



Analysis Of Prosthetic Arm

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Abstract:

Many people suffer from various disabilities that are caused by accidents and loose their body parts. About lakhs of amputees rely on a simple prosthesis that can simply open and close hands. Moreover for wearing a prosthetic device the person has to undergo various therapy and programmes for which he has to spend from his own pocket. Thus there is a need for new technology. There are various arms available in market but the cost matters and more over with the cheaper mechanical arms there is a problem with the string mechanism, to perform any work the patient has to pull the string so hard causing pressure in his scapula.

Analysis of prosthetic arm is the modification of mechanical arm and has electrical components merged into it, for brain computer interfacing controller is used. In this hand is trained using a camera via image processing according to regular activities and by creating a list of regular activities it's being programmed into controller, then further output is taken through either voice recognition or button commands. If a person has single limb (unilateral amputee) that person can use button command, means if button 1 is assigned to lift something and similarly button 2 and 3, accordingly it will be fed into memory of controller and controller would regulate motors to do further function. If a patient has lost both the limbs that person can use voice recognition command, thereby according to his voice the arm will operate. Camera senses RGB colour, so the camera is first configured in image processing using individual red, green and blue colour. The prime advantage is that it would reduce the cost and also help in reaching the masses

Key words: Prosthetic Arm, Image Processing, Controller

1. Introduction

Prosthetic arm consists of fingers, motors with worm-gear mechanism for movement of fingers, camera for capturing the input signals, microcontroller for controlling the motors. This prosthetic arm is implemented using image processing. Input signal is live image of the hand. RGB colours are used for colour sensing. In order to get desired output the person has to wear hand gloves and RGB sensors. According to the input movement made by the hand camera will capture the image and send signals of open or close via Matlab to controller and thus the prosthetic arm functions. The prosthetic arm can be operated through Controller as well as Matlab.

