Arduino Obstacle Detection, Bluetooth Control Robot with Voice Control and Vacuum Cleaner.

prof . Gayatri Jagnade, Shital Hande, Vaishnavi Chorghade, Pankaj Devale , Pratik Gargade ,Prathmesh Hawale

**Department of Chemical Engineering,
Vishwakarma Institute of Technology, Pune, 411037, Maharashtra, India**

Abstract —

Today's industrial and intelligent systems era of industrial and intelligent systems has seen a significant impact from the deployment of robots and their vast technical applications. The fact that these robots may walk around freely and with no control is a significant challenge. This study describes the creation of an autonomous obstacle-avoidance robot that makes use of ultrasonic sensors. In this design, the ultrasonic sensor acts as the robot's eye to support its autonomous movement. The wheeled robot can be operated either manually or by an Android app that is specifically designed for controlling them. The control application was an added feature in case human control of the robot was required.

Keywords — IOT, Bluetooth module, Arduino UNO, ultrasonic sensor .

I. INTRODUCTION

An open-source electronics platform called Arduino makes it possible to build a variety of projects, including robots. An obstacle detection and Bluetooth-controlled robot with voice control and a vacuum is one such project that may be made with Arduino.An Arduino board, a motor shield, ultrasonic sensors, a Bluetooth module, and a hoover cleaner may all be used to construct the robot. The motor shield and the ultrasonic sensors may be used to steer the robot and identify impediments in its path. A smartphone or other Bluetooth-capable device can be used to remotely operate the robot via the Bluetooth module.

A voice recognition module that can be interfaced with the Arduino board can be used to provide the robot with vocal control. After doing this, the user will be able to speak commands to the robot to move and hoover. By fastening it to the robot's chassis, the hoover cleaner may be added to it. With the Bluetooth module or voice control, the hoover cleaner may be turned on and off. This will enable the robot to move around and detect obstructions while cleaning the area. Overall, learning about electronics, programming, and robotics may be accomplished through this project.

In the Internet of Things context, "things" refers to a network of physical items with electronics, sensors, software, and network connectivity (IoT). The Internet of Things (IoT) makes remote object sensing and control possible, enabling the seamless integration of computer-based systems and the physical world. Automation is also being used more frequently in modern homes, which provides convenience and cuts down on the time needed for housework. Urban inhabitants work atypically long hours. In such situations, a person will constantly hunt for time-saving strategies. Career-driven women may find it difficult to combine their home and work lives. The ongoing Covid-

19 pandemic has made maintaining a clean and sanitary living environment a primary priority as of 2021. It is possible to clean floors with a variety of human and automated techniques. The floor is cleaned more quickly and over a bigger area by using machine power. The equipment used for cleaning floors does have some variations and limitations. Because of this, it is essential to develop a cleaning robot that runs automatically without human assistance to finish the job quickly and produce cleaner results across a broader area.

II. LITERATURE REVIEW

[1] Zeeshan Sheikh Dr. Ms. K.N. Kasat's voice-activated anti-drop cleaner design We can infer from what robot another said that we can easily clean our home utilising this robot. This robot has numerous features that are advantageous and makes living easier. Future updates to this robot's features and our ability to customise it to meet our needs are both possible. Future potential for this robot is enormous. Although the cleaner robot in this iteration is somewhat large, in the future we can make it smaller so that it can clean smaller areas of the house. However, it is still incredibly powerful and quick enough to clean the trash.

[2] Pawan Kumar Ramkissoon and Anshu Prakash Murdan An Android-based smart autonomous floor sweeper described by another plot and deployment of clever, details of work are independent cleaning or mopping robot . A 12 V rechargeable dc lithium polymer battery powers the system. Due to its numerous GPIO ports and Compared to other Arduino-based microcontrollers, it has better flash memory storage of 256 kB. , the Arduino Mega board is utilised in this project. The Android Studio-created application software offers Bluetooth connectivity to any pairable component or device.

