

## **PROJECT REPORT**

**Project Title:** Design of Artificial Hand with Artificial Fingers.

**DBT Sanction Order No. & Date:** “BT/NE/TBP/2013” Dated: 11/08/2014.

### **Principal Investigator & Affiliation (Parent Institution)**

Shri Nitin Sahai  
Assistant Professor  
Department of Biomedical Engineering  
North Eastern Hill University  
Shillong:793022, Meghalaya, India  
Telephone:+91-364-2723854(O)  
Email:nitinbiomedical@gmail.com

### **Co-Principal Investigator & Affiliation (Parent Institution):**

1) Dr Sudip Paul  
Assistant Professor  
Department of Biomedical Engineering  
North Eastern Hill University  
Shillong:793022, Meghalaya, India  
Telephone: +91-364-2723855(O)  
Email:sudip.paul.bhu@gmail.com

2) Dr Dinesh Bhatia  
Associate Professor and Head  
Department of Biomedical Engineering  
North Eastern Hill University  
Shillong:793022, Meghalaya, India  
Telephone:+91-364-2723853(O)  
Email:bhatiadinesh@rediffmail.com

### **Principal Investigator & Affiliation (Collaborating Institution):**

Dr Suresh Verma  
Professor  
Department of Mechanical Engineering  
Deenbandhu Chhotu Ram University of Science & Technology  
Murthal (Sonapat), Haryana: 131039  
Telephone:+91-9416540458  
Email:sureshc30@yahoo.co.in

**Other Collaborators:**

Dr Bhaskar Borgohain  
Associate Professor & HOD I/C  
North Eastern Regional Institute of Health and Medical Sciences.  
Telephone :+91-9436706397  
Email:bhaskarborg@gmail.com

Dr U. Singh  
Head, Department of Physical Rehabilitation Medicine  
All India Institute of Medical Sciences (AIIMS)  
New Delhi  
Telephone :+91-11-26594916  
Email:ushing@aiims.ac.in

**Total Cost:** Rs. 32.78 lakhs

**Duration:** Three years (2014-2017)

**Approved Objectives of the Project:**

1. To develop a cost-effective and acceptable prosthetic hand which can restore as much of the lost function and appearance as possible.
2. To develop prosthetic hand similar to the natural hand.
3. To develop prosthetic hand having high durability.
4. To develop prosthetic hand having maximum load bearing capacity with low cost in comparison to those available in the market.

### **Brief summary of the Project:**

Over the past few years prosthetic hand have become much improved although complex. However their costs are high and are not within the reach of most people in the Third World. The upper limb prosthesis being worked upon in the present work are for amputees with hands removed below the elbow and would offer a limited rotational movement of the finger joint by the control of servomotors. Our aim is to make it at a low cost. In this project we deal with the design and development of a Five Fingered Robotic Hand (FFRH) using 8-bit microcontroller and servomotors. The design of the system is based on a simple, flexible and minimal control strategy. The robot system has 2 independent commands for all the five fingers flex and extend (DOF=2) and 2 independent commands for the whole hand i.e closing and opening of the hand (DOF=2). The material used was NYLON-6 which is light weight and low cost. The total weight of the hand was around 450 gms. The cost of our hand came to approximately around Rs 3000 which is much less as compared to other below elbow hands manufactured in India which costs more than Rs 4500.

From the results, it has been observed that the developed prototype for the artificial hand and artificial fingers using Nylon 6 as the base material found to have a good movement of its fingers and thumb for the flexion and extension movement. It also shows that for given load capacity it can withstand for more duration of time. Also, the most important aspect of this artificial hand with artificial fingers is that it is of very low cost as compared with the available artificial hands in the market at present. Its effective cost makes it possible for the end users to use this artificial hand more easily as compared to the others.

