

Robotic Arm Using Arduino-Review

Omkar Desai¹ Shrikar Desai² Kunal Naik³ Vinaykumar Singh⁴

^{1,2,3}Students ⁴Head of Department & Assistant Professor

^{1,2,3,4}Department of Electronics Engineering

^{1,2,3,4}Shree L.R Tiwari College of Engineering, Thane, Maharashtra, India

Abstract— In recent times the daily routine and industry works are found to be more fascinated and implemented through automation Robots. The pick and place robot is used as one of the technologies in manufacturing industries which is designed to perform pick and place operations. The system is so designed that it eliminates the human error and human intervention to urge more precise work. There are many fields during which human intervention is difficult but the method into account has got to be operated and controlled this results in the world during which robots find their applications. Evidence suggests that the pick and place robots are designed and applied in different sector such as in bottle filling industry, packing industry, utilized in surveillance to detect, destroy the bombs and many more The project deals with implementing an pick and place robot using the Arduino for any pick and place functions. This project is an abstract of how we will make use of servo motor to form joints of a robotic arm and control it. This paper explores the robotic arm where the power of a person's to try to a task is restricted but not by his mental power but by his physical strength. In an environment where human interaction can't be possible to try to to a specific job where the robots can do. Here we design a robotic arm where it is controlled by the human with the app.
Keywords: Arduino Uno, Robot, Servo Motors, Robotic Arm, Sensor

I. INTRODUCTION

Nowadays, manual labour is being lowered at big scale industries and factories to increase efficiency and gain profit by installing robots that can do repetitive works. A onetime installation of such a device may cost a huge amount, but in the long run, it will turn out to be more profitable than manual labour. Out of mass, a simple robotic arm is one of the most commonly installed machines. Robotic arms are mechanical products that have manufactured and have been in the marketed the world at an extreme rate. There are many of types of arms are developed and accessible in the market developed by different companies. Industrial use robot arm are to be used this time even more than before in the domestic robot can do the job. We are going to introduce the basic concepts of an robotic arm controlled by Arduino project. A robotic arm is a normally programmable mechanical arm, similar to the functions of a human arm. There are numerous types of robotic arm used in industries but we are going to give you details on a basic prototype. There are always some conditions in the industry where humans cannot work so most robots in the world are designed for heavy weightlifting, high temperature, polluted air region and so on. Robot arms can also be used for high accurate places. Robot arm can be set to one task and also accurate implementation in a variety of environments.

Industrial robot arms vary in size, some are fixed body, type of joint, joint sequence. The range of motion to be connected and acceptable at each joint and individual fixtures

are called links. Robot arm is formed using different parameters like quantity axis, degrees of freedom, working area and dealing space that arm cover, kinematics, payload, speed and acceleration, accuracy and repeatability, motion control and arm drive this view sum up a developing issue robot arm. The mechanical and electrical construction are the components want to build the robot arm. Internet controlled robots will connect these wired robots and has some space limitations. So in order to avoid this restriction robot control is wirelessly i.e. by using Bluetooth, however the advancements used here are the most extensive so the WI-FI comes in to picture.

II. METHODOLOGY

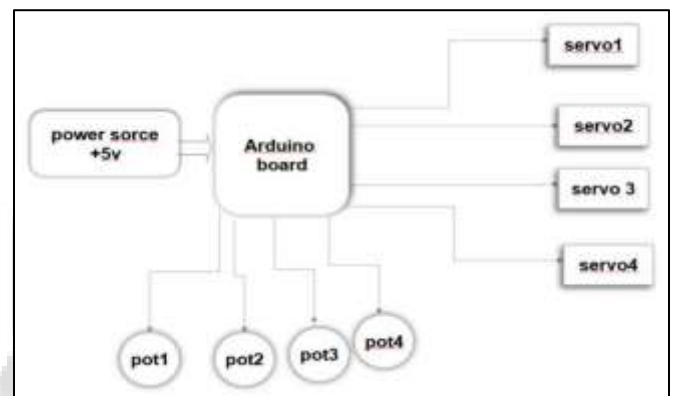


Fig. 1: (Block Diagram)

