



# **SNS COLLEGE OF TECHNOLOGY**

## **(AN AUTONOMOUS INSTITUTION)**

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## **Department of Biomedical Engineering**

**Course Name: ROBOTICS AND AUTOMATION IN MEDICINE**

**III Year : VI Semester**

**TITLE: BIONIC ARM – CLINICAL AND SURGICAL**



## BIONIC ARM

- A bionic arm is a prosthetic limb designed to mimic the function and appearance of a natural arm.
- It incorporates advanced technologies, such as robotics and sensors, to provide users with improved dexterity and control.
- Bionic arms can be customized to respond to muscle signals or other input mechanisms, allowing individuals with limb loss to perform various daily tasks with increased functionality.





## WORKING PRINCIPLE OF BIONIC ARM

- A bionic arm works by picking up signals from a user's muscles.
- When a user puts on their bionic arm and flexes muscles in their residual limb just below their elbow; special sensors detect tiny naturally generated electric signals, and convert these into intuitive and proportional bionic hand movement.
- The bionic hand is controlled by tensing the same muscles which are used to open and close a biological hand.
- To close the Hero Arm's hand, and perform the selected grip, imagine flexing the wrist inwards while pulling the fingers into the heel of the hand.
- To open the hand, imagine extending the wrist with an outstretched palm.





## HOW TO CONTROL A BIONIC ARM

- Most Hero Arm users tell us that they're able to control their bionic hand within just ten minutes, whereas some require a little more rehabilitation to strengthen their muscle sites.
- The technology fitted inside the bionic arm is known scientifically as electromyography, and the special sensors are electromyographical, or EMG, electrodes.
- Myoelectric bionic arms are plug and play, meaning users can take their bionic arm on and off with ease.
- The Hero Arm has an adjustable dynamic socket for maximum comfort
- No surgery is required; we simply identify a user's strongest muscle sites and take a 3D scan or cast of their residual limb before custom building a Hero Arm.





## IMPORTANCE OF BIONIC ARM



- The importance of bionic arms is succinctly summarized in their ability to restore functionality, enhance independence, and improve the quality of life for individuals with limb loss.
- Bionic arms contribute to increased mobility, psychological well-being, and social integration, empowering users to perform daily tasks and participate more fully in various aspects of life.

Vision Title 3



## USES OF BIONIC ARM



The uses of bionic arms include:

- **Restoring Functionality:** Bionic arms help individuals with limb loss regain the ability to perform everyday tasks and activities.
- **Enhancing Independence:** Users can achieve greater independence by having improved control and dexterity with their bionic arms. Vision Tit 2
- **Improving Quality of Life:** Bionic arms contribute to an enhanced quality of life by promoting confidence, reducing stigma, and facilitating social integration. Vision Title 3
- **Enabling Employment:** Increased functionality may provide individuals with more employment opportunities, as they can handle a broader range of tasks.
- **Adaptability:** Bionic arms are versatile, allowing users to switch between different grips and functions for various activities.
- **Advancing Technology:** The development and use of bionic arms drive technological innovation in the field of prosthetics and robotics.
- **Customization:** Bionic arms can be tailored to individual needs, offering a personalized and comfortable prosthetic solution



## CLINICAL APPLICATIONS OF BIONIC ARM

Tit 2



Clinical applications of bionic arms include:

**Motorized Prosthetics:** Motorized components in bionic arms enable users to control movements with greater precision.

**Myoelectric Control:** Bionic arms often utilize myoelectric sensors, allowing users to control the prosthesis using muscle signals.

**Functional Daily Tasks:** Users can perform various daily activities, such as grasping objects, eating, and writing, with improved functionality.

**Psychosocial Rehabilitation:** Bionic arms contribute to psychosocial rehabilitation by boosting users' confidence and reducing the emotional impact of limb loss.



## LIMITATIONS – BIONIC ARM



- The limitations of bionic arms include factors such as high cost, a learning curve for users to master control, maintenance challenges, the weight and bulkiness of some models affecting wearability, limited sensory feedback, dependency on power sources, and their suitability for specific medical conditions or amputation types.
- While bionic arms provide significant advancements in prosthetics, these limitations may impact accessibility, user experience, and overall functionality for some individuals.







THANK YOU!!!

Vision Title 3