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Obstacle Avoiding Robot Using Arduino

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Summary - The task is to create an obstacle avoidance tool that uses ultrasonic sensors for movement. A microcontroller (ATmega328) is used to do the job. A robot is a device that can be operated or controlled. The aim is to introduce a robot car with self-guided intelligence when faced with a problem. This robot car is built using AT mega 328 series microcontroller. Time determination means it gives the length of the heartbeat and will see the error in short beats. Consider pulses lasting from 10 microseconds to 3 minutes. It turns directly into distance during decision making. If the distance between objects is small, the robot will slow down and turn left, if there is an obstacle to the left, the robot will do the right thing. If the distance between objects is short, the speed of the robot will decrease and it can turn back and then move left or right. Ultrasonic sensors are used to detect any problem and send commands to the microcontroller. Depending on the received input signals, the microcontroller activates the motor connected to it, possibly with the motor driver, and directs the robot in the right direction. Some projects are built with infrared sensors and have their own software, so electronic equipment is not good in our competition, so we use ultrasonic sensors.

I. INTRODUCTION

Obstacle avoiding robots focus on robots in unknown environments avoiding collisions. The guard robot detects obstacles in front of it, avoids them and continues to work. Background wall, edge detection, bottom line etc. There are some popular methods for robot navigation such as One of the most common and widely used protection methods is edge detection. The disadvantage of edge detection as a preventative measure is that the robot must stay ahead of the problem to provide a more accurate measurement.

All mobile robots have some kind of collision avoidance ability from the old system, which uses certain difficulty methods that detect problems and stop the robot to avoid collision, make the robot get around the problem. The second algorithms are more complex because they involve investigating the problem and making some kind of quantitative measurement about the size of the problem.

Once these are identified, the antidestruct action should guide the robot around the problem and reset it to the original t arget. Steering algorithms ensure that the robot does not have to stand in front of obstacles while navigating. Ultrasonic sensors are used to detect all obstacles in front of them and to send commands to the microcontroller [10]. Therefore, th e robot can overcome some obstacles in the navigation process, travel well, as mentioned above, and not crash during o peration. If we use infrared detector, infrared detector detects the distance of an object to infrared radiation. When the b eam finds an object, the beam returns to the receiver at an angle after reflection, the sensor has limitations, these limitati ons are the performance of IR.

Sensors are always limited by their tolerance for light sources such as bright lights or bright colors. There are no products recognized in the dead zone, such as the Sharp GP2D12 IR distance sensor, where the dead zone is between 0 and 4 cm. Infrared sensors can also give false results on transparent materials or bright colors. Detection results also depend on the air environment, and the reliability of infrared sensors decreases with humidity and humidity. Additionally, IR sensors can detect IR radiation from sunlight, resulting in corrected or uncorrected output. Also, if an analog infrared sensor is used, the signal will be lost in the amplifier circuit. At the same time, PIR motion sensors need a long calibration time and are sensitive to thermal burst. Also, PIR sensors are not sensitive to slow motion or standing objects [2].

II. LITERATURE SURVEY

Aamir Attar, Aadilansari, Abhishekdesai, Shahid khan, Dipashrisonawale developed and passed "a line tracking and guarding robot using Arduino" to create a selfcontained robot that can intelligently detect problems in its movement, and was directed to the person he specified. Thus, the device offers an alternative to existing machines by replacing skilled workers with robotic devices, enabling more patients to be treated in less time with greater accuracy and a lower cost per patient.

Aniket D. Adhvaryu et al. Design and build "Obstacle Robot with Infrared and PIR Motion Sensors". Adhvaryu et al. suggests that advanced robots are not designed for specific tasks, but operate as wheels with optional capabilities.

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Therefore, it can be used for teaching, research or business. Students can use the C++ implementation of microcontroller programming to review Arduino Uno 1.6. Five compilers, IR and PIR sensor features, motor driving circuit and signal. Obstacle avoidance robotics exploration at the science and engineering level can help students increase communication, intelligence and teamwork. The design of such a robot can be easily modified and many techniques can be adapted to other applications. Indicates that the PIR sensor is more sensitive than the IR sensor in detecting men or women.

“"Protection of Robot Vehicles Using Ultrasonic Sensors for Obstacle Detection, Android, and Bluetooth" was designe d and developed by Vaghela et al. Based on various activities and strategies, various methods and their advantages and disadvantages are analyzed and analyzed. Therefore, it can be concluded that there are features such as the human interf acemild weight and portability of android OS based totally smart cellphone has overtaken the sophistication of technology like programmable glove, static cameras etc., making them out of date. even though current researches on this field have made wi-fi gesture controlling a ubiquitous phenomenon, it wishes to accumulate extra consciousness in applicable regions of programs like home equipment, wheelchairs, artificial nurses, desk top screens etc. in a collaborative way.

