Sameeksha – An Inspecting Security Robot

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ABSTRACT: The project is designed to build an Obstacle avoidance security robot. A robot is a machine which can perform task automatically or with the guidance of the user.Robotics is a combination of machines and the computational intelligence. Computational intelligence includes the programmed instructions.The project proposes robotic vehicle that has an intelligence built in it such that it redirects itself whenever an obstacle comes in its path. An Ultrasonic sensor is used detect the obstacle that comes in its path and sends a command to the driver-controller.Depending on the input signal received, the driver-controller redirects the robot to move in an alternate direction by actuating the DC motors**.** There are two ways to control this Robotic vehicle. They are Manual control and the Automatic control. When the user chooses the manual control, the robotic vehicle switches to user control mode where the user can control the movement of the robot using mobile application in four directions i.e towards Left, Right, Forward, and Backward. When the user chooses the automatic control, the Robot switches to self-monitoring mode, where the Robot moves/redirects itself without the guidance of the user. The robot also includes video streaming feature using Raspberrypi2 camera. This feature enables the user to continuously track all the activities that is going. The recorded video is being streamed by the user through the mobile application. The robotic vehicle also includes the two of the security features i.e Gas detection and fire detection through Gas detection sensor and fire detection sensors respectively.

KEYWORDS: Wheeled Robot, Self-monitoring, Autonomous, Obstacle avoidance, Sensors, Security.

I. INTRODUCTION

Obstacle avoidance Robot is designed to make a robot to navigate in unknown directions by avoiding collisions. Obstacle avoiding robot senses an obstacle which comes in its path and avoid it and resumes its running by changing its direction. Some types of Robot navigation are wall-following, edge detection, line following. A more general and most used method for obstacle avoidance is based on edge detection method. A disadvantage with obstacle avoidance basedon edge detecting is the need of the robot to stop in front of an obstacle in order to provide a more accurate measurement and by using sensor it may not able to reach the complete corner. There are many different types of mobile robotics. They can be divided into categories such as wheeled robot, crawling robot and legged robot and many.This project deals with a wheeled autonomous ROBOT. It is the part of Automation; Robot has sufficient intelligence to covers the maximum area by changing its direction. This robot uses ultra-sonic sensor to detect the obstacle in between the path and then avoid them to compute its objective. This technology, automatically sense the obstacles and then checks for the wider space using a 9g servo motor and then moves in that available free space. The 9g servo motor is capable of rotating 180^0.Two ultrasonic sensors are mounted on top of the servo motor inorder to sense all the four directions that is left, right, forward ,backward. After sensing in all the three directions it calculates the wider space among all the four directions and the redirects itself in that respective direction. These complete hardware is circuited with arduino board that is being coded with c programming. This technology also includes

manual control through android application. The robotic vehicle and the mobile application is being interfaced using a Bluetooth module which can reach upto the limit of thirty feet. The camera is included in the Robot, so that it captures the image of an obstacle and sends it to the mobile application. The mobile application and the camera is being interfaced using a Raspberrypi Wifi adaptor which requires a mobile Wifi network. The camera is implemented using Raspberrypi board and python coding. In this way a vedio streaming and image capturing is made user friendly. The main motto of designing such type of Robot is security. To achieve the motto the technology implements sensors based security. The project includes a gas detection sensor, by which a user can know the level of types of gases in and around a particular area. The project also includes a fire detection sensors that intimates the user through an alarm and a notification incase of a fire any fire accident.

II.SYSTEM DESIGN

The proposed robot was built with an Arduino UNO R3 development board on which microcontroller is placed. Arduino UNO board is connected with DC Motor through Motor driver board which provide power to the actuators. Actuators are used to move robot in Forward, Backward, Left and Right directions. The movement of robot will be stop whenever there is an obstacle is present on its path which can be detected by ultrasonic sensors, and moves to the longest available path which is calculated by using servo motor. The image of an obstacle is captured by using a Pi camera connected to an Raspberry pi board.

III.IMPLEMENTATION

The implementation of obstacle avoidance strategy for robot involves the writing and compilation of program using Arduino software. Arduino is a popular programmable board used to create projects. It consists of a simple hardware platform on which microcontroller is placed. It is designed in such a way that they can be used without necessarily being an expert programmer. Arduino offers an open-source electronic prototyping platform that is easy to use and flexible for peoples who are beginners in robotics field with both the software and hardware perspective. Aurduino involves a basic C programming language and a Arduino IDE language which is similar to C programming language. Sensors are connected with the Arduino board using breadboard along with servo motors with it. Microcontroller is able to sense the environment through receiving input from sensors. It is also able to control its surrounding through controlling motors and other actuators. The Arduino programming language that is based on the processing are used to program the microcontroller found on the board. Due to its open source environment, we can able to easily write and upload codes to the I/O board. The output of the comparator is given to the microcontroller, which then moves actuators in left or right direction by giving power through DC motor. The direction of the car can be controlled by the app created if it is running under manual control, and it will be self- monitored if it is automatically controlled. The sensors placed on Robot will send the current place environmental values and the images captured of the obstacle found, to the device connected through Bluetooth module.

