OBSTACLE AVOIDER ROBOT

A PROJECT REPORT

Submitted in partial fulfillment of the requirement for the J component of the course

OBSTACLE AVOIDER ROBOT

by

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ABSTRACT

The project is design to build an obstacle avoidance robotic vehicle using ultrasonic sensors for its movement. A microcontroller is used to achieve the desired operation. A robot is a machine that can perform task automatically or with guidance. The project proposes robotic vehicle that has an intelligence built in it such that it directs itself whenever an obstacle comes in its path. An IR sensor is used to detect any obstacle ahead of it and sends a command to the micro-controller. Depending on the input signal received, the micro-controller redirects the robot to move in an alternate direction by actuating the motors which are interfaced to it through a motor driver.

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1. Introduction:

1.1 MOTIVATION

Obstacle avoidance Robot is designed in order to navigate the robot in unknown environment by avoiding collisions. Obstacle avoiding robot senses obstacles in the path, avoid it and resumes its running. There are some very popular methods for robot navigation like wall-following, edge detection, line following and many more. A more general and commonly employed method for obstacle avoidance is based on edge detection. A disadvantage with obstacle avoidance based on edge detecting is the need of the robot to stop in front of an obstacle in order to provide a more accurate measurement. All mobile robots feature some kind of collision avoidance, ranging from primitive algorithms that detect an obstacle and stop the robot in order to avoid a collision, using some sophisticated algorithms that enable the robot to detour obstacles. The latter algorithms are more complex, since they involve detection of an obstacle as well as some kind of quantitative measurements concerning the obstacle's dimensions.

Once these have been determined, the obstacle avoidance algorithm needs to steer the robot around the obstacle and resume motion toward the original target. The steering algorithm ensures that the robot does not have to stop in front of an obstacle during its navigation. An ultrasonic sensor is used to detect any obstacle ahead of it and sends a command to the micro-controller [10] Hence the robots may overcome some of the problems during navigation, which are discussed above and it can navigate smoothly during its operation avoiding the collisions. if we were use the IR sensor Infrared sensors detect the object's distance with infrared radiation. When the beam detects an object, the light beam returns to the receiver with an angle after reflection there is a limitations in sensor those limitations are Performance of IR

sensors has been limited by their poor tolerance to light reflections such as ambient light or bright object colors.

1.2. OBJECTIVE

To make an obstacle avoiding robot which uses ir sensor to avoid objects within its vicinity.To use an arduino board in order to integrate the microcontroller and the required connections between ir sensors ,motors as well as the body of the robot.
To code a program for the ir sensor to work using arduino and uploading the code into the robot using usb a-b cable

1.3. Literature Survey

Road safety is not an issue that will resolve itself, every citizen has a responsibility for an action. We commit our combined knowledge, data, technology and networks to promote safety. Between 25percent and 33 percentof global crashes are work-related and 36 percentof occupational deaths worldwide aredue to road crashes. Hence, crash avoidance systems and devices help the driver and, increasingly, help the vehicle itself to avoid collision. This literature survey implements one such safety subsystem, Adaptive Cruise Control (ACC) using the ultrasonic sensors. This system uses an ultrasonic set up to allow the vehicle, to slow when approaching another vehicle or obstacle and accelerate again to the pre-set speed when traffic allows. ACC technology is widely regarded as a key component of any future generations of smart cars, as a form of artificial intelligence that may usefully be employed as a driving aid

anti crashing system for automobiles IEEE paper published in 2013, attempted to develop an anti-crash warning system combined with ultrasonic ranging technology and sensor technology for automobiles. It mainly focusses on potholes in the road and its detection and hence automatic or manual reduction in the speed of the vehicle in order to avoid crashing.2.In "Cooperative vehicle collision avoidance using inter-vehicle packet forwarding IEEE paper publishes in 2005, proposes a broadcast oriented packet forwarding mechanism for intra-platoon cooperative collision avoidance (CCA) using dedicated short range communication (DSRC) based wireless networks. Using an implicit acknowledgement strategy it is shown that with inter-vehicle spacing of nearly one second, the proposed mechanism is capable of saving up to 90 percent of vehicles in a platoon from chain crashes following emergency events at the front of the platoon.