Fig 1 show the diagram representing the robotic arm, The components here used are arduino uno board, capacitors, servo SG90, 10k pot rheostat. Now talking about servo motors they're excessively used when there's a requirement for a accurate shaft movement or position. These aren't proposed for a high speed applications. Servo motors are to be proposed for low speed, medium torque and accurate position of application. So they are best for designing robotic arm. Servo motor are available at distinct configuration and dimension. We are getting to use small servo motors (four) a servo motor will have mainly three wires positive voltage another is for ground and therefore the last one is for position setting. The RED wire is connected to power, the brown wire is grounded and therefore the orange wire is for signal.

- 1) The arm has been built and the individual parts are locked to servo motors. Arduino Uno is programmed to command servo motors. Servos motors are the joints of Robotic arm. This setup looks a sort of a Robotic Crane or we will convert it into a Crane by easy ways
- 2) This Robotic Arm is controlled by four Potentiometer with which we attach each with potentiometer that's want to control each servo. We can move these servos by rotating the potentiometer to select some object, with some practice we will easily pick and move the thing from one place to a different. Here we use low torque

- servos here but we will use more powerful servos to select heavy object.
- 3) Program done using Arduino.
- 4) We connect the circuit consistent with circuit diagram.
- 5) Now the voltage provided by these rheostat voltage which represents position control into ADC channels of Arduino.
- 6) We are getting to use four ADC channels of UNO from A0 to A3. After the ADC initialization we have digital value of pots which represent the position needed by user.
- 7) we'll take this value and match it with servo position.
- 8) The robotic arms takes an ideal scaling that's cardboard, foam board is cut using measuring a servo are fitted according in order that position of 1 servo motor does not affect the position of other servo motor.
- 9) As we rotate the 10K pot the worth changes accordingly and that we get rotation within the output of servo motor.
- 10) The voltage across variable resistors isn't completely linear; it'll be a loud one. So to filter this noise, capacitors are placed across each resistor.

