

Empowering patients and improving treatment of Parkinson's disease

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Recovering walking rhythm

The complete REMPARK system consists of a sensor worn at the waist, a smartphone acting as a gateway for sending and receiving information, a server receiving the data and communicating with medical staff, an auditory cueing system and a sensory functional electrical stimulation device. The sensor monitors the motor status of patients in real time and is able to identify the specific symptoms of Parkinson's. It evaluates patients' so called 'ON/OFF/ Dyskinesia status'. 'ON' indicates that the patient is able to move almost correctly, while 'OFF' indicates that the patient is having trouble moving and may be experiencing the trembling or other involuntary muscle spasms that often characterise Parkinson's.

A personal health system helps Parkinson's patients manage their symptoms while providing doctors with a rich source of information from continuous monitoring.

More than one million people in Europe live with Parkinson's disease today and this number is expected to double by 2030 as the population ages, according to the European Parkinson's Disease Association.

The REMPARK project promises to provide relief to Parkinson's [patients](#) and to help doctors improve treatment. Researchers are developing a patient [health system](#) that detects and records the current motor state of the patient and helps the patient restore nearly normal movement.

'Besides helping the patient manage their symptoms, the system also provides feedback to their doctor for more accurate follow-up of the disease,' says Professor Joan Cabestany, the project's coordinator and a member of the Department of Electronics Engineering at the

When a patient begins to have difficulty moving smoothly, an earphone connected to the system plays a rhythmic click much like a metronome. This gait guidance system helps the patient recover and perform daily activities.

Continuous information at your fingertips

Neurologists typically only see their Parkinson's patients a few times throughout the year, and thus only have access to a snapshot of the patient's status. With the REMPARK system, however, neurologists can view and analyse the disease's evolution. The patient's BAN (Body Area Network) sends data to the server in the cloud via the patient's smartphone. This information can be accessed by the physician remotely to evaluate the state of the patient and monitor evolution of the disease. Using the system, the physician can then provide feedback to the patient.

'The system helps doctors identify trends,' explains Professor Cabestany. 'They can examine data over any time frame.'

'The sensor is a device that can be used right now to improve patient monitoring. Doctors can measure disease evolution over a whole day or any other period, in ambulatory conditions as the patient goes through a normal day,' says Prof. Cabestany.

Using the insights gained from their analysis, neurologists can adjust patients' treatment regimes accordingly, and stay within the 'therapeutic window' in which the desired effects of medications outweigh any adverse effects.

This availability of information is not only good for doctors.

'When patients know how many hours they were ON/OFF, they can learn to manage their symptoms better by making adjustments in their daily routine or environment,' says Professor Manuel Moreno, a colleague of Professor Cabestany's on UPC's engineering faculty.

Alerts

If a sufferer gets into difficulties without realising it, the system can prompt them via a message to their smartphone so that the patient becomes more aware of their body state and can react accordingly.

In case of an emergency, for example a fall, the system can alert the patient's family, physician or a call centre.

REMPARK ran from 1 November 2011 through to 30 April 2015 and received EU funding of EUR 3.3 million. The project has conducted trials in ambulatory conditions with 43 patients from four medical centres in Spain, Italy, Ireland and Israel over the course of several months from September 2014 onwards.

Provided by CORDIS

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