A. 7 PERSON-SPECIFIC CONTACTLESS INTERACTION
USABILITY OF ASSISTANCE AND INFORMATION SYSTEMS AT HOME (UsAHome)

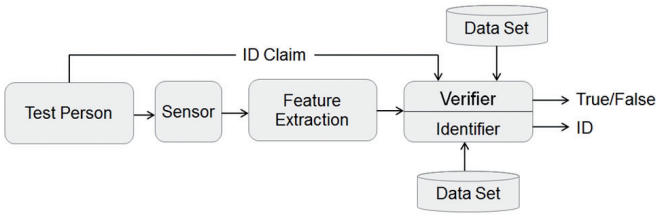
ABSTRACT

With a rapidly ageing population, it is increasingly important to develop devices for elderly and disabled people that can support and aid them in their daily lives, helping them to live at home as long as possible. The goal of this project is to implement a human-machine interaction and assistance system that can offer personalised health support for elderly people, or for those who have special needs in the home environment.

To generate service systems that provide person-dependent assistance, a method for identifying the interaction partner is needed. This basic requirement is divided into two subsystems – first, to recognise the person; second, to identify the prescribed drugs. The former is based on the analysis of one or more biometric features, while the latter uses an NFC-based recognition system to recognise the drug used.

Various biometric traits are being employed depending on the targeted application and environment. For instance, adequate fingerprint samples require user cooperation, whereas face and iris images can be captured by a surveillance camera. In pursuit of our goal of building a touch-less assistance system, we have used faces, finger veins, and hand palm veins to identify/verify the interaction partner. These features do not demand any direct contact with the sensor and hence meet our goal of remaining touch-less. In addition, these features can be captured incidentally rather than deliberately. Cameras integrated in bathroom mirrors or the doors of first-aid boxes could capture the face image, or that of the iris, where capturing the iris pattern requires a distance of 30 cm or less. Capturing the hand palm vein image could be achieved by using a suitable sensor encapsulated within a hand air dryer.

Typically, and independent of the trait used, biometric systems perform three basic tasks, namely sensor data acquisition, feature extraction, and decision-making as depicted in the second figure. Image pre-processing and enhancements could be achieved in order to get features with reliable quality for the next steps. Extracted features – information on the shape and texture of facial images or the positions and forms of veins within finger/hand palm images – are then compared to the people's stored features before reaching the final identification decision.



Three basic steps for data acquisition, feature, and decision-making in the modes for person identification and verification.

LIST OF PARTICIPANTS

- Fraunhofer-Institute for Software and Systems Technology (ISST), Dortmund
- inHaus GmbH, Duisburg
- Sozialwerk St. Georg, Gelsenkirchen
- MedEcon Ruhr e.V. and MedEcon Ruhr GmbH, Bochum
- Hochschule Ruhr-West, Computer Science Institut

PROJECT START AND DURATION, TOTAL COSTS AND FUNDING

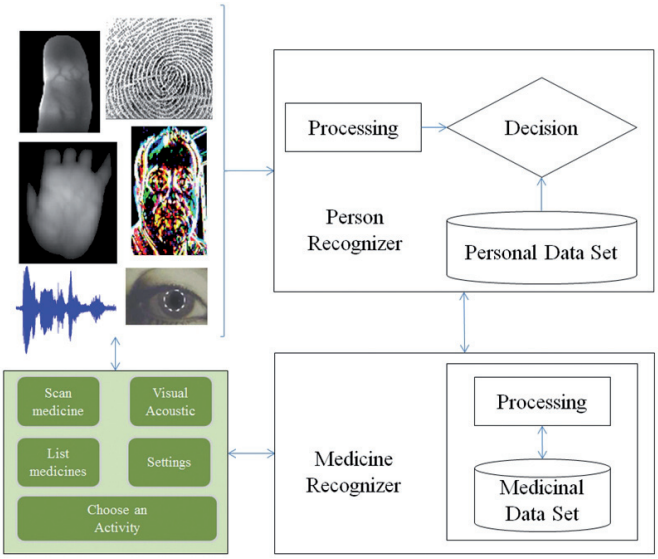
Project: January 2013 – December 2016

Costs: 530,000 Euro

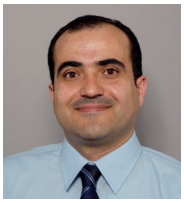
Funding: 240,000 Euro by Ministry of Innovation, Science and Research of the State of North Rhine-Westphalia ("FH Struktur")

PERSPECTIVES, APPROACHES AND IDEAS FOR FURTHER DEVELOPMENT AT THE EU LEVEL

Use of biometric devices in the field of personalised Human-Machine Interaction.



Basic architecture of the medical assistance system. The person is identified by using personal recognition, while the drug is identified by using NFC-based medicine recognition.



Dr.-Ing. Ahmad Rabie
© private

Prof. Dr.-Ing. Uwe Handmann