



Nanoplatfoms for Neuroscience— NeuroNanotech

Deliverable D5.1

Career Development Plan

Lead Beneficiary	UAM
Dissemination level	Sensitive
Version	V1



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v.1	22.01.2026	IMDEA Nanociencia	Creation	30
v.2	04.06.2026	IMDEA Nanociencia	Update	34

EXECUTIVE SUMMARY

This document *Deliverable D5.1 Career Development Plans* is a deliverable of the **NeuroNanotech** Project which participates in the Horizon Europe Marie Skłodowska-Curie programme.

This *Career Development Plan* outlines the training and professional development pathway for the doctoral candidates:

- A brief description on how the career development plan was designed and implemented for the recruited fellows.
- A short description of the supervision plans.
- An overview of the training provided on the specific discipline-appropriate skills and/or to gain new skills.
- Details of any additional support and/or training in non-research oriented transferable skills.
- Any updates (if relevant) to the career development and the associated training/supervision arrangements.

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Career Development Plan R1

Name of Doctoral Candidate: Giuseppe Junior Mosca

Department: Nanotechnology for health-care, IMDEA Nanociencia

Name of Supervisor: Paolo Perna & M. Teresa González

Date: 20/02/2026

BRIEF OVERVIEW OF RESEARCH PROJECT AND MAJOR ACCOMPLISHMENTS EXPECTED (half page should be sufficient):

The main aim of this research project is the investigation and characterization of magnetic materials with dual aims: to engineer heterostructures composed by different materials with on-purpose designed magnetoresistive properties, and to develop novel flexible sensor prototypes for *in vivo* and *in vitro* testing. Specifically, the plan is to study how both the microstructure and nano-scale order of the materials affect sensor sensitivity, hysteresis behaviour and biocompatibility. In terms of scientific productivity, 1-3 publications on high-impact peer-reviewed journals as first author are foreseen, and 1-2 oral presentations per year in international conferences.

Besides advancing the understanding of physical principles underlying magnetic phenomena regarding materials and combination of materials suitable for magnetoresistive sensors, it is expected to produce experimental prototypes that respond to industry needs and can lead to a tangible technological step forward in the field of neural interfaces.

The industrial valorisation of the project is another of the long-term objectives: depending on the technology readiness level of the research products, patenting processes and, possibly, spin-off constitutions will be considered.

LONG-TERM CAREER OBJECTIVES (over 5 years):

1. Goals:

The goal is for the researcher to acquire the skills to be a versatile professional who can easily adapt to both academia and industry.

At the end of this PhD program, he will have delved into magnetism, material science and neural interfaces, pursuing the goal to build sound scientific knowledge in many fields.

On the other hand, he will have improved his experimental and research management skills, will be able to conduct research in an independent way, and write projects and apply for international calls.

Since the academic skills to pursue a post-doctoral position will be acquired through the daily investigation work, the supervisor's guidance and by attending conferences and seminars, the researcher also plans to build useful skills for a transition to industry. The objective is to be able to work in roles such as technical project manager, scientific consultant or in technology transfer, exploiting technical skills in both science and project management, being able to work in environments such as incubators and accelerators of start-ups, research institutions and innovation hubs. Moreover, taking into account his passion for technology, business and entrepreneurship, the PhD candidate does not exclude the possibility of working in the field of innovation with a start-up, taking advantage of the network and the soft skills built during the PhD program.

2. What further research activity or other training is needed to attain these goals?

To facilitate the possible transition from academia to industry, adequate training on business models, entrepreneurship, technology transfer, and project management will be conducted. Moreover, courses on writing European projects will be attended because of a relevant interest in applications to international calls to obtain financing as for applied science as for business projects.

SHORT-TERM OBJECTIVES (1-2 years):

1. Research results

- Anticipated publications:

At least 2 international publications in collaboration with other partners of the network are anticipated, reflecting the development of the magnetic sensors and their applicability. Journals from the RSC, Elsevier and ACS editorials will be favoured.

- Anticipated conference, workshop attendance, courses, and /or seminar presentations:
 - European-MRS spring/fall meetings.
 - European school on Magnetism 2026.
 - JEMS (Joint European Magnetic Symposia).
 - IEEE International Magnetics Conferences, INTERMAG.
 - Annual Conference on Magnetism and Magnetic Materials, MAGNET2026.
 - Annual Early Stage Researchers Workshop at IMDEA Nanociencia.
 - Training Events of the NeuroNanotech network.

