M. Floeck, L. Litz. Advanced algorithms for activity monitoring among seniors living single in their private homes. Gerontechnology 2010;9(2):211; doi:10.4017/gt.2010.09.02.216.00 **Purpose** Life expectancy in western countries is steadily increasing. Societies must take up this challenge now to maintain a high standard of living and level of care for affected persons as well as to mitigate the impact on health care systems. The authors' approach is to provide ambient assisted living (AAL) technology, supporting the individual in his private home. By employing AAL technology, a high level of self-determination and quality of life shall be maintained, by enabling seniors to remain in their homes as long as possible. Easing daily life using home automation technology is pivotal to this approach, e.g., by remotely controlling roller blinds or the door opener. Moreover, this technology contributes to postponing institutional care and thus relieves health care systems. **Method** The authors gained extensive experience in sensing human activity using off-the-shelf sensors in an AAL project in Kaiserslautern, Germany[1-3]. Both wired and wireless sensors were used, e.g., door and window contacts, digital wall switches, and motion detectors. Thus, both direct and indirect activity could be detected. Activity from motion detectors is referred to as indirect activity because it is not generated by intentional actions of the tenant, whereas interactions with objects (i.e., doors, switches) are considered direct activity. This data is used to create activity patterns and – by inversing them – inactivity patterns. When collected over multiple weeks, inactivity patterns represent the typical behaviour of the tenant without being invasive. These patterns serve as a reference for identifying unexpectedly large deviations of the tenant's current behaviour from the learned one. If deviations are detected, the AAL system will assume an accident and call for help automatically. Emergencies are conceivable, however, they are not identifiable merely by evaluating inactivity, e.g., when a person falls, but is not unconscious, and keeps moving on the floor. In this case, there may be indirect activity but no direct activity. Advanced evaluation of the correlation between direct and indirect activity can help to detect this class of emergencies. **Results & Discussion** An AAL project comprising 20 flats proved that ambient sensors are suitable for creating inactivity patterns for individual flats. To guarantee self-determination, each user can decide whether and how inactivity alarms are triggered in his flat. Currently, tenants can review graphs of their inactivity and set thresholds based thereupon (*Figure 1*). If the actual duration of inactivity exceeds this threshold, an alarm will be triggered. If the user does not cancel this alarm within a set time, it is forwarded to an emergency hotline taking further steps to safeguard the safety and health of the tenant. False alarms to the tenant are an integral part of the concept. They cannot be avoided and are believed to be crucial for the users' acceptance: They both indicate that the system is indeed working and train the user how to deal with alarms. Ongoing research includes programming an assistant that helps users to establish more sophisticated alarm rules (e.g., time-dependent thresholds) and that automatically adapts to changing user behaviours (e.g., winter vs. summer).

References

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Keywords: ambient assisted living, assistive technology, ambient intelligence, senior housing
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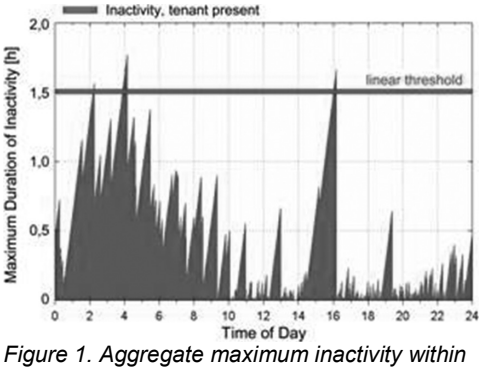

Figure 1. Aggregate maximum inactivity within one flat over multiple day