THE POTENTIAL FOR 'SMART HOME' SYSTEMS IN MEETING THE CARE NEEDS OF OLDER PERSONS AND PEOPLE WITH DISABILITIES

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The technology involved in intelligent homes has a market that is currently growing exponentially. To date this market has been led predominantly by the provision of luxury leisure goods to sectors of the population with large amounts of disposable income. Intelligence has been incorporated into the prestigious home as a marketing device, just as it is in prestigious, top-of-the-range cars. This development has naturally enough, been led by companies with a vested interest in marketing technology for profit. As with other technologies, from the telephone, radio and television to the home computer, that technology is now diffusing down to other markets involving lower income groups, as it becomes cheaper and more generally available.

There is little doubt that, over the next very few years, the intelligent house will have become, if not integrated into normal life for all income groups, then at least a common, well-understood and desirable consumer good. The question is not whether smart home technology will become a standard in ordinary housing for ordinary people, but whether we can ensure that such technology is harnessed to meet the genuine social need of groups that would benefit the most from its use.

Smart Home - What is it?

A smart or intelligent home uses basic (and assistive) devices to build an environment in which many features in the home are automated and where devices can communicate with each other. Many of the basic devices are readily available and currently used in home security systems, such as passive infra-red sensors, pressure pads and magnetic reed switches

It also uses other familiar devices, like infrared transmitters similar to TV remote controls, smoke, heat and gas detectors, door entry systems, powered doors etc. In an intelligent house all these devices are connected together on a communication network. This communication network can be a special cable, mains wiring and/or radio frequencies.

Enabling devices to communicate efficiently means

that one device can then instruct other devices to perform functions if certain conditions are met. The initiating device could be any device in the house. In this way a collection of separate devices can be organized and programmed to carry out complex functions.

Smart homes have the potential to enable elderly and disabled people to lead independent lives in their own homes. However, the devices and their interactions need to be chosen and designed in such a way that the system as a whole meets the specific needs of the householder.

Example

An elderly person, who has a high risk of falling and injury, needs to be able to get safely to the toilet during the night. The functionality that could be provided for this case could be as follows:

- If a householder gets out of bed between the hours of 10pm and 8am then lights in the bedroom and hall come on at 50% of illumination increasing to 100% over one minute, the bathroom light is switched on at 100%.

- After leaving the bathroom, the bathroom light automatically switches off. After the person gets back into bed the bedroom light is dimmed from 100% to 50% over one minute and then switched off.

- If the householder does not leave the bathroom after a specified time, say 30 minutes, an alarm is activated.

- Between the hours of 8am and 10pm anyone stepping on the pressure pad (householder, visitor or cleaner) will not activate this functionality.

The above scenario can be implemented by using only a pressure pad by the bed, passive infrared sensors in the hall and bathroom and an alarm system.
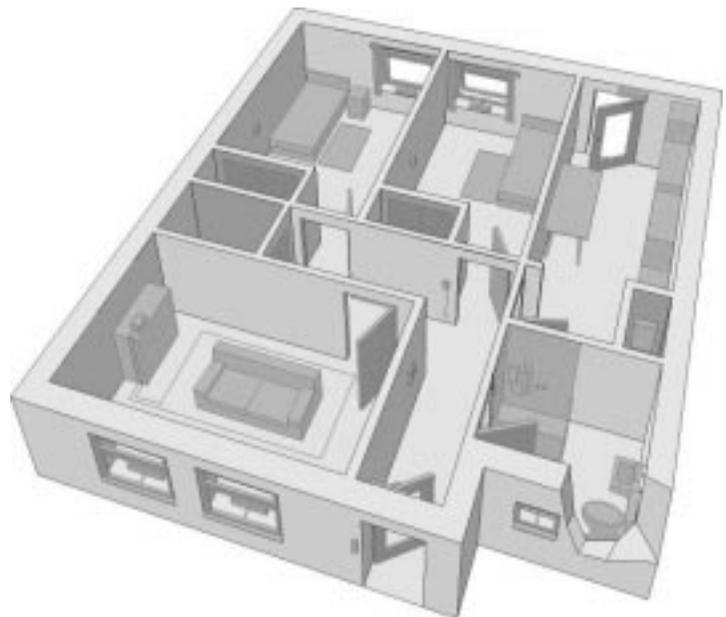
Smart Homes and Social Care

Smart Homes are often the ideal solution for individuals with different needs and abilities. This is because a Smart Home can:

• Provide an environment that is constantly monitored to ensure the individual is safe (activity monitoring).

