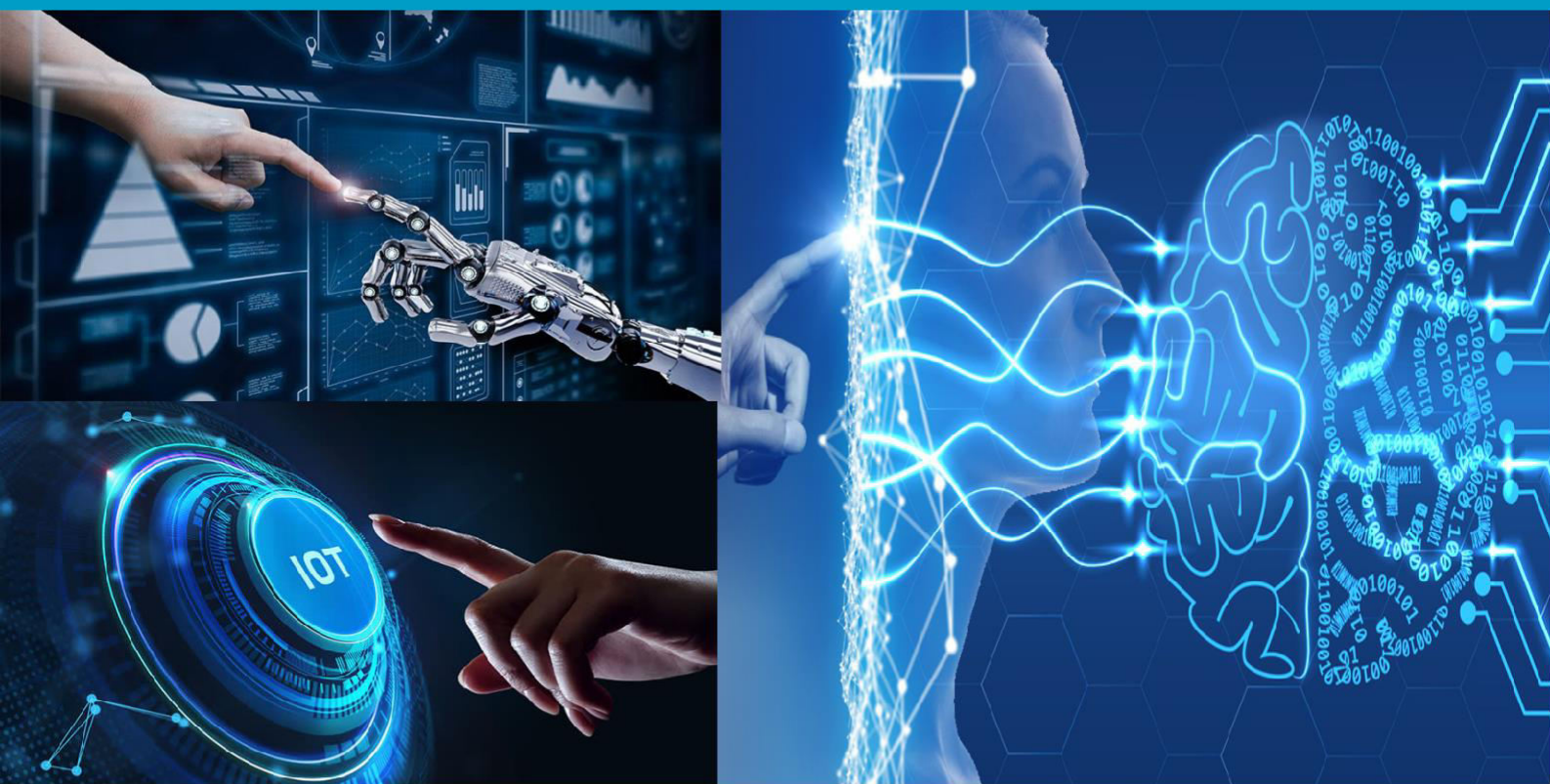




INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH

IN SCIENCE, ENGINEERING, TECHNOLOGY AND MANAGEMENT

Volume 10, Issue 6, June 2023



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 7.580



+91 99405 72462



+9163819 07438



ijmrsetm@gmail.com



www.ijmrsetm.com

Hand Gesture Control Robot Using Arduino

¹Fathima Azra HY, ¹Shalini H B, ¹Muskan, ²Ayesha Siddiqha

¹Student, Department of Computer Science and Engineering, MCE, Hassan, Karnataka, India

