

Robotic Arm Control through Human Arm Movement Using Accelerometers

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ABSTRACT

Robots have ended up vital over an extensive variety of uses from assembling, to surgery, to the treatment of dangerous materials. In this paper we have proposed a mechanical arm controlled by common human arm developments whose information is gained using accelerometers. It has a servo engine which is utilized for accuracy situating. Servos are utilized as a part of automated arm and legs, sensor scanners and in RC toys like helicopter, planes and autos. The automated arm can be self-governing or controlled physically and can be utilized to perform an assortment of errands with extraordinary exactness. In medicinal science, Neuroarm utilizes scaled down apparatuses, for example, laser surgical blades with pinpoint precision and it can likewise perform delicate tissue control, needle insertion, suturing, and searing.

Keyword : - Accelerometer, Servo Motor, Atmega-16, Microcontroller and so forth. Servo Motor etc...

1. INTRODUCTION

An automated arm is a sort of mechanical arm, typically programmable, with comparative capacities to a human arm; the arm might be whole of the component or might be a piece of a more mind boggling robot. The automated arm can be intended to perform any coveted errand, for example, welding, holding, turning and so on., contingent upon the application. For instance robot arms in car sequential construction system perform an assortment of undertakings, for example, welding, part turn and situation amid get together. People lift things up without considering the strides required all together for robot or an automated arm to get or move something, somebody needs to instruct it to perform a few activities in a specific request –from moving the arm, to pivoting the "wrist" to opening and shutting the "hand" or "fingers". So we can control every joint through PC interface.

2. SERVO CONTROL

A servo engine basically comprises of a DC engine, gear framework, a position sensor which is generally a potentiometer and control gadgets. The DC engine is associated with an apparatus system which gives criticism to the position sensor which is generally a potentiometer. From the rigging box the yield of the engine is conveyed by means of servo spline to the servo arm. The potentiometer changes position correspondingly to the present position of the engine. So the adjustment in resistance delivers a comparable change in voltage from potentiometer. A heartbeat width balanced sign is encouraged through the control wire .The beat width is changed over into an identical voltage that is contrasted and that of sign from the potentiometer in a blunder speaker. The servo engine can be moved to a sought rakish position by sending PWM (beat width adjusted) signals on the control wire. The servo comprehends the dialect of heartbeat position tweak. A beat of width shifting from 1 millisecond to 2 milliseconds in a rehashed time allotment is sent to the servo for around 50 times in a moment. The width of the be at decides the rakish position. For instance, a beat of 1 millisecond moves the servo towards 0°, while a 2 milliseconds wide heartbeat would take it to 180°. The beat width for in the middle of precise positions can be interjected likewise. Hence a beat of width 1.5 milliseconds will move the servo to 90°. It must be noticed that these qualities are just the approximations. The real conduct of the servos varies in light of their producer. A grouping of such heartbeats (50 in one second) is required to be gone to the servo to maintain a specific rakish position. At the point when the servo gets a heartbeat, it can hold the comparing precise position for next 20 milliseconds. So a heartbeat in each 20 millisecond time allotment must be sustained to the servo.

