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IJIEMR Transactions, online available on 22th Dec 2023. Link :http://www.ijiemr.org/downloads.php?vol=Volume-13&issue=Issue4

10.48047/IJIEMR/V13/ISSUE 04/40

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Volume 13, ISSUE 04, Pages: 356-360

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OBSTACLE AVOIDING ROBOT USING ARDUINO

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Abstract
This project represents the design and implementation of the obstacle avoiding robot it is fully autonomous robot using Arduino microcontroller technology. This robot designed with ultra sonic sensors to detect obstacles while it is moving. It includes decision making algorithm to change its path automatically when it detects the obstacle. Arduino plays a main controller of the robot it integrates sensors input and output signals, motor control system and decision making process of the robot. Robot moments is controlled by the DC motors. There are many types of automatic robots like line follower, fire detecting robot this obstacle avoiding robot is one of the automatic robot The Arduino UNO which uses in this robot as a central controller is easily affordable and simple to access educational purposes and providing live experience which makes more interests in robotics and programming. Probably this automatic robot are used in car manufacturing, aeroplanes, security protocols and in medical purpose also.

KEYWORDS: Obstacle, Arduino UNO, Sensors, detecting, Servo motor , Robot

Introduction
An obstructive A robot is an autonomous vehicle that can identify and avoid impediments in its path while navigating through a specific area. These robots are often employed in a variety of scenarios, including industrial automated guided vehicles (AGVs), exploration, and surveillance. An obstacle-avoiding robot's core working concept involves integrating sensors—typically ultrasonic or infrared sensors—to identify impediments and modify its path to avoid collisions.
The latter algorithms require more complex parameters related to the size of the barrier in addition to barrier identification, making them more complex overall. Once the object has been identified, the vehicle has to be

change its direction and permitted to continue moving by the obstacle avoidance algorithm. in the direction of the initial objective During navigation, the steering algorithm makes sure the robot doesn't have to halt in front of obstructions. A high-frequency the sensor notifies the microcontroller of an obstruction by sending it a signal. Consequently, some of the aforementioned navigational difficulties may be resolved by the robots. It has the ability to navigate smoothly, preventing mishaps. Must we make use of the ultra-sonic sensor the distance of an item is ascertained using infrared light from in ultra sensors. There are limitations on the way that the light beam can return. due to the item's angle of reflection, to the receiver after being detected. sensor, such limitations are the incapacity of infrared sensors to endure light reflections from luminous objects or surrounding illumination has hindered their operational efficiency.

Literature Survey

The obstacle avoiding robot using arduino was created by Aamir Attar, Aadilansari, Abhishekdesai, Shahid Khan, and Dipashrisonawale in order to create an autonomous robot that can recognize obstacles in its path and navigate by following instructions entered by the user.

As a result, by substituting robotic technology for trained workers, this system offers an alternative to the current one. With greater accuracy, faster recovery times, and reduced patient costs, this device can treat more patients in less time.Adhiket D. Adhvaryu et al. claim that rather than being built for a specific purpose, the "obstacle-avoiding robot with IR and PIR motion sensors" was developed as a general-purpose wheeled autonomous platform.
As such, it finds use in the fields of education, research, and industry. Students may use it to study the properties of IR and PIR sensors, motor driving circuits,

Arduino Uno 1.6.5 compiler, C++ microcontroller programming, and signal condition circuit design. Research on robots that avoid obstacles might be beneficial for polytechnic students. in teamwork, technical proficiency, and communication. Such a robot's design is very adaptable, enabling the customization of various methods for various applications. It proves that infrared sensors are less sensitive than PIR sensors. An extensive Many efforts have been made to control robots via wireless gestures.

As seen by the development of the project "Obstacle Avoidance Robotic Vehicle Using Bluetooth, Android, and Vaghela et al.'s "Ultrasonic Sensor for Obstacle Detection." Several methods have been investigated and assessed under a variety of operational and functional procedures, along with their advantages and disadvantages. Paul Kinsky is the developer of the "Obstacle Avoidance Robot," which Quan Zhou claimed had two extra purposes for its main body: it can carry a laptop and a camera thanks to a few mechanical components. Large-scale development, production, and testing went into making The motors were smoothly controlled by the AT89S52 development board. A accurate computer vision calibration is obtained by fixing and repositioning the very inexpensive cameras on the camera support. Users set up a development board with USB ports on the bottom and a laptop on top for serial connections. The development board will receive a signal from the laptop indicating the motor status.

Implementation

The fundamental block diagram for carrying out the project

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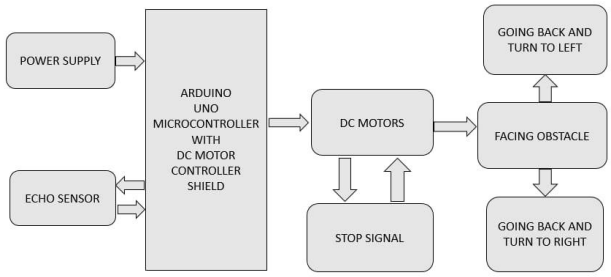

Fig 1: Block Diagram of the system

To implement the obstacle avoiding robot using Arduino Mainly Secure the Arduino uno, L298N motor driver and chassis board onto the frame check everything is correct and make sure everything is firmly attached and won't move around during operation. Connect the dc motors to the L298N motor driver. The L298N has dual H-bridge circuits we can control two motors independently. Connect all 4 DC motors to the result of the motor driver and provide power to the driver from the battery pack 4 lithium- ion batteries (18650) this is the battery which we used in this. The "18650" designation refers to the battery dimension (18mm in diameter and 65mm in length). Connect the ultra-sonic sensor to the Arduino uno and servo motor. Ultrasonic sensors generate sound waves, monitor the duration of those waves, and utilize that information to compute distance to an object. A servo motor is a kind of motor that, depending on the input signal it receives, may rotate to a particular angle. First, let's talk about how it operates. Being a completely autonomous robot, it can avoid any obstacles in its path.

