

Smartphones as a health tool for older adults

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Members of the UPC team involved in the project

A team of researchers from the Universitat Politècnica de Catalunya · BarcelonaTech (UPC) and the Universitat Autònoma de Barcelona (UAB) is creating a smartphone app that will help older adults to understand their state of health and develop healthier habits.

How can we promote an active lifestyle and encourage habits that improve our quality of life, particularly in <u>older adults</u>? To address the issue, a multidisciplinary team led by the researcher Miguel Àngel



García, a member of the Electronic and Biomedical Instrumentation group and lecturer at the Department of Electronic Engineering of the Universitat Politècnica de Catalunya · BarcelonaTech (UPC), has harnessed the potential of mobile phones to measure physiological variables such as physical activity and <u>heart rate variability</u>. The data will be combined with results for other variables in a new smartphone app designed to provide physiological, cognitive and emotional information about its users, enabling them to take control of the situation and improve their general health.

Miguel Àngel García explains that, to achieve this, the group first has to "achieve a basic objective: to validate algorithms that can measure physiological and psychological variables obtained non-intrusively via mobile phones and through cognitive tests or questionnaires on eating habits". According to the researcher, the data for these variables are "indicators of health and well-being that can help to improve quality of life in older adults and could, in the future, be adapted to other age groups".

The end goal of the project, which will run for a period of two years, is to develop an attractive, user-friendly smartphone app capable of measuring the definitive set of indicators and suitable for users aged over 60.

Other participants in the project include the researchers Mireya Fernández and Juan Ramos, from the Department of Electronic Engineering at the UPC, and a team from the Universitat Autònoma de Barcelona (UAB) led by Lluís Capdevila, coordinator of the consolidated research group in Lifestyle, Sport and Health.

Movement and location dataThe team of UPC researchers is currently working on the development, characterisation and validation of specialised software for measuring heart rate variability (HRV) and



physical activity via <u>mobile devices</u>, making use of sensors standard smartphones already contain. These include accelerometers, which detect a phone's movement, screen tilt and rotation and will be used by the app to measure physical activity, whether the phone is carried in the user's pocket, in a bag or in a holster.

The information will be combined with data from GPS sensors or nearby networks to confirm that the user is moving rather than simply handling the device, a combination that makes it possible to detect falls and pinpoint the user's location in the event of an emergency, leading to greater mobility and giving users of the technology a greater sense of independence and confidence in their physical well-being.

Measuring heartbeats from mobile phones

Using a smartphone's camera and flash, the app will also be able to analyse heart rate variability (HRV), via a highly precise, non-invasive technique that gauges the status of the autonomic nervous system and cardiorespiratory system. The system is particularly suitable for older adults, the age group at greatest risk of cardiovascular disease.

Other applications on the market already use smartphone cameras to measure <u>heart rate</u> or physical activity. One of the most common methods in current use is to record changes in pulse by placing a finger across the camera lens and illuminating it intensely with the flash. An alternative is to measure HRV in the user's forehead and record the results as a video.

The final app will incorporate these tools and other more sophisticated signal analysis techniques to measure HRV in real time, beat by beat, to assess whether a user's health is improving or deteriorating. The unique software, which will obtain and process data on multiple variables through a single integrated interface, will allow for comprehensive



monitoring of the user's state of health.

Two prizes and one spin offT

he project is one of 26 selected for the 2014 RecerCaixa programme, which promotes excellence in scientific research and received 362 submissions for this year's edition. The team of scientists from the UPC and the UAB has a combined total of eight years' experience in the development of apps and mobile devices for measuring, processing and monitoring variables associated with healthy lifestyles. In 2013 they launched the spin-off Health&SportLab, which in the same year won the first Valortec prize, awarded by the Government of Catalonia's ACCIÓ agency.

A social network for a healthy lifestyle

Once the <u>smartphone app</u> is available, users will be able to share their results and experiences online via the accompanying social network. Registered users will also receive confidential advice from experts and have access to 'wellness coaching' recommendations, a psychological support method that helps people to adopt lifestyles that prioritise physical and emotional health and well-being. The researchers hope to use the network to promote a healthy diet, <u>physical activity</u> and social interaction, the three mainstays of healthy ageing.

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