

## Assisted Living

### Goal

Enabling elderly people to live as long as possible self-determined at home

### Philosophy

Covering assisted living key areas Comfort, Safety and Health by unobtrusive home automation devices.

### Pilot Project in Kaiserslautern, Germany

- 17 x 2-room-apartments
- 2 x 3-room-apartments
- 1 x 4-room-apartment



### Equipment of a standard 2-room apartment

Main entrance and apartment door are opened with a transponder (comfort).

Both doors are monitored by cameras. Pictures are transmitted to a tablet PC and a voice connection is established (comfort and safety).

Lights in the bathroom, the bedroom, or the vestibule, are controlled by motion sensors (comfort and safety).

Windows and the apartment door are equipped with sensors which detect whether the window and the door are open or closed. A LED next to the apartment door indicates whether all windows are closed or not (safety).

A power switch next to the apartment door can de-energize predetermined power sockets like stove, washing machine, or iron (safety).

A water flow sensor measures the tenant's water consumption (safety and health).

PAUL, a tablet PC (comfort, safety, health).

All devices are connected via the home fieldbus KNX and/or WLAN.

### Principles of the Technical Concept

Only home automation devices with KNX (EIB) standard are used. Thus interoperability of different devices and manufacturers is ensured. The components are reasonably priced and technically mature. No specially trained technicians are required to install the equipment.

### Overview of the used devices

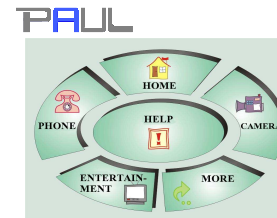
Sensor Type	#	Used to enhance/monitor		
		Comfort	Safety	Health
Transponder for front and flat door	1	X		
Front door camera	1	X	X	
Front door microphone	1	X	X	
Flat door camera	1	X	X	
Motion detectors	4	X	X	X
Light switches	8	X		X
Roller blind switches	3	X		X
Window sensors	3		X	X
Door sensors	2		X	X
Power switch	1		X	X
Water flow sensor	1		X	X
Door opener	1	X		X
PAUL	1	X	X	X
<b>Total</b>	<b>28</b>			

### Tasks of PAUL

#### (Personal Assistant Unit for Living)

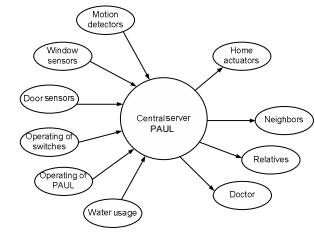
PAUL is based on a tablet PC and serves as:

- Human Computer Interface
- Central Data Collector
- Intelligent Monitoring Unit
- Alarm Generator



### Data Information Flow and Processing:

- Sensor signals are collected and evaluated.
- Home actuators like lights, blinds are activated to enhance comfort and safety.
- In case of detected emergencies, help is called.
- Depending on the actual health status, different assistance is involved (e.g. doctor, neighbors, relatives).

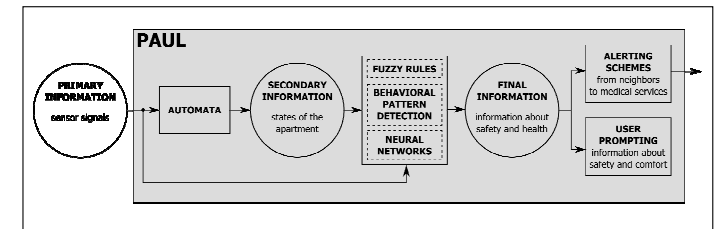


### Examples of Data Acquisition and Processing with PAUL

The interaction of the inhabitant with the switches and with PAUL provides information about the activity level of the inhabitant.

PAUL logs the sensor data received continuously. Thus, the database expands from day to day.

This data is processed using a variety of pattern recognition algorithms in order to detect abnormalities in the inhabitant's behavior.



### Information Hierarchy

**Primary information** is provided by the sensors and people's interaction with switches and PAUL. The primary information serves as input for automata, fuzzy systems, statistical analysis, and the identification of behavioral patterns of the inhabitant.

**Secondary information** is derived from primary information using automata models. For example, an automaton is used to determine whether the inhabitant is at home or not.

**Final information** is based on primary and secondary information. It represents final information, i.e. information used to rate the safety status and health level of the user.

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