ROBOTIC ARM

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DESCRIPTION

A robotic arm is a robotic manipulator, usually programmable, with similar functions to a human arm .Servo motor is used for joint rotation. It has about same number of degree of freedom as in human arm. Humans pick things up without thinking about the steps involved. In order for a robot or a robotic arm to pick up or move something, someone has to tell it to perform several actions in a particular order — from moving the arm, to rotating the "wrist" to opening and closing the "hand" or "fingers." .So we make the use of a computer interface for all the operations.

Overview

- Degree of Freedom:4
- Payload Capacity(Fully Extended) : 300gm
- Maximum Reach(Fully Extended) : 60cm
- Rated speed(Adjustable) : 0-0.3 m/s
- Joint speed(Adjustable) : 0-60 rpm
- Hardware interface : USB
- Control Software : Arduino IDE
- Shoulder Base Spin : : 180°
- Shoulder Pitch : 180°
- Elbow Pitch : 180°
- Wrist Pitch : 180°

TORQUE CALCULATIONS OF JOINTS

- The point of doing torque calculations is for motor selection. We must make sure that the motor we choose can not only support the weight of the robot arm, but also what the robot arm will carry .The first step is to label our FBD, with the robot arm stretched out to its maximum length. Torque calculated here is torque at rest

robotic arm(not in motion) .So rating of torque in servo motor is greater than calculated value.

- ## Torque of each Servo Used

	Minimum Necessary (kg-cm)	Use (kg-cm)
Base & Shoulder	7.68	9
Elbow	2.43	6
Wrist	0.43	6

//Heavy torque servos are used to accommodate more weight of the object
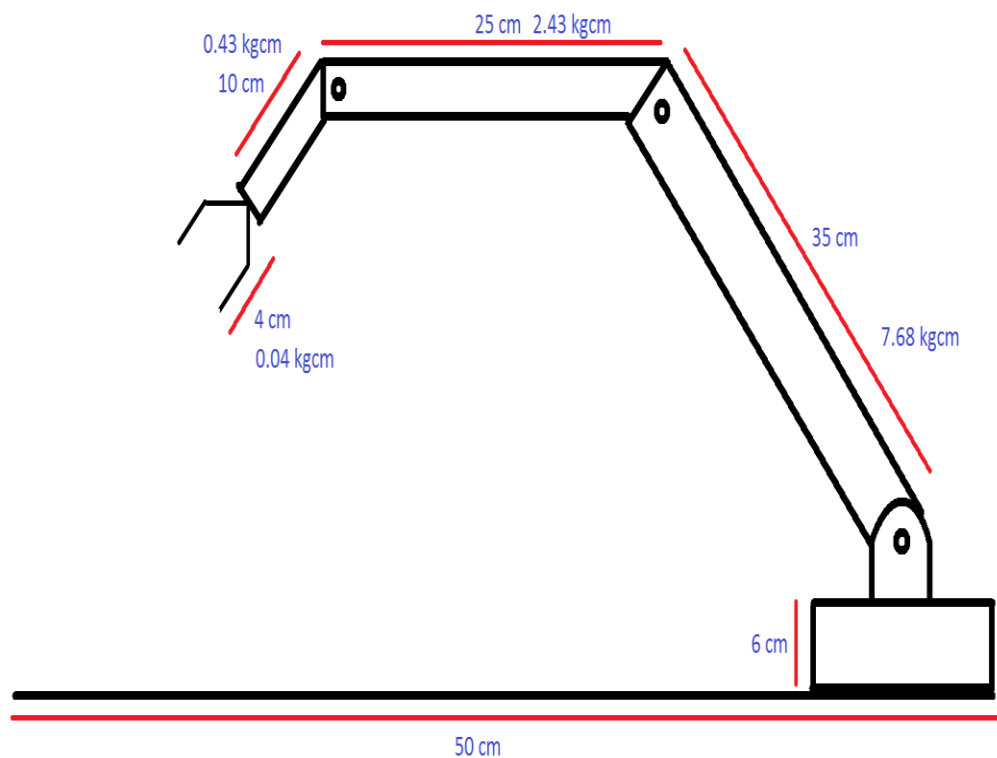

