Anthropomorphic Design using Advanced Manufacturing

Researchers: Dr Ajit Panesar*, Dr Stefan Rennick-Egglestone, Dr Amit Pujari
Investigators: Prof. Ian Ashcroft, Prof. Steve Benford, Dr Ruth Goodridge

*ajit.panesar@nottingham.ac.uk

EPSRC Centre for Innovative Manufacturing in Additive Manufacturing

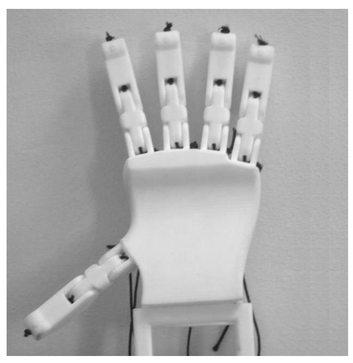
Introduction

The emergence of advanced manufacturing, design techniques and increased understanding of man-machine interfaces should be driving a step-change in the effectiveness of upper limb prosthesis. However, that is being hindered by the lack of an appropriate design system, with the result that most of the highly advanced designs are actually of little added benefit to the patient. In this work, we aim to develop an integrated design system in which the needs of the patient, together with constraints, such as the manufacturing technologies available and requirements for device accreditation for healthcare etc., inform the whole design to manufacture process.

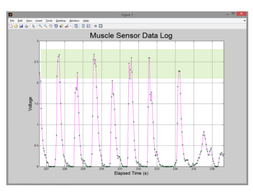
Background

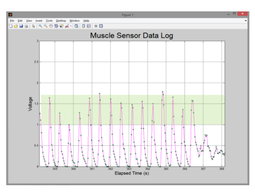
Student projects exploiting AM designs.

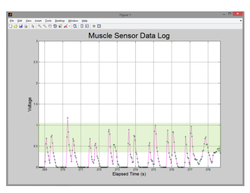




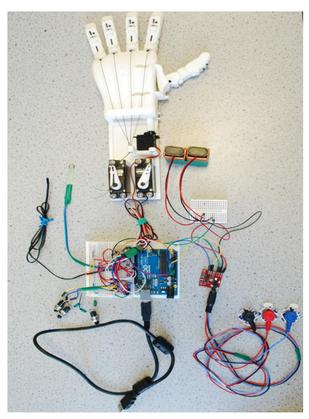
Low cost prosthetic hand:
1) Design – Additive manufacture designs
2) Features – Myoelectric sensing + Actuation
3) Hardware – Arduino interface
4) Software – MATLAB



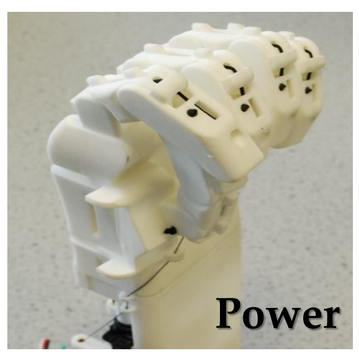


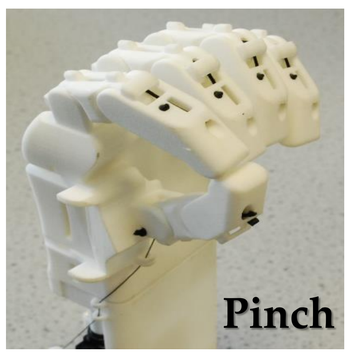


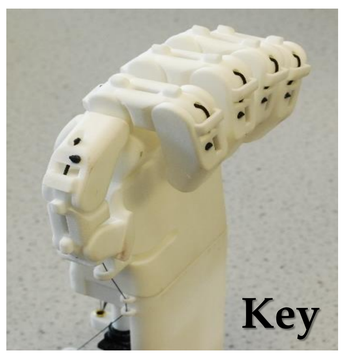


Three key grips for an affordable prosthetic device.





