

M. VACHER, F. PORTET, S. ROSSATO, F. AMAN, C. GOLANSKI, R. DUGHEANU. **Speech-based interaction in an AAL-context.** *Gerontechnology* 2012;11(2):310; doi:10.4017/gt.2012.11.02.262.00 **Purpose** The number of older persons in industrialized countries is steadily increasing. Seniors living alone are more numerous, and we must find solutions that will allow them to continue to stay at home comfortably and safely. Smart housings can be one of these solutions. One of the biggest challenges in ambient assisted living (AAL) is to develop smart homes that anticipate and respond to the needs of the inhabitants. Given the diverse profiles of the older adult population, it will therefore be essential to facilitate interaction with the smart home through systems that respond naturally to voice commands rather than using tactile interfaces. **Method** The first step in our study was to evaluate how well ambient assistive speech technology is received by the target population. We report on a user evaluation assessing acceptance and fear of this new technology<sup>1</sup>. The experiment aimed at testing three important aspects of speech interaction: voice command, communication with the outside world, home automation system interrupting a person's activity. Participants were 7 older persons (71-88 years old), 7 relatives and 3 professional carers; the experiments were conducted in a smart home with a voice command using a Wizard-of-Oz technique. The second step in our study was related to the adaptation of speech recognition technologies to the older adult population. Judging by the literature this has not been extensively studied. In fact, it is known that industrialized speech recognition system models are not adapted to seniors but to other categories of the population. In order to do this we recorded a specific speech corpus (voice-age) with 7 older adults (70 to 89 years old) reading sentences (a total of 4 hours of speech). A second corpus (ERES38) of free talking (18 hours of speech) was recorded by 23 speakers (68-98 years old). These corpora were analyzed in a semi-automatic manner to reveal the aged-voice characteristics<sup>2</sup>. **Results & Discussion** Regarding the technical aspect (*Table 1*), it appears that some phonemes are more affected by age than others. Thus, a specific adaptation of the acoustic models for ASR is required. Regarding the acceptance aspect, voice interfaces appear to have a great potential to ease daily living for older adults and frail persons and would be better accepted than other, more intrusive, solutions. By considering still healthy and independent older persons in the user evaluation, one interesting finding was overall acceptance provided the system is not conducive to a lazy lifestyle by taking control of everything. This particular concern must be addressed in the development of smart homes that support daily living by stressing the ability to control the daily routine rather than altering it. This study shows the great interest of voice interfaces to develop efficient solution to enable the growing number of older persons to continue to live in their own homes as long as possible.

### References

1. Portet F, Vacher M, Golanski C, Roux C, Meillon B. Design and evaluation of a smart home voice interface for the elderly: acceptability and objection aspects. *Personal and Ubiquitous Computing* 2011:1-18; doi: 10.1007/s00779-011-0470-5
2. Dugheanu R. Evaluation des outils pour la reconnaissance automatique de la parole adaptée aux personnes âgées. Master's thesis. Grenoble: Université Stendhal ; 2011

**Keywords:** voice interface, speech recognition, ageing voice, AAL, smart home

**Affiliation:** LIG, GETALP Team, Grenoble, France; E: Michel.Vacher@imag.fr

**Full paper:** doi:10.4017/gt.2012.11.02.262.651

*Table 1. Difference of acoustical score in forced alignment for 'Aged' vs. 'Non aged'*

Phonemic group	Score difference, %
Non voiced plosives	-57
Non voiced fricatives	-36
Voiced plosives	-29
Voiced fricatives	-18
Nasal vowels	-14
Open vowels	-10