Features

- The arm has five servos which are controlled through the use of an aurdino .
- The arm could grab things approximately in a hemisphere of 50cm and is robust made up of a suitable strength material.
- It could lift objects of standard weight.
- Enabling the base rotation without the help of any gears or ball bearing, also using only low torque servo motors.
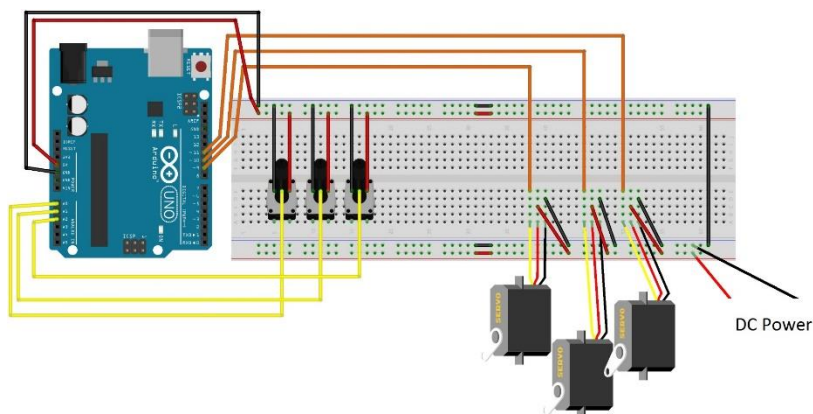
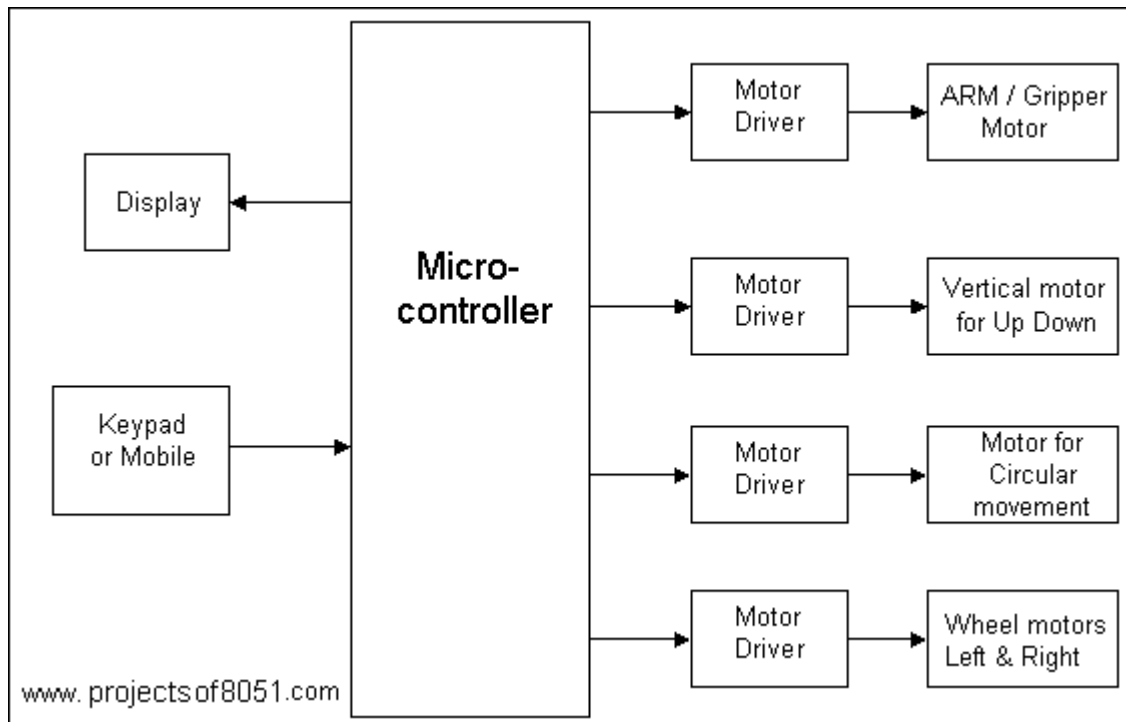- Keeping the design of robotic arm gripper simple.

Mechanism of robotic arm

Cartesian - Rectangular arm that moves on X, Y, Z coordinate system

BLOCK DIAGRAM

Circuit diagram

DC Power
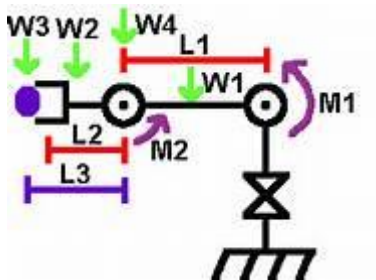
Algorithm

⬚ Co-ordinates of the object is fed into Arduino manually (or found by using ultrasonic sensor)

⬚ Corresponding angles of the arms are calculated to reach the object's position

⬚ Respective servos are set to reach the object

⬚ Claw is used to pick up the object

⬚ Coordinates of the box is fed to the Arduino and the object picked will be put into the box

THANK YOU