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LINE FOLLOWER ROBOT WITH OBSTACLE AVOIDING

Sachin N M[1], Sandeep Y H[2], Ujjwal Naidu[3], Vinay S P[4], Dr. Chanda V Reddy[5]

UG Students, Department of Electronics and Communication Engineering, K S Institute of Technology,

Bangalore, Karnataka, India[1-4]

Assistant Professor, Department of Electronics and Communication Engineering, KS Institute of Technology,

Bangalore, Karnataka, India[5]

Abstract: This project focuses on developing a line follower robot with obstacle avoiding capabilities. The robot utilizes line follower sensors to track a predetermined path and incorporates obstacle detection sensors to identify obstacles. It operates in a continuous loop, analyzing sensor data to make informed decisions. When the line is detected, the robot follows it, while monitoring for obstacles. If an obstacle is detected, the robot stops and takesevasive action. In the absence of a line, the robot searches or rotates to locate it. The objective is to create an autonomous robot that can effectively navigate a path while avoiding obstacles, ensuring safe and reliable operation.

Keywords: Line follower, Robot, Obstacle detection, Autonomous navigation

I. INTRODUCTION

The main aim of any robot is to reduce human effort. According to the purpose different types of robots are designed for practical applications. The workers can be used for other tasks instead of transporting goods from oneplace to other .Adding the features of obstacle avoiding robot to a traditional line follower robot prevents any damage to the robot. A traditional obstacle avoiding robot cannot help in transportation of goods because there is no particular path for the robot. This improves the working of the line follower robot. This smart and intelligent line follower robot can be used in industries for carrying goods from one place to another. This conventional line follower robot can be made smart and intelligent by giving it the ability to detect obstacles. This intelligent robot can also be installed for health care management in hospitals.

II. LITERATURE SURVEY

line follower robot with obstacle detection involves an in-depth review of research papers, articles, and publications related to the topic. The survey aims to gather knowledge on existing approaches, algorithms, and technologies used in line following and obstacle detection for robots. It examines various sensor technologies suchas infrared, ultrasonic, and lidar, along with computer vision techniques for object detection. The survey identifies trends, challenges, and advancements in the field, helping researchers understand the current state-of- the-art andpotential areas for improvement in developing an effective line follower robot with obstacle detection capabilities.

The first paper we referred was “DEVELOPMENT AND APPLICATION OF LINE FOLLOWING ROBOT BASED HEALTH CARE AND MANAGEMENT SYSTEM”, This paper describes the line following robot usingarduino for surveying, The development and application of a line-following robot-based healthcare and management system offers an innovative approach to enhance healthcare services. This system integrates autonomous robots with healthcare technology, enabling efficient patient transportation, medication delivery, monitoring, and data analysis. By automating tasks and optimizing workflows, it streamlines operations, improvespatient management, and contributes to infection control efforts in healthcare settings. [1]

The second paper we referred is “DESIGN OF AUTONOMUS LINE FOLLOWER ROBOT WITH OBSTACLE AVOIDANCE” The design of an autonomous line follower robot with obstacle avoidance involves integrating sensors, such as infrared or ultrasonic, to detect and track a line while simultaneously detecting and avoiding obstacles. The robot's control system uses algorithms to interpret sensor data and make real-time decisions for navigation. It employs motor control mechanisms to adjust its movement based on line tracking and obstacle detection, enabling autonomous operation without human intervention. The design ensures efficient and safe navigation while following a predetermined path.[2]

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The third paper we referred was "LINE FOLLWER & OBSTACLE AVOIDER ROBOT "The line follower and obstacle avoider robot is designed to autonomously navigate along a specified path while avoiding obstacles. It utilizes sensors, such as infrared or ultrasonic, to detect the line and identify potential obstacles in its path. The robot's control system integrates algorithms to interpret sensor data and make decisions for line following and obstacle avoidance. This combination of functionalities enables the robot to efficiently follow the line while safelymaneuvering around obstacles encountered during its movement. [3]

