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FUNCTIONAL PROSTHETIC ARM USING VOICE COMMAND

B. Priyanka[1], S.Saundharya[2],AR.Vasumathi[3],B. Subha[4]

1-3UG Students, Department of Bio-Medical Engineering, PSNA College of Engineering & Technology, Dindigul-624 622, TamilNadu, India
4Assistant Professor, Department of Bio-Medical Engineering, PSNA College of Engineering & Technology, Dindigul-624 622, TamilNadu, India

Abstract-Arms are thevital parts of the Human body because most of the functions that are done physically with the help of upper limbs. Patientswho are incapable of using their arms due to birth disorder, accidents etc. Prosthesis aid to replace the disabled body parts. There are various types of prosthetic arm such as Electrical, Mechanical and Myo-electrical. In this work, a Rehabilitated Arm is designed and initially trained with few voice commands to control its movement. The output of this work shows various movement of rehabilitated arm in both vertical and horizontal direction, hold and replace an object by using voice annunciator.

***Index terms*- Annunciator, gripper, robo arm, Prosthetic rehabilitation.**

1. INTRODUCTION

Current world is facing many accidents at every minute of time. People lost their physical parts such as arm, legs, etc. When an

Arm is disabled the person founds it difficult to do the regular things in the day –to- day life. Mostly the use of arm plays a vital role for aperson. Without an arm a person cannot pick, touch or do anything. Loss of arm can be happened because of accident, diseases and disorders such as Paralysis, Hemiplegia, Cerebral- palsy etc.

In earlier at the stage of the development of Medical Rehabilitation there was only a mould for the disabled person. It was done only for the cover up purpose. The patients could not do actions or even move their prosthesis .That was good cover butthey could not do things in routine.

In order to overcome this ordeal, the Rehabilitation Engineering plays major role in Medical field. There are various types of artificial arms such as Electrical, Mechanical and Myo-electric. By using electronics we can give movement to the prosthetic arm.

The prosthetic arm can be designed on the basis of patients need. Most of the patients need aid for the lower limb and the whole arm as well.The prosthetic arm is designed

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for the patients who cannot use their arms in their routine life. They can work with the help of the prosthetic further it reduces their depression about their deformity.

In this project we have designed a hardware set up of the prosthetic arm for the disabled person and the movement of the arm iscontrolledby a few voice commands that have been programmed with the help of the microcontroller (PIC).The prosthetic arm that we have worked out will respond to voice commands that have been given by the user. This Rehabilitated arm has the application on wearable systems

2. REHABILITATED ARM CONTROLLED BY THE VOICE OBLIGATION

2.1Basic Principles of the Rehabilitated Arm

Initially the Rehabilitated arm was designed for the disabled persons who lost their arm in any accidents or by any diseases and disorders.In this project we have used the Rehabilitated arm for the disabled persons and it can function in a simple method of commanding with their tone (voice).A voltage power supply is given .The materials that are used in this project are Microcontroller (PIC), Relays, Driver motor, gear motor(DC motor) and a gripper.

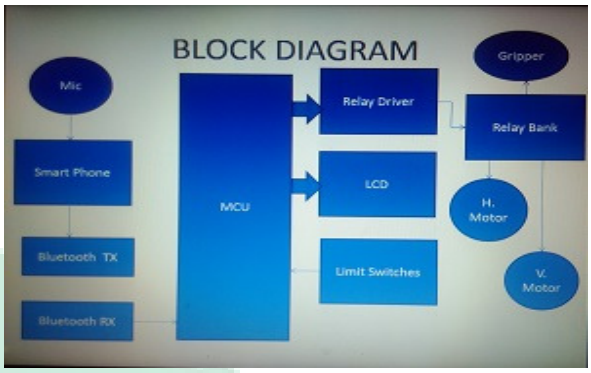

Fig 2.1 Block diagram

2.2Work Plan

The first task in this project is the design of the Gripper. The gripper is the main part of the whole set up in which it acts like the hand .It performs the operation of the fingers like holding (picking)the objects and dropping it. DC gear motor is used.

