IoT Based Wheeled Robotic Arm

P.Laya[1], E.Harshitha[2], Y.Madhu[3], Prashant Upadhyay[4], S.Rajasekaran[5]
[1, 2, 3] Dept of ECE
[4, 5]Faculty, Dept of ECE
[1, 2, 3, 4, 5] Madanapalle Institute of technology and Science, Andhra Pradesh, India.

Abstract- *Now a day, Robotic arm becomes an integral part of our automation industries. Robotic arm will reduce the human effort by picking and placing the object. In this project, we utilize IOT based technology to control the robotic arm. IOT is one of the emerging technology through which we can control any device by using internet. IOT based robotic arm can move by giving specific commands and it is equipped with servo motors which are controlled with the help of microcontroller. We also provide a login ID and a password to improve its security. Apart from this, we also tried to solve the degree of freedom of the arm.*

Robo-DK software is used for simulation purpose. We can monitor and control robotic arm through BLYNK mobile application. All the programming has been done in python language. In this pandemic situation the proposed IOT based robotic arm can be a better solution for patient care monitoring. We can send the arm near to patient for check his temperature, pulse rate, oxygen level and also save data for future purpose.

Keywords- Robotic arm, Pick and Place the objects, ROBODK, Security

I. INTRODUCTION

In recent years, robotic arm research has progressed from mechanical control robotic arms to potentiometer control robotic arms to switch control robotic arms to joystick control robotic arms with accelerator and flex sensor control, to name a few. In this project, the EMG sensor is employed to drive the artificial robotic arm. The robotic arm is controlled by the flex sensor's bending; as the flex sensor bends, its resistance changes, the current changes, and the robotic arm is controlled by this fluctuation. Here, fig 1 represents the robotic arm. An Electromyography (EMG) sensor is utilized to record and monitor muscle activity in the human arm in this investigation. Electromyography is a diagnostic and monitoring tools used in machine.

Fig 1: ROBOTIC ARM

The sign created by muscle compression in the muscle is estimated by the electromyography muscle sensor. As the muscle is moved or the fingers are bowed, the muscle signals change and the EMG muscle sensor perceives this variety and change and conveys the message to the microcontroller. The ATMEGA 328 microcontroller chip was used in this task. This microcontroller peruses the EMG sensor's feedback sign and afterward controls the servo engine as per the EMG sensor's orders. As the name says, this is a remote moving automated arm that can be controlled from a distance from a significant stretch.

A robot is a machine intended to execute at least one assignment consequently with speed and accuracy. We want robots since robots are frequently less expensive to use over people, furthermore it is more straightforward to do a few positions utilizing robots and some of the time the main conceivable method for achieving a few assignments! Robots can investigate inside fuel tanks, inside volcanoes, venture to every part of the outer layer of blemishes or different places excessively risky for people to go where outrageous temperatures or tainted climate exists. Advanced mechanics is an interdisciplinary part of designing and science that incorporates mechanical designing, electrical designing, software engineering, and others. Advanced mechanics manages the plans, development, activity and utilization of robots, as well as PC frameworks for their control tactile input, and data handling. Automated framework has been

broadly utilized in assembling, military and medical procedure since the robot can perform many benefits and utilized as the countermeasure for some work that can't be lead by the human fantastically.

Robots are utilized in various fields like modern, military, space investigation and clinical applications. Here, fig2 represents the sample pick and place robotic arm. These robots could be named controller robots and help out different pieces of computerized or semi-robotized hardware to accomplish undertakings, for example, stacking, dumping, splash painting, welding, and collecting. By and large robots are planned, assembled and controlled through a PC or a controlling gadget which utilizes a particular program or calculation. Projects and robots are planned such that when the program changes, the conduct of the robot changes appropriately bringing about an entirely adaptable assignment accomplishing robot. Robots are classified by their age, knowledge, underlying, capacities, application and functional abilities.

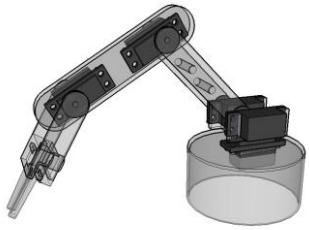

Fig 2: Sample pick n place arm.

The term robot comes from the Czech word robot a, generally translated as “forced labor.” This describes the majority of robots fairly well. Most robots in the world are designed for heavy, repetitive manufacturing work. They handle tasks that are difficult, dangerous or boring to human beings.

For instance, the mechanical arm is oftentimes utilized in assembling jobs. A normal mechanical arm is comprised of seven metal fragments, joined by six joints. The PC controls the robot by turning individual stepper engines associated with each joint (a few bigger arms use hydrodynamics or pneumatics).Unlike common engines, step engines move in precise augmentations. This permits the PC to move the arm definitively, playing out a similar development again and again. The robot utilizes movement sensors to ensure it moves the perfect sum.

