Line follower and obstacle avoider robot

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A B S T R A C T: This paper put forward a line follower and obstacle avoider robot. This robot follows the predetermined path, that can be either perceptible as a black line on a white surface or a high contrasting color. IR sensors are used for the detection of the path. The sensors and the method are chosen play a very important role in the response time of the robot, with the desired accuracy and speed. By giving obstacle detection ability, line-follower can be modified. It can be achieved by equipping the robot with an ultrasonic distance sensor, an anti-collision system, to detect and avoid obstacles.

Keywords: line follower, obstacle detection, black line, contrast.

INTRODUCTION

A line follower robot is a robot that is conceived to follow a predetermined path created by the user. This robot can be put to use mainly in semi or completely autonomous factories. In this condition, these robots carry out the purpose as carriers of materials to deliver materials from one unit of manufacture to another, but it can be generalized to any function of daily life. In addition to just the line tracking ability, this robot can be equipped with an anti-collision system. There are various methods used in path following robots, such as utilizing a camera for collecting instant images of the path, or using a light source such as LDR, or using IR sensors that are more precise than LDRs and economical than a camera. That being the reason we have chosen to use infrared sensors for line detection. For obstacle detection, an ultrasonic sensor is mounted in front of the robot to detect the potential obstacles. The robot is driven by two differential wheels, which are driven by two geared motors. These geared motors are controlled by Arduino after processing the information acquired by the sensors. This constructs the robot to follow a black line on a white background.

LITERATURE SURVEY

[1]   In this paper, A-line follower is a smart robot that detects a visual line embedded on the floor and follows it. The path is predefined and may be either visible sort of a black line on a white surface or a high contrasting color or a posh path like magnetic markers or laser guide markers. To detect these lines various sensors are employed. In general, infrared Sensors are used to detect the line. The robot movement is automatic hence can be used for long-distance applications. Line follower can be redesigned by giving obstacle detection ability to it.

[2]   In this paper, the method put forward for a line follower robot is based on the instantaneous computation of the radius of curvature of the line, using IR sensors. The number and layout of the sensors, along with the method chosen, play a very important role in the robot's response to the line, with the expected accuracy and speed. Adding on, the robot is provided with an anti-collision system, that's by using an ultrasonic distance sensor, which detects and avoids obstacles in several situations, particularly at line crossovers, when other robots share a standard complex line.

[3]   This paper state that, Line Following is one of the most important aspects of robotics. The Line Following Robot is an autonomous robot that follows either a black line on the white surface or a contrasting color. The robot uses arrays of IR sensors to recognize the line, thus stimulate the robot to stay on the path.

[4]   This paper has been designed to build a Line following Robot using an IR sensor to follow a designated path that is provided and runs over it. This smart robot is intelligent enough to hide the utmost area of space provided. It will travel in a particular direction defined by a black line embedded on the white surface. Automatic parking technology has become a well-liked research topic. Automatic parking technology can complete parking safely and quickly without the aid of a driver and can improve driving comfort, which may reduce the probability of parking accidents.

[5]   In this paper, a line follower robot is used for analyzing, designing, controlling, and improving the health care management system. A line following robot carrying medicine has been designed for directing the drugs to the patient. A-Line follower robot is an electronic system that will detect and follow the path drawn on the ground. Predominantly, the path is predefined that will be either visible sort of a black line on a white surface or with a high contrasting color.

[6]   This paper has confessed that Obstacle detection and avoidance should be considered as the main issue while designing mobile robots. The technology utilized provides the robots with senses which they can use to traverse unfamiliar

environments without damaging themselves. In this paper, an Obstacle Avoiding Robot is meant which may detect obstacles in its path and exercise around them without making any collision.

[7] In this paper, a Chinese company specialized in robotics developed a robot using computer vision to avoid obstacles. Open Computer Vision library has been used to implement a stereo vision for obstacle detection. Using microcontroller commands are sent to the motors. The robot was successful in detecting and avoiding different kinds of obstacles like bottles, chairs, and walls.

[8] In this paper, the obstacle avoidance robotic vehicle is built using ultrasonic sensors for its movement. An ultrasonic sensor is used to detect the obstacle in front of it and sends a command to the Arduino. Based on the command received, the Arduino makes the robot move in an alternate direction by sending the command to the motors which are driven by a motor driver.

PROPOSED WORK

We have planned to design the smart robot which is a self-operating machine that follows a pre-determined path, it can be a black line on a white surface or any contrasting surface. The purpose of this project is to build a line following robot which can detect obstacles on its path and avoid them by changing the direction and returning to the same path, and making the robot as simple and as cheaply possible. At a higher level, this will be useful in industries for transferring the goods and pieces of machinery and medical fields in delivering the medicines. This project uses an Arduino microcontroller for processing the information after a line or an object is detected. There are various methods for this project like using cameras and detecting objects which consume more space and are costlier.

COMPONENTS USED

COMPONENTS	QUANTITY
Arduino NANO	1
Hc-SC04 Ultrasonic Sensor	1
L298n Motor Driver	1
IR Sensor	2
2-wheel Chassis	1
Mini solderless Breadboard	1
Male to Female jumper wire	1 set
Battery	1
Switch	1

CONCLUSION

Our objective is to design a line follower and obstacle avoider robot designed for autonomous navigation along a black line on a white ground, using the concept of IR sensors and Ultrasonic sensors. In the case of crossover, the robot should be able to choose the free path. Since the robot cannot be controlled the applications in the real world are limited. The only way to control the line follower is to change the path. The robot can be controlled using a WIFI module but in this technique, power consumption is more, so the battery will drain out quickly. Apart from these limitations, the smart, intelligent, and autonomous line follower robot can be used for very long-distance applications with a predefined path.

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