Created and edited by "Defense Robot" Paul Kinski, these robots have few tools and usually have two main tasks, lapto p holder and camera holder. The AT89S52 development board was designed, manufactured, and tested for the quality o f the car. An ultralow cost camera that attaches to the camera mount for accurate measurement of computer vision. The user sets the communication mode between the upper computer port and the lower development board via the USB port . The notebook sends signals about the state of the motors to the development board [4].

FaizaTabassum et al. He designed and developed the "Obstacle Avoidance Tool", which is said to be an obstacle-free tool that can detect and avoid obstacles. A simple algorithm for influencing and reducing the turning radius makes the car steer well. As a result, organization is linked to all forms of planning. Timer interrupt during IR pulse.

Obstacle detection using an infrared transceiver. Servos use PWM. The steering wheel uses Lego and servos. [5].

III. METHODLOGY

The basic block diagram for the implementation of the project is as shown in figure1.

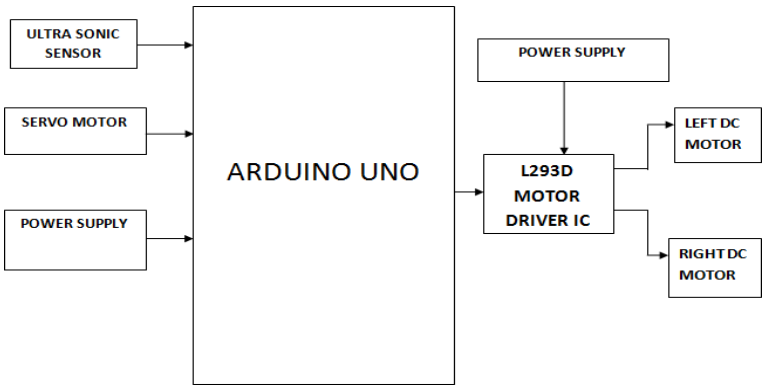

Fig. 1. Block Diagram of the system

Sonar is used in conjunction with the HC-SR04 ultrasonic sensor, which can determine the distance of an object such as a bat. Provides the best non-contact animal range from approximately 2cm to 400cm or 1ft to 13ft. Its work is not affected by sunlight or black materials. Ultrasonic sensors emit short, high-frequency signals. If they hit an object, they reflect the waist echo signal fed to the sensor on the Echo pin.

First, the user initiates the trigger and Echo stabilizes the robot and pushes it forward. The Echo pin will be input very often when a problem is detected. microcontroller. Pulse In characteristic is used for calculating the time of distance from the obstacle. each time the characteristic waits for pin to move high and begins timing, then timing may be stopped when pin visit low. It returns the pulse length in microseconds or when whole pulse was not received in the timeout it returns. The timing has been determined means it offers length of the heartbeat and will display errors in shorter

pulse Consider pulses lasting from 10 microseconds to 3 minutes. It turns directly into distance during decision making.

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If the object is some distance away, the robot slows down and turns left, if there is an obstacle on the left, it makes the necessary turn. If there is a short gap between objects, the robot speed will decrease and it can turn back and then move left or right. The robot has an Arduino board with a microcontroller on it.

TABLE I. INPUT PINS FOR MOVEMENT

Movement	Pin10	Pin11	Pin 12	Pin 13
Forward	1	0	0	1
Backward	0	1	1	0
Left	1	0	1	0
Right	0	1	0	1

The Arduino board is connected to the DC motor through the driver board (pin10, pin11, pin12, pin13) to power the actual or. Actuators are used to send forward, backward, left and necessary commands to the robot. A brief description of the input pins of the robot is given below the table. When there is an obstacle in the path of the robot that can be detected with the help of ultrasonic sensors, the movement of the robot can be prevented. Ultrasonic sensor provides cycle time-based motion as input to microcontroller

A. Sensors For Obstacle Avoiding

There are sensor data that can be used to define the area, some of the best known are: Infrared Sensors (IR), Ultrasonic Sensors, Cameras available as part of Laptop Vision, Sonar. In the installation of robots that can best close the gap in their own vision, ultrasonic sensors for interference detection and avoidance, we use ultrasonic sensors continuously emit frequency measurement, and when interference is detected, think back the warning message, then think back to it. an input sensor.

Fig. 2. Ultrasonic Sensor

Ultrasonic sensors have several vibrators fixed to their base. The multivibrator is a combination of resonator and vibrator, and the ultrasonic wave generated by the vibration is transmitted to the resonator. An ultrasonic sensor consists of two parts: an emitter that generates a 40 kHz sound wave, and a detector that detects the 40 kHz sound wave and sends an electrical signal back to the microcontroller. Use HC-SR04 ultrasonic sensor, including four pin VCC, Trigger, Echo, and GND.

