Design and Development of Cost-Effective Biosignals Controlled Prosthetic Hand

Design and Development of Cost Effective Biosignals Controlled Prosthetic Hand is an innovative and interdisciplinary project combining research elements from the domains of Biology, Electronics, Computer-Science and Mechanical Engineering. The successful realisation of this highly visionary project use the state-of-the-art research results from relevant fields to improve the functionality and controllability of proshtetic hand. TU Bionic Hand developed following a biomimetic approch is an major impact of this project. TU Bionic Hand can replicate six grasp types involved during 70% of daily living activities (dla) using forearm surface electromyogram (EMG) signals. The EMG recognition is based on PCA of time/ frequency domain derived feature vector through SVM reports an accuracy of 97.5%. The present work concentrates on embeddment of the developed control architecture aiming at the cost effectiveness in terms of the tangible benefits of the technology used.

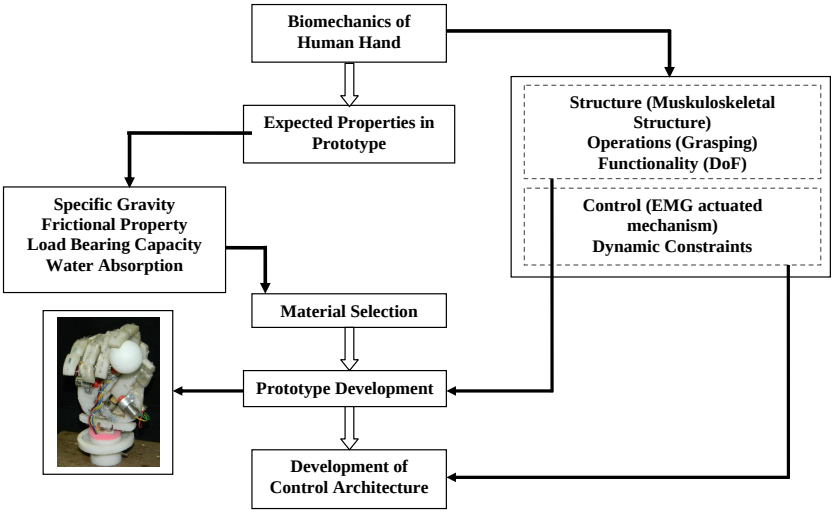

Fig. 1. TU Bionic Hand Developed through A Biomimetic Approach

Fig. 2. TU Bionic Hand performing six Grasp Types involved during 70% of dla

Contributions to Research Community:

1. Derivation of a wholesome feature set: *principal components of time/ frequency domain derived feature vector* for recognition of EMG based grasp types used during 70% of dla.
2. Derivation of a *Biomimetic Similarity Index within the context of anthropomorphism to rank the prostheses quantitatively* in reference to the human hand.
3. *A Two layered control architecture for a prosthsis* following the dynamic constraints, finger joint trajectories and velocity profiles of the human hand.

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