2. Research Skills and techniques:

- Technical expertise:
 - Development of micro- and nanofabrication techniques (i.e. Magnetron Sputtering, Pulsed Laser Deposition, Chemical Vapour Deposition, thin films fabrication, lithography). Magnetic sensors assembly, optimization and coatings biocompatibility studies.
 - Learning of magnetic characterization techniques (i.e. MOKE, spin dependent transport measurements) and magnetic sensors parameters evaluation (sensitivity, noise, hysteresis behaviour, biocompatibility).
 - Study of in vitro and in vivo experimental setups for real-time acquisition of magnetic data.
 - Microscopy techniques (SEM, TEM) and physical and physical-chemical characterization techniques (XRD and XRR measurements, XPS spectroscopy)
- Research Skills:
 - Development of original, independent and critical thinking.
 - Organized planning of scientific experiments. Critical analysis of the experimental data.
 - To conduct accurate and reliable bibliographic research using appropriate search engines (e.g. Google Scholar, ResearchGate) and to critically analyse the reported data.
 - Positive and fruitful discussion of ideas with researcher peers.
 - To acquire fundamental programming skills to optimize data analysis and interpretation.

3. Research management:

- Fellowship or other funding applications planned (indicate name of award if known; include fellowships with entire funding periods, grants written/applied for/received, professional society presentation awards or travel awards, etc.)
 - Develop the ability to successfully identify and secure possible sources of funding.
 - Get familiar with deadlines and delivery requirements, negotiation with funders, financial planning, and resource management.

- Besides relying on NeuroNanotech research funding, if the research work requires a longer period of time, applications to national and international research projects will be made in a timely manner with the help and guidance of the supervisors.

4. Communication skills:

- Oral and poster presentation: Personal presentation skills will be honed thanks to the participation in seminars, workshops and conferences, aiming to create a recognizable personal brand identity on social media (i.e. LinkedIn), useful to promote research outcomes. Periodic internal presentations will be held within the research team.
- Science communication: By attending conferences and scientific events, science communication skills will be improved and an adequate technical-scientific language will be acquired and employed in reports, academic papers and book writing. During these events, the ability to engage in dialogue and constructive discussion with colleagues will also be enhanced, in order to fully benefit from scientific debate and ultimately optimize the scientific research work.
- Written reporting: Work outcomes and experiment results will be communicated by means of written reports, in the context of communications to supervisors and network partners
- Academic paper writing: through preparation of manuscript drafts, technical and academic writing skills will be acquired.
- Dissemination and communication: Scientific results will be spread not only to a scientific audience by the means of poster sessions and talks, but also to a broader public, thanks to dissemination events in which interactive experiments and science games will make recent findings in one's own field accessible to everybody.

5. Other professional training (course work, teaching activity):

Greater attention will be paid to mentoring and supervision activities for undergraduate and graduate students engaged in Bachelor's and Master's theses on topics closely related to the PhD project or to relevant techniques, adopting a peer learning approach. Thanks to this model, critical thinking, communication and teaching skills will be practiced and improved.

6. Anticipated networking opportunities

NeuroNanotech will be the perfect environment to build valuable relationships with fellow PhD candidates and members of the Doctoral Network, starting with the cluster in Spain that includes the four projects conducted in IMDEA Nanociencia, CIMA (Center for Applied Medical Research) and UAM/CBM (Centro de Biología Molecular Severo Ochoa).

Training events and secondments within the network will be an excellent opportunity to get in contact with different research teams and institutions.

In addition, the professional Network will be enlarged to other colleagues of the scientific community of Madrid, from the sector of research (i.e. Universidad Autónoma de Madrid, Consejo Superior de Investigaciones Científicas, IMDEA) and industry (e.g. companies and start-ups from Parque Científico de Madrid), taking advantage of the concentration of these opportunities in the Cantoblanco Campus.

Moreover, relying on a personal network with the departments of Chemistry and Chemical Engineering of the University of Naples Federico II, useful scientific collaborations in the field of nanoscience could be established.

