

T.L. HAYES. *The ORCATECH Living Lab: From smart homes to smart communities*. *Gerontechnology* 2010;9(2):287; doi:10.4017/gt.2010.09.02.146.00

**Purpose** In recent years there has been a surge of research centered on smart home technologies. This research seeks to develop technologies that can be used to enable aging-in-place, and has focused on everything from detailed analyses of specific activities of daily living to the capture of acute events such as falls. Data are collected in a laboratory designed to look like a typical apartment and which has been outfitted with sensors to provide ground truth and to study the area of interest. While this approach helps establish the feasibility of certain approaches and enables development of initial algorithms to extract measures of interest from sensor data, it is not typically generalizable. What works in a controlled laboratory environment, doesn't necessarily work well when applied to data from seniors living in their normal home environment, and therefore these technologies cannot easily be transferred to large longitudinal studies that could determine their true efficacy.

**Method** To overcome this limitation, we have established a sustainable living laboratory of participating seniors, for technology-based health monitoring, intervention and support of independent aging, using diverse sites in the community, which is used to explore new behavioral markers and approaches for assessing health change in the home. We enrolled 35 seniors (mean age  $77.4 \pm 8.0$  years) into the ORCATECH Living Laboratory and installed a variety of technologies in their homes, including passive infrared motion sensors, contact sensors, phone sensors, medication tracking devices, home computers (for tracking computer use, mouse movements, and inter-keystroke intervals) and bed sensors. Participants are fully characterized clinically semi-annually, though extensive neuro-cognitive testing and clinical evaluation. Participants also complete weekly questionnaires about events of the previous week.

**Results & Discussion** Subjects have been monitored an average of  $788 \pm 211$  days (range: 211-1057 days). They have participated in numerous pilot studies that involved the use of additional technologies for some period of time, including coaching studies (using Skype and computer games), automated neuropsych testing (using a computer kiosk), outdoor monitoring (using body-worn accelerometers and cell phones), physiological monitoring (using a Viterion system), and speech monitoring (using a MAR device). A total of 21 pilot studies have been conducted in the Living Lab since its conception, with an average of  $6.2 \pm 4.0$  studies per participant (range 1-17 studies), and from 5-20 participants per study. A number of algorithms and technologies have been 'hardened' in this environment and have now transitioned to use in longitudinal studies. These successes confirm the value of this unique resource for evaluating emerging technologies in real-world environments.

**Keywords:** in-home assessment; technology and aging

**Address:** Oregon Health & Science University, Oregon Center for Aging and Technology (ORCATECH), Portland, OR, USA; E: hayest@bme.ogi.edu