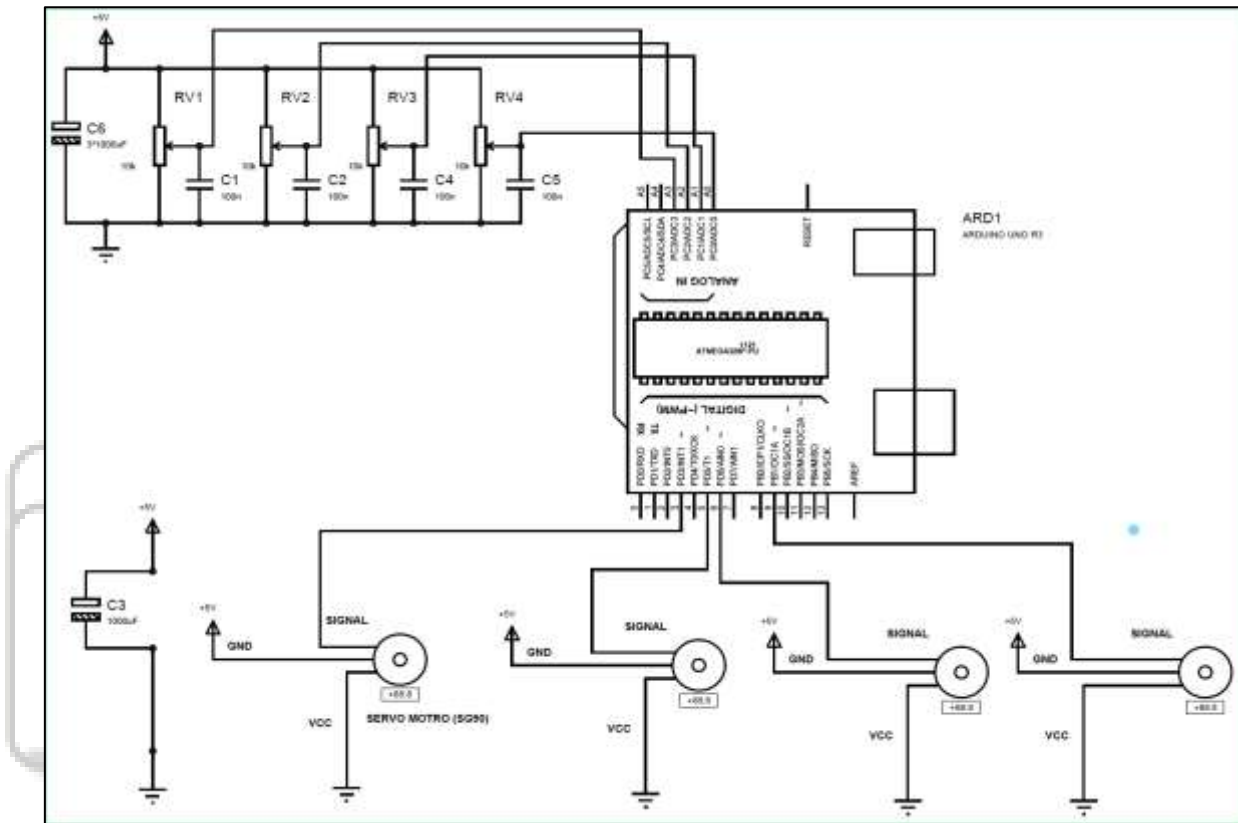


Fig. 2: Circuit Diagram

Flowchart of program of Arduino has its own six ADC channels. Here four are used for the robotic arm. The UNO ADC is of 10 bit resolution therefore the integer values starting from 0-1023($2^{10}=1024$). This will show that the input will range voltage from 0 and 5 volts into integer values between 0 and 1023. So for each ($5/1024=4.9\text{mv}$) per unit.

