

Multipurpose Sensing and Detecting Van

Tejashri Sunil Shrivagi¹, Sakshi Prashant Sawale², Sandip Devrao Misal³, ⁴Abhilash Netake

¹ Student, Electrical engineering, MET's Institute of Engineering, Adgoan, Nashik, Maharashtra, IN

² Student, Electrical engineering, MET's Institute of Engineering, Adgoan, Nashik, Maharashtra, IN

³ Student, Electrical engineering, MET's Institute of Engineering, Adgoan, Nashik, Maharashtra, IN

⁴ Assistant Professor, Electrical engineering, MET's Institute of Engineering, Adgoan, Nashik, Maharashtra, IN

ABSTRACT

This paper discusses the design and building of a versatile general robot. This robot is used household, military as well as civil applications are possible for the proposed robot. The positioning and design of numerous sensors, the wheel system, as well as the wireless communication and remote-control mechanisms are discussed in this paper. Its multiple part's coordination to complete various tasks is also discussed. The movement of the design robot can be controlled from Bluetooth terminal or an android application. It can be utilized in commercial, industrial applications such as detecting gas leaks in households and, surveillance of banks, shopping malls, parking lots, offices, workplaces, industries, as well as assisting rescue operations during natural disasters as well as to carry goods. The proposed robot's structure and design are adaptable, and it can be changed to increase its potential.

Keyword : *Arduino Uno, Ultrasonic Sensor, Metal detector, Gas sensor, Bluetooth, Dc Motor, Motor driver.*

1. INTRODUCTION

A robot is a multipurpose manipulator that may be programmed to execute a number of activities. Robots are required for a wide range of jobs and have several applications in a growing number of fields. Some activities, such as repeated, precise, high-speed movements, or high levels of strength, need performance beyond human capabilities. Furthermore, there are some tasks that are hazardous to humans. Mobile robots have a wide range of applications in industry and have become an important field of robotics. They are supposed to be a significant advancement in automated transportation systems. It is likely that, once technology has matured sufficiently to ensure safe and reliable functioning, it will be implemented.

As a result, the focus of this project will be on designing and building a robot with multiple uses multiple robots or multiple tasks performed by a single versatile robot must always be coordinated. Coordination is always a difficult task, and the successful operation of an integrated robotic system is largely dependent on i.e. multifunctional robot saves time and money by including many sensing and working modules that may work simultaneously and synchronously. Work is also completed more efficiently.

The goal of this project is to design and build a prototype of a versatile strategic robot that can do both dedicated and general-purpose tasks. It can sense numerous environmental elements in general-purpose activities, such as military purpose, rescue operations, and cargo transport.

2. LITERATURE REVIEW

In order to erect this project, numerous researchers conducted various studies. However, serve a different purpose and use different technologies. Some of these publications are programed here, along with descriptions of their technology and applications.

1) Namita Shinde, Shreya Srivastava, Vineet Sharma, Samarth Kumar, Discusses on the look, Design and model of mobile remote control robo car. The device is hold up by an Android operating system, an Arduino microcontroller, motor drivers, and a Bluetooth module. Arduino is a prototyping platform that is open-source. With an Arduino and a Bluetooth module, this is a pretty simple remote-control car. On that device, the app will have all of the vehicle's controls. We chose this as our major project since robots has become a vital part of our daily lives and has a wide range of applications in engineering. It is enormously important in the advancement of new technology.

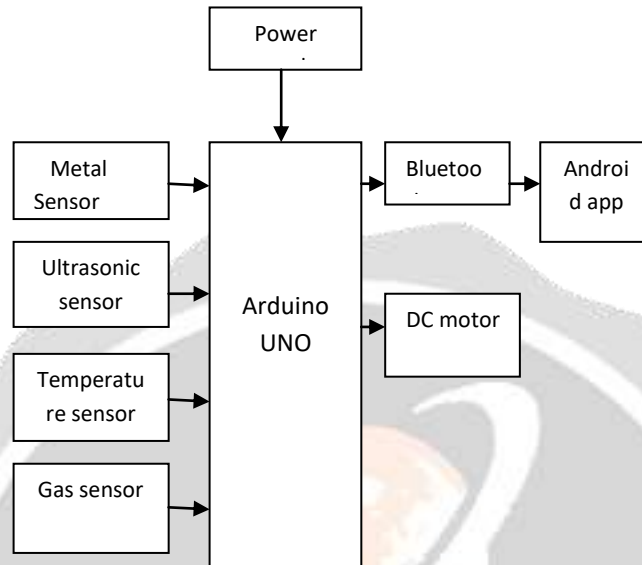
2) Vijayalakshmi S, Archana M, has described the whole process of robot car using Arduino controller Android OS, Arduino, L298N motor, DC motor driver, temperature sensor-DHT11, and Bluetooth module are all used to operate this car. Arduino is an Arduino ide. The temperature sensor is sensing its surroundings. An Arduino, L298N motor, and Bluetooth module are used to build a remote-control car. Using a DHT11, Arduino, and Bluetooth module to measure temperature. Using programming skills, upload the code to the Arduino board. The Arduino code was emitated in software before being conflucenced with hardware. Any Android-powered device can control the gadget. Air Droid is an Android only application that lets you connect your handset to a PC via a wireless network controller.

