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Title of abstract: Towards better measurement of joint stiffness in people with Rheumatoid Arthritis

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Rheumatoid Arthritis (RA) is characterised by synovial inflammation resulting in pain, stiffness, swelling and deformity of the affected joints. The Disease Activity Score (DAS) is commonly used to measure RA disease activity (Van der Heijde et al. 1993), but this only quantifies joints that are tender and swollen rather than measuring stiffness. The symptom of joint stiffness is 'the perception of difficulty in moving a joint'. Simply recording the duration of stiffness in the morning does not reflect its intensity or its impact on movement and function. Although goniometers can be used to measure the Range of Motion (ROM) in each joint, this is laborious to perform and rarely recorded in the clinic setting. Since joint stiffness is often linked with disability, awareness of this problem will help to focus treatment strategies.

Data gloves capable of measuring finger joint kinematics can provide objective and dynamic information on joint movement which has the potential to help measure joint stiffness in an objective and clinically relevant manner.

Our work initially focused on using commercially available virtual reality gloves - the 5DT (Fifth Dimension Technologies 2004) and X-IST (Inition 2013). We developed a simple visual interface for the patient and a more detailed view for the analyst. Although this improved the ease of calibration and reproducibility of the data it was still time-consuming due to the need for frequent calibration. We therefore developed a bespoke dataglove using multiple accelerometers, bend sensors and force sensors to eliminate the need for calibration and offer improved accessibility to users with arthritis. We will be using these gloves in a clinical trial to study joint stiffness and movement in patients who have RA.

References

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