

Line Follower Robot Using Line Tracing Sensors

Moe Mon Myint, Naing Kyaw Soe

Abstract— This paper is about the "Line Follower Robot using Arduino" circuits. The line follower robot is one of the self-operating robots. That detects and follows a line drawn on the area. The line is indicated by white line on a black surface or black line on a white surface. This system must be sensed by the line. This application depends upon the line tracing sensors. This project is developed to know the easy combination of software and hardware. Since the microcontroller used in this project it is very user friendly. This project paper is proposed using Arduino Uno board, two servo motors, five one-channel line tracing sensors and 12V power supply. The goal of this project is to construct the automated line tracing robot that follows black line on the white surface.

Index Terms—line follower, Arduino, line tracing sensors, microcontroller

1) INTRODUCTION

In these recent days, many line following robots have been designed and utilized. This line following robots normally consists of either four wheels, two wheels or single wheel. The line following robot was designed to follow a line that may be a physical spot on the floor. The sensor was mounted with the robot in order to communicate with microcontroller in sensing the line that had drawn by line tracer on a white surface or vice versa. The project is constructed using an Arduino Board(UNO) as a microcontroller, two servo motors, 12V DC supply , and robot frame. The block diagram of the system is shown in Figure 1. The purpose of the paper is to provide simpler robot's hardware architecture. The main objectives of the study include

- To introduce robotic system.
- To apply the useful C programming language systematically.
- To experiment on the compatibility of the working relation among the Arduino microcontroller and other components.
- To solve the complexity of hardware design construction

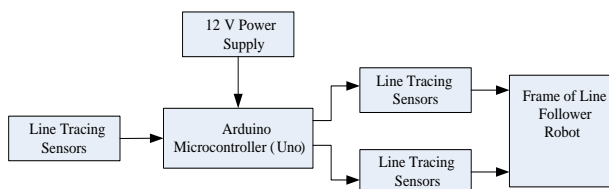


Figure 1. Block diagram of system

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2) HARDWARE REQUIREMENT

Arduino is the heart of the system. This Arduino Uno board controls the whole system. 12 V power supply is used for power supply unit. The two servo motors drive the line follower robot. The five line tracing sensors are used for following the path correctly.

3) INSTALLING ROBOT FRAME

Two wheels are used as left and right wheel pairs of robot tank. Each pair of this wheels is connected with two servo. Then two servo motors are used as LEFT SERVO and RIGHT SERVO for the Robot. These motors must be prepared as continuous servo for running 0 to 180 degree. The main requirement is to order the frame for this robot. In the frame ,there must be prepared to place the motors, DC power supply and drill to connect the outside world.

Servo motors have three wires: power, ground, and signal. The power wire is typically red, and should be connected to the 5V pin on the Arduino board. The ground wire is typically black or brown and should be connected to a ground pin on the board. The signal pin is typically yellow, orange or white and should be connected to pin 9 on the board.

The one-channel sensor module connects to the control module. VCC pin is connected to the 3.3V or 5V power supply, GND pin is connected to the GND, OUT pins are connected to the digital I/O pin. Pin number is based on the actual program code. After hardware connection, insert the sample sketch into the Arduino IDE.

4) SOFTWARE INSTALLATION

After the Hardware components are constructed faithfully a software program is needed to install using PC. But we must be careful not to connect signal pin with Board before verifying the program. In achieving the task the controller is loaded with program written using Embedded 'C' Languages. Now the program used is to receive the commands from line follower robot and five line tracking sensors, drive the robot in six conditions. To achieve our desired goals, we must know 'C' programming Language used in Arduino.

5) OPERATION OF ROBOT TANK

The five one channel line tracking sensors are chosen in order to define the line. The line tracking sensor senses the result data to the arduino microcontroller. The result shows moving the line tracker sensor in a white background to a black line. The sensor module has a HIGH output when subjected to the black line.

Then the microcontroller decode the receiving commands and check the conditions . The robot in the project can be

made to move in all the six directions using the five line tracking sensors, center sensor, left sensor one, left sensor two, right sensor one and right sensor two.

Since the motors are modified as continuous, they can turn 0 to 180 degree. Then the stop points are chosen at 93 degree for left servos and 80 degree for right servo. For clockwise rotation, the degree should be chosen greater than 80 degree and 93degree. Similarly, the degree should be less than 80 degree and 93 degree for counterclockwise rotation.

