**Title: Motion Capture Analysis & Plotting Assistant: an open source GUI for Xsens sensor-captured upper limb joint angles visualization and analysis**

Presenter: **Mr Runbei Cheng, MPhys Student, Mr**

Contact Address: Wadham College,

University of Oxford, Oxford – OX1 3PN, UK

Tel: +447496489321 E-mail: [runbei.cheng@wadham.ox.ac.uk](mailto:runbei.cheng@wadham.ox.ac.uk)

Other Authors: DrVikranth H. Nagaraja and Dr Mark S. Thompson

Contact Address: Institute of Biomedical Engineering,

University of Oxford, Oxford - OX3 7LD, UK

**Abstract:**

There has been an emerging interest in applications of motion capture (mocap) setups for analyzing prosthesis performance. However, such applications have mostly been done for research purposes only. There is a lack of clinical application of mocap-based prosthesis movement analysis, partially due to such analysis requiring coding in computing languages that an average clinician is unfamiliar with. Motion Capture Analysis & Plotting Assistant (MCAPA) is developed as a user-friendly analysis software which eliminates the needs for coding, making mocap-based prosthesis movement analysis more feasible for the clinicians.

MCAPA is coded in MATLAB®, and compiled as a standalone exe app powered by MATLAB® Runtime[1]. The current version is capable of importing \*.mvnx[2] type files, and analyzing the upper limb (UL) movements. The app is capable of qualitative analysis in the form of joint angle vs task completion plots; as well as quantitative analysis in the forms of bar plots and tables of maximum, minimum angles, and movement range.

MCAPA can compare prosthetic users’ UL joint angles with non-disabled control groups, as well as viewing patients’ improvement over time. The comparisons are done through 11 tasks designed to simulate everyday uses of the prosthetic devices; and the degrees of freedom compared are: shoulder flexion and extension, abduction and adduction, internal and external rotations; elbow flexion and extension, pronation and supination; wrist flexion and extension, radial and ulnar deviations. The angles are calculated in Z-X-Y Euler angle sequence, and follow the ISB guidelines [1].

**Keywords:** Prosthetic device, Xsens, Motion capture, Motion analysis

**References:**

1. Various, ISB recommendation on definitions of joint coordinate system of various joints for the reporting of human joint motion—Part II: shoulder, elbow, wrist and hand, J Biomech. 2005 May; 38(5):981-992.