



P.N. 0517-P/151656
10 September 2024

One (1) PhD Student Position [Ref # ORZ-0659]

The research group of Systems Neuroscience of IMBB under the European Program ERC-2022-STG - NEURACT entitled "Untangling population representations of objects. A closed loop approach to link neural activity to mouse behavior" (Program Coordinator Prof. Froudarakis) invites applications for one (1) motivated PhD candidate to assist with the understanding of the algorithm that the brain uses to identify objects in our visual environment under the aforementioned EU-funded ERC Research Program.

About the lab:

Our lab investigates how cortical circuits interact to form transformation-invariant object representations that can guide behavior. Natural environment contains a large number of objects with overlapping sensory input, and our brain is capable of using information from different sensory modalities to extract their identities with ease. Yet, despite extensive research in the last few decades, we are still far from having a complete understanding of how the brain creates untangled object representations. If we understood how the cortex achieves this extraordinary ability at the algorithmic level, this would represent a significant advance in our understanding of brain computation in general. To address this question, we combine advanced imaging techniques for recording neural activity with high-throughput behavioral training and computational modeling to study how the activity of large neuronal populations across different cortical regions enables behaving animals to identify and isolate objects in different contexts.

About the project:

A paramount component of intelligence is our ability to extract useful information in the world through our sensory observations. Object recognition is a fundamental problem in visual perception: every day we depend on our ability to identify objects in our visual environment, and our brain is capable of accomplishing it effortlessly and in a fraction of a second, in spite of immense variation in the sensory information that arrives in our retinas. Understanding the algorithm that the brain uses to do this complex task is a decisive conquest in neuroscience but in order to understand ethologically relevant visual processing, we need to understand how it drives behavior. Despite significant progress characterizing visual processing, we do not understand how the visual system solves visual inference problems in natural environments and we are still far from having a complete understanding of how the brain creates untangled transformation-invariant object representations in the perceptual/visual domain, that can subsequently be used to guide behavior.

The proposed research effort aims to :

- create a state-of-the-art behavioral virtual navigation system for mice,
- combine it with recent advanced functional brain recording techniques and sophisticated neural data analysis to study how objects

Position Description:

Object recognition is a fundamental problem in visual perception and our brain is capable of accomplishing it effortlessly and in a fraction of a second, in spite of immense variation in the sensory information that arrives in our retinas. The proposed research effort aims to (i) create a state-of-the-art behavioral virtual navigation system for mice, (ii) combine it with recent advanced functional brain recording techniques and sophisticated neural data analysis to study how objects are represented in the activity of large populations of neurons across the visual hierarchy and beyond and (iii) causally relate these representations to the behavior of the animal.

The selected candidate will analyze high-throughput electrophysiological, calcium imaging and behavioral data to discover how the visual system solves visual inference problems in natural environments and gain better understanding of how the brain creates untangled transformation-invariant object representations in the perceptual/visual domain, that can subsequently be used to guide behavior.

Required qualifications:

- M.Sc degree in Neurosciences
- FELASA or equivalent certificate for animal handling
- At least one high impact publication in scientific journals as author or co-author
- Experience with behavioral experiments on mice
- Experience with molecular techniques and imaging

| A/A | Evaluation criteria | Maximum score |
|---------------|--|---------------|
| 1. | B.Sc. degree in Biology (Grade of Diploma) | 10 |
| 2. | M.Sc in Neurosciences | YES/NO |
| 3. | FELASA or equivalent certificate for animal handling | YES/NO |
| 4. | At least one high impact publication in scientific journals as author or co-author | YES/NO |
| 5. | Experience with behavioral training on mice (No experience= 0 points, <12 months = 15 points, >12 months = 30 points) | 30 |
| 6. | Experience with molecular techniques and imaging (No experience= 0 points, <12 months = 15 points, >12 months = 30 points) | 30 |
| ΣΥΝΟΛΟ | | 70 |

Contract Duration: 12 months with the possibility of extension according to the project needs

Total budget: ~ 1.140 monthly cost (fellowship contract)

Envisaged starting date: 1st of November 2024

Application submission: Interested applicants should submit their application electronically by September 20, 2024 @ 13:00 (Greece time)

The application should consist of:

1. Application Form (see below)
2. CV
3. Brief statement of purpose
4. The names and contact details of two referees
5. Scanned copies of academic titles
6. Scanned copies proving all the qualifications

Submission of applications: orz0659@imbb.forth.gr

Evaluation procedure

Applications will be evaluated by a three-member evaluation committee. In case of interview procedure, applicants will be invited to participate in person or teleconference.

In case of titles and qualifications awarded by foreign Higher Education Institutions, the provisions of the Law 55/2023 (article 36) and 4957/2022 (article 304) are implemented.

The results of the selection will be announced on the website of IMBB-FORTH. Applicants have the right to appeal the selection decision, by addressing their written objection to the IMBB secretariat within five days since the results announcement on the web. Objections are submitted in one of the following ways: in person, by an authorized person, by post, by courier. They also have the right to access (a) the files of the applicants as well as (b) the table of applicants' scores (ranking of applicants results). All the above information related to the selection procedure will be available at the secretariat of IMBB-FORTH in line with the Hellenic Data Protection Authority. Access to personal data of co-applicants shall be limited to personal data (and relevant data) and supporting documents which have been the basis of the evaluation of the applicants for the specific post(s). Prior to the announcement of the personal data and/or documents of the co- applicants to the applicant, FORTH will inform the data subjects in an appropriate way.

The selected applicants will be notified personally regarding the success of his/her application and will be requested to submit certified copies of his/her degrees. If the submitted documents do not agree with the original application, the applicant will be dismissed.

GDPR Disclaimer

FORTH is compliant with all legal procedures for the processing of personal data as defined by the Regulation EU/2016/679 on the protection of natural persons with regard to the processing of personal data. FORTH processes the personal data and relevant supporting documents that applicants have submitted. Processing of that data is carried out exclusively for the needs and purposes of this specific call. Such data shall not be transmitted to or communicated to any third party unless required by law.

FORTH retains the above data up to the announcement of the final results of the call, unless further process and reservation is required by law or for purposes of exercise, enforcement, prosecution of certain one's legitimate legal rights' as defined in the Regulation EU/2016/679 and/or in national law. Under the Regulation EU/2016/679, applicants have the rights to be informed about their personal data, access to, rectification and erasure, restrictions of process and objection to as provided by applicable regulation and national laws. Applicants have the right to file a complaint to the national Data Protection Authority. For any further information regarding exercise of personal data protection rights, applicants may contact the Data Protection Officer at FORTH at dpo@admin.forth.gr.

Applicants have the right to withdraw their application and consent for the processing of personal data at any time. In this case, FORTH shall destroy such documents and/or supporting documents submitted and shall delete the related personal data.

APPLICATION FORM

Name: _____
Surname: _____
Date of birth (dd/mm/yy): _____
Address: _____
Telephone number: _____
Email address: _____

TO

**FOUNDATION OF RESEARCH AND TECHNOLOGY (FORTH)
INSTITUTE OF MOLECULAR BIOLOGY AND BIOTECHNOLOGY**

Hereby I submit my application for the position:

In the framework of the project: _____

Position code [Ref #] _____

Submitted with this application:

1. _____
2. _____
3. _____
4. _____
5. _____

I certify that:

- A) I accept the terms and conditions of the job announcement
- B) I possess all the necessary certificates and documents and I can present them in their original form to the committee without any delay if I am asked to do so
- C) I am able to complete the project within the foreseen time -frame
- D) all the information given in the framework of this application are accurate and true.

Date: _____

Applicant name

(signature)