An attempt has been made in this survey to understand and comprehend the aspects of ultrasonic distance sensors from which we would be able to find the distance of the obstacle like potholes or humps and warn the driver so that the speed is decreased. Since there is also a collaboration of ultrasonic motion sensors, if any moving obstacles are noticed like animals or people trying to cross the road suddenly, the diver can be warned about it and hence the speed can either be decreased manually or by the automobile itself by the usage of Adaptive Cruise Control (ACC), where ACC is a system which uses an ultrasonic setup to allow the vehicle to slow when approaching another vehicle or obstacle and accelerate again to the pre-setspeed.

2. DESIGNING METHODOLOGIES

Ir sensor : used to detect object using high and low commands so that the robot can avoid objects and move.

Arduino board : to integrate arduino program into it.

Microcontroller:to connect all the ir sensor and the motor so that al are intact and the robot can move.

Power bank : to make the robot move and for providing power to the board.

2.1 ARDUINO BOARD

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

Over the years Arduino has been the brain of thousands of projects, from everyday

objects to complex scientific instruments. A worldwide community of makers - students, hobbyists, artists, programmers, and professionals - has gathered around this open-source platform, their contributions have added up to an incredible amount of accessible knowledge that can be of great help to novices and experts alike.

Arduino was born at the Ivrea Interaction Design Institute as an easy tool for fast prototyping, aimed at students without a background in electronics and programming. As soon as it reached a wider community, the Arduino board started changing to adapt to new needs and challenges, differentiating its offer from simple 8-bit boards to products for IoT applications, wearable, 3D printing, and embedded environments. All Arduino boards are completely open-source, empowering users to build them independently and eventually adapt them to their particular needs. The software, too, is open-source, and it is growing through the contributions of users worldwide.

Why Arduino?

Thanks to its simple and accessible user experience, Arduino has been used in thousands of different projects and applications. The Arduino software is easy-to-use for beginners, yet flexible enough for advanced users. It runs on Mac, Windows, and Linux. Teachers and students use it to build low cost scientific instruments, to prove chemistry and physics principles, or to get started with programming and robotics. Designers and architects build interactive prototypes, musicians and artists use it for installations and to experiment with new musical instruments. Makers, of course, use it to build many of the projects exhibited at the Maker Faire, for example. Arduino is a key tool to learn new things. Anyone - children, hobbyists, artists, programmers - can start tinkering just following the step by step instructions of a kit, or sharing ideas online with other members of the Arduino community.

2.2 IR SENSORS

An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment. Infrared radiation was accidentally discovered by an astronomer named William Herchel in 1800. While measuring the temperature of each color of light (separated by a prism), he noticed that the temperature just beyond the red light was highest. IR is invisible to the human eye, as its wavelength is longer than that of visible light (though it is still on the same electromagnetic spectrum). Anything that emits heat (everything that has a temperature above around five degrees Kelvin) gives off infrared radiation.

There are two types of infrared sensors: active and passive. Active infrared sensors both emit and detect infrared radiation. Active IR sensors have two parts: a light emitting diode (LED) and a receiver. When an object comes close to the sensor, the infrared light from the LED reflects off of the object and is detected by the receiver. Active IR sensors act as proximity sensors, and they are commonly used in obstacle detection robots

3. Result analysis:

The result is obtained for obstacle avoidance robot using Arduino, if the robot moves forward if any obstacle detect it check for other directions and moves where there is no obstacles it moves in forward direction, to sense the obstacle IR sensor is used.

4. CONCLUSION AND FUTURE SCOPE

This project developed an obstacle avoiding robot to detect and avoid obstacles in its path. The robot is built on the Arduino platform for data processing and its software counterpart helped to communicate with the robot to send parameters for guiding movement. For obstacle detection, three ultrasonic distance sensors were used that provided a wider field of detection. The robot is fully autonomous and after the initial loading of the code, it requires no user intervention during its operation. When placed in unknown environment with obstacles, it moved while avoiding all obstacles with considerable accuracy. In order to optimize the movement of the robot, we have many considerations for improvement. However, most of these ideas will cost more money and time as well. In future cameras can be used to detect the obstacle however, it is better to get CCD or industrial use ones to get clear and fast pictures. Even the ones we mentioned in the camera holder part will be better because of the special software.

5.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

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PRESENTATION LINK: https://youtu.be/n1GaSyEMoCQ