An Overview: Line Follower Robot

Himanshu Gajbhiye [1], Shafakkt Ansari [2], Chetan Nagpure [3], Abhishek Bansod[4], Aniket Nerkar [5], Prof.Mrs.Bhagyashri Wankhede [6]

Final Year, Department of Electronics and Telecommunication, NIT Polytechnic, Nagpur, India[1,2,3,4,5]

Lecturer, Department of Electronics and Telecommunication,NIT Polytechnic, Nagpur, India [6]

Abstract:

In today's busy world , these autonomous bots can save both time and energy by helping in industries where instead of employing a human operator we can set our desired tasks to the robot which can easily follow the repetitive path from source to destination and vice versa. Kepping the need of industry in mind we have praposed the line follwer robot with the help of aurdino sytem which helps to overcome the problem of labour.It is microcontroller based autonomous robot which detects and follows a path that can be invisible magnetic field or a visible path indicated by black line on a white surface(or vice versa). The system senses the line. This work is done by sensors – IR sensors. The IR sensors are mounted at the front end of the robot. The data from these sensors will be given to the microcontroller (Arduino board) which in turn sends the signal to the motor driver that in turn drives the motor of the robot based upon the information of IR sensors. This system hence can be used in a safe, efficient, time-saving way in industries as well as for daily purposes.

Keywords: IR Sensor,Aurdino UNO, Robot, Motor

I. INTRODUCTION

Robot is a machine that is usually designed to reduce the amount of human work where it is applicable. It is usually developed for reducing risk factor for human work and increase comfort of any worker. High performance, high accuracy, lower labour cost and the ability to work in hazardous places have put robotics in an advantageous position over many other such technologies. In this paper a line tracer or follower has been presented which will trace a black line on a white surface or vice-versa . We have make use of sensors to achieve this objective. The main component behind this robot is Aurdino UNO which is a brain of this robot. The idea proposed in this paper is by using machine vision to guide the robot We have made a robot that has several works to perform besides following a line. This robot follows a line without going to other direction. The construction of the robot circuit is easy and small. This can also be used in many applications such as automatic valet parking in efficient way. The rapid increase in urban car ownership not only increases the burden of urban traffic but also exacerbates the problem of insufficient parking spaces. The increased driving distance in the parking process increases energy consumption and exacerbates parking difficulties, which increasing the number of minor accidents, such as scuffing and collisions.

II. PRAPOSED METHODOLOGY

The line follower robot is a kind of a design which is similar as a light follower robot. Here, besides sensing the light, the sensor is used for detection of a line. Therefore by individualizing the colour of line and its enclosing, any light sensitive sensor could be used for navigation of the robot to follow its designated track. The design of the robot was made like; it had one pair of Infrared ray sensor fitted underneath the robot. So Infrared ray sensor will first be sending a wavelength for detecting black line and then other infrared ray sensor will be receiving the information and take decision for following a black line on white surface. With the supply from an 9V DC power adapter the whole sensor and the motor driver IC and the motors and arduino are powered. Making the setup less prone to power failure The outputs of the sensor circuits are connected as in the analog inputs of the arduino board.

III. HARWARE IMPLEMENTATION AND WORKING

Fig. 1 Block diagram of Line following Robot

The block diagram includes Ultrasonic Sensor, Arduino Uno, DC Motor, Motor Driver. An Ultrasonic Sensor is attached to the Arduino so that when the sensor senses any item, the sign from the sensor is sent to the Arduino. The Ultrasonic sensor emits a high frequency sound wavesat everyday time periods as the velocity of sound in air. The waves fall at the object and get contemplated again to the receiver. The sensor emits the waves of frequency about 40KHz and it may cowl up to a selection of 2m. The transmitter this is present in the sensor coverts the electrical signal into ultrasounds while the receiver converts the ultrasounds into electrical signal.And,[10] the Ultrasonic sensor that's attached to the DC motor which is beneficial in rotating 360 degrees. If we use Servo motor, it may turn up to 180 degrees simplest. So that, DC motor is used.Then the DC motor which rotates continuously in order that the sensor emits the waves in all directions. The pulse signal is provided through Arduino to the ultrasonic sensor which receives the pulse sign and then displays lower back the ultrasonic wave inside the ahead direction. The DC motor is connected to the driver motor,itcontrols the speed and attitude of the sensor. Then, the Arduino integrated improvement environment that's written in Java is a pass platform application.[11] The Processing programming language and the wiring projects also can be used which might be derived from the Integrated Development Environment. It is deliberate in such a way that it introduces the basic thoughts of programming and information to new customers and beginners who have no knowledge on the software improvement.

