

Engineering applied to cognitive rehabilitation

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Within the CogWatch European project, coordinated by the University of Birmingham, researchers at the Higher Technical School of Telecommunications Engineering and the Higher Technical School of Industrial Engineering of the Universidad Politécnica de Madrid have designed the architecture and the first prototype of a system that provides cognitive rehabilitation for patients suffering from apraxia. Apraxia is a neurological disorder after suffering a stroke.

Apraxia is a [cognitive impairment](#) characterized by loss of the ability to carry out learned purposeful movements despite having the desire and the [physical ability](#) to perform the movements. This deficiency increases when the task includes more than a sequence of movements with complex actions and even the use of an object. The recovering can have significant effects after those strokes and it can be hard for patients to return to an independent life in their own homes.

The partners of the CogWatch project have developed a system that allows patients to perform these tasks in their own home and accompanied by a close environment. In this sense, while they are making a coffee or are dressing to go for a walk, the system will guide and warn them of mistakes as well as the actions needed to correct them.

The first prototype is already finished and is currently being assessed, the patient will interact with a screen which will show text messages and animations to guide their steps when they are not able to remember how to do it or they are doing wrongly. To do this, the system needs some

relevant information for real-time processing.

This information is acquired through cameras and sensors (strength and speed) set in the objects that patients use to perform the tasks (kitchen utensils, clothes). Researchers used a Kinect™ camera, an affordable device which is suitable to obtain [body movements](#) data with the accuracy needed.

In addition to helping patients to perform their daily tasks, the system can store all the information and send it to hospital. Therefore, doctors can conduct a remote monitoring and keep them updated of the evolution of the patient.

The CogWatch project started in 2011 and is expected to be finished in 2014, by then, the most advanced versions of the developed system will be on the market.

More information: Cogollor, J. Handmade Task Tracking Applied to Cognitive Rehabilitation, *Sensors* 12 (10): 14214-14231, Oct 2012.

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