[3] Salwan Ali Habeeb Al Sultani3, Wisam Kareem Meteab1, Haider Th Salim ALRikabi2, and Ibtisam A Aljazaery4 Using smartphone applications to monitor and control a robot car, another person saidIn this study, an Android-powered smartphone, Bluetooth, and an Arduino microcontroller were used to create the Car robot. The Arduino programme has been executed very effectively, and every accessory's function has been meticulously described. This will ultimately be significant in many facets of life. It will be a big help to people in getting their work done quickly and creatively. Additionally, this research

demonstrated that vehicles can travel on both smooth highways and uneven terrain.

[4] Li Hung Goon, Ahmad Nur Iman Md Isa,, W.A.F.W and Chia How Choong. Othman Arduino-based creation of a crucial parts was polisher robot basic of aromatic , basic automatic floor polisher including,an ultrasonic sensor, DC motors,Bluetooth module, , a motor driver, and PC fans, make up the basic automatic floor polisher. Each component in this robotic floor polisher carries out its own functions. The automatic floor polisher's remote ON/OFF functionality was added using a Bluetooth module, and an LED was utilized as an indicator of the ON/OFF status.

[5]Dr. F.B. Sayyad, Mr. Gitesh Wankhedeand Mr. Suryakant Singh Robot Fire Extinguisher has a very tiny footprint, is lighter, and occupies less room. These batteries are rechargeable. Because they can be recharged and reused hundreds of times with a basic battery charger, rechargeable batteries generate less waste. Each task is carried out in the most effective way possible, including the robot starting on its own, moving step-by-step through each room, finding the fire in a particular room, extinguishing it, and then returning to the front of the house.

III. METHODOLOGY

An Arduino obstacle detection, Bluetooth control robot with voice control, and vacuum cleaner using a paper methodology Four DC motors are used to build Vacuum Cleaner, which is programmed to operate at the speed specified by the Arduino IDE code and use a motor shield to move in the correct direction.

1.The ultrasonic sensor measures the distance from it to any obstacles in front of it. Therefore, the RC car carrying the vacuum cleaner alters its direction anytime it comes into contact with any barriers like walls, doors, tables, etc. Which cannot be regarded as waste and dust, To prevent crashing and destroying itself.
2.When an obstacle is detected, the code provided to the Arduino runs constantly and the cycle repeats at regular intervals. The ultrasonic sensor is used to detect obstacles and servo motors are used to move them.
3.The vacuum cleaner can be connected to Bluetooth using the Bluetooth module HC 05 and

the "Bluetooth RC controller" app for mobile devices. Additionally, a Bluetooth HC 05 module isused for voice control, and an app that detects and responds to the human voice is employed.

4.A vacuum cleaner consists of a water bottle, CPU fan, pipe, tape, gauze bandage, batteries, and a switch. A pipe connects the bottle cap area.

A.Components

1. Arduino UNO and Arduino motor shield: Using the Arduino Motor Shield, an add-on board, you can use your Arduino Uno to control DC motors. It contains two H-bridge circuits that can each drive one stepper motor or two DC motors. You may regulate the motor's direction and speed using the H-bridge circuits. The Arduino Uno's power supply or an external power source can be used to power the shield.

Fig. 3.1

2.Gear motor:- The four-gear motor powers this wheeled robot. Motor drive controllers are used to control these gear motors. A voltage rating of 3 to 12 V applies to this gear motor. It rotates at 200 RPM at idle. The use of this gear motor is for mechanical tasks. There are four of these gear motors, each with a DC motor and gears. The gear motor can propel this robot left, right, backward, and forward.

