Model and Implementation of Robotic Arm Using Android

M.Sunitha rani[1], G. Mary Valantina[2], M.Harsha vardhan Reddy[3], S.Hrithik[4], Mani Shankar[5], K.Sai Teja[6]

[1]*Assistant Professor, Dept of ECE, VJIT Hyderabad, India*
[2]*Assistant Professor, ETCM Department Sathyabama University Jeppiaar Nagar,Chennai*
[3,4,5,6]*B-Tech, Dept of ECE,VJIT Hyderabad, India*

ABSTRACT

In day-to-day life, technology is growing rapidly and helping human requirements. The proposed system is on embedded system which uses for human work easier using the robotic arm. Normally the traditional way of lifting goods and keep somewhere is needed, large place, and cost-effective. This system will easy to handle and don't require much effective equipment and place. The system uses the Arduino Nano microcontroller for controlling the robot arm depends on the input given by the user, the user will the commands using the android application. The android application sends commands to the robot wirelessly using Bluetooth technology. The Bluetooth module at the robot receives the commands from the android application. Depends on the input given robot moves, picks, carry, and place. The system robot moves in four-axis directions and using 5 servo motors.

Keywords: Arduino Nano, HC-05, Servo motors, DC motor, and Robot arm

I. INTRODUCTION

Nowadays people like to do work in less time-efficient. In present scenario manufacturing units are in a competitive environment which needs quality and cheaper product. So, manufacturing quality products need to have well-trained and have good experience people. This will lead to having more manpower which will affect wages. To overcome this problem machinery equipment required where the strength of the people is not sufficient. This machinery equipment will be operated by the human with less manpower. The machinery equipment is nothing robot, robots automate the process with commands given by the user. Robots are programmed such that it will make it easy to handle, less effort, and greater work.

II. RELATED WORK

• *Existing System*

In the existing system, the traditional way of lifting with cranes machinery required a large place to implement. This system can be used only where the equipment is installed and static. This system utilizes more power.

• *Proposed System*

The proposed system is implemented to overcome the drawbacks of the existing system. This system has Arduino Nano, Servo motors, and Bluetooth module. This system works on the commands given by the user from the android application. These commands are received by the robot Bluetooth module, these commands are fed to the Arduino microcontroller which takes action on the command received. The commands are pick, hold, travel, place, and release by the robot arm.

• *Objective*
• The main objective is to implement the robot arm for lifting, carrying, and place.

- So that in the manufacturing units reducing the man power.
- It is convenient to use in any fields of manufacturing areas.

III.   IMPLEMENTATION

- *Arduino Nano*

Arduino Nano is a microcontroller which is programmed in C language in Arduino IDE. Controller reads the received data from the Bluetooth module. Depends on the data received instructions are given to the servo motors which are interfaced to the robot arm.
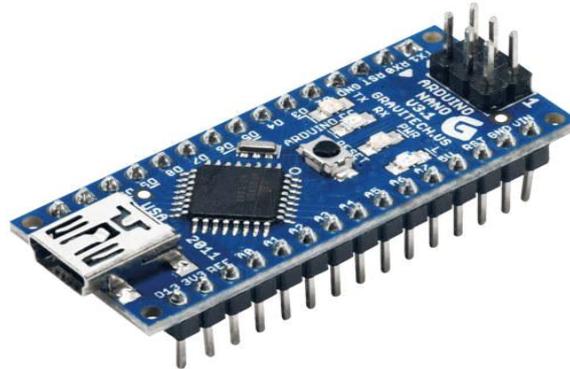
Fig 1 Arduino Nano

- *Bluetooth module*

HC-05 is a Bluetooth module which works on UART communication. Bluetooth module requires 5V power supply. Transmitter pin of Bluetooth module is connected to the Arduino which transmits the data received to the Arduino.

Fig 2 HC-05 Bluetooth Module

- *Servo Motors*

Servo motors are normally like dc motors but rotate in the particular angle. Servo motor needs the input in the PWM signal, depends the PWM wave time delay motor rotates in the particular angle depends the input signal wave. Servo motors are fixed to the robot arms to hold the object.

Fig 3 Servo Motor

- *DC Motor*

DC motors are used for the robot movement in directions are front, back, left, right and stop. DC motors works on the instruction from the microcontroller.


Fig 4 DC Motor

- *Software Application*

An android application is used to send the commands to the robot. This application has all the inputs are directions, pick and release. The application have the options to control robot can be move in the directions of front, back, left, right, and stop. Arm control options are Pick, hold and release.
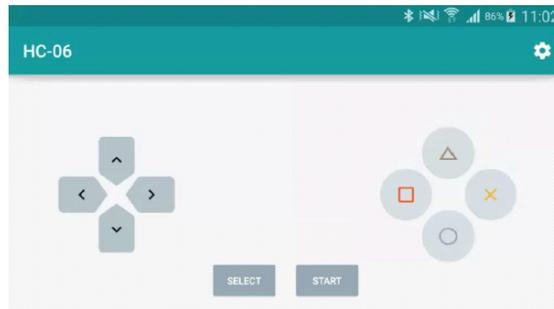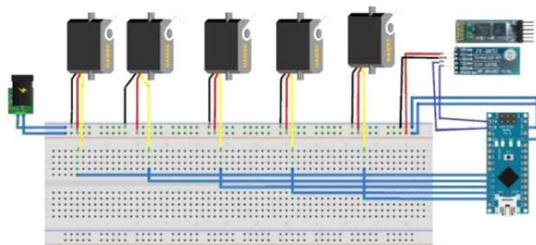

