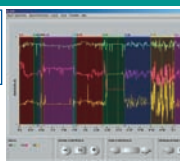

Early warning healthcare monitoring system

The SAPHE project team is developing a new generation of telecare networks with miniaturised wireless sensors worn on the body and integrated into homes, offices and hospitals to allow for continuous healthcare monitoring.

Key benefits

- continuous monitoring of the well-being of patients and vulnerable people
- unobtrusive sensors worn on the body and incorporated into homes, hospitals and the wider community
- early warning of emergency situations and long-term health problems

'Telecare' involves using computer and communications technology to deliver health and social care to people within their home or in the wider community. It involves the use of advanced monitoring equipment to deliver warnings of emergencies or changes in the condition of a patient or vulnerable person.

The aim of the SAPHE (Smart and Aware Pervasive Healthcare Environments) project is to develop a new generation of telecare networks with miniaturised wireless sensors worn on the body and integrated into the environment (homes, offices, hospitals etc) to allow for intelligent, unobtrusive yet continuous healthcare monitoring.

It offers a breakthrough in the delivery of health and social care to patients and vulnerable people, while significantly reducing the costs of delivering care. Patients will benefit from easy to wear sensing equipment which gives them reassurance that their condition is being monitored, so that diseases or illness can be detected before they become critical or life threatening.

Intelligent ambient sensing can ultimately replace existing home security and monitoring devices, with significant cost benefit. Patients will also be more likely to co-operate with the monitoring programme because the sensing equipment is unobtrusive. For health and care providers, early detection means better-informed care activities and improved resource management.

Professor Guang-Zhong Yang, principal project investigator from Imperial College, London, says: "The next great challenge for monitoring devices lies in their ability to monitor a patient's physical and biochemical parameters continuously, under natural conditions and in any environment. The development of wireless sensor networks, using ambient and on-body monitors offers a platform to establish such a health monitoring system. It has the potential to help maintain the independence and support the well-being of a growing number of vulnerable individuals living alone."

Imperial College is the lead partner in the project, which also involves BT, Philips, Cardionetics and Docobo, as well as the University of Dundee.

Nigel Barnes of BT adds: "BT has a long track record in collaborative R&D which it sees as a

valuable part of its research programme. Following the success of the Care in the Community projects, that BT led under the DTI Next Wave Technologies and Markets programme, we were very keen to build upon that work under SAPHE which we believe can help BT deliver significant new business opportunities in the future."

The project started in March 2006 and runs to February 2009. The total project cost is £3,676,898 with £1,650,248 provided by the DTI through the Technology Programme.

Objectives

The use of preventative care and effective chronic disease management to reduce dependence on health and social care services is a national priority. Treating patients with chronic diseases in a community setting or at home will result in improved patient well-being, lower demand for healthcare, and more effective use of resources.

The purpose of SAPHE is to develop and trial new sensing technologies to detect emergency situations and changes in well-being.

The new systems will monitor physical activity (such as sleep patterns, gait etc) and physiology (such as heart rate, weight, blood glucose etc).

Solutions

There are three main parts to the architecture of SAPHE: ambient sensing, wearable sensing, and systems to deliver the information to decision makers, such as doctors.

Ambient sensing captures information such as activity index, sleeping pattern, room occupancy, and gait and posture changes. SAPHE will use a variety of non-invasive sensors throughout the home to provide continual activity and environmental monitoring of the individual.

Wearable sensing provides patient-specific monitoring of key physiological information, such as respiration, peak expiratory flow and oxygen saturation for an asthma patient, for example.

The information gathered by the sensors needs to be communicated to care providers so they can make the right decisions. To achieve this, SAPHE will combine the use of a home gateway and, for patients on the move, a portable device such as a PDA or mobile phone. The gateway devices connect to remote data servers and existing healthcare ICT.

Results

At the start of the project, the focus has been on defining the end-user and service requirements for the SAPHE architecture, and investigating the technological specifications for generic ultra low-power wireless sensor platforms. The project consortium is collaborating to work towards the enhancement of existing sensor technologies.

A steering committee comprised of members from: Department of Health, Philips Medical, BT Global Health, the Strategic Commissioning Partnership and the DTI has been formed to provide strategic guidance for the implementation and practical deployment of the SAPHE system.

A dedicated test bed has been created, which includes a homecare environment and simulated hospital ward. The next 12 months will see the project focus on the integration of wireless sensor technologies, automated trust-based decision support, and the development of software architectures.

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Collaborative Research and Development

Collaborative Research and Development is one of two DTI business support solutions delivered through the Technology Programme, the other being Knowledge Transfer Networks (KTNs). Its primary objective is to enable the industry and research communities to work together in strategically important areas of science, engineering and technology in order to develop successful new products, processes and services. It also enables the latest thinking and understanding to flow between universities, other research centres and business.

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