

AUTOMATIC MOVEABLE ARM ROBOT USING ARDUINO

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Abstract

Nowadays, technology is evolving in the same directions as human wants are fast expanding. Every day, the effort done to address those needs makes life easier, and these research are mostly focused on robotic arms. Robot arms can interact with other people or follow pre-programmed commands. Industry and medical are currently the most developed fields of robot arms in all fields. The robot arm, which was designed and built as part of the project, can move in four directions using five servo motors. Many thanks to the holder, you can take the desired material from one place and carry it to another place, and also mix it with the material it receives. While doing this, robot control is provided by connecting to the android application via Bluetooth module connected to Arduino Mega 2560 microcontroller.

I.INTRODUCTION

Technology is growing fast these days. Technology is evolving as human society grows, and we use it every day. It helps to reduce human demand and increase efficiency and productivity.

Often in industrial production this automation is additionally used to create

sophisticated equipment. Everyday medical equipment such as X-ray machines, radiography, refrigerators, automobiles. Of all these effects, the robot arm is one. It is widely used for industrial purposes.

A robotic hand can be compared to a human hand. It features a free rotating joint rotation and a translational joint displacement for hand movement. This hand movement is usually driven by an electric drive (motor) or a pneumatic and hydraulic system (pistons). These actuators are controlled by a microcontroller (CPU), are usually programmable and are designed to perform a series of tasks. Most of these robotic weapons are designed for industrial purposes for fast and reliable performance, enabling mass production. This thesis is a theoretical thesis. In addition, the necessary research is done to evaluate the best solution to the problem that is part of the thesis. The project covers the following objectives. Comparing the available components from the market

which meet the best solution. i.e. Arduino Mega, Stepper Motor, Servo Motor, Stepper Motor Driver etc. Wiring Design and wiring installation

Designing and construction of a bridge board circuit, a voltage regulator circuit, a control pendent, a motor driver support system

Designing the gripper

Programming

Testing and Finalizing

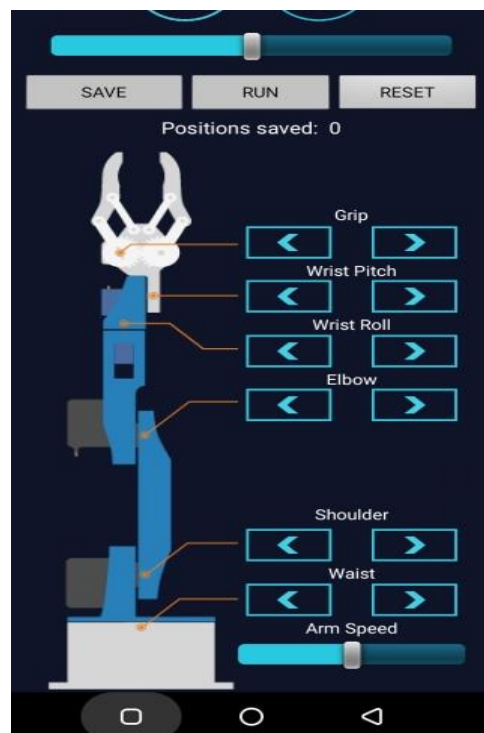
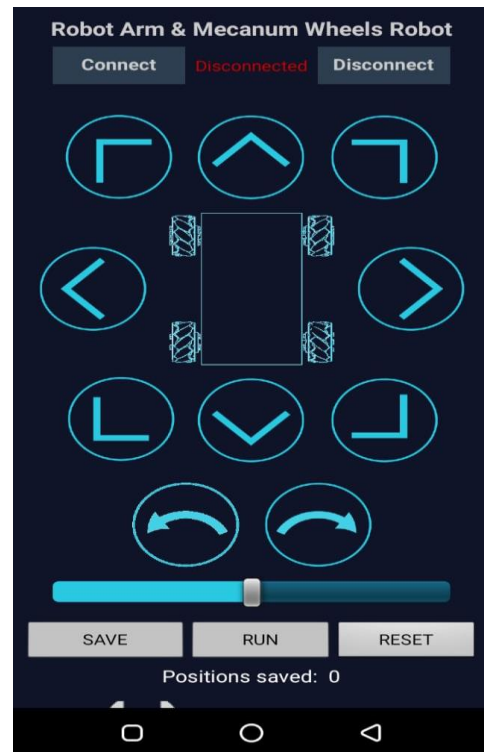
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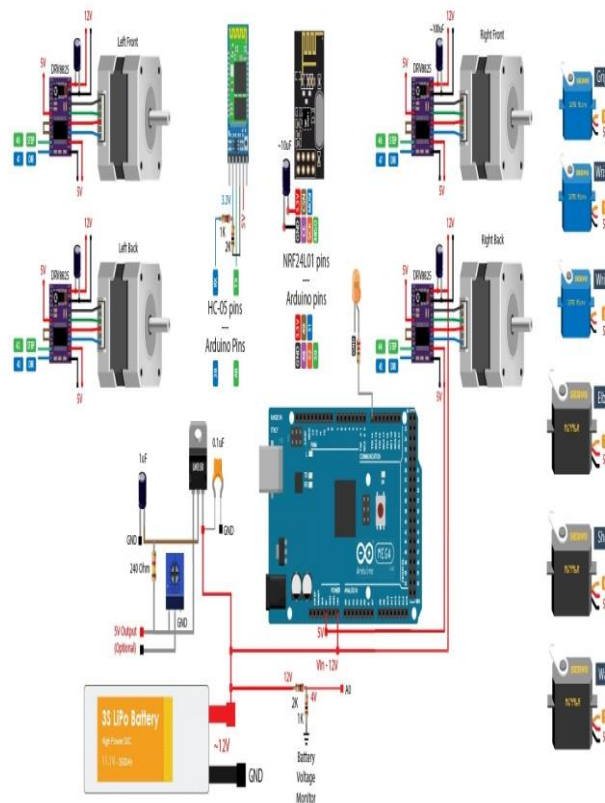
Components Used

Arduino
Servo Motor
Stepper Motor
Robotic Arm
Bluetooth Module
Stepper Motor Driver
Power Adaptor

Working

We have used a bluetooth module in our project so we can control the robotic arm using an android app which we designed. It have all the options to control the arm. The following picture shows the app designs.





