

Covid Robot Using Arduino for Hospitals

Likitha Balakrishna¹

Department of computer science engineering, BMS college of engineering, Bengaluru, India

Date of Submission: 25-09-2020

Date of Acceptance: 12-10-2020

ABSTRACT— This paper describes the line following robot using arduino for surveying , inspecting and enhancing the transportation of necessary materials inside the healthcare institutions, industries also. The proposed system spot the black path and proceed in its direction on to the ground . This system eases the work of material conveyance as well as minimizes the manpower. This technology targets on the secured, punctual and constructing transportation of goods. This paper aims to implement controlled movement of robot by tuning control parameters and thus achieve better performance. This robot is predominantly design to proceed in a predefined path. To locate this path two sensors are used. Robots like this are mainly used in industrial plants comprising of pick and place facility. This robot carries components from desired source to destination by following fixed path. Recently lot of research has been done to empower the automation in hospitals as well in industries. This robot is made to supply the essential goods such injections, medicine, etc. This paper is divided into hardware and software modules.

Keywords— Arduino, Black path, IR sensors

I. INTRODUCTION

Population in our country is increasing rapidly, with the increase in the number of people comes the proper management of service. A place like hospital needs 24 by 7 surveillance. Inadequate staff members, negligence of nurses can cause big risk to patients life [2] . Also there arises a problem of transporting goods such as medicines, food, linens and other equipment's from one place to another. Of course increasing staff members is the simple solution for this but not effective. This is the era of technology and automation. If automation is brought to healthcare center then it will be far effective. Automation can be introduced in hospitals by the application of line following robot. A line following robot can act as temporary nurse which can assist hospital staff in case of any emergency. Also this kind of robot will work as a delivery robot in operation room where doctors will

need any extra accessories at any emergency instance. This kind of robot has advantages such as fast service, available 24x7, more reliable, more efficient.

This robot is a kind of robot which follows white or black path instructed by the user [1]. In this project IR sensors are used for detecting the path [6]. The reason for choosing this sensor is they are good for detection of line from minimum 100cm to maximum 500cm, low power and fit in small spaces. Also for control and running the robot arduino and motor driving module are used respectively. For better understanding the whole mechanism of line following robot, prior knowledge of IR sensors, Arduino and Motor driver modules is necessary.

IR sensor is an electronic device used to detect properties of surroundings. It detects by either transmitting or detecting infrared radiation. The IR sensor was discovered by F.W.Herschel in 1800.

The working principle of IR sensor is governed by three laws: Planck's radiation law, Stephan Boltzmann law, Wein's Displacement law [6].

As the light is incident on colored surface it is partially reflected back. The light is completely reflected in case of white surface. Whereas if the light is incident on the black surface, it is completely drawn up due to the property of absorption of black color.

This principle is utilized in the design of infrared sensors. When light is made incident on a normal or regular surface it returns back to the photodiode whereas it is absorbed when incident on a black object, hence no light rays are not captured by the photodiode. The complete mechanism of IR sensors is explained in working.

The arduino IDE is free to use based on Atmel microcontroller. Arduino IDE is used to program the arduino board. It is able to simulate input and in return produces an output. When the sensors come in contact with white object the input goes high, whereas the input goes low for the black object.

A typical motor driving IC allows the DC motor to drive on any direction [4]. This IC

consists of 16-pins which are used to control a set of two DC motors. Motor driving IC act as bridge between the controller (here arduino) and the motor [8]. The input to this IC is the output of arduino.

A. Literature Survey

This kind of robot was earlier design for automation in industries for transportation purpose. With advancement in technologies, this kind of robot is used in Warehouse management of Amazon. Not surprisingly Amazon has launched 'SCOUT' a delivery robot which does home deliveries .Though it is not a line following robot but works with similar mechanism. A little while back there was a revival of this robot for transportation in Masdar city. Here not only goods were transported but people treat it as a way for transportation vehicle for them.

Unfortunately there exist lack of progress in Health care centers with subject to automation. This paper aims to proffer a automated robot to Healthcare centers for ease of delivery of medicines, food , injections, etc.

B. Materials used

1. Arduino UNO
2. Motor Driver module L293D
3. DC Motors
4. Robot Chassis
5. IR Sensor Module
6. Insulation Tape
7. Conductors
8. 9v battery
9. Battery Cap

working of a quintessential IR Sensor (IR LED – Photodiode pair) in front of a white surface and a black surface. As the reflecting percentage of the light color surface is high, the infrared light emitted by IR LED will be maximum reflected and will be recognized by the Photodiode. The light gets completely sop up by the dark black surface and finds it difficult to reach at photodiode due to low reflectance. By the identical mechanism, we setup the IR Sensors on the Line Follower Robot such that the two IR Sensors are on the either side of the black line on the floor. When the robot moves forward, both the sensors wait for the line to be detected [7]. Consider this, if the IR Sensor RM identifies the black line, it signals that there is a right curve (or turn) ahead.

II. BLOCK DIAGRAM AND ITS EXPLANATION

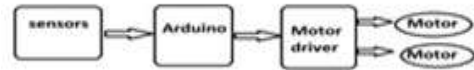


Fig.1 Block Diagram

Line follower robot detects white surface with the help of sensor and then feeds the signal to arduino[7]. Then according to the output given by sensors arduino drives the motors . Sensors i.e. IR sensors modules namely left sensors and right sensor are used in this set up . The robot will move forward when both right and left sensors are on white path. The robot will turn left when the left sensor is on black path and right sensor on white path. A complete opposite process occur when the right sensor is on black path. On detecting the surface except black robot continues moving forward. When both sensors are on black surface the robot will stop.