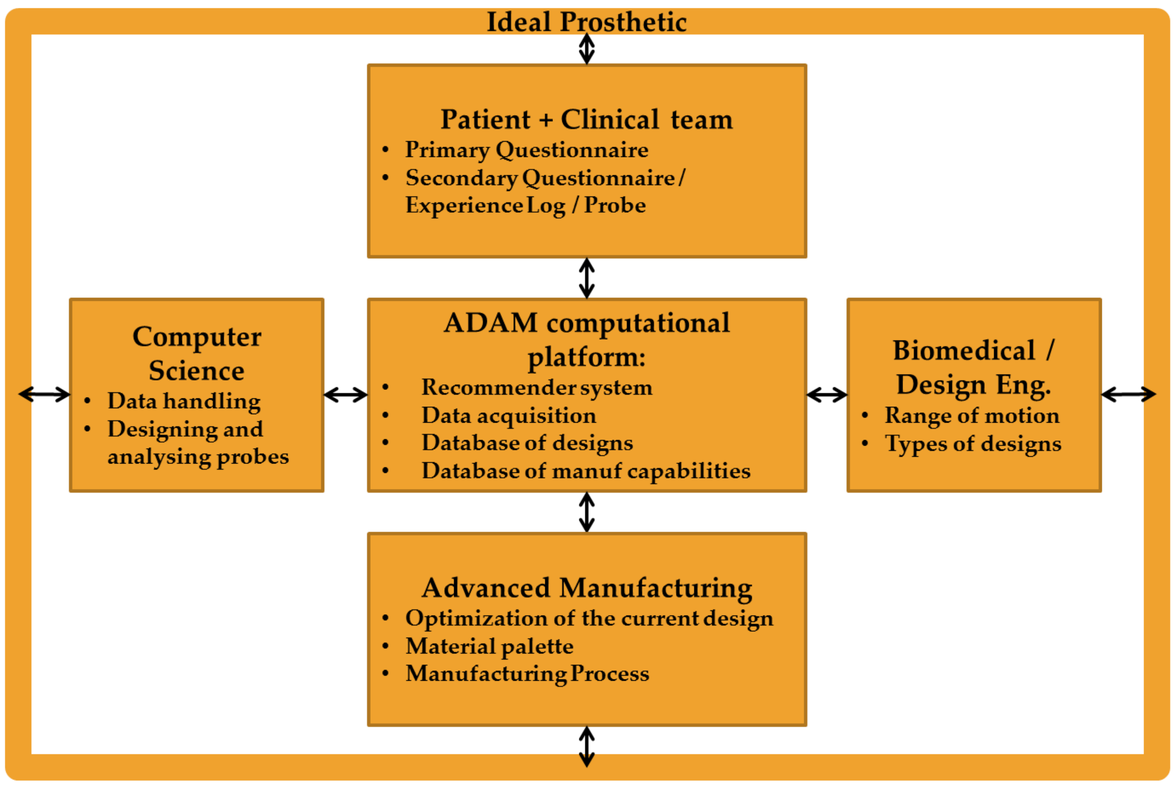


Vision

To develop a computational platform that interfaces with the various stakeholders, e.g. clinician, designer, manufacturer, controlling data transfer and analysis and applying optimization algorithms to drive the design to an optimal for each individual patient's needs.

Research Methodology

- Identify the key (common) elements that will enable in the higher acceptance rates of adoption for a prosthesis.
- Employ learning algorithms and to mine vast amounts of data to extract meaningful information that will enable in a patients' need-specific device to be made.



Direction for future investigations

1) Consultation with stakeholders, focus groups and data analysis.
2) Formalise computational platforms' hardware and data acquisition specifications.
3) Design and manufacture a customised and optimised prosthetic device.

The University of Nottingham
- Additive Manufacturing and 3D Printing Research Group
- Mixed Reality Laboratories
- Intelligent Modelling and Analysis Research Group

University of Strathclyde Glasgow
- Biomedical Engineering

NHS
- Nottingham University Hospitals
- The Royal Orthopaedic Hospital