IV. CIRCUIT DIAGRAM
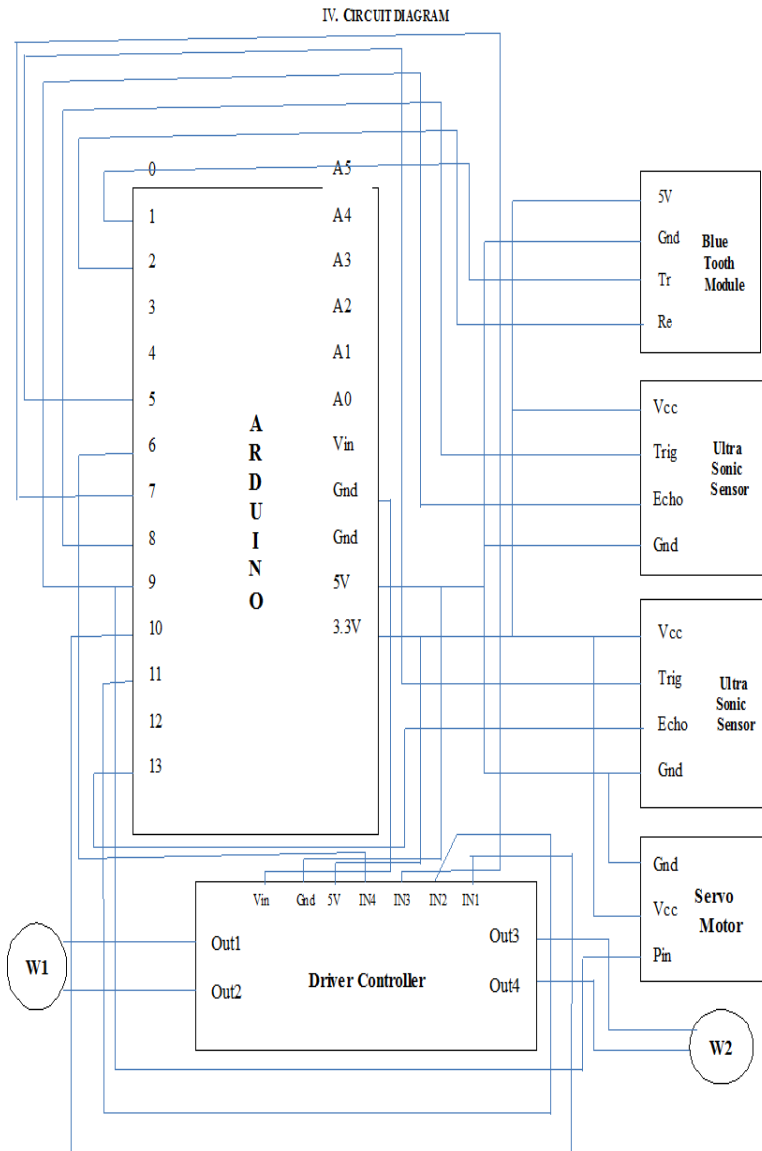
V. EXPERIMENTAL RESULTS

Fig.(a)shows the result of module1 of design of the project.it shows the simple obstacle avoidance robot using an ultrasonic sensor. The robot is capable of redirecting itself when it senses an obstacle in its path. It is also an application controlled robot through a Bluetooth interface.
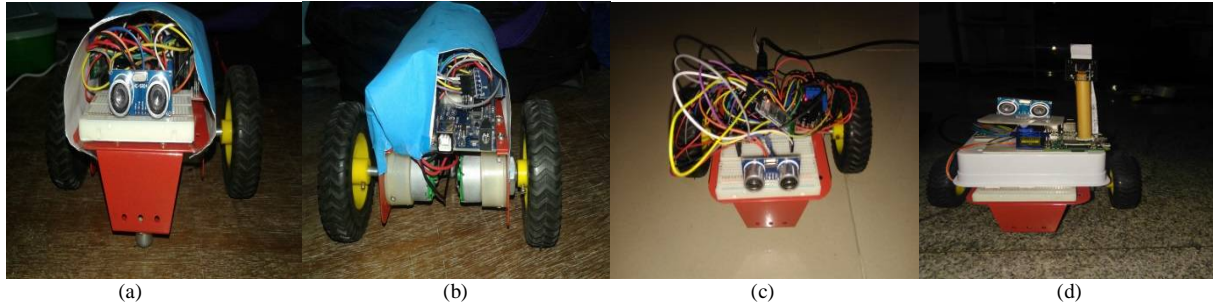
| (a) | (b) | (c) | (d) |

Fig.(d) shows the Camera interfaced robotic vehicle. It also shows the robotic car with servo motor that help the robot in redirecting to a wider area.

VI. CONCLUSION

The proposed robot that can navigate in all the directions left,right, forward and backward including a feature to stop the robotic vehicle. The goal of the project is to build a Security Robotic vehicle that is completely in the control of the human where in he can switch the vehicle to work as a self –monitoring or a manual controlled robot. The self-monitoring feature enables the robotic vehicle to sense the obstacle and redirect itself to a wider area. Also if the vehicle is switched to a manual mode by the user, he can control it through the navigating buttons. The goal is also achieved by including the providing video streaming feature and sensors based security.

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