

# HAPTIC KNOB: A ROBOTIC DEVICE FOR REHABILITATION AFTER STROKE

The use of robotic devices for rehabilitation is a promising solution to complement classic rehabilitation therapies and increase the intensity of treatment proposed to post-stroke patients. Moreover, robots can accurately measure the performances, offer personalized therapy of adapted difficulty, and motivate subjects to train by challenging games with rewarding visual feedback.



Due to space constraints and costs, stroke patients are often sent back after they recover some mobility functions and before they fully recover their arm and hand functions, thereby strongly limiting patients in their daily activities. The *Haptic Knob* (Figure 1) is a 2 degree-of-freedom (DOF) robotic device developed at NUS to exercise grasping in coordination with pronation/supination of the forearm, two of the activities stroke patients desire to recover the most.

Figure 1: The Haptic Knob

Results of a study with the Haptic Knob at Tan Tock Seng Hospital's Rehabilitation Centre suggest improvements in hand function in terms of precision of movement, movement smoothness and force coordination (Figure 2). Clinical assessments also show a decrease in the impairment of post-stroke subjects and patients reported improved hand function in their daily activities (operating knobs, grasping and holding objects). The paper on the Haptic Knob was given the Best Application Paper Award at the 2006 IEEE/RSJ international Conference on Intelligent Robots and Systems.

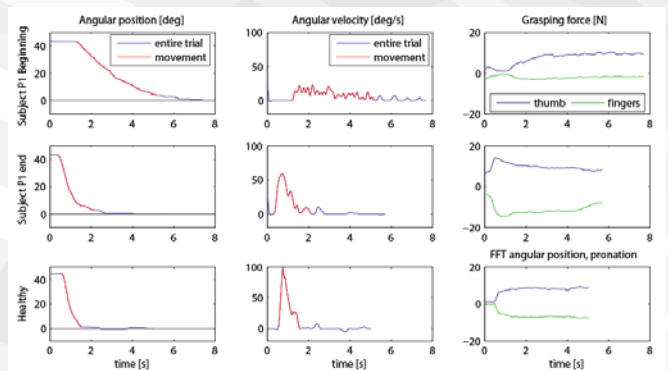
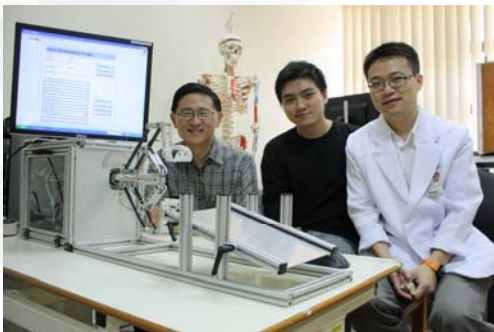


Figure 2: Typical results for a post-stroke and a healthy subject during a pronation movement on the Haptic Knob.



A/Prof CL Teo, 4th year student Mr Hyet Khine and Tan Tock Seng Rehabilitation Centre's Senior Therapist Mr Hong Yun with the Haptic Knob system

**ASSOCIATE PROFESSOR TEO CHEE LEONG**

**Tel : (65) 6516 2259**

**Email : mpeteocl@nus.edu.sg**

**NUS Team:** Assoc Prof Teo Chee Leong, Mr Olivier Lambercy, Mr Ludovic Dovat

**Collaborator:** Dr Etienne Burdet (Imperial College London)