A. Fleury, M. Vacher, H. Glasson, N. Noury, J-F. Serignat. Data fusion in health smart home: primary results of individual evaluation of two sensors. Gerontechnology 2008; 7(2):105. The constant improvements in medicine results in an increase in life expectancy and generates a need for gerontechnology research. A Health Smart Home is a flat equipped with sensors to give information on person[1,2] and environment. Our aim is to detect activities of daily living. **Materials, methods and experiments** The Grenoble Health Smart Home (*Figure 1*) is equipped with (i) Presence Infra-Red detectors and door sensors, (ii) Physical measurements of temperature and hygrometry, (iii) large vision webcams that are used for automatic learning (videos are time-stamped and the different computers that acquire the signals from the sensors are synchronised by NTP), (iv) ACTIM6D, an inertial and magnetic based sensor system for activity and posture of the subject, (v) microphones for speech and sound recognition (distress or normal sentences, different sounds of daily life). We characterized the sensitivity and specificity of the two last sensors to allow for data fusion. ACTIM6D signal is acquired and processed with a pattern recognition algorithm based on wavelets. It allows the detection of the moments when the subject changes posture (sit-down, lie-down, stand-up). We experimented with the subject reproducing a scenario containing these changes of posture (sitting down five times on two chairs with a different orientation, lying down five times, pick up an object and walk). Microphone signals are acquired and processed by a multi-level recognition system[3]. The system analyses the signal from the eight microphones continuously. When an adaptive threshold is reached, the sound is recorded in a file until the end of the detection. Then it is processed with a segmentation algorithm that gives the probability for this sound to be speech or other. Depending on the segmentation result, this file is processed by speech recognition or by a sound classification system. These two algorithms have been trained with daily life sounds to recognize eight classes (doors clapping, doors lock, step sounds, phone ringing, dishes sounds, glass breaking, object falls and screams) for sounds and with a corpus of distress and one of normal sentences in French language. To test this system in an uncontrolled environment, we asked 15 subjects to realise a scenario in which they reproduce a large part of these sounds, without any order constraint (everything is indexed afterwards with the cameras) and to enunciate a total of twelve sentences (six of the distress corpus and six of the normal corpus). **Results and discussion** This was a first test of the sound and speech recognition system 'in real conditions'. It was also an occasion to collect other sounds (sounds of water) needed to learn one other class of sound. In case of speech, only 65% of the whole enunciated sentences were detected, therefore the adaptative threshold may be improved in order to decrease the number of these missed detections. The next step is to use all the sensors to learn the different activities of daily living and to automatically recognize them.

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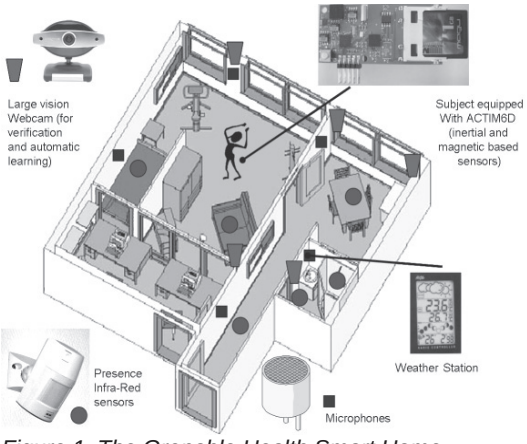

Figure 1. The Grenoble Health Smart Home