ITERATIVE LEARNING CONTROL AND ADVANCED TECHNOLOGY FOR FES-BASED UPPER-LIMB STROKE REHABILITATION

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Motivation

➢ Aim:
  ▪ **Develop technology that enables patients to perform ADLs with potential transference to their own homes.**

➢ Objectives:
  ▪ **To extend the scope of current FES to fully support functional tasks.**
  ▪ **To combine novel sensing approaches with model-based controllers.**
  ▪ **To establish feasibility with stroke patients.**
Iterative Learning Control

Input (FES levels) → System (movement trial) → Output (joint angles)

THEN REPEAT THE PROCESS

Iterative Learning Controller

Ideal reference (joint angles) → Next trial (FES levels)
Goal-Oriented Stroke Assistance by Iterative Learning

4 chronic stroke patients recruited.
Range of Movement increased at shoulder, elbow, wrist and hand.

UKACC PhD Presentation Showcase
Conclusions and future work

- The feasibility of applying precisely controlled FES to multiple muscle groups in the upper limb using advanced sensors, controllers and array hardware was demonstrated.
- The low-cost technologies used also have potential to transfer to patients’ homes, which reduce costs and workloads of physiotherapists.
- The next steps:
  - Fabric electrode will be used.
  - Embedded version will be designed.