• Automate specific tasks that an individual is unable to perform (turning lights on or off).

• Provide a safe and secure environment (alerting the user of potentially dangerous activities).

• Alert helpers or carers should the occupant be in difficulties (through linking to a local community alarm scheme).

• Enable and empower the user.

• Facilitate in the rehabilitation of individuals (by giving prompts that could be auditory and/or visual)

There are many other ways in which Smart Homes can be of benefit to the disabled and older people.

The Robert Gordon University Faculty of Design is primarily concerned with the production and maintenance of high quality built environments that can meet the needs of the widest possible range of people. Our involvement in smart or intelligent housing does not stem from a commitment to the technology per se, or a perception that high-tech solutions to problems in the built environment are necessarily desirable or preferable to low-tech solutions. Rather it has arisen through an interest in universal or barrier free design and a desire to push these concepts way beyond the mere removal of physical obstructions like steps and narrow doorways. The idea of the barrier free home can be a much more proactive one and smart home technology can play a part in the removal of barriers to independent living for a wide range of people currently restricted both by their own disability and the environment around them.

To this end we have become involved in leading a research and development project, entitled CUSTODIAN funded by the European Commission. This project aims to ensure that the rapid pace of technological change, which is beginning to impact on the home and which will inevitably affect public sector organisations involved in social housing and care provision, is properly understood by that sector and controlled to its advantage.

CUSTODIAN aims to empower strategic decision-makers, carers and medical practitioners and facilitate communication between these sectors and the designers, providers and installers of smart home technology. The end product of the project will be a software tool designed to ensure that the needs of individual end users are sensitively met in a way that reflects their social circumstance, care, medical and institutional needs and resource constraints.

CUSTODIAN is designed to enable its users to design smart homes for older persons and persons with disabilities that reflect their needs. There is significant potential for this software within the Occupational Therapy, Social Care Management, Care Provider, and Housing Provider markets.

The Market for Intelligent Homes in the Wider Social Sector

Whether or not a large amount of intelligent, social sector housing that will meet care needs in the community is achieved, depends on a number of factors:

• Diffusion of the technology may rely on a continued fall in real prices of such systems, which seems immanent given the technological precedents, the downward trend in the price of devices and industry's plans in this area.

• It relies on demonstration of the benefits to different groups of people with disabilities, the information on which is growing but partial and still only related to selected disabilities.

• Perhaps most crucially it relies on economic scenarios demonstrating savings in institutional and community care costs.

In simple terms this last condition requires that we ask the question:

By allowing someone to remain independent in their own home, until later in life than they would otherwise be able to, can the hardware and support costs be offset by the savings in, for example, sheltered housing and nursing care costs?

If this condition can be met, smart housing has the potential, in the short term, to reduce pressure on existing stocks of supported housing, for example. In the longer term it requires a radical reappraisal of current scenarios for housing demand, which envisage greatly increased demand for supported housing and care, but which are based on the assumption that the nature of the house, as a passive construction of bricks and mortar, is an immutable, fixed entity.

The reality is that the home, even without intelligence is not so much bricks and mortar, but increasingly a series of personal care services. With the advent of the smart home the range of services that the home provides may be about to undergo a radical change. The nature of these services can either be dictated by the supply side; the manufacturers and suppliers of the technology; or can be mediated by the demand side; the care sector and the end users of the housing; to ensure that technological solutions are tailored to the real needs of people.

— If you are interested in learning more about the CUSTODIAN project, contact Dr Martin Edge at Robert Gordon University, Scottish Centre for Environmental Design Research, School of Architecture, Garthdee Road, Aberdeen AB10 7QB, United Kingdom. Phone: +44 1224 263539, fax: +44 1224 263737 or email m.edge@rgu.ac.uk