



Fraunhofer IMS Innovation on Silicon

Fraunhofer IMS in Duisburg has more than 25 years of experience and proven expertise regarding microelectronic circuits and systems. One of the priorities in the field of complex electronic assistance systems are Health & Care applications. In close cooperation with other Fraunhofer institutes and a large number of external partners, two special laboratories have been set up inside the Fraunhofer inHaus Innovation Center. These are used for the research and development as well as the testing and evaluation of innovative Health & Care solutions.

One laboratory is specialized on innovations in hospital technology. The aim of this area is the optimization of processes in hospitals – to make them more effective and resource efficient. This is crucial due to the limited budget of the health care system and the economic requirements for the operation of hospitals.

The second laboratory is dedicated to the research and development of system solutions for care applications. In this field, innovative technical solutions and new business models are necessary to meet the upcoming challenges caused by the rising percentage of elderly and handicapped people in our society as well as the decreasing number of nursing staff.

Fraunhofer IMS provides all microelectronic technology necessary for the realization of innovative Health & Care solutions, such as sensor technology, wireless communication, ASICs, micro system technology, embedded systems and network technology.

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HEALTH & CARE SOLUTIONS

PROJECT EXAMPLES





SENSOR AIDED CARE TROLLEY

The improvement of processes in hospitals by making them more resource and also cost efficient is an important item for Fraunhofer IMS and many external partners. One of these hospital processes is the care process for patients. Nursing personnel is chronically understaffed and therefore always busy and under stress. This leads to unintended mistakes with potentially dangerous consequences, e.g. if medicine is administered to the wrong patient. Furthermore, the nursing staff has only very little time for the actual care of the patients due to their obligation of care documentation. In this case, an electronic assistance system could take the pressure off the nursing staff. Fraunhofer IMS has developed an innovative care trolley that is able to localize itself and to identify sickbeds and other hospital devices using RFID technology in order to avoid mixing up patients as well as objects. In addition, drawers, compartments, and fluid dispensers are equipped with individual sensors. An embedded system located in the trolley evaluates the sensor data and the hospital's back-end system identifies actions and procedures carried out by the nursing staff. This facilitates the inventory management and can contribute to an automatic generation of care documentation.

Fraunhofer IMS services:

- Sensor device, interfacing, and evaluation conception
- Embedded system design including power supply
- Wireless network and localization conception
- Development of middleware and application software
- System integration and prototype realization



ASSISTIVE BATH MIRROR

Elderly or handicapped people often have difficulties to manage their activities of daily living. However, in many cases it is not necessary to accommodate them in nursing homes. With some assistance they are still able to live independently and to do the right things at the right time within their own homes. For this purpose Fraunhofer IMS has developed an electronic assistance system in the form of a bathroom mirror. This device is a real mirror that functions at the same time as an interactive display controlled by an embedded system. Several sensors and actuators placed at fixed locations in the bathroom (e.g. water tap, soap dispenser, towel rail, flush, medicine chest) recognize the user's current situation or activity and are therefore able to give appropriate advice on what should be done next or what might have been forgotten. This advice is either displayed on the mirror using simple and unambiguous icons or it is indicated through the activation of related actuators, such as opening the medicine chest. User activities can be monitored and reported to the nursing staff in order to detect emergency situations and to provide additional help. Of course the display can also be used for the presentation of multimedia content.

Fraunhofer IMS services:

- System design, user operation concept
- Interfacing of sensors and actuators
- Interface to the network / internet
- Development of middleware and application software
- System integration and prototype realization



SAMDY

Many elderly or handicapped people, whether living in nursing homes or still in their own flats, are quite able to manage their daily activities on their own or with only a little support. However, their condition may deteriorate leaving them in need of professional care by nursing staff. Within the SAMDY project an intelligent system has been developed which consists of several sensors located in the living environment of the user (e.g. at the bedside, in the kitchen, in the bathroom) and a local home station. Most of the sensors are wireless and can be installed without much efforts and costs. The system captures the sensor data representing the user's activities. With specially developed algorithms, the data of the normal living processes is collected and evaluated by the system. In case of deviation, the relevant results are reported to the nursing staff and a related web portal via a special communication channel. Using this technology, the nursing staff has the means to acquire information on events and processes in the user's environment without being on-site. Sudden emergency situations as well as the gradual decrease of the patient's health condition can be detected, so adequate measures can be initiated immediately.

Fraunhofer IMS services:

- Overall system conception
- Setup of the sensor infrastructure
- Integration of domotic components
- Middleware and application software of the Home Station
- Setup and assistance of a pilot installation in a care-providing institution.