3) R Ismail Omar, S Suaibun, has described A robot that can avoid obstacles was developed, built, and programmed, and it might be utilized for educational and scientific purposes. When the infrared and passive infrared sensors sense a signal, the built robot will move in a precise route while avoiding obstacles in its path. The robot can also do activities in unstructured conditions without the need for constant human supervision. As part of the embedded system, the hardware was combined into a single application board. Arduino IDE 1.6.5 was used to compile the program, which was written in C++.

4) Md Abdul Kadir, Md Belayet Chowdhury, Jaber AL Rashid, Shifur Rahman Shakil, had described A Manual loading and unloading of heavy items is one of the most vital tasks in industries, but it is also one of the most tricky, sluggish, and dangerous tasks for humans. The mechanical design of the industry-based programmed robot is illustrated in this study, which involves the Ackerman Steering Mechanism and the Differential Mechanism. With Ackerman Steering, the front two wheels can turn left and right in the track without leaving it. A differential has been installed with two back wheels, and a DC motor with its controller has been used to get the robot moving. The autonomous robot is programmed to begin its journey from a beginning point where products are loaded, then follow a white line placed on a black surface and unload goods on its own when it arrives at its destination. Line of Communication The following sensor has been put in front of the robot so that it can identify the path by generating and receiving signals, allowing it to drive along a pre-defined track with left and right turns while transporting goods from the starting position to the destination. The primary goal is to load and unload weighty cargo.

5) E Amareswar, G Shiva Sai Kumar Goud, K R Maheshwari, E Akhil, has described for more than half a century, robotics has been a backbone of advanced production. Robots and their associated equipment are increasingly being used for military and law enforcement reasons as they grow more sophisticated, reliable, and smaller. From patrol to dealing with suspected explosives, mobile robotics are becoming increasingly crucial in military concerns. Mobile robots are operated remotely for reconnaissance patrol and feedback video pictures to an operator with appropriate sensors and cameras to conduct diverse missions. Android smart phones are the most common device nowadays.

3. BLOCK DIAGRAM



3.1 DESCRIPTION OF BLOCK DIAGRAM

The Arduino uno gives out the project's primary controller. The Arduino Uno takes the input from the sensors, processes it, and gives definite output. The ultrasonic sensor is used as the Arduino's input in this project. The ultrasonic sensor is used to spot the distance between obstacles. The temperature is detected using a temperature sensor. The LM35 temperature sensor is used as the Arduino's input. A metal sensor is employed to detect the metal underground. The Arduino uno is given a metal sensor as an input. The project also includes a gas sensor as an input to the Arduino Uno. The gas is detected by an MQ9 gas sensor. The robot's mobility is controlled with the help of the Bluetooth module.

4. SYSTEM COMPONENTS

Arduino: The Arduino UNO is an Arduino standard board. It was also Arduino's first USB-connected board. It is regarded as a powerful board that is employed in a variety of tasks. The Arduino UNO board was created by Arduino. The ATmega328P microcontroller is used in the Arduino UNO. In comparison to other boards, such as the Arduino Mega board, it is simple to use. Digital and analogue input/output pins (I/O), shields, and other circuits make up the board. It was programmed using the Integrate Development Environment.

Ultrasonic sensor: This is a device that uses ultrasonic sound waves to determine the distance between objects. An ultrasonic sensor sends and receives ultrasonic pulses that communicate information about the vicinity of an item via a transducer.

Temperature sensor: It is the commonly observed parameters on the universe is temperature. They are utilized in everyday household products such as ovens, freezer, and air conditioners, as well as in all sectors of engineering. The heat/cold created by an object to which it is attached is measured by a temperature sensor. It subsequently outputs a proportional resistance, current, or voltage, which is measured or processed as per our needs.

Gas Sensor: It is a device that detects the presence or of gases in the atmosphere is called as a gas sensor. The sensor produces a corresponding potential difference based on the gas concentration by changing the resistance of the material inside the sensor, which may be detected as output voltage.