IV. COMPONENT USED

A. Arduino UNO

The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging 2.1mm centre-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector. The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

B. IR Sensor

Infrared Sensors are used to find the path and direction. IR sensors contains a transmitter and receiver pair. We know white surfaces are good reflectors and black surfaces are poor reflectors .So if the receiver receives the reflection ray it means the robot is on white else if it doesn't receives it means the robot is on black. Thus the device works by measuring the amount of light that is reflected into the receiver.IR sensors works best when it is shielded from ambient light and the distance between the sensors and the surface is small(less than 10mm).

C. Motor

Motor driver is used to control Robot movement such as forward, reverse, left and right. Which is interfaced with arduinouno .in one motor we can able to connect two motors.

V. APPLICATION

1. Industrial automated equipment carriers.
2. Delivering medicines to patients at hospitals.
3. As path guides in museum and shopping malls.
4. In domestic purposes like floor cleaning, painting the wall.
5. Automated cars.

VI. ADVANTAGES

- Low cost/simple
- Easy to operate – reliable
- On-line data collection possible
- End-to-end connectivity and affordability
- Notification and alert
- Easy to Install
- Remote location monitoring

VII. CONCLUSION

Our Line Follower robot has the capability to follow any curve or cycles. We have built a robot that is light weight with high speed motors and high sensibility sensor circuit. The weight of the designed robot is about 300grams. The robot makes use of two wheel in rear and a free wheel (caster wheel) on the front so that the robot can move with ease. The power supply is 9V. It has three IR sensors to detect the track. Microcontroller Arduino UNO and Motor Driver L293D is used to control direction and speed of the motors. The robot is self-operating and micro controlled.

REFERENCES

[1]. Aziz, A.R.A., Designing and Constructing an Automatic Steering Vehicle (AGV), in Dept of Electrical Engineering. 2004, University Tenaga Nasional: Malaysia. p. 50.

[2]. Bajestani, S.E.M., Vosoughinia, A., "Technical Report of Building a Line Follower Robot" International Conference on Electronics and Information Engineering (ICEIE 2010), vol 1, pp. v1-1 v1- 5, 2010.

[3]. Prananjali Koppad, Vishnu Agarwal published by International Journal of Engineering Research & Technology (IJERT), ISSN: 2278-0181, IJERTV3IS090023 Vol. 3 Issue 9, September-2014DhareshVadalia, MinalVaity, KrutikaTawate, DynaneshwarKapse, "Real Time soil fertility analyzer and crop prediction",IRJET, Volume 4, Issue 3, March 17

[4]. Navya Amin ; Markus Borschbach " Quality of obstacle distance measurement using Ultrasonic sensor and precision of two Computer Vision-based obstacle detection approaches" 2015 International Conference on Smart Sensors and Systems (IC-SSS).

[5]. Yusuf AbdullahiBadamasi, "The Working Principle Of An Arduino", 978-14799-4106-3/14, © 2014 IEEE

[6]. F. Kaiser, S. Islam, W. Imran, K. H. Khan and K. M. A. Islam, "Line follower robot: Fabrication and accuracy measurement by data acquisition," 2014 International Conference on Electrical Engineering and Information & Communication Technology, Dhaka, 2014, pp. 1-6.

BIOGRAPHY

Mr. Himanshu Gajbhiye is final year student studing in NIT polyechnic Nagpur.Activally Participated in college activity.His area of Intest is Robotics and its applications.

Miss. Shafakkt Ansari is final year student studing in NIT polyechnic Nagpur.Activally Participated in college activity. Her area of Intest is Robotics and its applications.

Mr. Chetan Nagpure is final year student studing in NIT polyechnic Nagpur.Activally Participated in college activity.His area of Intest is Robotics and its applications.

Mr. Abhishek Bansod is final year student studing in NIT polyechnic Nagpur.Activally Participated in college activity.His area of Intest is Robotics and its applications.

Mr. Aniket Nerkar is final year student studing in NIT polyechnic Nagpur.Activally Participated in college activity.His area of Intest is Robotics and its applications.

Prof. Mrs.Bhagyashri Wankhede is currently working as Lecturer at NIT polyetechnic Nagpur,She is having 19 year of Experience in the field of academics.She has completed her B.E from Shri Sant Gajanan Maharaj College of Engineering Shegaon. Her Area of intrest is Signal processing and robotics.