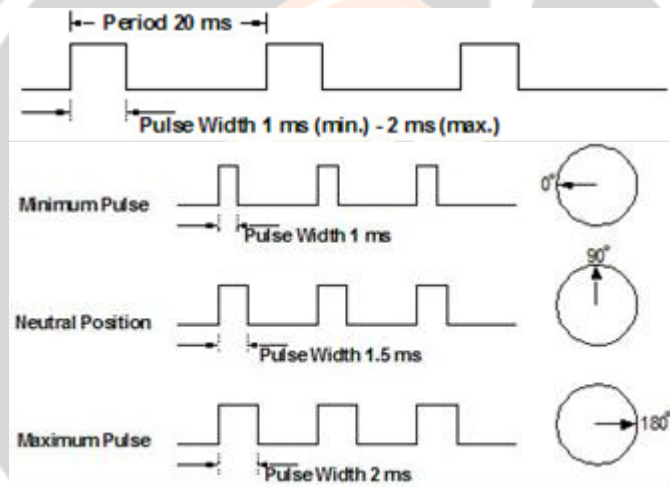


Fig -1: Different pulse widths with angles

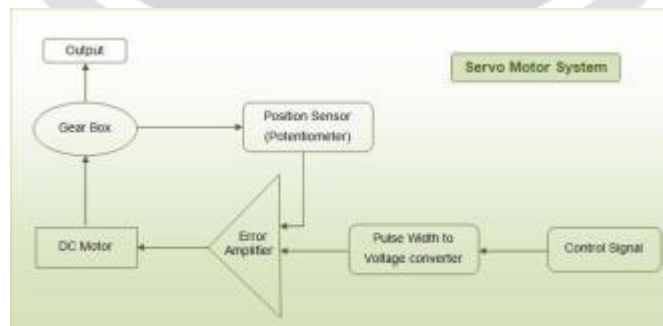


Fig -2: Servo Motor System

The required heartbeat train for controlling the servo engine can be produced by clock IC, for example, 555 or a microcontroller can be customized to create the required waveform.

2.1 Basic Servo Motor Bracket Assembly

These servomotor sections might be utilized to make any number of automated task like mechanical arm, hexapod, snake robot.



Fig -3: Assembled Servo Motor



Fig -4: Brackets



Fig -5: Front and Back Portion of Brackets

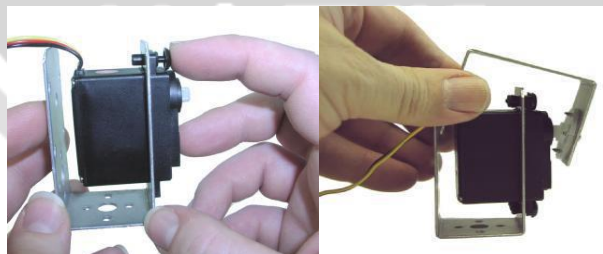


Fig -6: Fitting Servo Motor into Bracket

3. PROGRAMMING OF ROBOTIC ARM

We utilized the openCV serial port interface capacities for correspondence between the pc and microcontroller for sending the slider values (OCR values) to Atmega 16 for producing the required square wave for driving the servo engines. The serial correspondence in openCV is quick when contrasted with that in Matlab., hence empowering us to build the rate of exchange of OCR qualities to Atmega 16. Since we require slider estimation of PC interface to be exchanged very fast, so we favored openCV.

4. PLANNING AND CONSTRUCTION

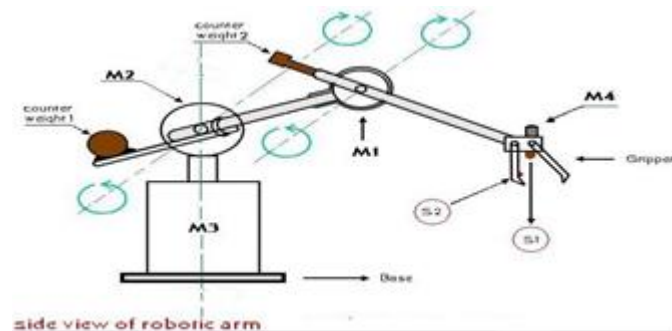


Fig-7: Side view of Robotic Arm



Fig-8: Final Servo Arm

Before executing it for all intents and purposes the mechanical arm was broke down by utilizing Statics. As specified first and foremost it requires some learning of Engineering Mechanics too. Before building the Arm, the most extreme torques or powers on each of the Servos is ascertained. The free body graph is made to examine all the powers following up on various servo joints. In the wake of breaking down the Free Body graph of the Robotic arm, the servos of the required particulars are utilized in like manner. There are numerous Servo producers giving the standard details out of which we can choose the one fulfilling our prerequisite. The equipment of the arm was made by utilizing PVC Plastic for making the arm lightweight. The Gripper was built utilizing PVC plates of alluring shapes or else there are producers which give a readymade Gripper

5. FUTURE WORK TO BE FINISHED

- 1) Increasing the degrees of opportunity of the mechanical arm by embedding more servos engines.
- 2) Implementing the reverse kinematics method in automated arm.
- 3) Equipping the mechanical arm with material sensors nearness sensors.
- 4) Developing the graphical client interface for making the arm more easy to use and building up a web interface so arm could be controlled in remote spot by your Web program.

6. CONCLUSIONS

The robot arm can be self-ruling or controlled physically to implement pick and place framework operations. It has better degree in business sector because of the developing interest for characteristic Human Machine Interfaces and robot instinctive programming stages. The Robotic arm can be effectively controlled utilizing the accelerometer and the gripper could pick the doled out weight with no challenges.

7. REFERENCES

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