



ACTIVITY MONITORING

USING ACTIVITY DATA GENERATED BY DISAGGREGATING EXISTING DATA SOURCES FROM THE HOME INFRASTRUCTURE, POTENTIAL EMERGENCY SITUATIONS WITHIN THE RESIDENCE SHOULD BE IDENTIFIED.



BLADL*

Passiver Service HUB

08. December 2020

Sebastian Wilhelm
Technology Campus Grafenau
Deggendorf Institute of Technology
sebastian.wilhelm@th-deg.de

Dietmar Jakob
Technology Campus Grafenau
Deggendorf Institute of Technology
dietmar.jakob@th-deg.de

I. INTRODUCTION

Monitoring people within their residence can enable elderly to live a self-determined life in their own home environment for a longer period of time. Therefore, commonly activity profiles of the residents are created. Deviations from the typical activity profile may indicate an emergency situation. For this purpose, sensors are usually used to monitor the activities of the elderly (e.g., motion detectors, cameras). But, equipping full residences with sensors is expensive, has mostly only a limited monitoring range and offers the residents the feeling of being supervised.

II. AIM

An alternative approach for monitoring people within their residence we investigate within our research in the project *BLADL* is reusing existing data sources instead of installing additional sensors. In private households there exists numerous data sources such as smart meters, weather stations, routers or voice assistants. Intelligent algorithms can be used to evaluate this data and conclude on personal activities. This, in turn, allows the creation of activity profiles of the residents without using external sensor technology.

III. METHOD

Within the scope of the project, we collect data from the domestic infrastructure in 20 private households. We focus on smart meter data of power and water, a source of data available in every household. Additionally we collect ground truth data for both, power- and water consumption. Subsequently, we develop suitable disaggregation algorithms to:

- recognize which devices are currently active (e.g., coffee machine) based on the total power consumption of a household.
- recognize by means of the total water consumption of a household at which water tapping point in the house (e.g., toilet flush) water is currently consumed.

This disaggregated data is then used for activity detection to create a typical activity profile of the residents. Deviations from the typical daily behavior can indicate an emergency situation.

IV. RESULT

We started in 2019 with the collection of power consumption data (including label data) which we have published as OpenData under the name *GeLaP* (German Labeled Data Set for Power Consumption). Furthermore, we are currently working on the evaluation of disaggregation algorithms for the detection of individual devices from the total power consumption of a household. In parallel, data collection of labeled water consumption data in 20 private households is currently being launched. Furthermore, in a side project we were able to show that CO_2 measurements of a commercial weather station, like those often used in private households, are quite suitable to detect human presence and thus can be used for activity detection.

V. PROJECT PARTICIPANTS

Sebastian Wilhelm holds a Master's degree in 'Applied Research in Engineering Sciences' with a focus on 'Applied Computer Science'. Since 2018, he is a member of the research group 'Smart Region' at the *Technology Campus Grafenau*. His research focuses on the ambient recognition of help and emergency situations in households.

Dietmar Jakob holds a Master's degree in 'Caritas Science and Value-Oriented management'. Since 2018, he is a member of the research group 'Smart Region' at the *Technology Campus Grafenau*. His research focuses on the possible applications and effects of digitization for the elderly.

VI. FUNDING

The project is funded by the *Bavarian State Ministry of Family Affairs, Labor and Social Affairs*.

*'Besser Leben im Alter durch digitale Lösungen' (transl. 'Better Life in Old Age through Digital Solutions')