Your arm's responsibility is to move your hand from one spot to another. Likewise, the mechanical arm's responsibility is to move an end effector from one spot to another. You can equip mechanical arms with a wide range of end effectors, which are fit to a specific application. One normal end effector is an improved on variant of the hand, which can handle and convey various articles. Mechanical hands regularly have implicit strain sensors that let the PC know how hard the robot is grasping a specific item. This holds the robot back from dropping or breaking whatever it's conveying. Opposite end endeavors incorporate blowtorches, penetrates and splash painters

Fig 3:Robotic arm in medical purpose

A sequential robot can be depicted as a chain of connections that are moved by joints which are activated by motors. The fig 3 represents the robotic arm which can be used for medical purpose. An end-effector, likewise called a robot hand, can be appended to the furthest limit of the chain. As other mechanical systems, robot arms are regularly ordered as far as the quantity of levels of opportunity is equivalent to the quantity of joints that moves the connections of the automated arm. At least six levels of opportunity are expected to empower the robot hand to come to an arbitrary pose (position and orientation)in three dimensional space. Additional levels of opportunity permit to change the arrangement of some connection on the arm(e.g., elbow up/down), while keeping the robot hand in a similar posture. Opposite kinematics is the numerical cycle to workout the design of an arm, ordinarily as far as joint angles, given an ideal posture of the robot hand in three layered space.

Software Requirement specification:

Robo DK is a software we used to create the robotic arm and control the commands given to the arm and also provide a login ID and a password for the security reasons. The BLYNK application is a mobile phone application which is used to connect the Arduino with the mobile phone. Using the BLYNK application we can command to the robotic arm to make the robot to work. Fig 4 represents block diagram of the proposed robotic arm of our project. The things we needed to control the robotic arm by BLYNK is by the internet connection to both the mobile and the robotic arm. In this application we can arrange the control panel and access and control the controls as we wish.

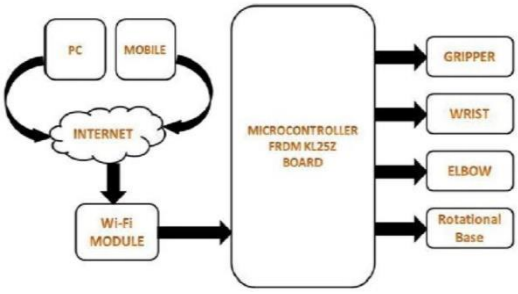

Fig4: Block diagram of proposed arm

Here, the Arduino microcontroller is used to control the whole robotic arm. The Arduino microcontroller we use is ATmega328 micro controller. In the Arduino microcontroller there is a chip where we need to upload all the programs to control the robotic arm. Also there will be a port to connect it with the computer by that port we can upload all the programs we needed. Then there is a port which is used to connect to the internet, it can be either connect by wifi module or by an internet connected computer. The Arduino microcontroller is directly connected to the arms and the wheels of the robotic arm.

Fig5: Blynk Application in Smartphone.

Motor Drivers are the IC used to control the Motors used in a component. The Motor Driver used here is the L293D. The motor driver is used to control the rotation motion of the DC motor. It is fixed to the DC motor in the robotic arm. We use three DC motors in the robot. For each DC motors we use separate motor drivers.

Thereis three wires present in the servo motors which are used to power supply and to the control of the signals to the servo motors. The servo motor is the motor used to make the rotation motion accuracy of the servo motor is very high than compare to the DC motar.

Here we use three DC gear motors. A gear motor is a motor designed with an integral and gear reducer parts. The end shield of the drive end of motor is designed to give dual functions. The side which faces the motor gives the rotor bearing and a sealing through where the integral rotor shaft pin passes. On the other side of the end shield, it gives multiple bearing supports for gearing itself, and also a sealing and fastening provision for the gear housing. This is the process happening in the DC gear motor.

Power supply has very important role in electronic system thus its design will be having a major part in each of the applications. Proper choice of power supply is needed to avoid the mal-operation which results to discontinues power supply and fluctuated load. The power supply circuit operates by using the built filters, voltage regulators, and the rectifiers. The power supply used here is the DC supply which we give individual supply to each of the components in the robotic arm.

There are many distinct sorts of robots; they are employed in a variety of locations and for a variety of purposes. Fig 3.2 represents the Blynk application which is operated by smartphone. Despite their wide range of applications and forms, all robots share three essential structural similarities: All robots have a mechanical structure, such as a frame, form, or shape, that is designed to do a certain purpose. Caterpillar tracks, for example, might be used by a robot intended to travel through thick dirt or mud. The mechanical part is mostly the creator's response to performing the prescribed goal while also coping with the physics of the surrounding world. Function comes first, then form. Computer programming code is present in all robots. A program is how a robot decides when or how to do something. In the caterpillar track example, a robot that needs to move across a muddy road may have the correct mechanical construction, and receive the correct amount of power from its battery, but would not go anywhere without a program telling it to move.

