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IOT Based Arm Robot

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Abstract: ***The proposed IoT-based Robotic Arm system consists of a robotic arm, sensors, actuators, a microcontroller, and a wireless network module. The system allows remote operation of the arm through a web-based user interface, providing increased flexibility, reduced costs, and improved efficiency for various industries. The system can automate repetitive tasks, reducing the need for human labor and improving productivity. However, further research is needed to optimize the system's performance and address the challenges of implementing IoT-based robotic systems.***
Keyword: IOT, Arm Robot, IoT Based Arm Robot, Robot, Servo motor

I. INTRODUCTION

Automation is a critical component of modern industrial development, enabling increased efficiency and productivity while reducing the need for human labor. One significant outcome of this trend is the widespread use of robotic arms in production and assembly environments. Robotic arms are programmable manipulators that can perform a range of tasks in various settings, improving performance and reducing repetitive labour costs. The Internet of Things (IoT) has also made a significant impact on automation, allowing for data exchange across devices and facilitating remote control and monitoring. This includes the use of wearable energy harvesting devices and implanted wireless biomedical applications, such as wireless micro pumps, micro mixers, and micro valves. By connecting multiple devices, IoT enables broader monitoring and control arrangements using open or public standards and personal computer systems. Robotic arms rely on electric drivers, pneumatic and hydraulic systems, and microcontrollers to perform a set of sequential tasks. These arms are widely used for mass production in industries like manufacturing and assembly. A theoretical-based thesis can help evaluate the best solutions to problems associated with implementing robotic arms. The project objectives include comparing available components, designing installation layouts, developing wiring designs and installations, constructing support systems, designing grippers, and programming the robot.
While IoT-based robotic systems offer many benefits, further research is needed to optimize their performance and address the challenges involved in their implementation. By overcoming these challenges, IoT-based robotic systems may revolutionize the future of industrial automation, leading to increased efficiency, productivity, and flexibility while reducing costs and improving safety.

A. Aims and Objectives

1) Enhance automation and efficiency in various industries such as manufacturing, logistics, and healthcare.
2) Perform a wide range of tasks with high precision, speed, and accuracy.
3) Improve safety, reduce costs, and provide flexibility in operations.
4) Provide businesses with a versatile and flexible tool that can enhance productivity, safety, and efficiency while reducing costs and optimizing operations.

II. MATERIAL & METHOD

An IoT-based armed robot that uses wireless control is a robotic system that can be controlled remotely via the Bluetooth or other wireless communication technologies. The robot is equipped with sensors, and weapons that can be activated and controlled wirelessly using a web interface or mobile application.
The robot uses wireless communication technologies such as Wi-Fi, Bluetooth, to receive commands and transmit data. This allows the robot to be control.
The wireless control aspect of the robot makes it easy to deploy and operate in remote locations where physical access may be limited. It also allows for real-time monitoring of the robot's activities and the environment it is patrolling.
Overall, an IoT-based armed robot that uses wireless control is a highly advanced security solution that provides enhanced safety and protection against potential threats. The major components required for an IoT Based Arm Robot are:

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A. Arduino

Arduino boards are widely used in the robotics industry and in various computing elements within robots. They are utilized for a range of applications, from path planning and safety systems in self-driving vehicles, to sensors that enable vibration analytics in industrial settings, and provide high performance while conserving power in drones used by emergency response services. This versatility has led to a change in approach in how we create this technology.

The ATmega 328P microcontroller, which is commonly used in Arduino boards, has become more pivotal, particularly in the field of machine learning (ML) which plays a significant role in powering modern robotics. Arduino's focus has always been on pairing the best compute solution with the required workload.

B. Servo Motor Controller

A motor controller is an electronic device or a set of devices that regulate the performance of an electric motor in a predetermined manner. This can involve mechanisms for starting and stopping the motor, selecting the direction of rotation, regulating the speed, limiting torque, and protecting against overloads and malfunctions. Motor controllers may have manual or automatic controls depending on their intended use.

C. Servo Motors

This control system is designed to operate a motor bidirectionally and at variable speeds for specific applications. This depicts a Servo gear motor. The motor operates at a nominal voltage of either +5V or +12V, with a nominal power range of 4W to 10W, and a nominal current range of +2A to 4A.

D. Potentiometer

A potentiometer is a type of variable resistor that consists of three terminals, including a sliding contact. It functions as an adjustable voltage divider for measuring electric potential, or voltage, by allowing the user to change the resistance in a circuit. Potentiometers are frequently used in a variety of electrical devices such as audio equipment volume controls, position transducers, and signal adjustment applications. They can be used as voltage dividers or position sensors in measurement instruments or robotics applications.

E. Bluetooth Module

This particular module is designed to operate on a 3.3V power supply but it can also handle a 5V supply voltage due to the presence of an onboard 5 to 3.3V regulator.