The fourth paper we referred is "A LINE FOLLOWER ROBOT WITH OBSTACLE DETECTION BY ULTROSONIC"The Line Follower Robot with Obstacle Detection by Ultrasonic is a robotic system that utilizes ultrasonic sensors for both line following and obstacle detection. The robot follows a predetermined line path using line tracking sensors and employs ultrasonic sensors to detect obstacles in its vicinity. By integrating thesefunctionalities, the robot can autonomously navigate along a line while actively detecting and avoiding obstacles,enhancing its safety and versatility in various applications.[4]

III. METHODOLOGY

1. Arduino Uno

Arduino uno is a micro controller board based on the ATmega328P and It has 14 digital ip/op pins. It also has 6 analog inputs, a 16 MHz quartz crystal, a USB connection, power jack, and a reset button. It is the mostwidely used and user-friendly micro controller. Simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get connection.

2. IR Sensor

Sensor emits infrared light, which bounces off objects and returns to sensor. If an object is within detection range, the reflected infrared light will be detected by sensor.

3. Motor Driver L293D

Motor driver L293D circuit has a quadruple high current half-H driver, Wide Supply-Voltage Range: 4.5V to36V, High-Noise-Immunity Inputs. And Output Current is 600mA Per Channel Peak Output Current is1.2APer Channel.

4. Servo motor

.A servo motor is a type of rotary actuator that provides precise control over angular position, velocity, and acceleration. It consists of a DC motor, a position feedback sensor (such as a potentiometer or encoder), anda control circuit. The control circuit compares the desired position with the feedback signal and adjusts the motor's speed and direction accordingly. Servo motors are widely used in robotics, RC vehicles, industrial automation, and other applications that require accurate and responsive motion control..

5. 4 Wheel robot chassis kit

A 4-wheel chassis kit is a set of mechanical components designed to build a vehicle or robot with four wheels.It typically includes a chassis frame, wheels, motors, and other necessary hardware.

6. Battery

1.5 Volts alkaline battery gives power to 4 wheel chassis kit to work on the circuit. A battery is a portable energy storage device that converts chemical energy into electrical energy. It is composed of one or more electrochemical cells, which consist of positive and negative electrodes, electrolyte, and a separator. Batteriesare used to power a wide range of devices, from small electronics to electric vehicles.

7. Ultrasonic Sensor

An ultrasonic sensor is a device that uses sound waves with frequencies above the audible range of humans (typically above 20 kHz) to detect and measure distances to objects. It emits ultrasonic pulses and measures the time it takes for the pulses to bounce back after hitting an object, allowing for distance calculations