When the robot detects the object while it moving forward direction automatically it will stop. Robot stop moving before 30cm from the obstacle when it detects the obstacle. In other words, when it encounters an obstacle while traveling forward, it will halt, look to the left and right, and begin to move in the best possible direction. If the obstacle is on the right, it will move to the left; if it is on the left, it will move to the right; and if there are still obstacles in the left and right directions, it will automatically move backward and find the best path.

Related Work

Ultra Sonic Sensors

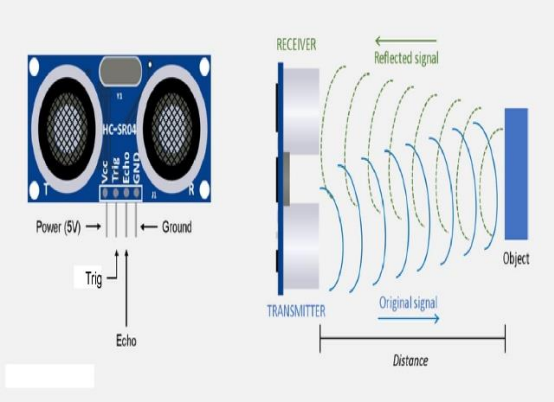

Fig 2: ultra sonic sensors

Pins 10, 11, 12, and 13 on the motor driver board link the Arduino board to the DC motor, supplying power to the actuators. Actuators are employed in robot may travel in four directions: forward, backward, left, and right. The table above provides a quick summary of the input pins used to move the robot. When a robot encounters an obstruction that its ultrasonic sensors can identify is in its path, it will halt moving. Ultrasonic sensors provide the microcontroller with time in length as an input for additional operations.

SG-90 Servo Motor

Fig 3 : SG-90 Servo Motor

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A DC or AC engine, a potentiometer, a equip convention , and a manage circuit make up a servo. At first, we utilize a adapt get together to lower the motor's RPM and boost its torque. Accept that the potentiometer handle is situated so that, at the servo engine shaft's beginning position, no electrical flag is created at the potentiometer's yield harbour. The mistake finder amplifier's other input terminal is presently accepting an electrical flag. The criticism instrument will handle the contrast between the two signals, one beginning from a potentiometer and the other from another source, and convey an blunder flag as the yield. The engine gets this incorrect flag as input, and it starts to pivot. The potentiometer is presently joined to the engine shaft, and when the engine turns, so does the potentiometer, creating a flag. Thus, the potentiometer's yield criticism flag shifts in couple with its precise area. After a few time, the potentiometer's position comes to a point where its yield matches the provided outside flag. Since there is no differentiation between the flag generated at the potentiometer and the remotely delivered signal in this scenario, the engine stops rotating since there is no yield flag from the intensifier to the engine input.

DC Motors

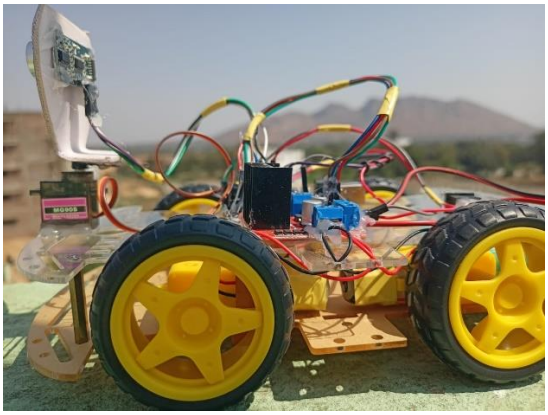
Fig 4 : DC MOTORS

An electrical gadget that turns and changes coordinate current (DC) electrical vitality into mechanical vitality is called a engine. A coil or inductor when DC control is presented to its terminal. A attractive field interior the DC engine produces rotational movement. An press shaft secured with a wire coil is found interior the engine. Due to the two settled North and South magnets on either side of the shaft, there's an appealing and awful constrain that combine to create torque.

The Arduino Uno is a well-known microcontroller board based on the ATmega328P processor. Because of its simplicity and adaptability, it's frequently used for DIY electronics projects and prototyping. Its foundation is the ATmega328P microcontroller chip, which features 32 KB of flash memory for program storage and operates at 16 MHz. Six of the Uno's fourteen digital input/output pins may be utilized as PWM (Pulse Width Modulation) outputs. Six analog input pins are also included.

Result

The obstacle avoidance robot's Arduino results are acquired by moving the robot ahead, detecting obstacles, checking for more directions, and moving. When there are no impediments, it travels ahead; an ultrasonic sensor is used to detect obstructions. The ultrasonic sensor was rotated by a servo motor.



Real picture of the robot

Conclusion

In arrange to recognize and dodge hindrances in its course, this investigate built an obstacle-avoiding robot. The Arduino is utilized to construct the robot. stage for information preparing and its comparing program helped in sending movement-guiding parameters to the robot through communication. Three ultrasonic separate sensors, which advertised a bigger field of discovery, were utilized for deterrent recognizable proof. The robot works completely on its possess without the require for human help after the programming has been stacked. When put in an new region with deterrents, it moved and maintained a strategic distance from each one or maybe absolutely.

Acknowledgement

We express our gratitude to all the writers of the several research articles that we consulted while composing this work. It was really educational and beneficial for the future study will be conducted.

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