Fig. 3.2

3.Bluetooth module:- It is used for Bluetooth control and Voice control of the vacuum cleaner

Fig. 3.3

4.Ultrasonic sensor: - Within this robot, there is an ultrasonic module. Sonar is used by this module to determine an object's distance. 5V is the operational voltage. The static current is under 2 mA. Its sensing angle is around 15 degrees. The detecting range of this module is 2 cm to 450 cm.
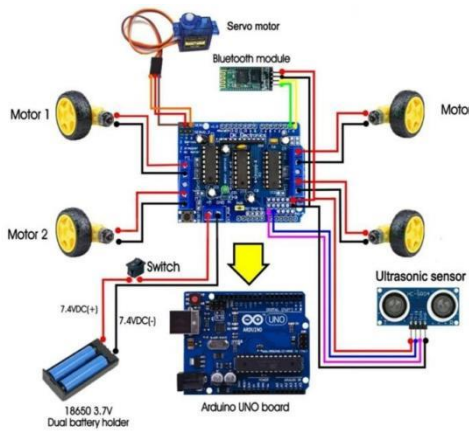

Fig . 3.4

5.Servo motor:- This robot weighs approximately 9 grams and uses a servo motor. It moves at around 0.10 seconds every 60 degrees. On the servo motor, the ultrasonic sensor is placed. To detect the object, the ultrasonic sensor was moved in all directions. The Arduino board controls this servo motor.

Fig. 3.5

B. Design

IV. FUTURE SCOPE

The short-range Bluetooth modules have been the project's primary emphasis. Using a long-range module allows for long-distance connectivity with the robot. Power optimization might take schedules for getting up and going to sleep into account. Accuracy can be improved by using servo motors. An automatic targeting system that follows the target may be installed on the robot. There will also be a 2-D artificial intelligence mapping system. To do this, the hoover first scans the entire area, after which it can travel to any place in the area with a single command utilizing a 2-D map that was created during the initial scan.

V. CONCLUSION

A project for a programmable Android-based floor cleaner is being considered. The structure can clean the flooring. The technology requires little to no physical energy from people to operate. The approach comes with an Android control that uses a Bluetooth communicator. The main aim of our project is to develop such kind of robot which will help a lot in our day to day life, as we know that in our busy life managing each and every household work is very difficult so for that, this robot will help us a lot in every way as it will help in cleaning the floor and vaccum cleaner will help us in absorption of dust particles and after moping fan can be used in drying the floor and all this process will help us a lot and will also decrease labor work.

VI. ACKNOWLEDGMENT

VII. REFERENCES

[1] H. Hyung, B. Ahn, B. Cruz and D. Lee, Analysis of android robot lip-sync factors affecting communication, 11th ACM/IEEE International Conference on Human-Robot Interaction (HRI), 2016, pp. 441-442

[2] Bradshaw, 1991"The UK Security and Fire Fighting Advanced Robot Project," IEE colloquium on advanced robotic initiatives in the UK, pp.1/1-1/4

[3] Ruiqing Jia, Changliang Li, Tao Jiang, Wenhao Dong, and Peng Xia. "Design of Ultrasonic Obstacle Avoidance System Based on the Mine Mobile Robot," Development & Innovation of Machinery & Electrical Products, 2011.

[4] HC-SR04 User Guide, Nov. 20, 2017, [Online]. Available: http://www.elecfreaks.com/store/download/product/Sensor/HCSR04/HC SR04_Ultrasonic_Module_User_Guide.pdf

[5] J. Forlizzi and C. DiSalvo, "Service robots in the domestic environment: a study of the roomba vacuum in the home," in *Proceeding o f the 1st ACM SIGCH1/SIGART conference on Human-robot interaction - HRI •06*,2006, pp. 258-265.

[6] F. Vaussard *et al.*, "Lessons learned from robotic vacuum cleaners entering the home ecosystem," *Rob. Auton. Syst.,* vol. 62, no. 3, pp. 376-391,2014.

[7] Roa'a M Al_airaji, Aljazaery Ibtisam A, Al_Dulaimi Suha Kamal, Alrikabi Haider TH Salim and Informatics 2020 *Generation of High Dynamic Range for Enhancing the Panorama Environment* (Bulletin of Electrical Engineering) vol 10 no 1

[8] Mustapa, M. A., Othman, W. A. F. W., Bakar, E. A., & Othman, A. R. (2018). Development of pole-like tree spiral climbing robot. In Intelligent Manufacturing & Mechatronics (pp. 285-293). Springer, Singapore.

[9] Hirani, A. (2019). Design of mini CNC using arduino uno.