

ERA Chair VIBraTE

Doctoral Researcher

We are seeking a highly motivated and enthusiastic recent university graduate to join our ERA Chair project. The successful candidate will have the opportunity to work with leading experts in their field and participate in exciting research projects. The project will focus on one of the 4 research axes of the project. The position will be based at the [Institute of Information and Communication Technologies of the Bulgarian Academy of Sciences](#), and will involve travel to international conferences and training schools.

Location

Sofia, Bulgaria

Responsibilities:

- Conduct high-quality research in accordance with the research project's objectives.
- Participate in project training activities, including workshops and training schools.
- Disseminate research findings through publications, conferences, and communication with the public.
- Participate in project meetings and events.
- Write a high-quality doctoral thesis and defend it

Qualifications:

- A Master's degree (or equivalent) in a relevant field (e.g. computer science, applied mathematics, data science, (bio)physics, electrical or mechanical engineering).
- A strong academic record, including relevant research experience.
- Excellent written and oral communication skills in English.
- The ability to work independently and as part of a team.
- Applicants must be early-stage researchers (i.e. less than 4 years' full-time equivalent research experience).
- Applicants must be residents of the European Union

We offer:

- A competitive salary according to the Marie Curie European standards
- An international and dynamic research environment
- Access to state-of-the-art facilities and equipment
- Opportunities for professional development and career advancement

This is a full-time position for three years (36 months), with the possibility of an extension until the end of the project (Jan 2028) based on the performance of the candidate. The successful candidate is expected to enroll in IICT's graduate program and pass an entry exam. IICT is an equal opportunity employer and welcomes applications from candidates of all backgrounds.

Applications should be submitted by 1st July 2023. Shortlisted candidates will be invited to an interview.

Application

We look forward to receiving your application and will screen it as soon as possible. To apply, please submit a

- cover letter, in which you describe your motivation and qualifications for the position.
- CV according to the Europass standard
- 2 letters of recommendation.
- 3-minute video pitch in English

The applications will be evaluated by an international hiring panel.

Applications should be sent to Tsvetelina Yorgova : tsvetelina.yorgova@iiict.bas.bg

About the project

A brain-computer interface (BCI) is a technology that collects brain signals and transmits them to an external device that outputs commands. Insight into the interaction between BCI implants and the brain tissue will help maximize the potential of the technology. The EU-funded VIBraTE project aims to support the establishment of a BCI lab at the [Institute of Information and Communication Technologies of the Bulgarian Academy of Sciences](#). Among the objectives of the lab will be to model and investigate the properties, geometry, and mechanical effects of the interaction of the brain with the implanted electrodes. The research objectives of the VIBraTE Chair are situated along the following research axes:

- Axis 1: Viscoelastic coupling
- Axis 2: Optimization of the interface geometry for invasive and non-invasive BCI
- Axis 3: Diffusion phenomena in the brain tissue
- Axis 4: Effects of viscoelastic deformations on modeled brain activity

The main expected outcome in Axis 1 would be to quantify the mechanical interactions of different implants and link them to physiological states and the observed tissue response. Viscoelastic phenomena are typically investigated with the tools of fractional calculus. Fractional calculus is a domain of applied mathematics, which develops very fast and is especially suited to model processes with memory (time-fractional) or spatial inhomogeneities (space-fractional). It is expected that Axis 2 would identify some design rules for brain electrodes and less invasive BCI as a main application. Some partnerships with SMEs are expected to be initiated along Axis 2. The results in Axis 3 would extend our understanding of local drug or gene delivery in tissues. An example of such an approach is optogenetics, which could possibly be extended to human applications by local transfection around an implanted electrode. Axis 4 could refine our understanding of the limitations of invasive neural electrode signal decoding (i.e. spike-sorting).

ERA Chairs are funded by the European Union to support the development of research excellence in specific scientific areas. The objective of the ERA Chair project is to attract and maintain high-quality researchers at the host institution, improve research quality and impact, and enhance the institution's research environment. The project provides funding for research projects, mobility opportunities, and training activities for researchers.