Such cumbersome capacities are totally not required in this line following robot, and it just uses the IR sensors to movement on the dark lines.

Dissimilar to room-investigation robots that regularly stall out against seats and cover edges, you don't need to pursue a very much planned line-following robot. Most line-following robots have two engines, two front sensors, and a fundamental electronic circuit for self-ruling control. However, an awesome thing about this kind of robot is that it simple to roll out little improvements for included many-sided quality. Straightforward change is to introduce the robot in an ornamental holder, alongside beautiful LEDs. Further developed outlines include different sensors and a programmable microcontroller Tiva for quicker speed, smoother turning.

# Chapter 2

## Hardware Components

### 2.0.1 Microcontroller

We have utilized the Stellaris microcontroller LM4C1233H6PM in our Project. The LM4C1233H6PM microcontroller has a Reduced Instruction Set Coding (RISC) core. Internal clocks, UART, USB, SPI, pull-up resistors, pulse width modulation, ADC, simple comparator and guard dog clocks are a portion of the features. With on-contribute framework programmable Flash and SRAM, the LM4C1233H6PM is an ideal decision keeping in mind the end goal to advance cost.

One of the most important step in our project is that we power up our microcontroller through Power bank Refer figure ??

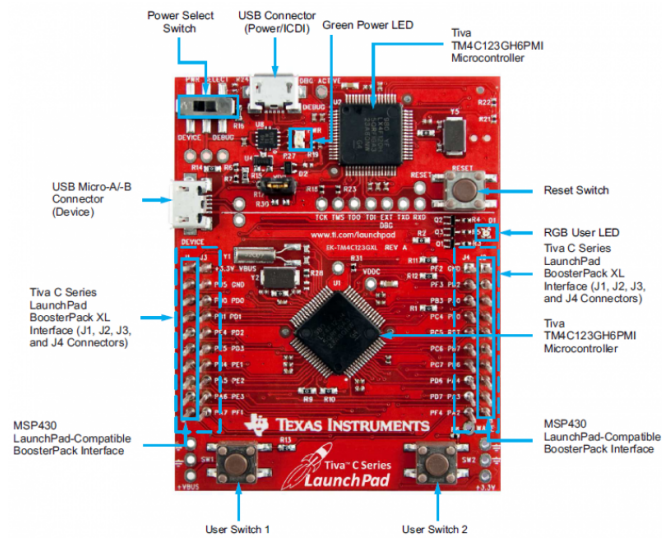
### 2.0.2 5 IR Sensor and Obstacle

This is a Five IR Sensor Exhibit with Obstacle and Knock Sensor. A 5 IR sensor use with TCRT5000 have a conservative development where the producing light source and the locator are masterminded a similar way to detect the nearness of a question by utilizing the intelligent IR-beam from the object. The working wavelength is 5 cm. The identifier comprises of a phototransistor. Refer figure ?? Input voltage: 5V DC VCC, GND Pins.

Output: 5 from TCRT5000 is S1, S2, S3, S4, S5 digital.

Output: 1 from Bump switch is CLP digital.

Output: 1 from IR Obstacle sensor Near digital.



