KARNATAKA STATE COUNCIL FOR SCIENCE AND TECHONOLOGY

INDIAN INSTITUTE OF SCIENCE CAMPUS, BENGALURU-560012

KSCST

PROJECT REPORT ON

Assistive Prosthetic Arm

By

A Rimshiya Tarheen
1CD19EC001

Akshatha R
1CD19EC008

Bhavana G L
1CD19EC016

Dharshini M
1CD19EC034

Under the Guidance of

Prof. RAVI KUMAR M
Assistant Professor
Department of Electronics and Communication Engineering

CAMBRIDGE

Department of Electronics and Communication Engineering
CAMBRIDGE INSTITUTE OF TECHNOLOGY, BANGALORE
2022-2023

Dr. G. Indumathi	Dr. Shivapanchakshari T.G.	Prof. Ravi Kumar.M
Principal	Head of the Dept	Project Guide
CITech	Dept. of ECE, CITech	Dept. of ECE, CITech

INTRODUCTION

In medicine, a **prosthesis** or a **prosthetic implant** is an artificial device that replaces a missing body part, whichmay be lost through trauma, disease, or a condition present at birth (congenital disorder). Prostheses are intended to restore the normal functions of the missing body part. Amputee

rehabilitation is primarily coordinated bya physiatrist as part of an inter-disciplinary team consisting of physiatrists, prosthetists, nurses, physical therapists, and occupational therapists. Prostheses can be created by hand or with computer-aided design (CAD), a software interface that helps creators design and analyze the creation with computer- generated 2-D and 3-D graphicsas well as analysis and optimization tools.

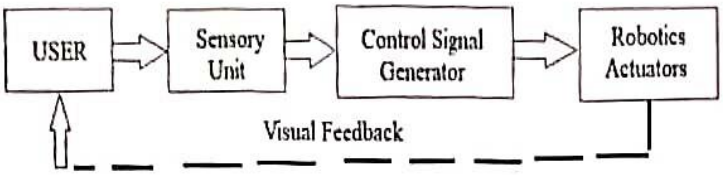
A prosthesis is a medical device that substitutes a missing body part due to damage, disease, or congenital disorders. A transradial prosthesis, or below elbow (BE) prosthesis, replaces the arm between the elbow and thewrist. They can be practical or purely cosmetic, depending on their purpose. An amputee who undertakes a lotof manual labour may choose a hook prosthesis. Opting for a cosmetic prosthesis means sacrificing functionality for a more natural appearance (fast- changing field). Currently, only a few specialists need to know this. The demand for bionic hands is expected to expand as technology progresses. An ancient hook prosthesis gave wayto today's bionic limb. We describe modern prosthetic hands' primary functionalities. However, bionicprostheses still lag behind biological prostheses. A bionic hand that can fully duplicate or even surpass the human hand's intrinsic capabilities is the ultimate goal of bionic limb research.

Develop a highly versatile upper body prosthetic device that overcomes the current prosthetics' cost and usability issues. This saves money and frustration for myoelectric prosthesis users. The Arduino uses this data to power servos that individually trigger each finger. Cheap materials and ubiquitous technology like cellphonesmake it easy for amputees to purchase new prosthetics

OBJECTIVES

- Design and fabricate a customized 3D-printed assistive prosthetic arm, for an arm amputee main focus is cost-effective, comfortable,
- The main focus is cost effective , comfortable, lightweight, durable, and aesthetically appealing.
- To facilitate a generic control,flex sensor data will be collected for set of gestures from a wide range of participants.
- multi-degree-of-freedom wrist joint connector, this can beachieved by using five servo motors with flex sensor.
- The Bluetooth is introduced as one more method as commanding.
- Bluetooth contols the fingers by degree given to it.
- The voice command is given by Bluetooth aurdino app.

METHODOLOGY



Simple Block diagram

User will be used to take the movements and to do different types of action using this assistive prosthetic arm.

Sensory Unit- Sensory Unit will be attached for the user fingers. Here we use Flex sensor as a sensory unit. A flex sensor is a sensor that measures the amount of deflection or bending. Usuallythe sensor is stuck to the surface, and resistance of sensor element is varied by bending the surface. Bending is similar to varying voltage and hence it is often called flexible servo motor. Flex sensors inserted in each finger, which collect information about the finger positions. Flex sensors are used to measure the change in resistance caused by bending or deflection, which is read as voltage in a voltage divider. A flex sensor is a mechanical device that offers varied resistance after being bent. the flex sensor interfaced in glove and finger gesture detection using the sensor. It is feasible to measure the resistance of a flex sensor by feeding a voltage through it and into an analogue input on an Arduino UNO board. Moreover, servo motor is also called as variable resistor. Resistive carbon components makeup flex sensors. A flexsensor is a changeable printed resistor on a flexible thin substrate. It creates output resistance proportional to the bent angle of the substrate . It is obvious that when a flex sensor's bend angle increases, so does the resistance. A flex sensor's flat state has nominal resistance. The resistance increases with the radius.

CONCLUSION

- Thus, a 3D printed assistive prosthetic Arm is designed whose operation is governed by the intensity of contraction and rarefaction of the movement in the hand.
- The operating tools for the motion are servomotors whose nature of rotation depends on the desiredmovement.
- The system is capable in the field of Disability, hospitality industry and areas where normal human hands are prone to risk. Therefore, the prosthetic arm can satisfy each application along with its limitations as well.
- The hand is able to execute the variety of gestures in response to command
- The is successfully designed to fit within the size restraints of the average adult hand
- The system functions were verified to the best of our ability
- If the recommendations we made for further improvement were implemented this design would be able to bring a highly functionally, easy to use transracial prosthetic of people

RESULT

A redid 3D-printed prosthetic arm will be planned utilizing Autodesk Fusion 360, manufactured utilizing 3D printers, and tried for an arm handicapped person. The 3D-printed prosthetic arm configuration is financially savvy, agreeable, light weight, strength, and appearance. To work with a nonexclusive control of the prosthetic arm, flex sensors information will be gathered for a bunch of signals from a wide scope of members. The gathered information will be handled and highlight extraction will be performed to prepare a classifier.

Extra elements are expected to additionally work on the Assistive prosthetic arm; for instance, This can be accomplished by utilizing five servo engines with sections or by using a round controller. The graphical representation along with the value of readings in tabular form for various type of motion represented by the arm is attached along. The nature of readings given by the flex sensors for different positions are compared graphically. The reading observed when the hand is at open position is taken as the reference position and is compared to various motion of hands. The first graph compares the nature of readings between the hand at open position to hand at close condition whereas the second graph compares the nature of values between the reference position and hand being closed and rotated position. The values can be concluded to be stable up to applicable state. The minor fluctuations are due to practical factors such as sensitivity of equipments.

SCOPE FOR FUTURE WORK

- More advancement is done in terms of controlling the different movement.
- The system is capable in the field of hospitality, disability
- Servomotors whose nature of rotation depends on the desired movement.
- The artificial arm can satisfy each application along with its limitations.
- The prosthetic arm is controlled by voice as well.
- The improved feedback system.