This work presents the NAP348 project to develop a smart glove to facilitate the arthritis rehabilitative process through the integration of sensors, processors and wireless technology.

Rheumatoid arthritis is a chronic, inflammatory joint disease. Stiffness, swelling and deformity are the most common symptoms. Approximately 20% to 30% of people become work disabled within the first two to three years of the disease.

Clinical Assessment Techniques

A Health Assessment Questionnaire (HAQ) determines the patient ability to perform daily tasks.

- Goniometer
- Kapandji score
- Grip strength

- Based on manual assessment techniques
- It is a time consuming process
- To date, joint stiffness is not sufficiently quantified and it is difficult to measure empirically

Biomechanical model, Sensor Choice & Positioning

- Biomechanical model: The Objective is to identify the degrees of freedom
- Sensor Choice & Positioning: Sensors and their positioning need to account for the identified degrees of freedom

System Design

The finger’s side of the PCB is expected to be under flexion repeatedly under glove usage.

Minimizing the stress under finger flexion, the meander-type structure allows the PCB to undergo large deformations without fracture.

Conclusions

- This glove will help to quantify joint stiffness and allow for joint stiffness to be dynamically and empirically monitored
- Auto Calibration

Future Work

- Integration in to glove
- Characterisation testing
- Test and validation will commence with clinical trials