Metal Sensor: Metal detector sensors are unique sensors or gadgets that are used in metal detectors and have specially constructed circuits for detecting metallic items below. In more complex metal detectors, a metal detector sensor could be a search coil, as in electromagnetic metal detectors, or a specific circuit integrated in the search probe.

Motor: It is an electrical equipment that converts direct current electrical energy into mechanical energy is referred to as a motor. The common varieties rely on magnetic fields to produce forces.

Bluetooth: Bluetooth's are used for short distance wireless communication and are classified into Bluetooth.

5. ADVANTAGES

1. Robots can travel to totally unknown depths where people would be crushed.
2. Robots can complete things considerably more quickly, regularly, and correctly.
3. This robot can carry weight; it can be used for good carrying purposes.
5. It is modest size; the robot can be utilized for surveillance.
6. Military robots are self-contained or remotely operated systems or robots created for military purposes.
- 7 This sensing and detecting van have the potential to lower the number of military personnel who are injured or killed in war.

6. CONCLUSION

Android is a smart phone that can be used to create an excellent remote-control program. The program communicates with the robot through Bluetooth. It has demonstrated that meaningful two-way communication between the Android phone and the robot is possible. The Multi-Purpose Military Service (MPMS), serves a variety of purposes like, the military, police, and armed forces will be served by robots that are designed to meet their needs. It has a wide range of uses and can be employed in a variety of settings and scenarios. For example, it can be utilized by the armed services for survival purposes in one location and for spying purposes in another. After detecting the mines, it will also be able to disperse them.

7. FUTURE SCOPE

- In future the model can be made with more sensors for detecting different parameters like smoke, humidity etc.
- By using GSM module some emergency alerts can notified to operator on the mobile phone.
- By using artificial intelligence or modifying programming of the model the model can work autonomously without any manpower.

8. REFERENCES

- [1] Namita Shinde, Shreya Srivastava, Vineet Sharma, Samarth Kumar, 'Android controlled Arduino bases Robot car' International Journal of Industrial Electronics and Electrical Engineering, Volume 6, pn 2347-6982, 2018
- [2] Vijaylakshmi S, Archana M, 'Robotic car using Arduino with Bluetooth Controller' International Journal of Intelligence in science and Technology, Volume 1, pn 18-25, 2019
- [3] R. Ismail, Z. Omar and S Suaibun, 'Obstacleavoiding robot with IR and PIR motion sensors', International Conference on Materials Science and Engineering, pn 152-159, DOI :10.1088/1757-899X/152/1/012064, 2016.

- [4] Md. Abdul Kadir, Shifur Rahman Shakil, Jaber AL Rashid, 'An autonomous industrial robot for loading and unloading goods', Conference on School of Engineering and Computer Science Dhaka, Bangladesh, Md. Khalilur Rhaman (E.d), pn 286-290, DOI : 10.1109/ICIEV.2015.7333984, 2015.
- [5] E Amareswar, G Shiva Sai Kumar Goud, K R Maheshwari, 'Multi Purpose Military Service Robot', International Conference on Electronics Communication and Aerospace Technology ICECA ., pn 684-686, DOI : 978-1-5090-5686-6/17 ©2017 IEEE, 2017.
- [6] Rajesh Singh, Anita Gehlot, Temperature Monitoring System Using LM35 ,Bhupendra Singh (E.d), Arduino Based Embedded System, CRS Press , London New York, pn 207-213, 2018.
- [7] Olatus System Pvt.Ltd Mumbai, HC-05 Bluetooth Module User's Manual V1.0, BS153: Parts 2B & 3: 2005, May 2005.
- [8] Open Hardware Design Group LLC, Programming electronics academy, <http://www.programmingelectronics.com/arduino-simulator-tinkercad/org.htm>, December 12, 2021.
- [9] Sebastian van Delden and Andrew Whigham, 'A Bluetooth-based Architecture for Android Communication with an Articulated Robot', IEEE, 978-1-4673-1382, pp 104- 108, July 2012.
- [10] Arpit Sharma, Reeteshverma, SaurabhGupta, Sukhdeepkaurbhatia, 'Android phone controlled robot using Bluetooth', IJEEE, Vol.7, pp 443-448, Nov- 2014.
- [11] Ankit Yadav, AnshulTiwari ,Divya Sharma, Ratnesh Srivastava, Sachin Kumar, 'Smart Robot', International Journal of Science, Engineering and Technology Research (IJSETR) Volume 5 ISSN: 2278 – 7798 Issue 4, pp 931-939, April 2016