Finally, a valuable asset is the human resources from the researcher's volunteer association UniConNet, which includes professionals working in the field of neuroscience scientific publishing, innovation and project management, but also post-doctoral scientists working in several different fields.

7. Other activities (community, etc) with professional relevance:

In order to ensure awareness about the job market, participation in orientation and networking sessions with mentors from both the industry and the academic community will be organized, relying on multiple events and organizations (e.g. IMDEA Nanociencia Alumni, Chaperone, UniConNet). At the same time, specialization courses and workshops to grow competencies in fields like data analysis and AI will be carried out during the PhD programme to respond to the evolving job market needs.

Date & Signature of Doctoral Candidate:



19/02/2026

Date & Signature of supervisor

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19/02/2026

Career Development Plan R2

Name of Doctoral Candidate: Marina Castrillo Fernández

Department: IMDEA Nanociencia

Name of Supervisor: Isabel Rodríguez & M. Teresa González

Date: 17/02/2026

BRIEF OVERVIEW OF RESEARCH PROJECT AND MAJOR ACCOMPLISHMENTS EXPECTED (half page should be sufficient):

Marina's research focuses on the development of flexible neural interfaces coated with vertically aligned metallic or polymeric conductive nanowires, using nanofabrication techniques such as sputtering, photolithography, template-assisted electrodeposition, and nanoimprint lithography. The objective is to achieve stable and low-impedance devices with improved electrochemical and mechanical performance, enabling long-term neural stimulation applications.

The project includes the fabrication, followed by electrical and mechanical characterization under physiological conditions. In collaboration with partners, the project also includes in vitro biocompatibility and in vivo neural stimulation studies to validate the interfaces. A second major objective is the development of functional neural electrode prototypes that are compatible with regulatory requirements of medical technologies for future clinical translation.

In parallel, scientific dissemination will be ensured through 1–3 peer-reviewed publications and 1–3 oral or poster presentations per year at international conferences. Finally, the long-term ambition is that the developed technologies could be translated into real-world applications through industry partnerships and clinical trials.

LONG-TERM CAREER OBJECTIVES (over 5 years):

1. Goals:

- Become an expert in implantable neurotechnologies and neural interfaces, contributing to the development of next-generation neuroprosthetics.
- Develop a strong academic profile during the PhD through publications and participation in international conferences, gaining solid research experience.
- Gain experience in neurotechnology R&D within the industrial sector to better understand how research is carried out in industry, how companies are created, and how scientific discoveries are translated into products.
- Transition to R&D roles in the neurotechnology industrial sector after the PhD.
- Develop and eventually lead a technology-based venture through innovation and incubation programmes.
- Engage in science communication and outreach activities, especially those promoting women in science and public awareness.

2. What further research activity or other training is needed to attain these goals?

- Further training in micro- and nanofabrication techniques and neuroengineering.
- Attend international conferences to learn from leading research groups in the field and establish professional connections.

- Exposure to translational research and medical device development through visits/collaborations to companies, start-ups, and spin-offs, to better understand the process of transforming an idea into a commercial technology.
- Participation in industry collaborations and secondments.
- Knowledge of regulatory frameworks for medical devices (EU MDR/FDA) and clinical translation.
- Training in intellectual property, technology transfer, innovation, entrepreneurship, project management, and European project writing for international funding calls.
- Training in science communication and outreach activities, including school outreach and initiatives promoting women in science.

SHORT-TERM OBJECTIVES (1-2 years):

1. Research results

- Anticipated publications:

At least 2-3 submissions of research articles to high-impact journals in the fields of neurotechnology or biomaterials, preferably journals such as Scientific Reports, Biomaterials, Advanced Materials Interfaces, Frontiers in Neuroscience, Nature Nanotechnology, Nature Medicine, Advanced Functional Materials, and Neurology.

- Anticipated conference, workshop attendance, courses, and /or seminar presentations:
 - E-MRS (European materials research society) meeting.
 - SBAN (Spanish Conference on Biomedical Applications of Nanomaterials).
 - Brain Days 2027 and Brain Innovation Days 2027 Pitch Competition.
 - Annual Early-Stage Researchers Workshop at IMDEA Nanociencia.
 - Training events of the NeuroNanotech network.
 - IEEE EMBS Neural Engineering Conference.
 - IEEE EMBS workshops and summer schools.
 - Neural Interfaces Conference (NIC).
 - Society for Neuroscience (SfN).
 - AdvaMed MedTech Conference.
 - MedTech Forum (Europe).
 - European Society for Biomaterials (ESB).
 - MRS Biomaterials and Advanced Materials conferences.
 - NeurotechX events.
 - FENS and IBRO neuroscience schools.
 - TERMIS.