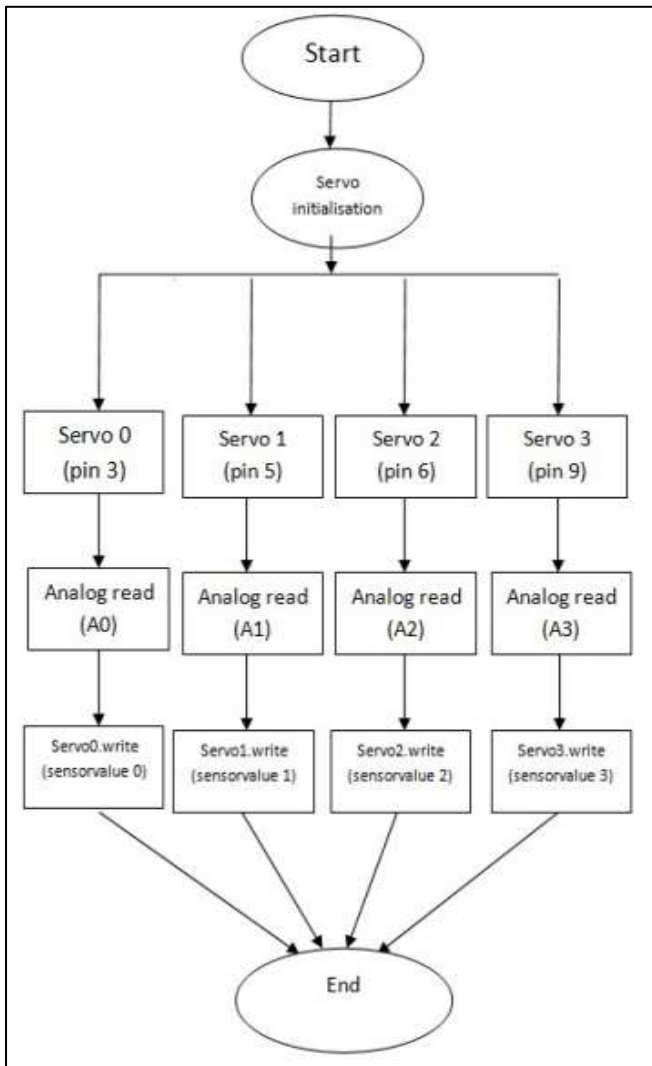


Fig. 3: Flowchart

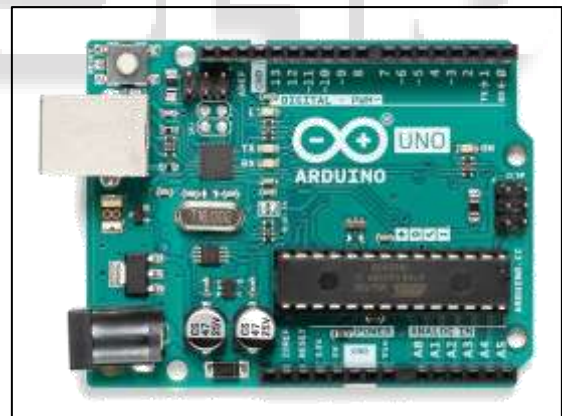
As all the UNO ADC channels features a default reference of 5V for ADC conversion at any input channel. Since some sensors provide voltages from 0- 2.5V, with a 5V reference we get lesser accuracy, so we've a instruction that permits us to vary this reference value. We have analog Reference() for changing the reference value. As default we get the utmost board ADC resolution which is 10 bits, this resolution are often changed by using instruction (" analog Read Resolution(bits);"). This resolution change can are available some cases. Now if the above condition are set default, then we will read value from ADC of channel '0' by directly calling function analog Read(pin) here pin represents pin where we have to connect analog signal. the worth from ADC are often taken into an integer as float voltage value= analog Read(A0); by this instruction the worth after ADC gets stored within the integer "Voltage value".

Fig 2 show the Circuit Diagram and fig.3 for flow chart. Now for the arduino UNO to convert analog signal into digital signal, we'll need to use ADC channel of Arduino UNO with the assistance of above function: a. analog Read(pin); b. analog Reference (); c. Analog will read the Resolution in bits. Now by talking about servo motors the arduino Uno has a feature which enables us to regulate the servo position by just giving a value to the degree. Say if we would like the servo to be at 60, we will directly represent the

worth within the program. The Servo header also known as Servo.h file will take care of entire duty ratio calculations internally. #include servo servo0; servo0.attach(3); servo0.write(degrees); Here the primary statement represents the header file for controlling the SERVO MOTOR. Second statement is for naming the servo. Here considering as servo0 as I even have used four servo motor. In the third statement it states that where the servo signal pin is connected there must be PWM pin in our case pin3 for first servo. Fourth statement gives instructions for positioning servo in degrees. If it's given 30, the servo motor rotates in 30 degrees. Now we've SG90 servo position from 0 to 180 and therefore the ADC values are from 0-1023. We will use a servo value function which matches both values automatically. sensorvalue0=map(sensorvalue0, 0, 1023); sensorvalue1=map(sensorvalue0, 1, 1023); sensorvalue2=map(sensorvalue0, 2, 1023); sensorvalue3=map(sensorvalue0, 3, 1023); The above statement will plot both the values automatically and also stock the end in integer 'sensorvalue0'. The above statement will plot both the values automatically and also stock the end in integer 'sensorvalue1'. The above statement will plot both the values automatically and also stock the end in integer 'sensorvalue2'. The above statement will plot both the values automatically and also stock the end in integer 'sensorvalue3'. Thus by using the pot means by rotating the pot which changing its voltage value will change the servo angular rotation.