Tiva C Series TM4C123G LaunchPad Evaluation Board

Figure 2.1: Tiva Microcontroller

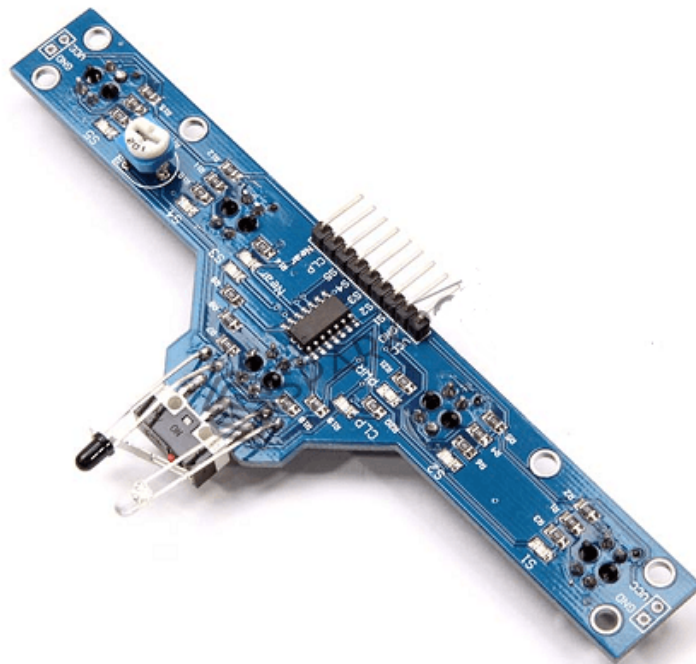


Figure 2.2: Optocoupler



### 2.0.3 DC Motors

A motor is an electrical machine which converts electrical energy into mechanical energy. Refer figure ??

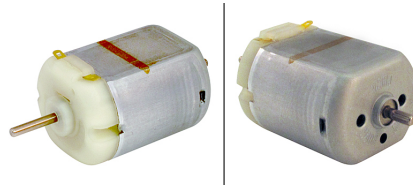


Figure 2.3: DC Motor

### 2.0.4 H-Bridge L298N

Utilizing L298N as the control chip, the module has such qualities as solid driving ability, low calorific esteem and solid hostile to impedance capacity. This module can utilize worked in 78M05 for electric work by means of a driving force supply part. Be that as it may, to stay away from the harm of the voltage balancing out chip, please utilize an outer 5V rationale supply when utilizing in excess of 12V driving voltage. Utilizing vast limit channel capacitor, this module can take after current to secure diodes, and enhance the unwavering quality. L298N Double H Bridge Motor Driver Module: Refer figure ?? Control chip: L298N

Logical voltage: 5V

Drive voltage: 5V - 35V

Logical current: 0mA - 36mA

Drive current: 2A(MAX single bridge)

Storage temperature: -20C to +135C

Max power: 25W

Size: 43 x 43 x 27mm

### 2.0.5 12V Rechargeable Battery

A rechargeable battery, stockpiling battery, auxiliary cell, or aggregator is a kind of electrical battery which can be charged, released into a heap

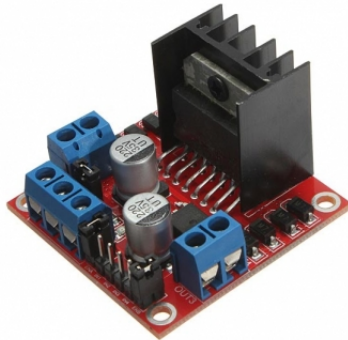


Figure 2.4: Motor driver

## 2.0.6 Power Bank

a power bank is a compact charger or power supply which can charge by any USB upheld gadgets (unless indicated contrastingly by maker). Most Power banks are for advanced cells, cameras or potentially tablets like Ipads. The power bank is produced using ultra high-thickness A+ Li-polymer battery cells and premium microchips. It has LED light battery markers and wise circuit board. Refer figure 2.5



Figure 2.5: Power Bank

# Chapter 3

## Literature

### 3.1 Literature Survey

The line follower robot is made by operation amps and transistors, where the engine is straightforwardly on or off utilizing the flag of the comparator. Presently the systems can be supplanted by PWM utilizing more sensor, microcontroller and H-Bridge engine controller IC i.e. L298N. Likewise rather than LDR it can be utilized phototransistor whose reaction is vastly improved than LDR.

There are 2 line sensors utilized here so the vacillation of line is a reality. Utilizing in excess of 2 sensor likely 5 sensor cluster might be utilized to identify the dark line rapidly. Additionally utilizing microcontroller it can draw the turn around course and in addition impediment staying away from turning the engine 180. The piece chart might be spoken to as takes after. Likewise utilizing shading sensors the robot can detect diverse hues. It can be utilized as a part of the automated amusement rivalry and different fields. So the improvement includes in a word:

Applying PWM system

Use of Microcontroller

Use of shading sensor.