2. Research Skills and techniques:

- CAD design and 3D printing.
- Micro- nanofabrication: photolithography, nanoimprint lithography, template-assisted electrodeposition, sputtering, and reactive ion etching.
- Material characterization techniques, including optical microscopy and scanning electron microscopy.
- Electrochemical characterization techniques, including cyclic voltammetry, electrochemical impedance spectroscopy, and charge injection/charge storage capacity measurements.
- Experimental design and data analysis.
- Critical evaluation of experimental results and scientific literature.
- Research ethics, intellectual property, and technology transfer awareness.

3. Research management:

- Fellowship or other funding applications planned (indicate name of award if known; include fellowships with entire funding periods, grants written/applied for/received, professional society presentation awards or travel awards, etc.)
 - Development of skills to identify and secure research funding opportunities.
 - Training in project management, resource management, and research planning.
 - Understanding of funding mechanisms for academic, translational, and innovation projects.

4. Communication skills:

- Strengthening communication skills through attendance at conferences and scientific events, improving technical and scientific language for reports, publications, posters, and presentations.
- Participation in science communication and outreach activities related to neuroscience and neurotechnology.

5. Other professional training (course work, teaching activity):

- Training in ethics, intellectual property, and innovation.
- Training in science communication and outreach activities, including school outreach and initiatives promoting women in science.
- Supervision of undergraduate and master students.

6. Anticipated networking opportunities

- Build and maintain strong collaborations within the NeuroNanotech Doctoral Network through interactions with fellow PhD candidates and partner institutions.
- Connect with academic and industrial researchers through international conferences and relevant medtech and neurotech events (mentioned above), fostering collaboration with both research groups and industry stakeholders.
- Develop international collaborations through training schools, secondments (NeuroNanotech).

7. Other activities (community, etc) with professional relevance:

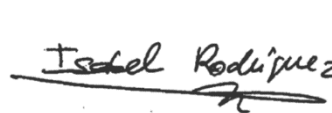
- Participation in initiatives promoting women in STEM and biomedical engineering careers.
- Engagement in science communication and outreach activities to make neurotechnology more accessible to the general public.
- Participation in career development and networking activities with mentors from academia and industry to better understand different career paths and job market needs.
- Attendance to workshops and training courses to strengthen transferable skills and improve employability (e.g. Big Data & data analysis, project management).

Date & Signature of Doctoral Candidate:



17/06/2026

Date & Signature of supervisor



17/06/2026

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Career Development Plan R3

Name of Doctoral Candidate: Harikrishnan Satheesh

Department: CNRS-GREYC

Name of Supervisor: Laurence Mèchin & Stéphane Flament

Date: 02/03/2026

BRIEF OVERVIEW OF RESEARCH PROJECT AND MAJOR ACCOMPLISHMENTS EXPECTED (half page should be sufficient):

LONG-TERM CAREER OBJECTIVES (over 5 years):

The objective of the PhD work will be to magnetically detect the activity of neurons in-vitro. The PhD work will involve optimising the magnetoresistive detection elements as well as the low-noise electronic conditioning system and will include the following tasks:

- (1) Explore different compositions of manganites and other ferromagnetic oxide materials.
- (2) Explore silicon substrates to fabricate the magnetoresistive sensors based on the epitaxial ferromagnetic oxide thin films.
- (3) Design sensors and external magnetic circuits to increase the detection capability.
- (4) Design polymeric surfaces to place the neurons close to the magnetoresistive sensors in in vitro testing.
- (5) Evaluate the feasibility of the detection of magnetic activity of neurons in vitro.

The candidate will take part to the fabrication of the sensors using the clean room facility available in CNRS-GREYC and will have to make all electrical and magnetic characterization of the successive prototypes. He will use existing set-ups at GREYC such as photolithography equipment's, magnetoresistance and low frequency noise measurement set-ups, magneto-optical Kerr effect microscope.

