

The high-tech future of healthcare: A digital health assistant in your home

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The UK's healthcare system faces unprecedented challenges. Britain is the most obese nation in Europe and the country's ageing population is especially at risk from isolation, depression, strokes and fractures caused by falls in the home. A pioneering new collaboration hopes to address these issues by developing a 24/7 digital home health assistant.

An interdisciplinary [research collaboration](#) (IRC) led by the University of Bristol together with the Universities of Southampton and Reading, has been awarded a grant by the Engineering and Physical Sciences Research Council (EPSRC) of £12 million. They will work in partnership with Bristol City Council, IBM, Toshiba and Knowle West Media Centre (KWMC).

The collaboration, known as SPHERE (Sensor Platform for HEalthcare in a Residential Environment), will develop home sensor systems to monitor the [health](#) and wellbeing of the people living at home.

Professor Ian Craddock, Director of the IRC and who will be leading the interdisciplinary team, said: "SPHERE aims to have a profound impact on the health and wellbeing of people with a wide range of different health challenges.

"Families, carers, health and social services professionals involved in all stages of care will benefit from the system. SPHERE will address real world challenges by developing a practical technology to monitor people's health in the home environment, targeting health concerns such

as; obesity, depression, stroke, falls, cardiovascular and musculoskeletal diseases. "

David Willetts, Minister for Universities and Science, said: "New British technologies are transforming healthcare and saving lives. In future, our smart phones will tell us when we are ill, controlling the spread of infectious diseases. As healthcare challenges become more complex, our world-class scientists are of finding the next generation solutions."

The IRC's vision is not to develop fundamentally-new sensor technologies for individual health conditions but rather to impact all these healthcare needs simultaneously through data-fusion and pattern-recognition from a common platform of non-medical/environmental sensors at home.

The system will be general-purpose, low-cost and accessible. Sensors will be entirely passive, requiring no action by the user and suitable for all patients, including the most vulnerable. An example of SPHERE's home sensor system could be to detect an overnight stroke or mini-stroke on waking, by detecting small changes in behaviour, expression and gait. It could also monitor a patient's compliance with their prescribed drugs.

Importantly, SPHERE will work hand-in-hand with the local community through Bristol City Council and its partners at KWMC. Leading clinicians in heart surgery, orthopaedics, stroke and Parkinson's disease, and recognised authorities on depression and obesity will also be involved with the project, along with the Elizabeth Blackwell Institute for Health Research, Bristol Health Partners and Bristol's NIHR-funded Biomedical Research Units.

Professor Jeremy Tavaré, Deputy Director of the IRC, said: "The involvement of patients, carers, nurses and clinicians from the outset of

this project will be key in ensuring acceptability of these exciting new technologies."

Once practical, user-friendly technologies have been developed further, they will be piloted in a large number of homes over extended periods of time.

The University of Southampton has UK-leading expertise and lab facilities for studying movement in stroke and Parkinson's disease rehabilitation, and also conducts research into falls and impaired balance.

Professor Ann Ashburn, Professor of Rehabilitation at the University of Southampton, said: "We have limited knowledge of the ways in which individuals move about, negotiate obstacles and on some occasions become unsteady and fall over in their homes. This exciting research opportunity will allow us to detect these situations and make major contributions to fall prevention among the older population."

Professional William Harwin in the School of Systems Engineering at the University of Reading, said: "The production of ubiquitous and unobtrusive 'passive sensors' is a key constituent part of this project. These sensors could be embedded in clothing or jewellery, or more ambitiously implanted, possibly in association with remedial surgery.

"Information from these sensors will monitor and track the signature movements of people in their homes and trigger a response in accordance with health needs. This will enable health care experts to respond as appropriate."

Rodric Yates, Program Director in IBM's Chief Technology Office, said: "Although healthcare budgets and changing demographics are creating serious challenges, the latest technological advances can help

society keep pace with this environment. We were pleased to be invited by the University of Bristol to join this important project and will contribute by drawing upon some of the best examples from around the world in healthcare sensing, medical data collection and analysis, and the delivery of healthcare systems. Improving patient care in a cost-effective way and helping people stay independent, for longer, is an objective we share with the University and the city."

Cllr Barbara Janke, Cabinet Member for Connected Cities and Wellbeing said: "This is excellent news and further establishes Bristol's reputation as a leader in smart technologies. This award means that we've now attracted £26 million over the last year in funding for high tech development.

"I strongly believe this is due to our strong relationship with our partners in the city - universities, businesses and organisations such as the Knowle West Media Centre.

"This project is a great example of how we can harness the power of technology to bring real benefits to the health and wellbeing of residents, the elderly or infirm living at home. It will also build upon the wide practical experience of our Emergency Control Centre Careline service."

Provided by University of Bristol

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