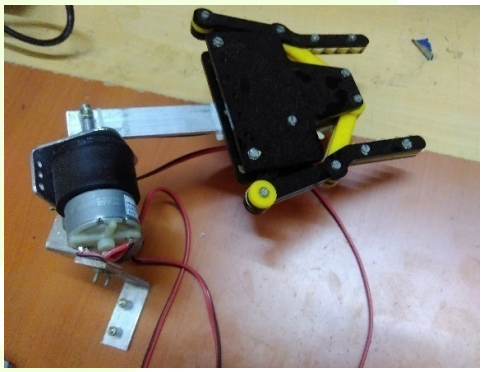

Fig 2.2.1.Gripper

The second task is the design of 2-axial arm module. In this 2 DC gear motor is fixed in which the arm type moves vertically (up and down) and horizontally (right and left).The gear motor which is used here is the plastic gear of 10rpm

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The third task is that design and fixation of driver motor to control the relays. A relay is an electronic switch which is used to give the commands to the gear motor to implement the command. The coil can be on or off so that the relays have two switch positions and they are double through switches.

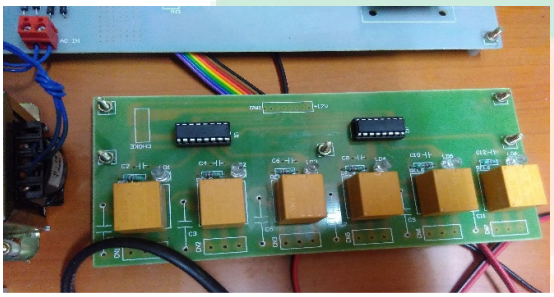

Fig 2.2.2 Relay with the driver circuit

The commands are passed by the microcontroller program. The microcontroller that is used here is PIC16F877A microcontroller. It is a 40 pin DIP package, RISC architecture. It contains 3timers with independent configuration. It includes multiple interrupts. It is also efficient with 10-bit ADC with 8-channel Multiplexer. Inbuilt USART supports both synchronous and asynchronous communication.

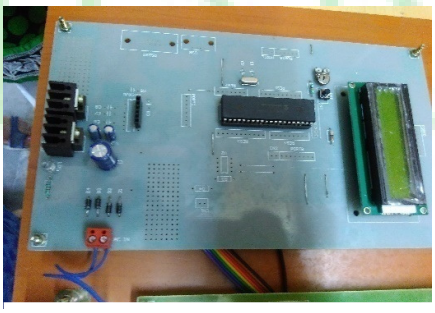

Fig 2.2.3 PIC Microcontroller with the display

The voice command is given through the application installed in the user's mobile. Then the command is transferred to the microcontroller through the Bluetooth transmitter and a receiver. By this method the functional arm responds to the commands given by the user.

3. RESULT

As the arm is the vital part of the body as it performs many actions like holding things, sensing by the touch, gestures, etc. related to the human body and their surroundings. Unfortunately people with limited arm movements face many challenges in their day to day activities Engineering technology helps these individuals to overcome their reach challenges.We have developed a voice activated, light weight, mobile linked functional arm. With this a person can perform simple and reach tasks independently.

The functional arm is designed to perform actions like normal hands by feeding user voice. This program is developed to give the command for the microcontroller. By this time the Rehabilitated Arm performs operations such as moving left and right, up and down, pick and drop.

4. CONCLUSION

After having analyzed the above-mentionedresults, it can be concluded that a voice commandsystem to control tele-operated devices is an efficienttechnique for functional arms. Verbal command can be translated into acomplex action involving several tasksand function to

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better mimic natural limb movement and user intent.

5.FUTURE PROCESS

1) Another joint may be attached with another respective Servo motor attachment between the shoulder and gripper. This will increase the freedom of motion from 2 to 3. Metres range.
2) Better quality voice recognition software capable of communicating via Bluetooth can be used to increase efficiency of the machine.
3) The structural design can be modified so that the torque generation by the servos is greater, resulting in increased weight lifting capacity of the machine.
4) Another servo maybe attached to the gripper controlling its rotation about the arm axis.
5) Other function-specific modifications maybe done depending on how it is used such as industrial manufacturing robot or as prosthetic arm for disabled.

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