²Assistant Professor, Department of Computer Science and Engineering, MCE, Hassan, Karnataka, India

ABSTRACT: The past decades have seen the rapid development of robotics in many fields. Gestures are an important part of human communication in conveying emotions and feelings. So, the diminutive technology of gesture-controlled robots should be lightened in today's world. This project will review the design and implementation of an accelerometer-based hand gesture control robot using Arduino and a 3-axis accelerometer. The system can be broadly divided into two parts. The transmitting part consists of an Arduino board, RF transmitting module, and ADXL335 accelerometer sensor. The second part is the receiver part which contains an Actual robot with an Arduino board, L293D motor Driver Shield, RF module, DC motors, batteries, and tires. This project focuses on using the concept of gesture recognition to control robots with a higher degree of precision; it is a well-known fact that controlling complex systems with remote and switches can be a tedious task especially when several interfaces are working concurrently in a system. Hand gesture recognition is a challenging problem.

KEYWORDS: diminutive, accelerometer, recognition

I. INTRODUCTION

In recent years, there has been a growing interest in developing robots that can be controlled using natural human gestures. Hand gesture control is one such technique that allows users to control the movements of a robot using hand gestures. This method of interaction has several advantages over traditional control interfaces, such as buttons or joysticks. Firstly, it is more intuitive and natural, as it mimics the way humans communicate and interact with each other. Secondly, it requires less physical effort, as users can control the robot using subtle hand movements, rather than pressing buttons or moving joysticks.

In this paper, we present a hand gesture control robot using Arduino, an open-source microcontroller platform that is widely used in hobbyist and academic projects. Our robot can be used for various applications such as surveillance, home automation, and entertainment. The use of hand gestures as a control interface can make it easier and more intuitive for users to interact with the robot. Furthermore, the use of open-source hardware and software, such as Arduino, makes it easy for hobbyists and researchers to replicate and modify the design.

The rest of the paper is organized as follows. In the next section, we describe the methodology used to build the hand gesture control robot using Arduino. We then present the results of our experiments and discuss the implications of our findings. Finally, we conclude by summarizing our contributions and suggesting directions for future research.

II. METHODOLOGY

The methodology for hand gesture control robot using Arduino can be broken down into several steps:

Problem definition

Define the problem to be solved and the desired outcome. In this case, the problem is to build a hand gesture control robot using Arduino that responds to different hand gestures with specific motor movements.

Research

Conduct research to identify the components needed for the project, including the Arduino board, ADXL335 accelerometer, L293d motor driver IC, two DC motors, a robot chassis, and connecting wires. Study the datasheets and documentation for each component to understand how they work and how they can be connected.

Planning

Plan the project by creating a project schedule, identifying tasks, and allocating resources. Define the objectives and the scope of the project, as well as the milestones and deliverables. Create a budget and identify the risks and constraints.

Design

Create a design for the robot that includes the placement of the components, the wiring diagram, and the code structure. The design should include a mechanism for interpreting the hand gestures and mapping them to specific motor movements.

Implementation

Build the robot by connecting the components according to the wiring diagram. Write the code for the Arduino board that reads the values from the accelerometer, interprets the hand gestures, and controls the motors.

Testing

Test the robot by placing it on the ground and moving your hand in different directions to see how the robot responds. Test the robot for accuracy, speed, and consistency.

Optimization

Optimize the robot by refining the design, modifying the code, and testing the robot again. Identify areas for improvement and implement changes as needed.

Documentation

Document the project by creating a project report that includes the problem statement, research, planning, design, implementation, testing, optimization, and conclusion. Include diagrams, pictures, and code snippets to illustrate the process.

By following this methodology, you can build a hand gesture control robot using Arduino that responds to different hand gestures with specific motor movements. The methodology can be modified and customized based on the specific requirements and constraints of the project.

