

## Technology for Independence

K. PEPPER, A. KABOUTEH, J. GÜTTLER, A. ENGLER, E. SCHULZE, T. LINNEN, C. PFEIFER, T. BOCK. *Developing and testing an ambient assisted living apartment. Gerontechnology 2018;17(Suppl):143s; <https://doi.org/10.4017/gt.2018.17.s.139.00>*

**Purpose** According to recent research, many reasons led to independent living become more prevalent among the aging population. This is in contrast with the high age capabilities to perform Activities of Daily Living. Consequently, it is necessary to provide in-home support for the increasing elderly population. For this reason, the project L.I.S.A. Habitec has the objective to develop Ambient/Active Assisted Living (AAL) furniture considering the user-requirements and acceptance among the elderly. The results presented here are based on the laboratory tests executed a year before<sup>1</sup>. After these tests and corresponding prototype improvements, 32 seniors (69+ years old) tested the final prototypes in May 2017 in Deutschnofen, Italy. The field test took place in a real apartment at a senior home. The following prototypes were developed and tested. **Method** Bed-Terminal focused on safety and comfort: Main focus is to get safely in and out of the bed. For this purpose, various handles were integrated unobtrusively. These handles can be hidden in the wall or within the bed construction. The table can move over the bed using a remote controller and can be used for reading, eating or working. Additionally, the remote controller can move the mattress to different positions e.g. sitting upright or lying comfortably. Furthermore, lighting was realized in the Bed-Terminal for more comfort. Bathroom safety and Monitoring: In the bathroom, a novel fall detection, a scale and a Bathroom-Terminal were integrated. The unobtrusive fall detection system is implemented inside a baseboard to detect a fallen person in the bathroom. The Bathroom-Terminal includes a height adjustable sink and an unobtrusive fever monitoring module based on a thermal camera. Entrance-Terminal: The Entrance-Terminal provides support with focus on activities such as sitting/standing, putting on shoes and clothes. For this reason, an "Uplift Premium Power Lifting Seat" from Uplift Technologies Inc.<sup>2</sup>, a moveable footplate and hidden handles were implemented in this terminal for the elderly. Furthermore, a supportive single task robot was developed and tested to help the elderly to put on their jackets. In addition to the aforementioned systems, a chair was developed and tested which includes systolic blood pressure prediction based on the Pulse Transit Time (PTT) integrated in the armrest using capacitive electrodes. Finally, a smart TV was used as main interface for communication and monitoring purposes. For this purpose, a local area network was established using RabbitMQ for the software communication. **Results & Discussion** After several field tests, the user-acceptance was measured, the preferred prototypes (*Figure 1*) were selected and the usability of the prototypes were evaluated<sup>3</sup>. The fall detection in the bathroom and the handles in the Bed-Terminal were most favoured. These prototypes increase the user safety at home and thereby the user comfort. As a result, every prototype had a positive feedback after the field tests and all participants could imagine having at least one of these prototypes at home.

### References

- Güttler J, Linner T, Bittner A, Engler A, Schulze E, Bock T. Development and Evaluation of Assistive Terminals for the Improvement of Functional Performance of the Elderly in a Variety of Life Centers. AAID Japan. 2017 March
- Uplift Technologies Inc. UPEASY Power Seat Users Guide. 2004
- Engler A, Schulze E. LISA habitec. Ergebnisse des Feldtests. Berlin. 2017

**Keywords:** AAL, ICT, smart furniture

**Address:** Lehrstuhl für Baurealisierung und Baurobotik der Technischer Universität München Arcisstr. 21 80333 München;  
**E:** kim.peper@br2.ar.tum.de

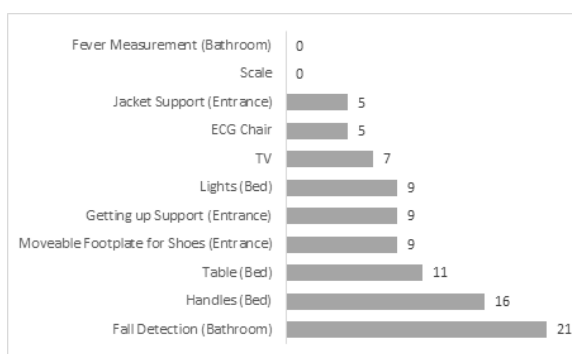


Figure 1. Preferred prototypes of the test apartment