III. HARDWARE

A. Arduino Uno-



Arduino Uno is a microcontroller board supported by the ATmega328P. It has 14 digital input/output pins (6 of them are often used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, an influence jack, an ICSP header and a push button . It contains all the components to support the microcontroller; connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to started,dont be afraid if something gets wrong ,worst case you will replace the chip for a some price andstart over.

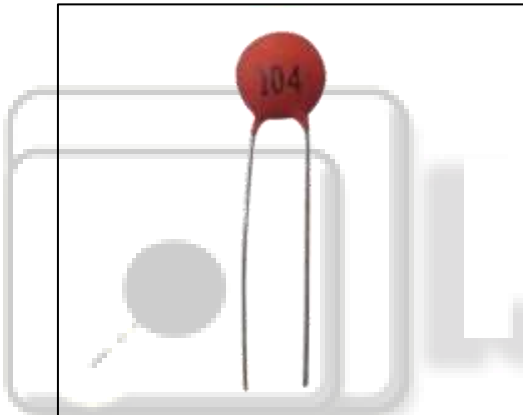
B. 1000uF Capacitor (4 pieces):



1000uF 25V electrolytic may be a high quality electrolytic which is of longer life and high reliability. Electrolytic Capacitors are ordinarily used for capacitors in Electronic Circuits.

Electrolytic Capacitors have 2 Polars - Positive polar and Negative polar.

C. 100nF Capacitor (4 pieces):



A one-hundred nano-Farad capacitor is written as 100nF or simply 100n. It can be marked as 0.1 uF which means 100nF. Or it is going to be marked with 104 which means 10 and 4 zeros: 100000pF which is adequate to 100nF. A twenty-two pico-Farad capacitor can also be written as 22pF or 22p

D. Servo Motor (SG 90- four pieces):



A servo motor may be a sort of motor which will rotate with great precision. Normally this sort of motor consists of an

impact circuit that gives feedback on the present position of the motor shaft, this feedback allows the servo motors to rotate with great precision. If you would like to rotate an object at some specific angles or distance, then you employ a servo motor. It is just made from an easy motor which runs through a servo mechanism. If the main power of motor is DC power supply then it is called DC servo motor, and if the main power of motor is AC-powered motor then it is called AC servo motor.

E. 10K pot- Variable Resistor (4 pieces):



A potentiometer may be a three-terminal resistor with a sliding or rotating contact that forms an adjustable potential divider. If only two terminals are used, one end and therefore the wiper, it acts as a rheostat or rheostat.

This measuring system called as potentiometer is actually a potential divider used for measuring potential (voltage), this component is an implementation of an equivalent principle so it is named potentiometer.

Potentiometers are commonly wont to control electrical devices like volume controls on audio equipment. Potentiometers operated by a mechanism are often used as position transducers, for instance, during a joystick. Potentiometers are rarely wont to directly control significant power (more than a watt), since the facility dissipated within the potentiometer would be like the facility within the controlled load.

F. Power Supply (5v- preferably two):



5V power supplies (or 5VDC power supplies) are one among the foremost common power supplies in use today. Normally a 5VDC output can be obtained from a 50VAC or 240VAC input employing a combination of transformers, diodes and transistors. 5V power supplies are often of two types: 5V regulated power supplies, and 5V unregulated power supplies. 5V regulated power supplies are available three styles. It also has type Switching regulated AC to DC, it also has type Linear regulated AC to DC, and Switching regulated DC to DC.

IV. CONCLUSION

This proposed work is an summary of how we will make use of servo motor to form joints of a robotic arm and control it using potentiometer and arduino UNO. Also used for high loaded industrial application work. This work proposed is an overview of making of servo motor to make joints of a robotic arm and control it by using potentiometer and arduino UNO. It is also used for high loaded industrial application work.