The HC-05 Bluetooth module operates using a 3.3V level for RX/TX, which can be easily detected by most microcontrollers without any extra voltage shifting required. However, it is important to ensure that the transmit voltage level from the microcontroller is shifted correctly to match the RX input of the HC-05 module. The HC-05 module is capable of transferring data at rates of up to 1Mbps over a distance of approximately 10 meters.

F. Power Supply

For this particular application, two types of power supply units: the PS 307 with a 5A capacity and the PS 307 with a 2A capacity. Motor controllers are used to drive the motors in this application, and it is important to note that the starting current for the motor is around 3A while the nominal motor current is approximately 1A. Given that the motor controller requires a larger amount of power, the power unit with a 5A capacity (PS 307) is connected to the motor controller, while the power unit with a 2A capacity (also PS 307) is connected to the control units.

G. Voltage Regulator

In order to power potentiometers used as input devices for an analog signal module, a constant voltage supply is required. To regulate this voltage, the HB7809 voltage regulator is being utilized, which has a fixed output voltage of 9V.To set the voltage range for the analog signal module, adjustments can be made based on specific conditions. In the current setup, the processing range for analog signals has been configured to be within the range of 0-10V.

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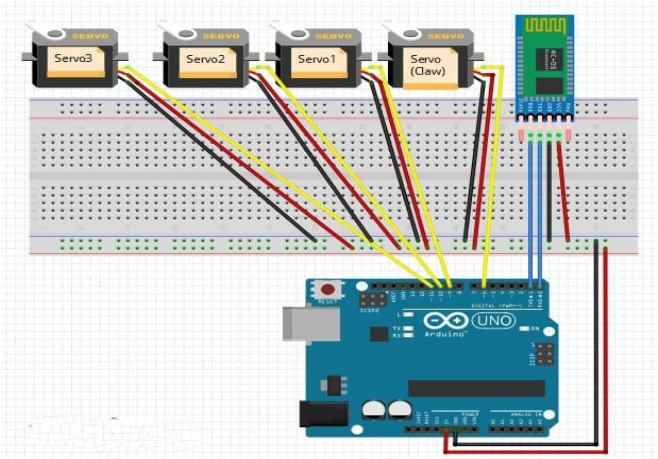

Fig.1 Circuit Diagram of IoT Based Arm Robot

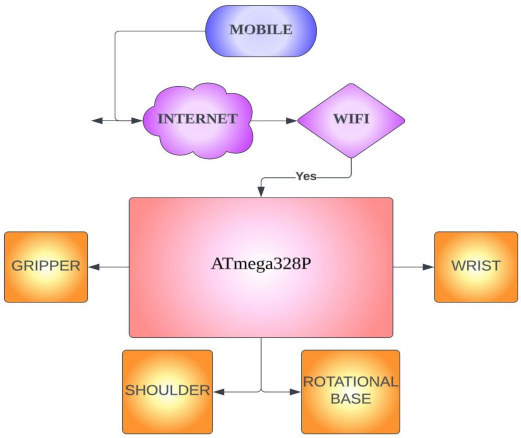

Fig.2 Block Diagram of IoT Based Arm Robot

This block diagram describes the basic components and flow of information within an IoT-based robotic arm system, controlled by a mobile device over WiFi, and powered by an ATmega228p microcontroller with a wrist that operates on rotational movement.

III.RESULT

While previous research has focused on robotic arm technology, the incorporation of IoT provides an opportunity toadvance this research. In this study, an Android mobile device is utilized as the primary platform for remote control of the robotic arm, specifically for pick and place operations. This approach utilizes modern technology to improve the functionality and accessibility of the robotic arm, allowing for more efficient and effective operation.

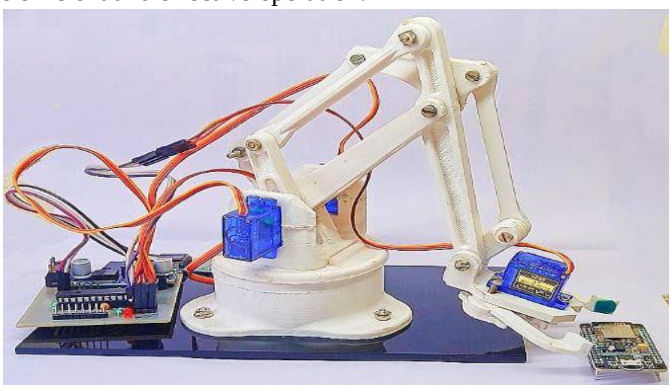

Fig.3 IoT Based Arm Robot

IV. CONCLUSIONS

The IoT-based arm robot is a promising technology that has the potential to revolutionize various industries, including manufacturing, healthcare, and agriculture. A detailed study of this technology showed that it involves the integration of sensors, actuators, and communication protocols to enable the robot to interact with its environment and perform complex tasks.