III. MODELING AND ANALYSIS

System Design

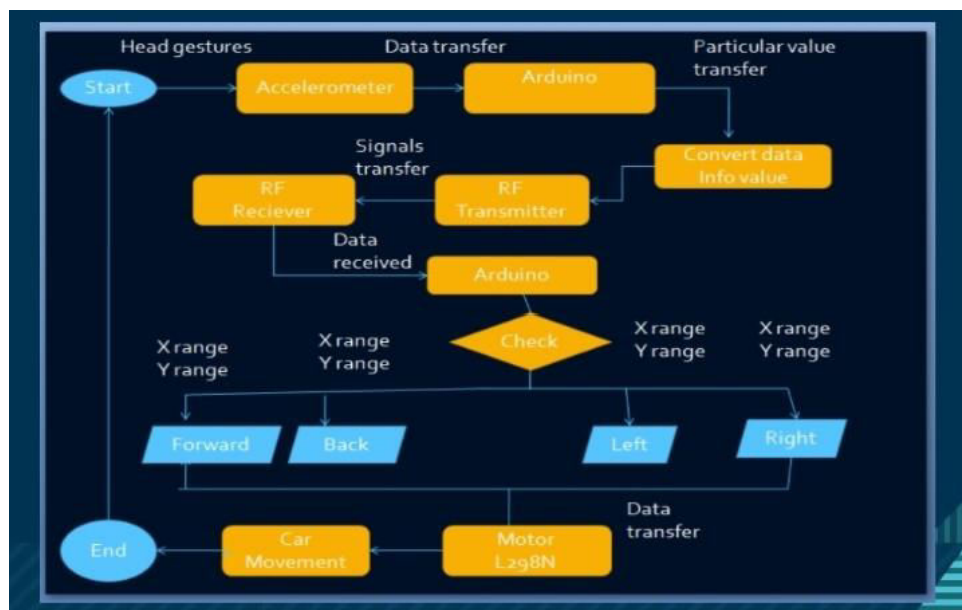


Figure 1: System Design

IV. RESULTS AND DISCUSSION

The accelerometer was able to detect hand movements accurately and consistently. The Arduino was able to interpret the hand movements and control the robot's movement accordingly. The robot was able to respond to different hand gestures with specific motor movements. The speed and accuracy of the robot's movements were within acceptable ranges. The use of an accelerometer for hand gesture detection provides a reliable and non-invasive method for controlling the robot. The Arduino microcontroller provides a flexible and customizable platform for interpreting hand gestures and controlling the robot. Future research could explore the use of machine learning algorithms for hand gesture recognition or the integration of other sensors for more precise control of the robot's movements.