III. WORKING

As depicted in the figure 1, sensors are used to identify the line. For line identification logic, two IR Sensors with IR LED and photodiode are mounted [5].The light emitted by IR LED will be detected by photo diode, whenever they come near to a reflective surface.

The image (fig 2) below portrays the

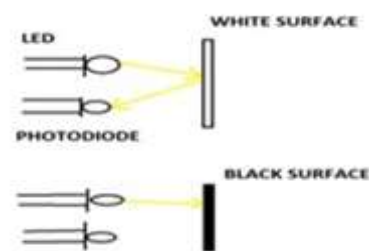


Fig.2 Mechanism of IR

Arduino UNO identifies the variation in color and sends signal to motor driver correspondingly. Using PWM the robot slows down right motor in order to move right. Simultaneously the motor on the left side runs at normal speed [4]. Likewise, when the IR Sensor RM or LM identifies the black line first, it indicates that there is a right curve or left curve ahead and the robot has to turn right or left respectively .The robot turn left, if the motor on the left side of the robot is slowed down (or can be stopped

completely or can be rotated in opposite direction) and the motor on the right side is run at original speed, this same is applicable for right turn. Arduino UNO constantly monitors the data from both the sensors and aligns the robot as per the line identified by them [3].

In medical field, this robot play a role of transporting medical materials such as medicines, injections, patients file, prescriptions, etc. Nurses can focus on patient monitoring instead of routine tasks such as medicine distribution. This Robot will help in speedy delivery of lab- testing process by providing lab test items on time. Due to accurate timing on real time basis, timely medicines will be addressed to patients hence there will be ease related to delivery concern.



Fig .3 line follower robot

A. Working on different surfaces

TABLE I

NON UNIFORM SURFACE	UNIFORM SURFACE
On hard surface path is disturbed due to which sensors cannot move on a fixed track.	On soft surface path is uniform hence sensors move in fix path
On non-uniform surface, speed of the motor is disturbed due to imbalance between wheels	Here instructed speed of the motor is constant.
Due to hard surface ,there occurs an error in turning edges	smooth and uniform turning of robot

IV. ALGORITHM

1. START
2. Read LM and RM
3. If LM and RM both on white surface.
4. Move forward (rotate both motor on full speed)
5. Go to step-2
6. If LM on black line
7. Move left (reduce left motor speed to half)
8. Go to step 2

9. If RM on black line
10. Move right (reduce right motor speed to half)
11. Go to step 2
12. If LM and RM on black line
13. Stop

V. RESULT

For better understanding the working of this robot consider following cases:

CASE 1: Straight path

TABLE II

Sr no .	Distance covered	Time required
1.	1.2 m	16 sec.
2.	2.4 m	22 sec
3.	3.6 m	31 sec.



Fig 4 Graph for straight path readings CASE 2: Curved path

TABLE III

Sr.no.	Distance covered	Time required
1.	1.2 m	19 sec
2.	2.4 m	27 sec
3.	3.6 m	36 sec

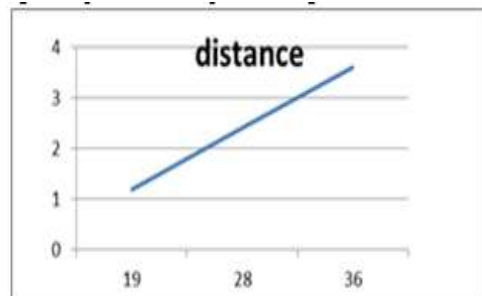


Fig 5 Graph for curved path readings

Response/performance of robot for different types of curve

TABLE IV

Microcontroller “ Nas publication,2007

SR NO	TYPE OF CURVE	BEHAVIOUR
1	Simple	Followed easily and smoothly
2	Conic(sharp)	Out of track
3	Bezier curve(s-curve)	Followed path but with more time

VI. CONCLUSION

In this robot 9v battery is used to run DC motors. The distance covered by the motor is directly proportional to speed . Speed is reduced due to half drain batteries. This robot cannot take high load, if we use it in real time scenario in hospitals. More power supply will be needed to carry high load.

This robot is a prototype .When it will be actually implemented in real time, there will be practical errors but those can be solved with better components and more time .Once it will be fixed it will be helpful application for health care centers Due to structure and technical lacuna of the robot ,it is not possible to transport high load goods. However in future if the center of gravity and other technical aspects are taken off, it is also possible to transport high load goods. Efficiency of robot is dwindled due to drain of the battery, also taking sharp turns would be possible if radius of curvature is properly adjusted.On addressing above limitations high tech top notch robot would be able to design.

REFERENCES

- [1]. Mehran pakdaman, m. mehdaisa naatiyan, Mahdi ghahroudi, “A line follower robot from design to implementation
- [2]. :Technical issues and problems”, Research gate publications, March 2010
- [3]. Lawanya Shri M ,”A line following robot for Hospital management”, Research gate publications ,February 2019
- [4]. M. Kahe ,”Robotic Guide”, Kanone Oloum Publication,2008.
- [5]. Cao Quoc Huy,”Line Follower Robot”, University UPG din Ploiesti.
- [6]. M.Zafri Baharuddin,”Analyst of Line Sensor Confiuration for Advanced Line Follower Robot” ,University Tegana Nasional.
- [7]. P. Heryati , A. Aghagani, “Science of Robot Design and Build Robot”, Azarakshh Publication,2008.
- [8]. M. Mashaghi,” Robotic Guide “, Kanone Oloum Publication, 2008. A. Kahe,” A V R