

Conception of a new helmet for Magnetoencephalography

Context

Human brain attracts a lot of attention by being probably the most important organ defining our behavior, our thoughts, our personality and by still being probably the most unexplored of all of the human organs. There is already a progress in the study and treatment of such neurological disorders as epilepsy, Alzheimer's and Parkinson's diseases, sclerosis, migraine, autism, brain tumor... Still, the development of new techniques and methods for brain imaging are in a great demand. Magnetoencephalography is a functional neuroimaging technique for mapping brain activity by recording magnetic fields produced by electrical currents occurring naturally in the brain, using very sensitive magnetometers. For instance, such techniques are used as a clinical routine for the functional brain mapping and for the seizure focus resection – the most common type of epilepsy surgery.

Mag4Health develops a new generation of non-invasive magnetometers for MEG and an entire new MEG system to allow the imaging of the brain activity in real time with surgical precision. Thanks to the patented quantum technology working at room temperature, we are free from the cryogenic units, which are still the major obstacle for the adoption and commercialization of 'traditional' MEG systems (such systems can weight up to 10 tons and cost ~ 10M\$ for 10 years of work). The democratization of the MEG technique thanks to Mag4Health magnetometers would allow the emergence of new clinical applications, expansion of the technique in both clinics and research centers, its use for early diagnostics and even for emergency services.

Mag4Health is a young startup born at the CEA Grenoble. Today the team consists of 8 people working on the development, fabrication and commercialization of MEG systems for hospitals and medical research centers. Our technology has entered the industrialization stage, the first system will be available in January 2023 and more and more systems will be produced in the following years. We design several MEG versions in respect to different applications (routine medical diagnostics, emergency services, research centers, etc) and for both adult and child patients – the key aspect here is the helmet conception compliant to different needs and specifications of each application.

Your mission

The objective of the internship is to conceive a new helmet for the most general case – the use in medical hospitals for a routine MEG procedures (identification of seizure focuses, for instance). Together with your supervisor engineer you will propose several design conceptions, taking into the account the way the magnetometers should be placed on a head, its fixation, ergonomics, distribution of the cables, etc. The helmet should be comfortable to wear and suit different head sizes and shapes. Of course, we should not omit the aesthetics aspect, the quality of the materials, its resistance to cleaning products, etc. The internship will allow you to express your creativity, to test yourself in a vivid start-up atmosphere, to deal with the conception of medical devices.

Practical information

The internship will take place among the Mag4Health team, currently housed at the CEA Grenoble – ‘Presqu’île scientifique’, in less than 10 minutes by foot from Grenoble train station.

Desirable date to begin: 1st quarter of 2023

Candidature

The internship is proposed to M2 students (last year of M.S.) having a strong aptitude to experiments and engineering.

An experience in mechanical design and at least a basic knowledge of a corresponding software (ideally - SolidWorks) are essential for this project.

You should be fluent at least in English or French.

The candidature must include a CV and a motivation letter and to be send to the following contacts.

Contacts

The candidates are welcome to send their application to:

sm@mag4health.com – Dr. Sergey Mitryukovskiy, industrialization lead