The use of IoT in robotics enables real-time monitoring and control of the robot, making it more efficient and accurate in its operations. It can also be used for predictive maintenance, which helps prevent breakdowns and reduces downtime. Additionally, IoT-based arm robots can be remotely controlled and monitored, providing opportunities for remote work and collaboration.

While the technology is still in its early stages, there is immense potential for further development and improvement. Future research could focus on enhancing the accuracy and reliability of the sensors and communication protocols, as well as exploring new applications in different industries.

Overall, the IoT-based arm robot presents many exciting possibilities for the future of robotics and automation. Its integration with IoT technology has the potential to make robots more efficient, autonomous, and adaptable to different environments, ultimately leading to increased productivity and cost savings for businesses. This report highlights the importance and benefits of adopting this technology and provides a basis for further research and development in this field.

V. ACKNOWLEDGMENT

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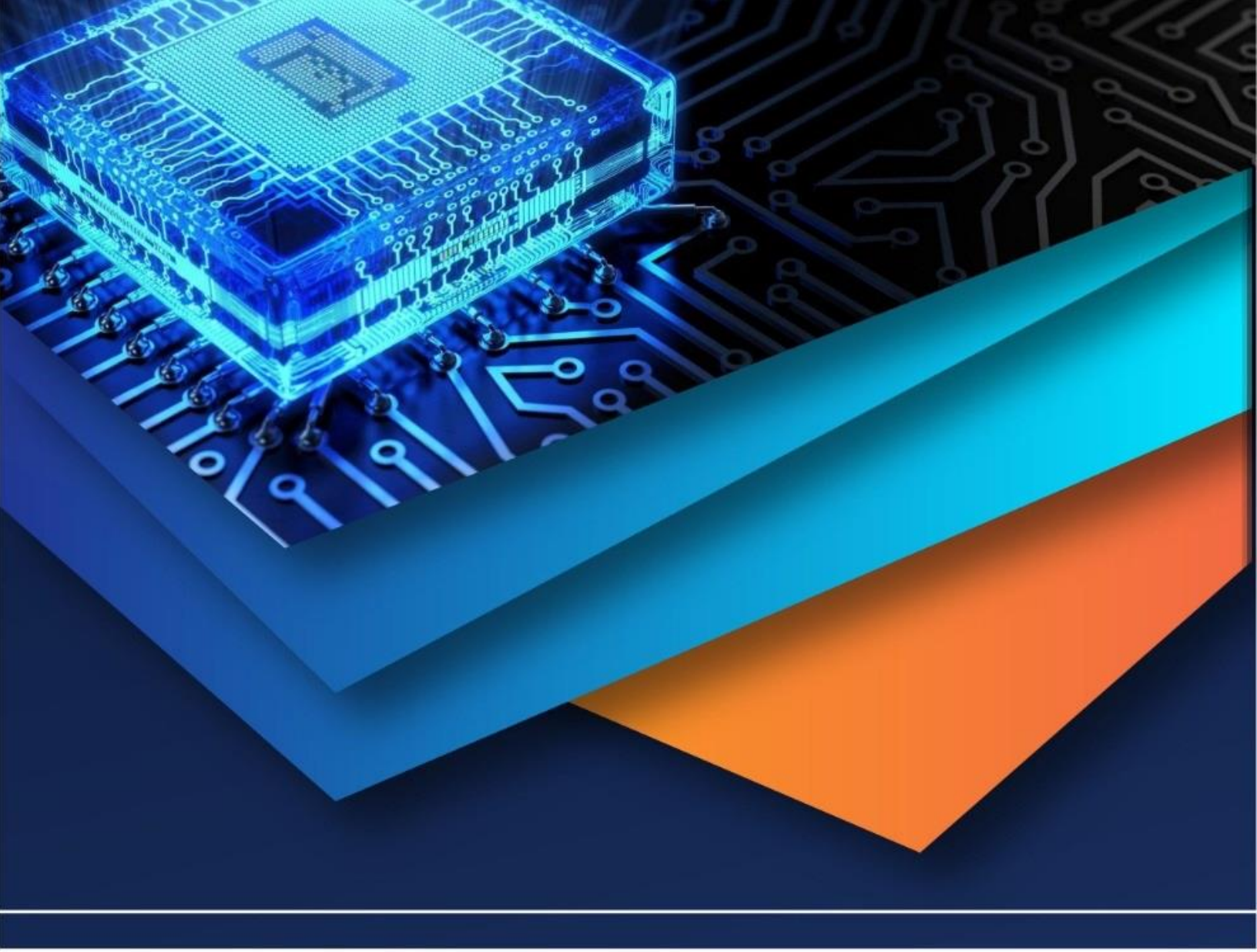

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