Fig 5 Android Application

- EXPERIMENT RESULT
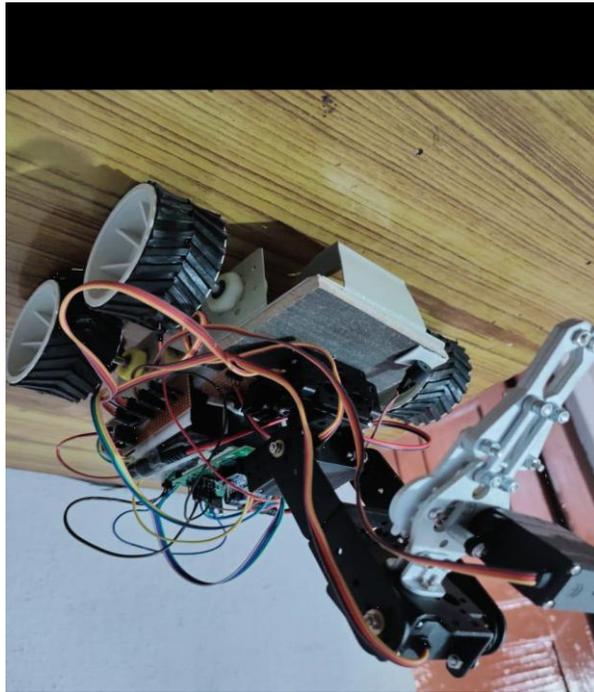
Fig 6 Proposed System Robot

Fig 6 Bluetooth controlling user Interference

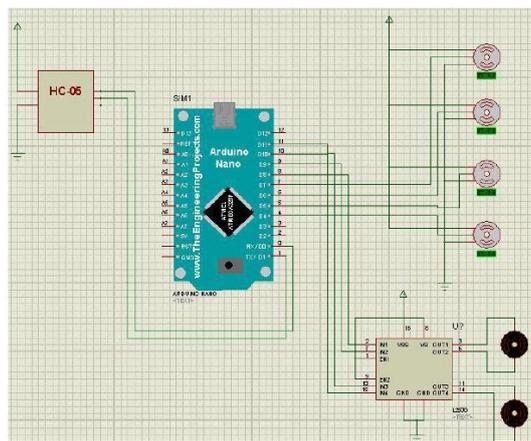*Fig 7 Connections of the components*

Fig 8 Schematic Diagram of the project

IV. CONCLUSION

As per the objective of the project is implemented successfully with good efficiency. This system uses the Arduino Nano microcontroller, Bluetooth module to receive the commands from the android application given by the user, Servo motors to control the arm of the robot, and DC motors are for the movement of the robot to carry the object. In future work, we can increase the arm size for complex objects and carrying capacity that is heavyweight can able to carry.

REFERENCES

1. WMHW Kadir, RE Samin, BSK Ibrahim. Internet controlled a robotic arm. Procedia Engineering. 2012.
2. MAK Yusoff, RE Samin, mobile robotic arm. Procedia Engineering. 2012.
3. AM Al-Busaidi, Development of an educational environment for online control of a biped robot using MATLAB and Arduino, (MECHATRONICS), 9th France-Japan.2012.
4. HS Juang, KY Lurrr. Design and control of a two-wheel self-balancing robot using the Arduino microcontroller board.Control and Automation (ICCA), 2013.
5. R Krishna, GS Bala, SS ASC, BBP Sarma. Design and implementation of a robotic arm based on haptic technology. Int. J. of Eng. Research. 2012.
6. Electric Electronic Technology-Step and Servo Motors, SVET, 2007.
7. KeerthiPremkumar, K Gerard Joe Nigel, "Smart Phone Based Robotic Arm Control UsingRaspberry Pi, Android andWi-Fi", IEEE Sponsored 2nd International Conference on Innovations in Information Embedded and Communication Systems ICIIECS'15
8. Zain Anwar Ali1, M.Tanveer2, Habib Shaukat2, SaadAnwar3, (2014)."Android Operated Robotic Arm",Universal Journal of Control and Automation 2(1),13.
9. Christian Hernández, RacielPoot, Lizzie Narváez, Erika Llanes and Victor Chi(2010)"Design and Implementation of a System for Wireless Control of a Robot" International Journal of Computer Science, 7(5),163-169.
10. Zain Anwar Ali1, M.Tanveer2, Habib Shaukat2, Saad Anwar3, (2014)"Android Operated RoboticArm", Universal Journal of Control and Automation 2(3), 7-1.
11. Lung Ngai, Wyatt S. Newman, VincenzoLiberatore, (2014.) "Android Operated Robotic Arm" Universal Journal of Control and Automation 2(1): 1-3
12. Ramya,B.Palaniappan,T.Akilan (2013)"Embedded System for Robotic Arm Movement Control using Web Server and ZigBee Communication, International Conference on Research Trends in Computer Technologies Proceedings published in International Journal of Computer Applications(IJCA), 0975 – 8887.