# Post-Doc / Research Engineer Position

## PAPIoT: Position and Activity Monitoring Platform based on IoT Technology

**Keywords:**
Internet of things, miniature antenna, LoRA, e-Health, wearable device.

**Advisors:**
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**Working Place:**
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**Subject:**
Ageing is associated with significant decline in psychological, physical, and social functions contributing to disability as well as the loss of autonomy, dignity and quality of life. In particular, it is well known that aging is directly related to increase in Mild Cognitive Impairments. It is important, at the public health and economic levels, to preventively act against prodromal signs of cognitive disability early when the process is still sensible to effective implementation of specific tailored interventions. The assessment and care of cognitive frailties can be addressed by considering Activities of Daily Living.
In this framework, the objective of the selected postdoc/research engineer is the realization of a prototype of a wearable device enabling the monitoring of elderly people during their everyday activities based on Internet-of-Things (IoT) technologies. The device will enable hybrid (outdoor and indoor) localization, allowing elderly people to be localized in case of emergency (e.g. typical case of an old person suffering of Alzehimer's disease who gets lost in town). Localization will be based on smart use of a variety of data sources, such Global Positioning System (GPS) receiver, WiFi and Bluetooth modules, which will be all included in a single wearable device, designed for use by elderly people and to minimize energy use. The device will also include an accelerometer, whose data will be used to identify the movements of the monitored person. The position information will be sent through a low-power standard LoRa communication channel to a web service that will process the data.
The starting point for the creation of the prototype will be an already existing IoT platform resulted from a scientific collaboration between LEAT and Abeeway (http://www.abeeway.com/). This platform is a miniaturized tracker, which can be attached to the object whose position needs to be tracked. It already includes a GPS receiver and the WiFi, Bluetooth and LoRa modules.
The work will be aimed at further exploiting this research work, by extending the operation of the already existing IoT platform on the human body, making the device suitable for e-health application. To this end, two main activities will be carried on: the modification of the antenna to maintain an acceptable radiation efficiency when operating in close proximity of the human body, and the variation of the shape of the device to better fit with wearable e-health application.

Moreover, the device will be used as source of information by the middleware for Location Based Services (LBS) of Nively (http://www.nively.com/). The software solution developed by Nively allows localizing people and analyzing their spatial behavior across indoor and outdoor spaces using a variety of different hardware. This is done in a hardware-agnostic way which provides a software abstraction layer on top of low-level location hardware.
The recruited postdoc/research engineer will join the LEAT and in particular the CMA (Conception et Modelisation d'Antennes) team. However, he will be continuously in contact with Abeeway and Nively.
The main goals of the work will be:

- Identification of the form factor of the wearable device for best acceptance from aged people.
- Design of a miniaturized antenna solution optimized for on-body operation.
- Integration of the designed antenna with Abeeway IoT platform.
- Realization of a complete prototype (including also the battery and the casing).
- Test and verification of the realized prototype with the Abeeway API.
- Integration of the Abeeway API in the Nively middleware for location services.
- Creation of a small pilot for testing the complete solution for the monitoring of aged people at home.

**Requirements:**
The successful candidate is expected to hold or to be about to receive a PhD in Telecommunication or Electronic Engineering. A specialization in antennas is an asset. Good command of both written and spoken English is required to publish and present results in international journals and at international conferences.

**Salary:**
Approximately between 1900€ and 2400€, depending on the experience.

**Starting date:**
January 2017

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