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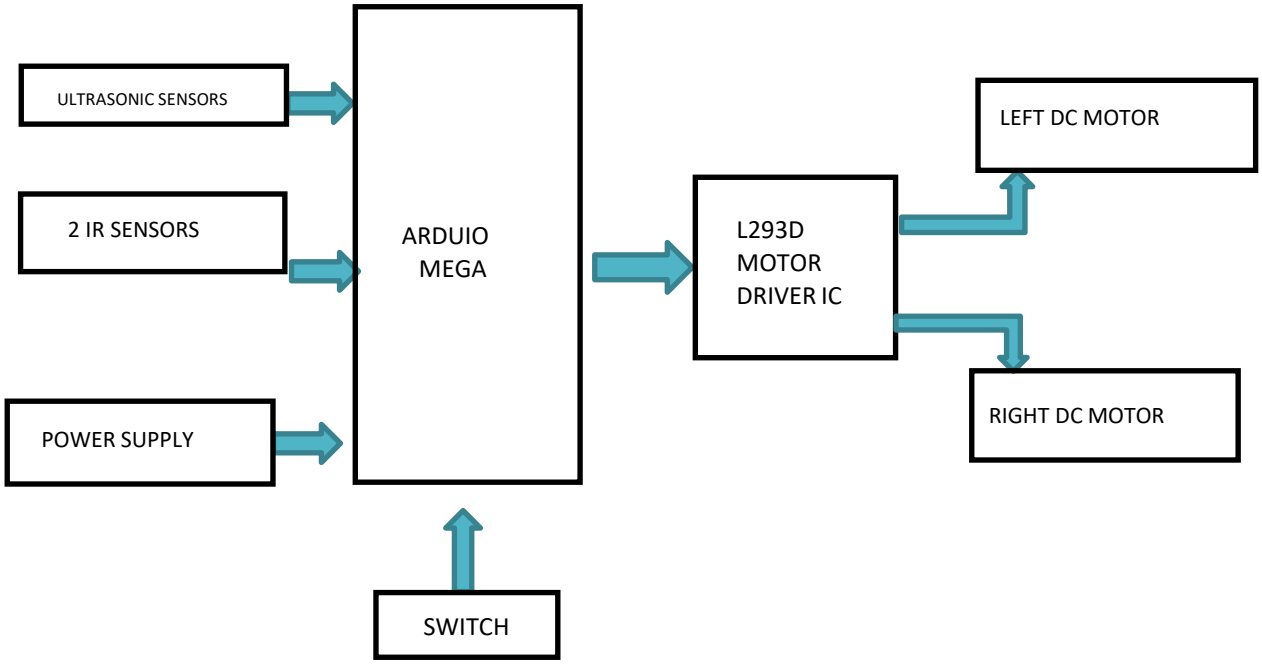
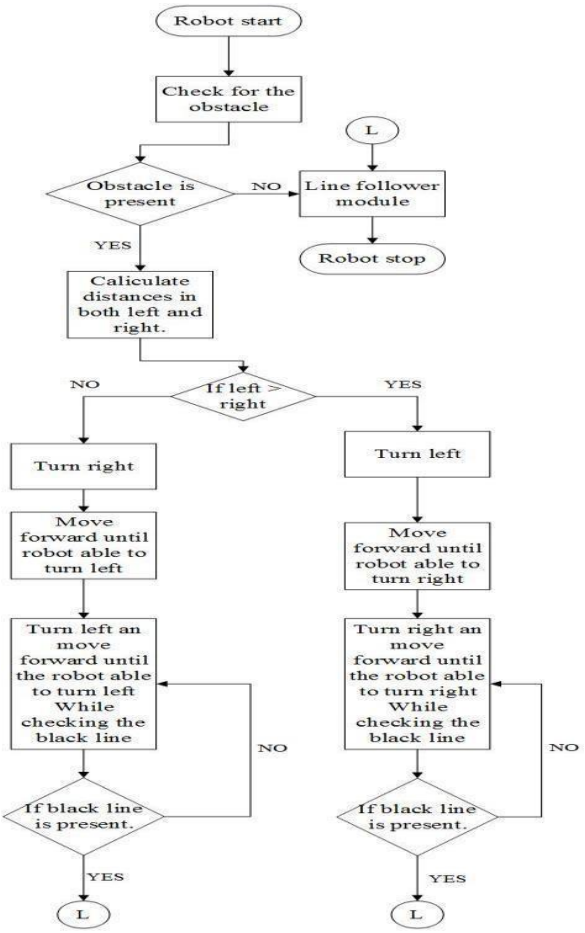
IV. BLOCK DIAGRAM



V. FLOW CHART



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VI. IMPLEMENTATION

The implementation of a line follower robot with obstacle avoidance involves assembling the hardware components, integrating line tracking and obstacle detection sensors, developing algorithms for line following and obstacle avoidance, and controlling the motors based on sensor inputs. The system is then tested, refined, anddeployed for autonomous navigation while avoiding obstacles.

VII. CONCLUSION

the development of a line follower robot with obstacle avoidance capability offers numerous benefits and opens up possibilities for various applications. By integrating sensors for line tracking and obstacle detection, the robot can autonomously navigate along a specified path while avoiding obstacles in its environment. This enhances its efficiency, safety, and versatility in tasks such as transportation, surveillance, and exploration. The combination of accurate line following and obstacle avoidance algorithms ensures reliable and precise navigation, making therobot a valuable asset in industries, healthcare settings, and other domains requiring automated and intelligent robotic systems. Further advancements in sensor technologies and algorithms will continue to improve the capabilities and performance of line follower robots with obstacle avoiding capabilities, driving innovation in thefield of robotics.

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