Engineer position
Embedded smart radar vision system

Context & objectives

By 2050, the ageing of the population requires a rethinking of policies for the early detection of frailty by new technological means, so as to be able to delay the admission of seniors to specialised structures, to improve therapeutic education, to optimise care pathways and to support health professionals with personal monitoring tools. The societal challenge in this area is the avoidance of falling, which depends on the fragility of the person [1]. Drawing on the epidemiological research of Thelot, Pedrono and Lasbeur [2], it is highlighted that falls are the leading cause of injury-related hospital admissions in this demographic, with around 30% of people over the age of 65 and 50% of people over the age of 80 having at least one fall per year. These falls not only result in direct physical injuries, such as hip fractures requiring hospitalization and surgery, but also have profound psychological repercussions. The fear of falling again can lead to reduced mobility, social isolation, and a condition called "post-fall syndrome," characterized by loss of confidence and increased anxiety. It is becoming essential to be able to qualify and quantify the risk of falling through the estimation of frailty, the complexity of which lies in the multifactorial nature [3]. In recent years, automatic activity measurement has given rise to intense research activity for early detection. The fall of people [4-8] can be effectively detected [9] by various modalities. However, these devices have limitations: lack of respect for privacy, adaptation and layout of living spaces, no night-time monitoring, solutions requiring a permanent display of sensors, significant instrumentation of the home, intrusive (camera) and stigmatizing sensors, and can generate significant false alarms (80% false alarms – Bluelinea experience report). Although these solutions are adapted to detection, characterization (markers of the condition) and temporal monitoring (prevention) remain open problems in the context of daily life (home or specialized establishments (EHPADs)). Current industrial solutions are still at the detection stage with very variable performance. The SmartGaitLab Labcom aims to strengthen fall prevention through the continuous monitoring of an automatically recognized TUG activity. The innovation lies in the observation and characterization of the test (TUG) of the person by radar imaging, which does not impose any protocol or specific action. The benefits are 1) Continuous measurement that ensures long-term follow-up of the test. 2) Identification is carried out in a familiar environment, without stress or stigma, which avoids the introduction of bias. Practitioners frequently observe that patients implement strategies to deceive the measurement in the clinical setting (e.g. by setting a point to compensate for the loss of balance), 3) Quantified observations of the evolution of the steady state in real time and 4) Increased prevention in the event of negative and significant variations in the TUG parameters reported to the healthcare professional.

Objective and missions

The CY Cergy Paris Université has been developing a bespoke real-time platform for human activity recognition in the context of assisted living. This radar V1 has been tested in lab and should be experimented in nursing environment soon. Radar V1 system is based on the integration of COTS product: Luswave front-end radar and a Xavier Jetson GPU.

The objective of the engineer application is to contribute for developing a new generation of a radar imaging @ 24Ghz.

The missions of the engineer application are the:

- Development of the embedded radar system @24GHz.
- Implementation of the runtime on Xavier Jetson Nano.

- Test the board and the system in controlled environment (Lab)
- Test the board and the system in real environment (partners)
- Report of the development.
- Collaborating to publish the results.

How to apply?

Send to the following emails: a motivation letter, CV, support letters, report (master or thesis), the last transcript.
Deadline: 15th October
Professor Olivier ROMAIN : olivier.romain@cyu.fr
Dr Petr DOBIAS, assistant Professor : petr.dobias@cyu.fr
Dr. Alexandre Bordat, engineer Bluelinea : alexandre.bordat@ensea.fr

Starting: 1st December

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