ITEA 3

Project Results

MoSHCA

Intelligent, user-friendly apps boost quality of care

EXECUTIVE SUMMARY

The ITEA 2 MoSHCA project was geared to improving patient-doctor interaction and controlling chronic diseases. The considerable and measurable advances achieved in intelligent healthcare system solutions for patients with diabetes, epilepsy, pregnancy-related disorders and COPD, and baby monitoring and general health monitoring using low-cost smartphones and medical sensors contribute to more effective healthcare and more cost-effective medical practices.

PROJECT ORIGINS

The World Health Organization has forecast that the population aged over 60 years will soon reach two billion, a trend that is fuelling a dramatic increase in the prevalence of disability and chronic illness, with an enormous impact not only on individuals but also on healthcare systems and economies. An emerging solution to alleviate this burden is to empower patients with self-management technology. There is increasing consensus among governments, healthcare professionals and patients alike that many chronic disorders can be managed better in the home environment than in an outpatient clinic or hospital. In this setting the MoSHCA project focused on smart care assistants, with the aim of drawing clinical conclusions about the patient's health status without human intervention. Over the past few years, an ideal platform for delivering these assistants has matured in the form of smartphones: sophisticated and versatile, yet small, networked and relatively cheap computing devices.

TECHNOLOGY APPLIED

The MoSHCA solution typically involves a number of body and other sensors that communicate wirelessly with a smartphone, transmitting relevant physiological and activity data such as different cardiac and vascular information, glucose levels, etc. The intelligent MoSHCA software installed on the mobile terminal receives this information, along with subjective patient generated data such as pain and mood levels, stiffness, medication taken, etc. The use of mobile phones and sensors brings a significant degree of user-friendliness to the solution along with increased intelligence through both objective data (sensor inputs) and subjective data (patient perception). With context-awareness and interoperability key features, the technology was tested in medical environments with real patients. Valuable feedback was gained from patients and care providers. Excellent collaboration between the SME and academic participants in the project facilitated access to medical data and the appropriate adaptation of algorithms, leading to a high degree of user orientation. Reliability and energy consumption of medical sensors were improved and a better understanding gained of the balance of the privacy and security needed for healthcare data-mining and data communications, and the systematic means to privacy and security assurance.

The technology can be illustrated by the epilepsy use case demonstrator, the goal

of which was to reduce the night-time care burden whereby ambient sounds are minimised and a snoring detection algorithm is implemented in a hardwired system. The patient activates the app before going to bed, places the smartphone on the bedside table and connects the charger to prevent battery drain. The app monitors the sounds in the room and transmits an alert

as soon as sounds associated with epileptic seizures are detected. The three elements in this demonstrator were a smartphone with the MoSHCA Epilepsy app, a CLB Unicare Backend (running on a laptop) and a care provider app (CLB Medical Messenger) while the key technologies applied were Proprietary Sound Intelligence algorithms, CLB Unicare communication protocol and CLB Unimessaging message router. The MoSHCA infrastructure informed the care provider when epileptic events were detected.

MAKING THE DIFFERENCE

Exploitation of the project results has been fast and tangible, with various Dutch hospitals (MCA, Heliomare, AMC) already using a mobile guaranteed messaging app for care providers based on the project's results. Other examples include the key software technology developed by Evalan within the project and incorporated in SensiStep, a rehabilitation support application being used in the Netherlands, Belgium and Sweden, whereby people recovering from certain types of leg or hip fractures have to perform partial weight-bearing exercises. SensiStep provides dynamic support and shows the actual weight that is exerted on a leg continuously and in real-time. This means that both the patient and the physical therapist can monitor whether the rehabilitation is progressing on track, or if the exercise programme needs to be adjusted accordingly. The epilepsy detection technology referred to in the demonstrator example above is now being used to monitor 2000 patients at 's Heeren Loo care group (ten-year contract). This is the first (mobile) product that can detect sounds affiliated with epileptic seizures and is able to alert care providers to on-going seizures without using physical sensors attached to the patient's body with the added benefit of comfort (no sensors attached to the patient). Furthermore, patents have been acquired for the hypertension use-case (Pat. Number 10-2013-0062641) and exacerbation prediction (EP2541450 A1) while the reasoning module for premature babies is protected by the Catalan Intellectual Property Office.

MAJOR PROJECT OUTCOMES

Dissemination

- More than 10 publications in relevant magazines and journals
- More than 30 demonstrations of prototypes at meetings, fairs and events
- More than 30 presentations at conferences and symposiums

Exploitation (so far)

- Epilepsy App, to detect epileptic seizures with a proprietary sound algorithm- being used to monitor 2000 patients at 's Heeren Loo care group (ten-year contract)
- SensiStep, to support fracture patients with partial load bearing exercises
- Care Me At Home (CM@H), to enable premature babies to be monitored at home
- Healthifly, a general health and fitness app
- Five hardware and software modules that are available for third parties

Standardisation

- MoSHCA contributed to the development of the SNOMED CT terminology for areas related to context-aware information and reasoning as applied to the medical field

Patents

- Application Number 10-2013-0062641 – Medicine bottle for hypertension patients
- Application Number EP2541450 A1 – Exacerbation prediction for COPD patients

ITEA is a transnational and industry-driven R&D&I programme in the domain of software innovation. ITEA is a EUREKA Cluster programme, enabling a global and knowledgeable community of large industry, SMEs, start-ups, academia and customer organisations, to collaborate in funded projects that turn innovative ideas into new businesses, jobs, economic growth and benefits for society.

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October 2012

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