II. LITERATURE REVIEW

Many research works have been undergone in the area of Embedded Systems. The following shows some of those works.

[1]G. Oliveira, G. Oliveira, J. Luna, C. Egoavil, Member, IEEE, and C. Carvalho Jr., Member, IEEE (2020) ‘Development of Robotic Arm Control System Using Computational Vision’ IEEE LATIN AMERICA TRANSACTIONS, VOL. 17, NO. 8, AUGUST 2019. In which the arm is controlled by an Arduino mega board with the help of the Computer Vision which helps to move the robotic arm. Computer Vision is used to calculate the movement of arm automatically without

any manual input. We use sensors to get the information and then use that to calculate and control the robotic arm.

[2]Mariano Garduño-Aparicio, Member, IEEE, Juvenal Rodríguez-Reséndiz, Senior Member, IEEE, Gonzalo Macias-Bobadilla, Member, IEEE, and Suresh Thenozhi (2019) ‘A Multidisciplinary Industrial Robot Approach for Teaching Mechatronics-Related Courses’ IEEE TRANSACTIONS ON EDUCATION, VOL. 61, NO. 1, FEBRUARY 2019. Here the robot is designed in an industrial approach robotic arm.

[3]Qinghua Huang and Jiulong Lan (2019) ‘Robotic Arm Based Automatic Ultrasound Scanning for Three-Dimensional Imaging’, IEEE Transactions on Industrial Informatics (Volume: 15, Issue: 2, Feb. 2019).In the model they use Ultrasound Scanning for recognition of objects surrounded by and use that information to operate the robotic arm. This process is done by the Arduino Mega micro-controller.

[4]P.K. Allen ,A. Timcenko ,B. Yoshimi and P. Michelman ‘Automated tracking and grasping of a moving object with a robotic hand-eye system’ IEEE Transactions on Robotics and Automation (Volume: 9, Issue: 2, Apr 2019).In this

project they use the robot to move object from one place to another place using a hand-eye system.

[5]Mohamed Raessa, Jimmy Chi Yin Chen, Weiwei Wan and Kensuke Harada 'Human-in-the-Loop Robotic Manipulation Planning for Collaborative Assembly' IEEE Transactions on Automation Science and Engineering (Volume: 17, Issue: 4, Oct. 2020)

III.PROPOSED METHODOLOGY

We can control the arm robot with the custom designed Android Application.

The coolest feature of this robot is the ability to store the movements and then automatically repeat them.

The robot arm has 5 degrees of freedom, so we need 5 servo motors, plus an additional servo for the gripper mechanism.

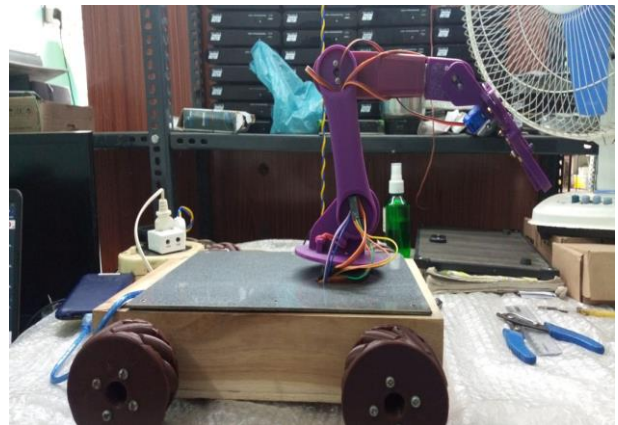
The movable platform is controlled by Arduino Mega board which controls each wheel individually.

In low light situation hand might be hard to recognize because of the limited ability of the image acquisition apparatus.

We use bluetooth module to control the arm robot which provides a semi automatic control.

By using a smart phone we control the arm robot which will be helpful in low light conditions. And also we can save the required operations it performs which can be repeated as long we want.

IV.CONCLUSIONS





Thenozhi (2019) ‘A Multidisciplinary Industrial Robot Approach for Teaching Mechatronics-Related Courses’ IEEE TRANSACTIONS ON EDUCATION, VOL. 61, NO. 1, FEBRUARY 2019

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VI. REFERENCES

G. Oliveira, G. Oliveira, J. Luna, C. Egoavil, Member, IEEE, and C. Carvalho Jr., Member, IEEE (2020) ‘Development of Robotic Arm Control System Using Computational Vision’ IEEE LATIN AMERICA TRANSACTIONS, VOL. 17, NO. 8, AUGUST 2019

Mariano Garduño-Aparicio, Member, IEEE, Juvenal Rodríguez-Reséndiz, Senior Member, IEEE, Gonzalo Macias-Bobadilla, Member, IEEE, and Suresh