

# Above Elbow Myo-electric Arm

## Introduction

One disability which commonly occurs in factory workers and military personnel is the partial/full loss of upper limb. People who lose their arm and hand find it very difficult to perform various operations that a normal arm does. Different solutions are available but most are non-functional cosmetics. The functional solutions are imported and are very costly, which are beyond the limit of an Indian individual. Based on the location of amputation, CSIR-CSIO developed two solutions namely below elbow and above elbow myoelectric arms.

Below elbow myoelectric arm technology is an indigenous myoelectric arm consist of two parts - mechanical assembly and electronic circuitry. Mechanical part comprises gripping fingers, palm, wrist and lower portion of upper limb. Electronics involve myoelectric electrodes, circuitry to process the myoelectric signal and a dc motor for opening and closing the hand with proportional grip force control. A body coloured glove provides the cosmetic appeal to the entire setup.

Above elbow myoelectric arm consist of gripping fingers, palm, wrist and elbow joint of upper limb. This arm further has two DC motor one for hand movement, another for the movement of the elbow joint. EMG sensors are there to pick up myoelectric signals from the stump and there is circuitry to process and condition the signals to perform the opening and closing of hand and micro-switch/wireless switch for elbow flexor and extension.

## Features

- Intelligent prosthesis with variable hand speed setting according to user preference.
- Microcontroller-based myoelectric hand operation with proportional grip force.
- Switch (remote/electrical) controlled elbow movement with fixed speed.
- Consistent speed and self-locking elbow using lead screw mechanism.
- No back lash during operation.
- Light weight, simple in manufacturing and durable.



## Specification

- Operating Voltage : 7.2V - 12V
- Current Consumption : 250 mA at no grip, 750 mA at 2 Kg load (Hand) and 190mA at no load & 870mA at 2 Kg load (Elbow)
- Hand opening Width : 75-100 mm (Max)
- Hand average Speed : 3-4 cm/sec (approx.)
- Elbow rotation angle : 0-145° (Max)
- Elbow operating speed : 45° per second
- Max. Weight to be grasped : 2 Kg
- Weight of the arm : 2.2 Kg
- Operation : By EMG signal (Hand)  
By electronic push button/RF Switch (Elbow Joint)

## Application

Amputees of below or above elbow can lead the normal life to some extent with these functional prosthetic devices for upper limb.

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