

RadarID

Radar-Based User Identification in Smart Environments

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CONTEXT AND MOTIVATION

The environments we live in, including our homes, are becoming smarter, populated by a wide range of technologies that not only allow us to control and automate tasks in these environments, but can also be harnessed to obtain information about the environment and its occupants. However, smart environments can have multiple users. Therefore, in the context of human monitoring, the ability to identify each user is essential to associate the collected information to the corresponding person. In addition, each user is different. They can have distinct characteristics, capabilities, and preferences. Therefore, in the scope of interaction between humans and smart environments, human identification can foster the development of adaptive systems, which is important to guarantee that the environment is accessible to everyone.

Ambient sensors (i.e., sensors deployed in the environment) are a good option for user identification since they do not require the user to own and permanently use a wearable device, such as a smartwatch. A possibility is to use vision-based sensors, but users can find them too intrusive due to privacy concerns, especially in more sensitive environments (e.g., bathroom, bedroom). Radars can be a less intrusive alternative for user identification, since they do not capture images, using radio waves instead to capture information on the position and/or speed of a moving target (in this case, a person). Additionally, radars can also be useful for other aspects, including user monitoring and interaction with the smart environments, making it an interesting technology for the future development of these environments. Research carried out at IEETA has already explored the use of radars for user identification from vital signals, but the question of whether it can be used to identify people based on their body movements remains.

OBJECTIVE

Explore the use of radars for human identification in smart environments during activities of the daily routine (e.g., walking), as well as other specific contexts such as interaction with the environment (using speech, gesture input, ...).

TENTATIVE WORK PLAN

- Acquire knowledge and skills in sensor-based human identification, radars and machine learning techniques, profiting from previous work at IEETA.
- Update the state-of-the-art on human identification in indoor environments, focused on the last years.
- Propose and develop methods for human identification using radar data.
- Implement a proof-of-concept prototype integrating the proposed methods and evaluate its performance.
- Writing of documentation and reports.

RESEARCH CONTEXT

The work to be developed is relevant for ongoing research @ IEETA, including projects on smart homes of the future, where the University of Aveiro is collaborating with OLI and other partners.

NUMBER OF STUDENTS

5 or 6