

# Solar Based Path Follower Robot

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**ABSTRACT** - Solar energy is rapidly gaining notoriety as an important means of expanding renewable energy resources. As such, it is vital that those in engineering fields understand the technologies associated with this area. My project will include the design and construction of a microcontroller-based solar based line follower robot. A Line Follower Robot, as the name suggests, is an automated guided vehicle, which follow a visual line embedded on the floor or ceiling. Usually, the visual line is the path in which the line follower robot goes and it will be a black line on a white surface but the other way (white line on a black surface) is also possible.

**KEY WORDS:** Line Follower Robot, Microcontroller, Sensor.

## INTRODUCTION

A line follower robot is basically a robot designed to follow a line or path already pre-determined by the user. This line or path may be as simple as a physical white line on the floor or as complex path making scheme e.g. embedded lines, magnetic markers and laser guide markers.

In order to detect these specific markers or lines various sensing schemes can be employed. These schemes may vary from simple low cost line sensing circuit to expansive vision system. The choice of

these schemes would be dependent upon the sensing accuracy and flexibility require. From the industrial point of view, the path following robot has been implemented in semi to fully autonomous plans. In this environment, these robots functions as materials carrier to deliver products from one manufacturing point to another where rail ,conveyor and gantry solutions are not possible. Apart from line following capabilities, these robots should also have the capability to navigate junctions and decide on which junction to turn and which junction ignore. This would require the robot to have 90 degrees turn and also junction counting capabilities. To add on to the complexity of the problem, sensor positioning also place a role in optimizing in the robots performance for the tasks mentioned earlier. Line following robots with pick and placement capabilities is commonly used in manufacturing plants.

These move on a specified path to pick the components from specified location and place them on desired locations. Basically, a line following robot is a self operating robot that detects and follows a line drawn on the floor. The path to be taken is indicated by a black line on a white surface. The control system used must sense the line and man oeuvre the robot to stay on course while constantly correcting the wrong moves using feedback mechanism, thus forming a simple yet effective closed loop system.

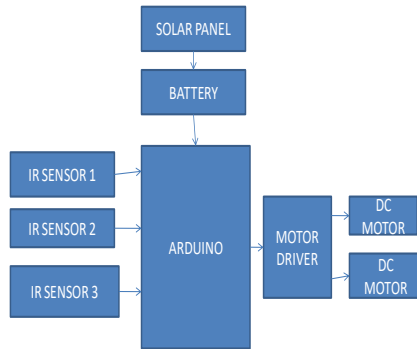


Fig:1 . Block diagram

## SENSORS

The robot uses IR sensors to sense the line, IR sensors consist of two diodes that one of them sends ray and another one must receive it.

If the receiver receives the reflection ray, it means that the robot is on white and if it cannot receive it, so the robot is on black. IR reflectance sensors contain a matched infrared transmitter and infrared receiver pair.



Fig: 2. IR reflectance sensors

These devices work by measuring the amount of light that is reflected into the receiver. Because the receiver also responds to ambient light, the device works best when well shielded from ambient light, and when the main points and conclusions will be explained in section 5. The electrical circuit of some line follower robots can compare the analog signal received from sensors and then transmit the result to the processor in digit '0' or '1' and some of them send the analog signal to the processor directly. Anyway, the analog signal must be converted to the digital form and then the processor can process it according to that digit and the reflective surface is small (less than 5mm).

## MOTOR DRIVER

We must use a driver IC for controlling the motors. The microcontroller sends a signal to the driver that acts as a switch. If the signal received by the driver is high, it will rotate the motor or else it won't do so. Note that the microcontroller only sends a signal to a switch which gives the voltage required by the motor to rotate. One of good driver for our project is L298 which can be used to control two motors. The L298 motor driver has four inputs to control the motion of the motors and two enable inputs which are used for switching the motors on and off. Many Circuits use L293D for motor control, we chose L298 as it has current capacity 2A per channel 45V compared to 0.6A 36V of a L293D.

The movement system is an important part of a robot. And its objective is how to move robot from one point to another one. This system has some details shown

us how we should use motors and wheels. We use motors to convert electrical energy to the mechanical energy. There are a lot of kinds of motors and we must choice the best one that we need. Our choice is depended on the robot function, power and precision.

## ARDUINO UNO

The Arduino microcontroller is an easy to use yet powerful single board computer that has gained considerable traction in the hobby and professional market. The Arduino is open-source, which means hardware is reasonably priced and development software is free. This guide is for students in ME 2011, or students anywhere who are confronting the Arduino for the first time. For advanced Arduino users, prowl the web; there are lots of resources. This is what the Arduino board looks like. patients in light of the investigation is outlined in area 5. The completion of the work initiated framework and the conceivable future works are shown in area 6. Information is utilized to examine the sickness and danger happening to the patients. Franca examined advancements in new era of frameworks were improvement of nonstop observing elements involved in monitoring patients what's more, change in work processes, efficiency of medicinal individual. Likewise underlined the different remote advances and the benefits of utilizing those advances for quicker correspondence.



Fig:3. DC Motor

To overcome this problem the L293D driver IC is used. It is a Quadruple Half H-Bridge driver and it solves the problem completely. You needn't connect any transistors, resistors or diodes. We can easily control the switching of L293D using a microcontroller. There are two IC's in this category L293D and L293. L293D can provide a maximum current of 600mA from 4.5V to 36V while L293 can provide up to 1A under the same input conditions. All inputs of these ICs are TTL compatible and clamp diodes is provided with all outputs. They are used with inductive loads such as relays solenoids, motors etc.



Figure : 4. Arduino microcontroller

### PATH FOLLOWER ROBOT APPLICATIONS

As solar panel are mounted on robot, the sunrays incident on the solar panel i.e. solar energy is absorbed and is converted into electrical energy by using photovoltaic effect. This energy is stored in the battery, which is used to operate the line follower robot. The above discussed whole mechanism and system is run on the following principle and when assembled together turns out to be an eco-friendly machine. As solar energy is clean, green, free and widely available, it can be one of the best alternatives for the current robot operations. Line follower Robots are commonly used for automation process in industries, military applications and consumer applications.

### CONCLUSIONS

The most abundant and non hazardous source of energy on our planet is being used today in many fields & its not far when it will become prime source of energy. Many applications are under development consuming this source and will be technologically and practically implemented in day to day life in near

future. Medical robots are moving from the benches of laboratories to the bedside of patients rapidly. With advancements in technology, these are being used for minor services to diagnostic as well as therapeutic. The navigation path planning can be concluded by an information decision making system. A Line Follower Robot for Transport Applications in Hospital Domain is one of the good choices.

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