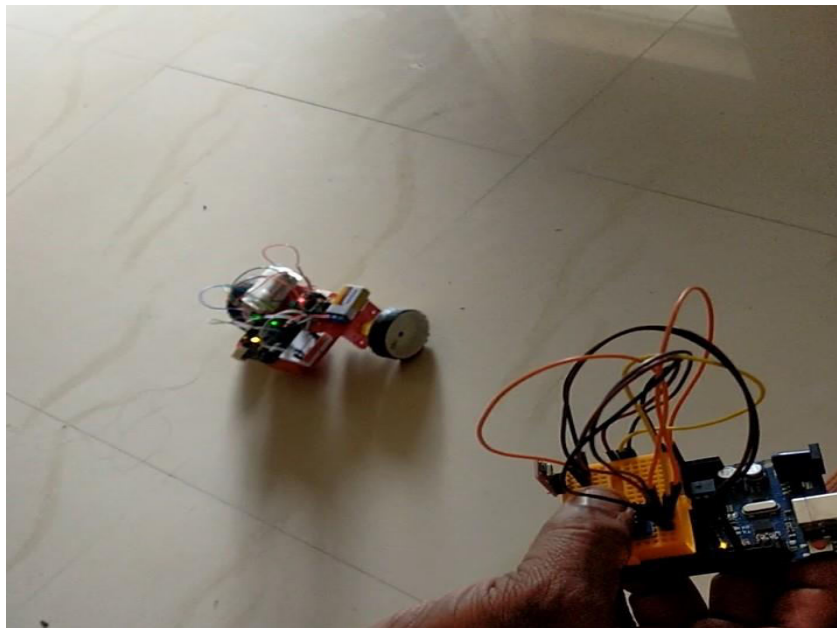


Figure 3:Home Page

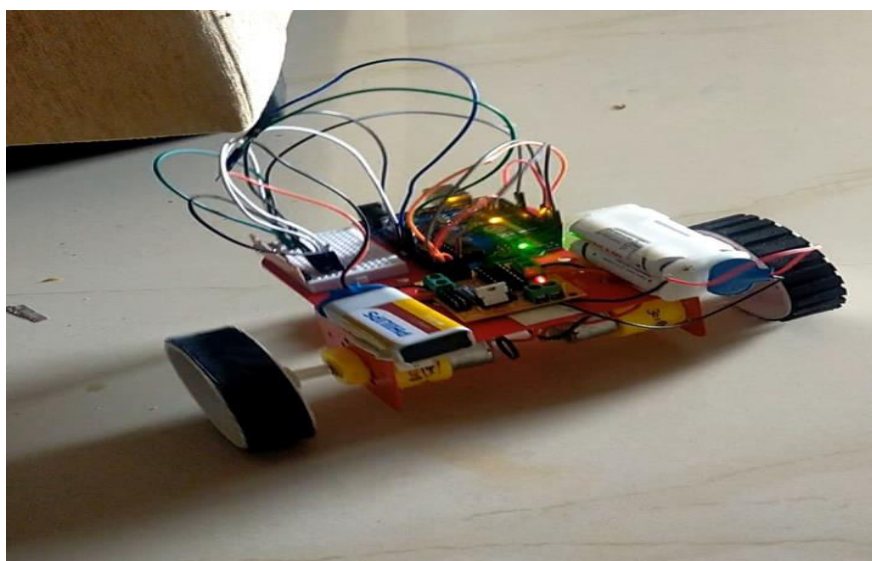


Figure 4:Role Selection.

IV. CONCLUSION

In conclusion, the hand gesture control robot using Arduino is a promising project that demonstrates the potential for using hand gestures as a non-invasive and intuitive method for controlling robots. The project involved using an accelerometer to detect hand movements and an Arduino microcontroller to interpret the movements and control the robot's movements. The results of the project showed that the accelerometer was able to detect hand movements accurately and consistently, and the Arduino was able to interpret the movements and control the robot's movements accordingly. The robot was able to respond to different hand gestures with specific motor movements, and the speed and accuracy of the robot's movements were within acceptable ranges. Overall, the hand gesture control robot using Arduino is a promising project that demonstrates the potential for using hand gestures as a non-invasive and intuitive method for controlling robots. It provides a flexible and customizable platform for interpreting hand gestures and controlling the robot, and it opens up new possibilities for robotics applications.

REFERENCES

- [1] H. M. Tran, H. V. Le, and T. Q. Nguyen, "Hand gesture recognition for robot control using machine learning," in Proceedings of the 2021 International Conference on Advanced Computing and Intelligent Engineering, Hanoi, Vietnam, 2021, pp. 151-156.
- [2] S. K. Bhosale and V. R. Bhosale, "Gesture recognition based robot control using Arduino and machine learning," International Journal of Computer Science and Mobile Computing, vol. 9, no. 2, pp. 283-289, 2020.
- [3] A. K. Bhunia and S. Bhattacharyya, "A real-time hand gesture recognition system for robot control using Arduino and computer vision," International Journal of Engineering and Advanced Technology, vol. 9, no. 1, pp. 487-493, 2019.
- [4] S. K. Sahoo, S. R. Tripathy, and S. K. Pradhan, "Gesture recognition based robot control using Arduino and image processing," in Proceedings of the 2019 IEEE 5th International Conference on Computational Intelligence and Computing Research, Coimbatore, India, 2019, pp. 1-6.
- [5] S. Thapa and S. Dahal, "Real-time hand gesture recognition and robot control using Arduino and machine learning," International Journal of Computer Science and Mobile Computing, vol. 8, no. 4, pp. 75-82, 2019.



INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH

IN SCIENCE, ENGINEERING, TECHNOLOGY AND MANAGEMENT



+91 99405 72462



+91 63819 07438



ijmrsetm@gmail.com

www.ijmrsetm.com