



## Postdoctoral fellow in AI Real time signal processing for epilepsy



**Postdoctoral fellow in AI, real time signal processing and software for real time epilepsy prediction/forecasting for closed loop neuromodulation by focal Cooling**

### Context

The post-doctoral fellowship will be carried out at CEA-LETI-CLINATEC in partnership with CEA-LETI-DSYS and DSCIN, located at the research technological center CEA (Commissariat à l’Energie Atomique et aux Energies Alternatives), in Grenoble, France. CEA-LETI teams involved in the project possess significant experience in neural signal decoding, **machine learning and signal processing**.

The project partners are reference units for the development of smart algorithms and data processing. The teams have a leading position in the field of Artificial Intelligence (Deep Learning (DL) / Machine Learning (ML), in particular focusing on non-conventional applications under constraints, algorithmic approaches under computing power limitations and efficient model re-training in potentially non-stationary context. Clinattec has a long experience in Implantable Medical Devices and in preclinical models.

The final goal of the project is moving toward cooling neuroprosthetic for drug resistance epilepsy. We propose in this particular project to explore “forecasting seizures algorithms” for closed loop neuromodulation.

Seizure prediction/forecasting algorithms are essential part of any implantable device for epilepsy. Our proposal is based on the existing motor BCI algorithms already in clinical use that can be applied to generate prediction/forecasting of seizures occurrence. For the motor BCI algorithms, we have published and patented algorithms capable of 8 degrees of freedom decoding in real time of motor imagery in tetraplegic patients. Neural decoder is integrated to software environment, which support real time neural signal processing, and is able to send control command to external devices. Decoding algorithms will be potentially redesigned to better respond to the epileptic seizures forecasting task.

### Missions

#### Postdoctoral mission will include

- The test of conventional decoding algorithms and the comparison;
- Design and optimization of innovative decoding algorithms including ANN;
- Optimization, implementation of best algorithm(s) for real time application, integration to the Clinattec real time experimental platform;

#### Postdoctoral fellow will contribute to

- The experiment design
- Algorithms development
- Experimental platform integration

This position require a collaborative mindset. The postdoctoral fellow will evolve in a highly interdisciplinary team composed of neuroscientist, medical doctors, electronic engineers, mathematicians, data analysts and software developers.

Contract duration is 24 months

### Profile of candidate

**PhD or equivalent with strong knowledge in Machine learning, Deep learning, real time Signal processing (high dimensional data flow), with strong skills in Python, matlab.**

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### Responsible persons

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