# Chapter 4

## Work Done

### 4.1 Working of Project

#### 4.1.1 Motor Driver Functionality

Motor driver act like the current amplifier. It is use for controlling the current in the motor. The motor drive provides high current as the dc motor need when it receives low current in the circuit.

For drive the motors a high value of the current is needed. L293D IC can control the two dc motor simultaneously. It can rotate the motor in the forward and reverse direction.

By using the motor driver a line following robot can be move in clockwise and in anticlockwise directions. It completely controls the movement of the dc motor thats why it has been called as motor driver.

#### 4.1.2 Sensors

IR proximity sensor is the infrared sensor, which use for detect the obstacle. If any obstacle comes between the IR transmitter and the IR receiver then it gives the output.

That output can be used as making device automatic and set theflag bit of the microcontroller.

It plays a vital role in the field of detecting any obstacle. As,the total 8 pins of IR Sensor are connected to PB0 to PB5 one Vcc pin and the ground pin of IR sensor is connected to power bank .

One adustable Bump switch is used to sense the IR radiations.

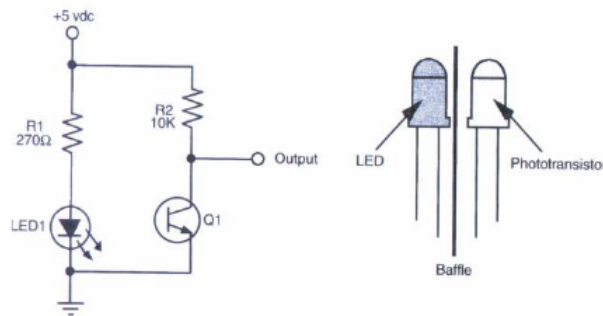


Figure 4.1: IR Sensor

### 4.1.3 Circuit For Optocoupler

This circuit consists of four IC 4N35703. There are two grounds: one is connected to the ground of the Tiva microcontroller, and the other ground is connected to the Motor driver.

The inputs of Tiva pins PA2-PA5 are connected to the IC 4N35703 anode, and we are using two types of resistor values: 330k and 10k.

The emitter as output pin of IC is connected to the Four pins of H-Bridge (Input 1-Input 4). When input 1 is at high logic, the right tire moves forward; when input 2 is at logic high, the right tire moves backward; when input 3 is at logic high, the left tire moves backward.

When input 4 is at logic high, the left tire moves forward, and when input 1 and input 2 both are at the same logic, the right tire is stationary, and when input 3 and 4 are at the same logic, the left tire is stationary.

### 4.1.4 12V Battery

We are using 3.3V rechargeable cells in series, which are used to power up the H-Bridge and

H-bridge provides us 5V supply, which is used to power up our four IC's of optocoupler.

# Chapter 5

## Future Work

Line following robot based health care management system can play a vital role in the field of hospitality. Robotics is a grooming technology. By using robot in the government and private hospitals the cost for the cure can be reduced. It can be very beneficially for the patients. In India many people hesitate to admit in the hospital because of costly medical practitioner.

Monitoring of every patient is very difficult for the nurses in the hospital. So a camera can be placed in the line following robot, from which the status for every patients can be handle from a single room. In the bed of the patient an accelerometer can be placed from which if a patient have a heart attack then that device can operate a alarm circuit.

Line following robot's application over electronics engineering can't be underestimated. This line following robot can be use as carrying the load and many more applications.

A GSM module can be placed with the line following robot so that if any mishappening occurs then that system can make a call to the doctor. Robotics is very big field for the new innovation and research. By using the robot in real time applications, a health care system can be manage in an effectively way.

# Chapter 6

## Conclusion

In this undertaking, we have outlined a line following robot. This robot does not require any remote controller or any controller like Bluetooth, Wi-Fi, GSM, driver and so on, it will run naturally with following a line.

We have not utilized any microcontroller. This robot is minimal effort yet extremely successful for different purposes. Our task can be utilized as a part of different areas like in drug conveying in healing facilities, conveying items in any spots, spying, and surveillance criteria. In future we can include a few sensors, cameras and so forth to get more highlights.

# References