Features of Ultrasonic Sensor:

- Compact and light weight
- High sensitivity and pressure
- High reliability
- Power consumes of 20mA
- Pulse in/out communication
- Narrow acceptance angle
- Provides exact, non-contact separation estimations within 2cm to 3m
- The explosion points LED shows estimations in advancement
- 3-pin header makes it simple to connect utilizing a servo development link

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IV. APPLICATIONS

1. Used in mobile robot navigation systems
2. Used for household work like automatic vacuum cleaning
3. Used in dangerous environments, where human penetration could be fatal.
4. Automatic change overs of traffic signals
5. Intruder alarm system
6. Counting instruments access switches parking meters
7. Back sonar of automobiles

V. FLOW CHART

Figure 4 is a diagram showing the operation of the robot protection system. It checks for problems in 30cm first. If there is a problem, it stops the change and turns left and measures whether there is an object within 30 cm. Control has two effects, yes or no. Yes, that means it must be anything closer than 30cm.No, it means that no object is detected within 30 cm. If there is nothing within 30 cm, the robot can move forward because the road is clear. If the distance is less than 30cm, the robot should avoid interference. The first level of fashion is to stop the robots! If you don't stop the bot now it will crash! After the robot stops, it needs to see which direction it should move. It does this by looking in all directions, just as you should when walking down the street. The robot first turns left to read, then right to work. Experiment further to see which way works best for the head. If you are moving to the left, you must turn left and move forward. If the robot is steered in the right direction, it will move freely as it crosses the right path.

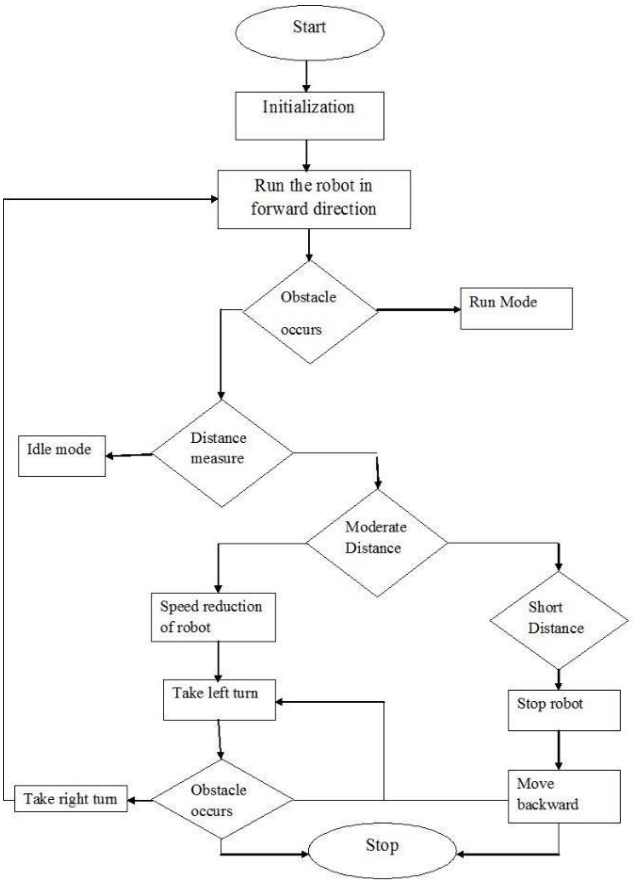

Fig. 3. Flow chart

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VI. RESULT

Protecting the robot using the results from Arduino, if it encounters a problem, the robot will move forward to find othe r commands and work without interruption, move to the front and sense the problem. Ultrasonic sensors are used. We u se a servo motor to rotate the ultrasonic sensor

[

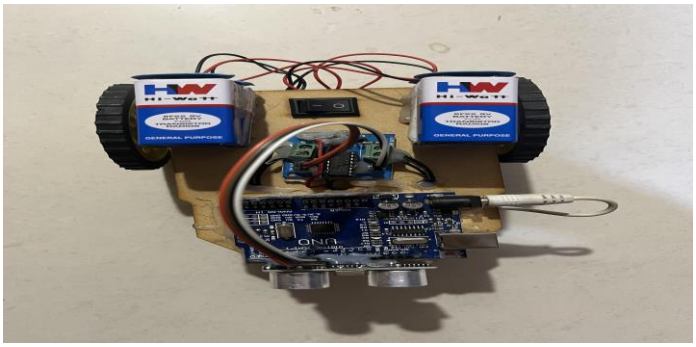

Fig. 4. Result of the project

VII. CONCLUSION & FUTURE SCOPE

This work introduces an obstacle to prevent the robot's direction from crossing and avoiding the obstacle. The robot is b uilt on the Arduino platform for data acquisition, and its associated software helps to communicate with the robot to ov ercome the inability to direct movement. To detect interference, Three ultrasonic distance sensors are used, providing a wide detection range. The robot is fully autonomous and works without user intervention after the first code upload. When placed in an unknown place with obstacles, it very well avoids all troubles on the go. There are many improvements that we need to consider to improve the robot's movement. However, many of these ideas also cost more money and time. Cameras can be used to identify problems in the future, but for clarity and speed it is better to use CCD or commercial products. Even the one we mentioned in the camera assembly section is fine with proprietary software.

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