



## FRAUNHOFER IMS

### INNOVATIONS ON SILICON

When the shower tray calls for help in case of a fall, a bicycle light not only glows, but also ensures safety for the cyclist, a door seal provides for fresh air in the room, and the window protects from break-ins, simple objects become important support in everyday life.

Instead of remaining a passive existence, these objects take an active role in the »Internet of Things« where they are connected to the internet. They become interactive and intelligent objects that are able to share information online and self-sufficiently, initiate actions and control each other, due to programmability, storage capacity, their sensors and communication technology.

According to estimates, in the year 2022 about 14 billion devices like sensors, security cameras, vehicles and production machines are going to be connected to each other.

The Fraunhofer Institute for Microelectronic Circuits and Systems (IMS) in Duisburg has an extensive knowhow in the field of base technologies for the »Internet of Things«, for example energy harvesting, wireless communication, sensor technology and microelectronics. It researches and develops for a variety of areas of applications. For health and care, the domestic area, leisure time, or the office, sensor solutions are being developed that give the objects a kind of intelligence through the connection to the internet. Therefore they can react actively to the needs, challenges and conditions of their surroundings.

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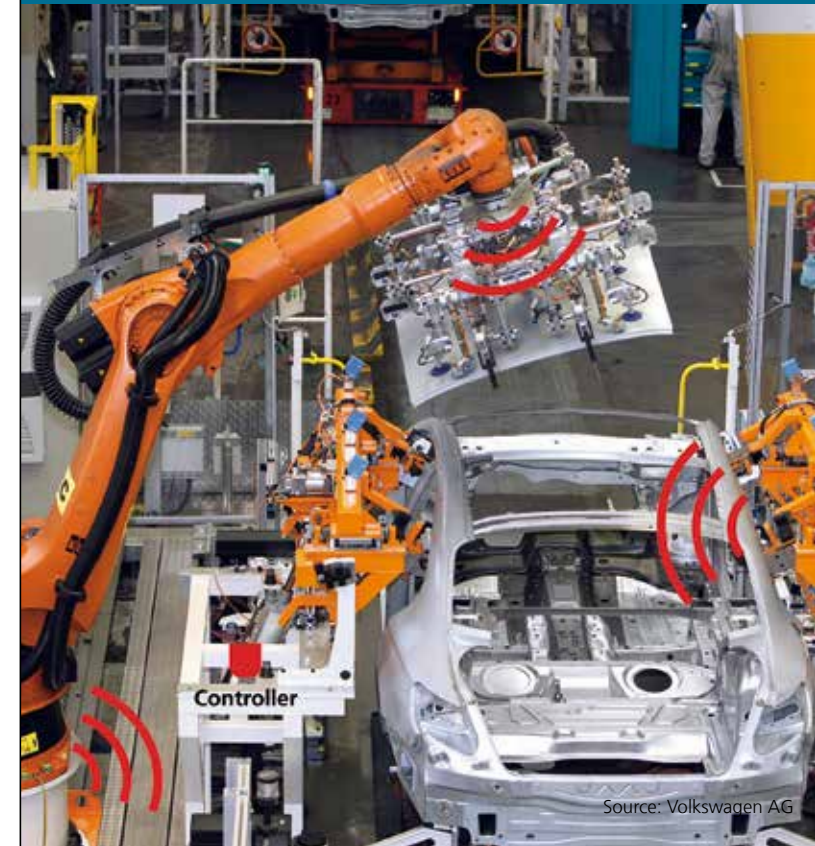
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# ASSISTANCE SYSTEMS USING »INTERNET OF THINGS«





## MORE TIME FOR PATIENTS

The project »Hospital Engineering« at the Fraunhofer inHaus Center shows that the use of sensors brings many advantages for everyone involved in hospital surroundings. On 350 square meters all the relevant premises of a hospital have been recreated. With several other Fraunhofer Institutes and industrial partners the developments can be tested in a realistic environment, and later be brought onto the market. In these innovative surroundings, the Fraunhofer IMS can rely on years of experience in the research area of sensory analysis and activity detection. For the »Hospital of the Future« the institute equipped a care trolley with different sensors, which are able to detect the use and removal of materials and utensils.

Through the sensor technology that detects the care processes, the intelligent care trolley makes suggestions for the needed documentation, which just have to be confirmed by the caregiver. With the use of sensor technology the administrative effort is reduced and the documentation becomes more precise, which leaves more time for the care of the patients.



## MIRROR ASSISTS AT HOME

In the year 2060, every third person will be over the age of 65 and there will be twice as many 70-year-olds as children will be born. For elderly people, the wish to stay at home as long as possible is steadily increasing. The Fraunhofer IMS is involved with the development of technical assistance systems to make a long and self-determined living and housing in the own home possible. An example for this is the project »inBath« – an electronic assistance system as a bathroom mirror with an interactive display, which can help older inhabitants with orientation and coping with their daily tasks. Different sensors that are installed on the faucet, the soap dispenser, or the medicine cabinet, detect the activities of the inhabitant and assist with the next steps or remind them what has been forgotten. These notes are depicted on the display with comprehensible symbols. The procedures can be analyzed and individualized by the relatives or the nursing staff.

Another project of the Fraunhofer IMS is an intelligent shower tray, which can trigger an alarm with the installed sensor technology, when an elderly or disabled person falls in the shower.



## BICYCLE LIGHT CALLS FOR HELP

As the bicycle is gaining more popularity as sports equipment and a mode of transportation, the institute developed a bicycle light, which not only gives light, but also detects a fall of the cyclist and sends the GPS data of the place of the accident to a telephone number that is stored in the system. The lamp works energy self-sufficiently and is optimized for a temperature range in which even similar smartphone solutions do not work.

On average, every second German owns a bicycle. Unfortunately, many cyclists are not too particular about the lighting of their bicycle. But this behavior can be dangerous! The fall recognizing bicycle light ensures fast help and can be installed onto different kinds of bicycles due to the variable installation possibilities. A theft reporting is also possible with this sensor solution. Even in the area of fitness this lamp could be of use, as it tracks the training route, the pulse data, and the pedal frequency data of the cyclist.