Subjects: A cloud-based architecture for smart homes and assistive robots

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In cooperation with the company Teseo Tech SRL, QExperts Italia SRL and Ospedale Galliera di Genova.

Field of research: Human-machine interaction, human activity recognition

Motivations and general objectives:

Smart homes and assistive robots are expected to provide new services to elderly, people with special needs and people with disabilities. Whilst assistive robots can move within the environment and help the assisted person in doing home chores, smart homes are expected to "sense" what a person is doing to learn their habits and determining possibly "dangerous" events.

In the past few years, we have developed methods and technologies for smart homes and assistive robots and now we extended our activities: on the one hand, a start-up company (Teseo Tech) has been established to commercialise solutions for smart homes; on the other hand, we established a joint lab with Ospedale Galliera di Genova, in which a smart home environment and an assistive tele-presence robot (a PadBot U1 from PadBot Inc.) help patients to regain their “independence” and “well-being” after hospitalisation.

We want to port all of our solutions to a cloud-based architecture, possibly managing multiple smart homes, and evaluate its effectiveness with real users.

The expected results are:
1. A cloud-based framework acquiring data from multiple sensors and assistive robots in a smart home and
“understanding” human behaviour.

2. Specific techniques to model, represent and reasoning upon human behaviour, in order to understand whether the assisted person performs the so-called activities of daily living and act appropriately.

3. A real-world case study to ground further work on learning and human behaviour recognition.

Proposed work plan

The student is expected to carry out the following tasks:

1. Re-engineering the current framework for cloud-based deploy.
2. Integrate it with the new generation of distributed sensors developed by Teseo Tech and QExperts Italia.
3. Extend previously developed systems for human behaviour recognition modelling in a probabilistic sense.
4. Define two specific case studies involving human behaviour recognition and the intervention of the tele-presence robot.

The student will be strongly encouraged to propose innovative solutions leading to scientific publications.

List of bibliographic references


Contacts

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Signature of the local coordinator

Date