Prosthetic Hand

Status: Filled

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Sponsor(s):   The MENRVA Group

Supervisor(s):   Carlo Menon, PhD, PEng, Associate Professor, Mechatronic Systems Engineering
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progress, trans-radial amputees have largely depended on body powered mechanical prosthetics owing to their greater reliability and user comfort over robotic prosthetics. The MENRVA group has been researching into technologies which promise to increase the confidence of users in bionics.

The proposal for the project is to design a bionic hand to be used by trans-radial amputees with the cross goal of providing the MENRVA group with the necessary hardware to research/test/demonstrate their user-to-robot interaction technologies.

The students are expected to interact with trans-radial amputees to deliver a product which is functional primarily to the end user and secondarily to the engineers, with user comfort, weight, mechanical and functional reliability being the driving factors. The preliminary vision is of a product capable of hand gestures such as open, grasping, pinching, pointing with sensory capability to detect slippage of held objects, touch feedback for the user, actuator strength control for user-to-robot interaction technology, and with possibility of modes to use the device as a bionic or body powered mechanical prosthetic.

Project Plan:

Pre-Capstone Logistics: October-December 2015

       Research into open source bionic projects and existing technologies
       Meetings and Interviews with trans-radial amputees
       Brainstorming pre-prototype ideas
       Ad-hoc design/assembly/testing of pre-prototype ideas
       Revision of designs, and capstone strategy

Capstone Logistics: January-February 2016

       Search of suitable components and suppliers
       Rapid prototyping and testing of mechanical and electrical designs

Material Ordering: March 2016

       Send out purchase orders and machining requests

Pre-Assembly Logistics: March-May 2016

       Design of software backbone, algorithms, and APIs
       Preparation of automated testing jigs

Assembly and Testing: June-July 2016

       Assembly of obtained hardware
       Merger of software and hardware architecture
       Automated testing of hardware
       Adjustment and fine tuning

User Trials: July – August 2016

Testing of device on end users
Adjustment and fine tuning

Project Delivery: End of August 2016

Deliver project to MENRVA group.

Available Resources:

Rapid prototyping facility with 3d printer, LPKF ProtoMat, and laser cutter. Basic machine shop facilities with band saws, drill and arbor presses etc.