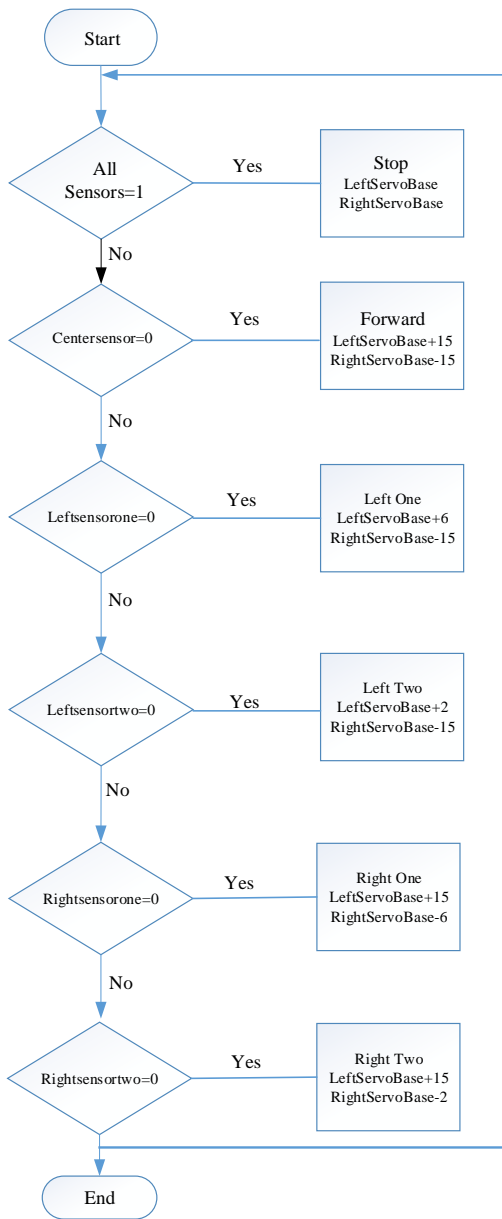


Figure 2. System flow chart

If the user desires the robot to move Forward, the LEFT SERVO must rotate counterclockwise and RIGHT SERVO must rotate clockwise. The reverse is to move Backward.

If the user want to turn Left side, both servo motors must rotate clockwise and to turn the Right, both servo motors must rotate counterclockwise. The other directions can be chosen based on this four directions.

The microcontroller need to supply 5V dc .It is connected with 12V battery. The regulator built in Arduino provides 5V.

To get stable 5V, the capacitor is now used. The flow chart of the proposed system is shown in Figure 2.

6) TEST AND RESULT

In our project, the test and result of the proposed circuit is shown in Figure 3. This result is tested in arduino software IDE and serial monitor. In order to show the serial monitor, the data is sent to computer using “Serial.begin(9600)” and “Serial.println” commands. And then, the complete circuit photos are shown in Figure 4 and Figure 5.

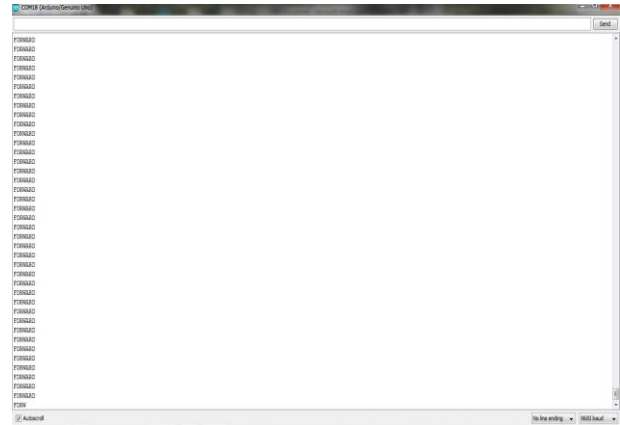


Figure 3. Test and result of forward moving

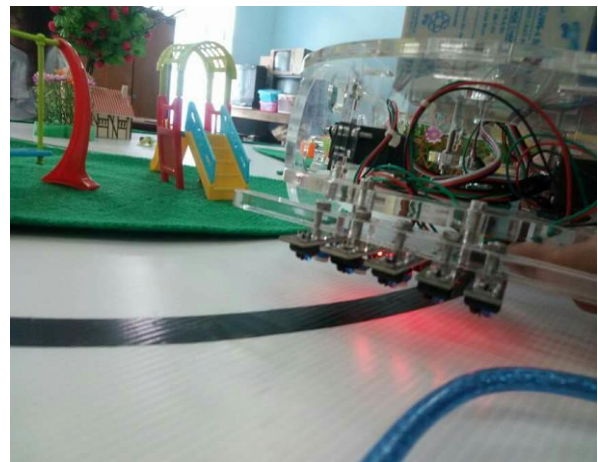


Figure 4. Complete circuit photo(forward moving)



Figure 5. Complete circuit photo

7) CONCLUSION

A line follower robot project pointed the understanding of electronics, mechanical system and their integration using programming. This project is completed and finished by studying Arduino, servo motor working principle, line tracing sensors and C programming. In this project, it is hoped that the current activity will lead to further enhancements. In our project, the project can be advanced as an obstacle detecting Tank by connecting an ultrasonic sensor and Bluetooth technology.

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