Summary

The body shape measurement is vital in determining the optimum design of custom contoured seat shape and the underlying musculoskeletal deformities to aid clinicians in visualising and communicating a client’s posture.

Background

Cardiff and Vale University Health Board’s (UHB’s) Rehabilitation Engineering Unit (REU) produce custom contoured seating systems for wheelchair users. Clients with severe musculoskeletal deformities require specialised seating to accommodate shape and evenly distribute pressure with a view to manage posture and improve function. The custom contoured seating systems are produced either by manipulating the seating material into an appropriate shape for a particular client’s form (e.g. Vacuum casting Bag Technique) or by taking an impression of the client’s ‘shape’ using body shape measurement systems such as Cardiff Body Match (CBM) system, scanned bag or Lynx and Matrix seating [1][2].

After the seat geometry has been carefully designed and optimised it is recoded on to a computer. It is difficult to infer and visualise client’s posture from the recorded clinical data, especially in the case of clients with complex body shapes. Such visualisation would be very useful from the clinical perspective; it would assist clinicians in analysing and learning from past seating designs, monitoring the progression of client’s musculoskeletal condition and promoting function and comfort of the individual. In order to assist clinical engineers in visualising complex seated postures from CBM measurements and to investigate the relationship between seat shape and musculoskeletal deformities, an interactive 3D computer model of a human skeleton has been developed.

Clinical Details & Preliminary Results

The Cardiff and Vale UHB’s REU has a large database of hundreds of client shapes dating back to 1996 obtained via the CBM. These clients have a wide range of neurological, postural and musculoskeletal conditions (e.g. kyphosis and lordosis). An interactive 3D model is capable of representing the client’s seated posture captured in the CBM system corresponding to different musculoskeletal conditions and postural characteristics. The prototype has two modes of operation automatic and manual. In automatic mode the CBM data is processed by the algorithm to produce the visual representation of the seated posture. In manual mode the model can be manipulated by entering clinical measurements taken during the seating assessment by the clinical engineer. Preliminary testing of the model has been completed and presented to Clinical Engineers who were very enthusiastic about the projects potential.

References