II. SIMULATION

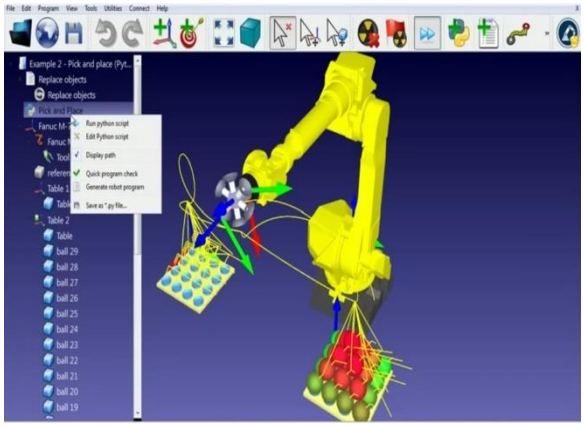

Fig 6: Designed robotic arm.

Output Screens and Result analysis:

The robotic arm is picking and placing the things for the given weight and is also monitored using the ROBODK software. Robotic arm is programmed using the software and is represented in fig 7.

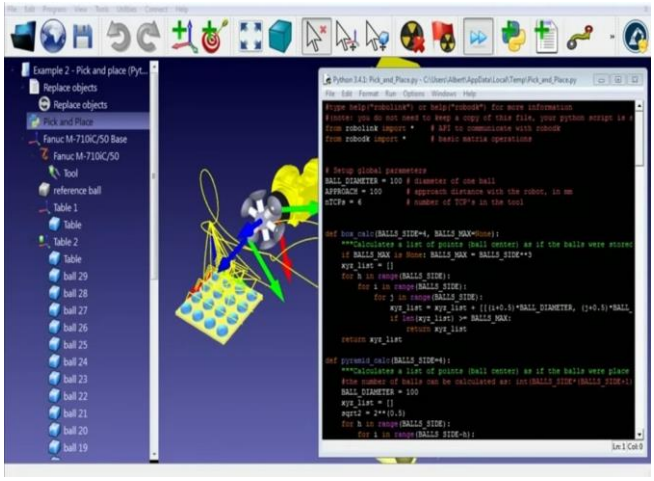

Fig 7: Programmed Robotic arm.

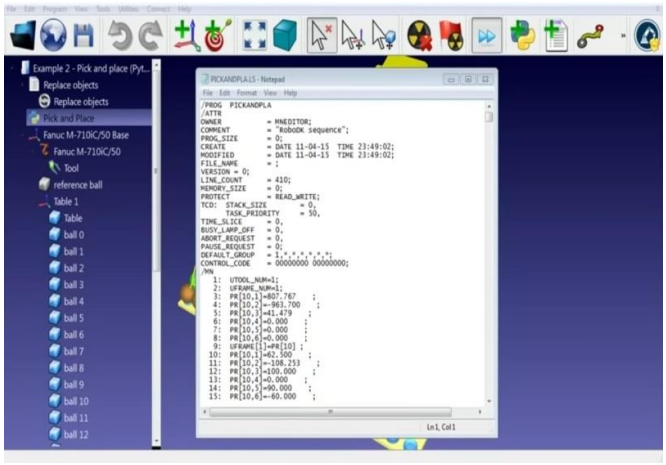

Fig 8: Simulated result of Robotic arm.

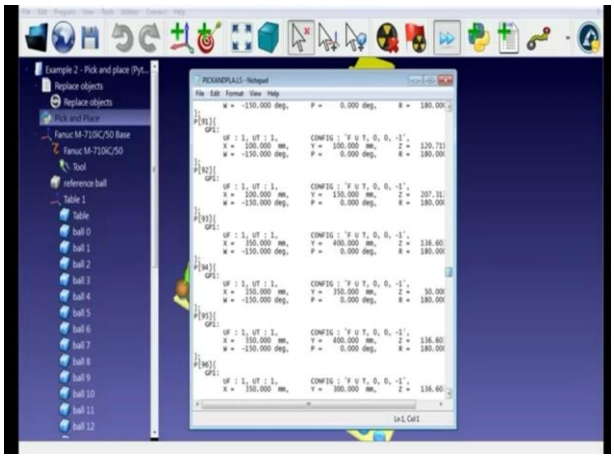

Fig 9: Configuration of Robotic arm.

III. CONCLUSION

The conclusion for this project is the robotic arm can lift and move the heavy objects. It can easily move to anywhere. It helps in increasing productivity, safety, efficiency, and quality of products. The arm achieved more accuracy than the humans. Now, it is easy to monitor and control things using the BLYNK mobile application. The robotic arm is highly secured with the password. Robotic arm is used to do repetitive actions or jobs and also used in factories, medical appliances. In this project we were able to control the Robotic arm not only using the wired controls but with the help of Internet of Things which is the growing technology in recent times we successfully controlled the robotic arm using the IOT interface. This can be useful to various industrial applications where machines need to be controlled from distant places. This project not only responds to the controls sent but also records the movements and can perform the same tasks repeatedly reducing human efforts. The robotic arm can be controlled by the IoT using the mobile phone from anywhere in the world. Even if we lost our mobile we can control our robotic arm with the help of another mobile phone, what we needed is the installation of the blynk application. Also there will be no privacy lose due to the usage of the login id and password we created on the cloud. We can controlour robotic arm with any mobile phones which have blynk application with our login details. In future, this can be used for the space explorations. In the medical field, we can do minor surgeries from far distance through IoT. Detection and diffusion of suspicious objects like mine bombs can also be done

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