

Robotic ARM

**More Riddhesh Manoj¹, M. D. Faizan², Sawant Utkarsh Ramdas³,
Pokharkar Pranav Dhananjay⁴**

^{1,2,3,4}Department of Mechanical Engineering, Samarth Polytechnic Belhe

Abstract

Robotic arms are an essential part of modern automation systems, widely used in industries for tasks requiring precision, speed, and repeatability. This research paper presents the design, development, and implementation of a low-cost robotic arm using an Arduino microcontroller. The system integrates servo motors for movement and an ultrasonic sensor for object detection. The robotic arm is capable of performing basic pick-and-place operations autonomously. The main objective of this project is to demonstrate how embedded systems and simple electronics can be used to develop an efficient automation system. The proposed model is cost-effective, easy to build, and suitable for educational purposes as well as small-scale industrial applications.

Keywords: Robotic Arm, Arduino, Embedded System, Servo Motor, Automation, Ultrasonic Sensor, Pick-and-Place Robot

1. INTRODUCTION

Automation has become a key aspect of modern engineering, especially in manufacturing and production industries. Robotic arms play a significant role in automating repetitive, dangerous, and precise tasks. Traditional industrial robotic arms are expensive and complex, making them inaccessible for students and small-scale applications.

This project focuses on developing a simple robotic arm using Arduino technology. Arduino is an open-source microcontroller platform that allows easy programming and interfacing with hardware components. By using servo motors, the robotic arm can achieve controlled movement across multiple axes.

2. BODY OF PAPER

The body of the paper consists of numbered sections that describe the design, development, and working of the robotic arm system. These sections explain the integration of hardware and software components used in the project.

2.1 System Architecture

The robotic arm system is designed to perform automated pick-and-place operations using sensor input and microcontroller processing.

- **Microcontroller:** Arduino Uno is used as the main controller to process signals and control the system.
- **Sensor:** HC-SR04 Ultrasonic Sensor is used to detect objects by measuring distance.
- **Actuators:** Servo motors are used to control different joints of the robotic arm such as base, shoulder, elbow, and gripper.

The sensor detects an object and sends signals to the Arduino, which then controls the servo motors to perform the required action.

Table -1: Sample Table format

S.R	Component Name	Specification / Model	Quantity
A	Electronic Components		
1	Microcontroller	Arduino UNO R4 wifi	1
2	Servo Motor	MG996R	6
3	Ultrasonic Sensor	HC-SR04	1
4	Power Supply	5V/12V DC Adapter	1
5	Wiring	Jumper Wire	1
B	Mechanical Component		
6	Robotic ARM Structure	Metal Frame	2
7	Gripper	mechanical Claw	1



Fig -1: Figure

3. CONCLUSIONS

The developed robotic arm successfully demonstrates the concept of automation using Arduino and embedded systems. The project achieves its objective of performing pick-and-place operations using sensor input and motor control. It highlights how low-cost components can be used to create an efficient robotic system. This project serves as a strong foundation for advanced robotics and automation technologies.

ACKNOWLEDGEMENT

We would like to express my sincere gratitude to my project guide and faculty members for their valuable guidance and support throughout the development of this robotic arm project. I am also thankful to my college for providing the necessary facilities and resources. Lastly, I would like to thank my friends and family for their encouragement and support in completing this project successfully.

REFERENCES

1. Arduino Official Website – <https://www.arduino.cc>
2. “Introduction to Robotics” – John J. Craig



3. Online tutorials on Arduino and robotics
4. Research papers on robotic arm development