In this growing demand for natural Human Machine Interfaces and automaton intuitive programming platforms, a robotic system that permits users to manage AN industrial automation using arm gestures and postures was planned. Two 3-axis accelerometers were be the input devices of this technique, capturing the human arms behaviors. The robotic arm is a really good alternative common input devices like teach pendant, this approach mistreatment accelerometer is additional intuitive and to work, besides giving the likelihood to regulate a automaton by wireless suggests that. mistreatment this technique, a no expert robot applied automaton quickly and through a natural method. The low worth and short set time square measure alternative advantages of the system. still, the irresponsibleness of the system may be a vital limitation to believe. The ANN's shown to be an honest choice to acknowledge gestures and postures, presenting a mean of ninety-two of correctly recognized gestures and postures. The system features a excellent reaction time is another necessary issue. This can evolve in future by futher development of properly recognized gestures. One approach could be the implementation of a gyro into the system, so as to separate the acceleration due to gravity from the inertial acceleration. The employment of additional accelerometers attached to the arms is another chance. The Arduino is excellent in its response time and the same system can be used up to raspberry pi in future and the same is implemented on proteus design tool. Finally, the system was first repose on a bread board and therefore the values area calculated an equivalent values were utilized in the code to ascertain the difference within the of the robotic arm.

REFERENCES

[1] Gu, Ke, Junfei Qiao, and Weisi Lin. "Recurrent Air Quality Predictor Based on Meteorology and Pollution Related Factors." *IEEE Transactions on Industrial Informatics* (2018).
[2] Witten, Ian H., Eibe Frank, Mark A. Hall, and Christopher J. Pal. *Data Mining: Practical machine learning tools and techniques*. Morgan Kaufmann, 2016.

[3] García Nieto, P.J., Sánchez Lasheras, F., GarcíaGonzalo, E. et al. "Estimation of PM10 concentration from air quality data in the vicinity of the major steel works site in the metropolitan area using machine learning techniques" *Stoch Environ Res Risk Assess* (2018), <https://link.springer.com/article/10.1007/s00477-018-1565-6>.
[4] Hu, Ke, Ashfaqur Rahman, Hari Bhrugubanda, and Vijay Sivaraman. "Hazeest: Machine learning based metropolitan air pollution estimation from fixed and mobile sensors." *IEEE Sensors Journal* 17, no. 11 (2017): 3517-3525.
[5] Niranjan L, Sushma S, Shreekanth R, Santhoshilakshmi G S "Design and Implementation of Security Based Automatic Teller Machine against Intruders", in *International Journal of Engineering Research in Electronics and Communication Engineering (IJERECE)*, ISSN 2394-6849, Vol 4, Issue 6, Page 260-266, June 2017.
[6] Niranjan L, Nethravathi V, Bhavya Shree G, Nethravathi G, Rithu Shah "Home Automation using SCADA & IOT" in *International Journal of Engineering Research in Electronics and Communication Engineering (IJERECE)*, ISSN 2394-6849, Vol 4, Issue 6, Page 335-344, June 2017.
[7] Niranjan L, Charmila G, Bindhu V, Jyothi M, Meghana M "A Novel Approach to Wireless Power Transmission in Non-Radiative Field" in *International Journal of Engineering Research in Electronics and Communication Engineering (IJERECE)*, ISSN 2394-6849, Vol 4, Issue 6, Page 304-310, June 2017.
[8] Chandrakumar H S, Sadika, Supritha, Meenu Gaur "Establishing High Transmission Bandwidth from Service Providers through SDH" in *International Journal of Engineering Research in Electronics and Communication Engineering (IJERECE)*, ISSN 2394-6849, Vol 4, Issue 6, Page 314-318, June 2017.
[9] Sreekanth B, [2] MeesalaPuneeth, [3] Divya A T, [4] Savitha J S, [5] Pavithra R "Robotic Four Wheeler for Health Monitoring" in *International Journal of Engineering Research in Electronics and Communication Engineering (IJERECE)*, ISSN 2394-6849, Vol 4, Issue 6, Page 280-287, June 2017.