2. Hardware Implementation

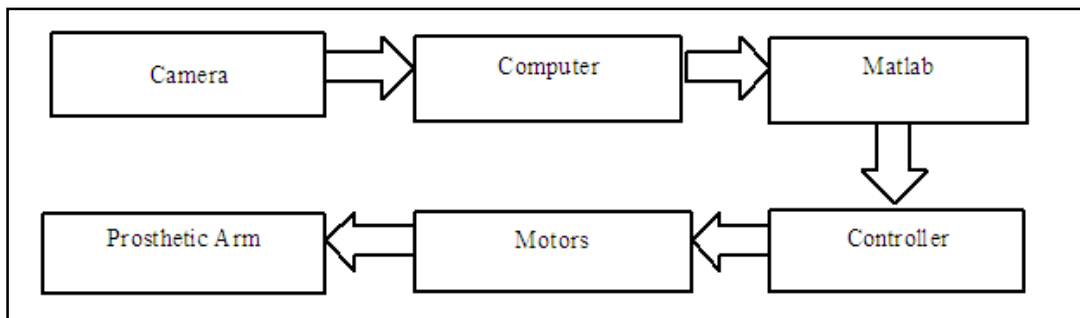


Figure 1: Block Diagram of Prosthetic Arm

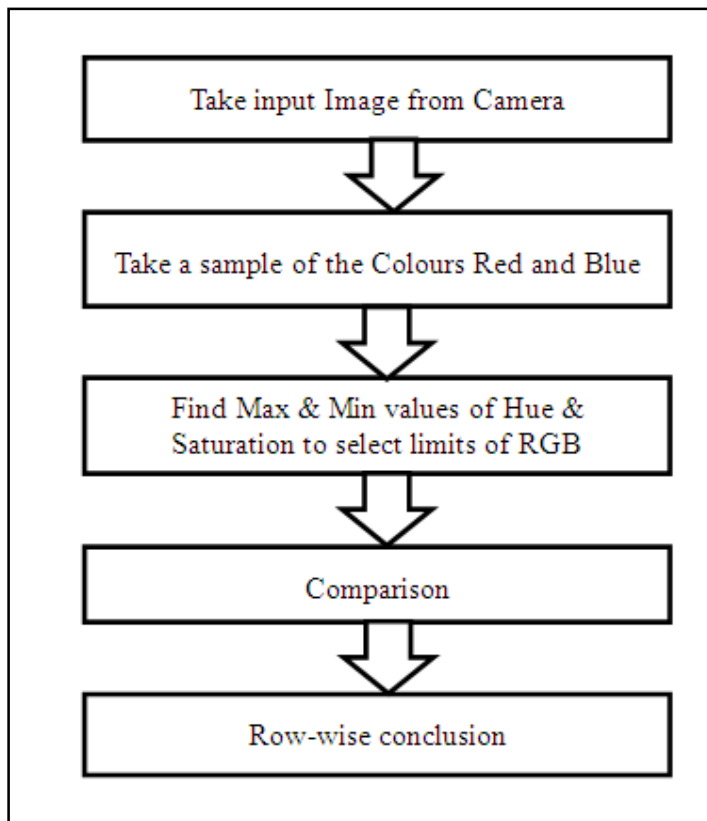
The input signal is captured through camera and processed in Matlab. For communication between computer and controller serial communication MAX232 is being used. Signals from Matlab are sent to serial port of controller. Serial pins of controller are connected to usb-serial converter thereby the data sent by the matlab is read at the controller side. According to the information received controller sends open and close signals and controls the motors and accordingly the prosthetic arm functions.

3. Image Processing

Matlab environment is used for image processing. RGB colours are captured by the camera. The screen is divided in 3 rows i.e top, middle and bottom. By default the count of these three rows are kept as zero. The red colour is being assigned to middle and thumb finger whereas blue colour is assigned to ring finger. If the top count is 1 the middle finger moves to the top, similarly the process will go on with comparison and final conclusion will be made according to the count. In the case of low light intensity,

colours cannot be identified using matlab so manual control is given in other arm in order to control robotic arm movements.

Algorithm



4.Specification Of Developed Prosthetic Arm

Prosthetic arm can handle minimum weight of 500gm till maximum around 1kg.The time taken by Matlab for entire one execution from opening to closing of finger is 10sec and through controller its about 4 sec. Motor speed is 300&100r.pm.Battery supply is 6v,4.5Ampere.

5.Conclusion

In robotic arm mostly for controlling it different techniques are used like neural networks, EMG signals. In this project prosthetic arm is implemented through image processing. Thus we are combining mechanical, electrical and nerve-reinnervation arm into a single prosthetic arm. The fingers will be according to the wish of amputee. The

emerging cost factors as compared to other arms will be reduced and it can reach the masses.

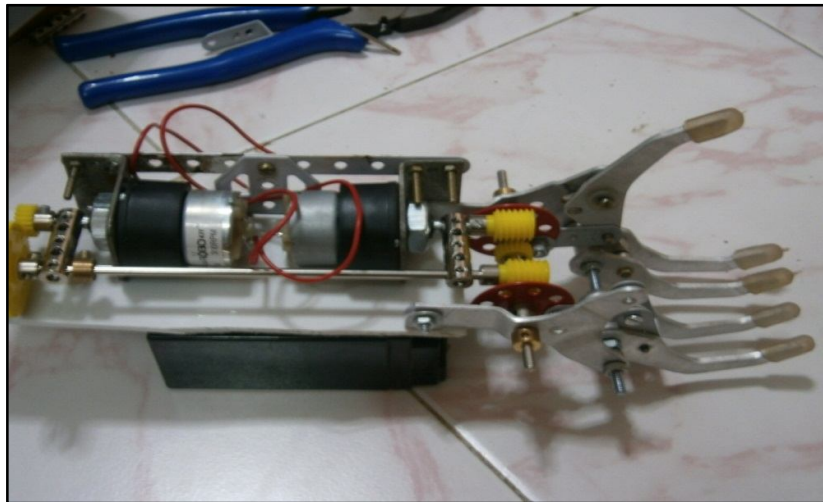


Figure 2: Experimental Setup

6.Reference

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