A three-month secondment to SAL (Silicon Austria Labs, Villach, Austria) is planned for the modelling and design of sensors and magnetic circuits to be integrated into sensors and/or polymer structures. Another 3-month secondment is planned to IMDEA (Instituto Madrileño de Estudios Avanzados en Nanociencia, Madrid, Spain), for the design and production of the polymer materials to be placed between the magnetoresistive sensors and the neurons.

Several 1-2 weeks of experiments are planned to be performed at SISSA (Scuola Internazionale Superiore di Studi Avanzati, Trieste, Italy) for in vitro testing of magnetic neuron detection.

1. Goals:

Over the long term, the PhD candidate aims to establish a strong career in research and development within a reputed organization working in the same or related fields as his doctoral research. He intends to contribute to innovative technological development while continuously strengthening his research profile.

In parallel, the researcher wishes to maintain active collaborations with academic institutions through joint research projects and publications. In the longer term, he aspires to take on leadership roles in research initiatives and potentially establish a research-driven organization that contributes to technological growth and community development.

2. What further research activity or other training is needed to attain these goals?

The research and training activities planned within the PhD program provide a strong foundation to achieve the researcher's long-term career objectives. The planned secondment at Silicon Austria Labs (SAL), Austria, will offer valuable exposure to an industrial research and development environment, complementing the academic training received during the PhD.

Additionally, the PhD candidate considers active participation in international conferences, workshops, and training schools to be essential for his development. These opportunities will help him broaden his scientific perspective, gain new insights, strengthen his professional network, and support his long-term growth in research and innovation. Therefore, he looks forward to engaging in more such activities whenever possible.

SHORT-TERM OBJECTIVES (1-2 years):

1. Research results

- Anticipated publications:

Publications in dedicated journals such as ACS Sensors, ACS Applied material and interfaces, Applied Physics Letters, J. Phys D: Appl. Phys are foreseen.

- Anticipated conference, workshop attendance, courses, and /or seminar presentations:

Participation (poster/oral contributions) in international conferences such as JEMS, EMSA, Intermag is expected.

2. Research Skills and techniques:

- Training in specific new areas, or technical expertise etc:
 - Electrical engineering.
 - Applied physics.
 - Magnetism.
 - Instrumentation.
 - Materials science.

3. Research management:

- Fellowship or other funding applications planned (indicate name of award if known; include fellowships with entire funding periods, grants written/applied for/received, professional society presentation awards or travel awards, etc.)

4. Communication skills:

As part of the PhD programme, courses such as Scientific Integrity, Research Ethics, Combating Gender-Based and Sexual Violence, and French Language Training will be undertaken to enhance communication within the research community in a clear, responsible, respectful, and ethically sound manner, while supporting professional interaction at both national and international levels. Opportunities to present seminars in the GREYC lab and in small group meetings focused on oxide-based sensors will further develop presentation skills. Use of professional networks such as LinkedIn is also planned to strengthen visibility and connections within the scientific community.

5. Other professional training (course work, teaching activity):

- Scientific Integrity (Intégrité Scientifique)
- Research Ethics (Éthique de la Recherche)
- Prevention of Gender-Based and Sexual Violence (Lutte contre les Violences Sexistes et Sexuelles)
- Français Langue Étrangère (FLE)

6. Anticipated networking opportunities

Initial networking opportunities will be provided through meetings with other PhD students and partners, and further strengthened during the planned secondments. Participation in doctoral school courses and national conferences will offer additional occasions to build professional connections and engage with the wider scientific community.

7. Other activities (community, etc) with professional relevance:

Date & Signature of Doctoral Candidate:



02/03/2026

Date & Signature of supervisors



02/03/2026

Career Development Plan R4

Name of Doctoral Candidate: Rishan Haasib

Department: SPEC CEA-Saclay

Name of Supervisor: Myriam Pannetier Lecoœur & Claude Fermon

Date: 03/02/2026

BRIEF OVERVIEW OF RESEARCH PROJECT AND MAJOR ACCOMPLISHMENTS EXPECTED (half page should be sufficient):

The aim of the project is to develop magnetic sensors based on spintronics to detect the magnetic field produced during the activity of neuronal population. The work focuses on capturing the magnetic signature surrounding neural networks, providing information about both the amplitude and direction of signal propagation. The idea is to design magnetic probes working in close vicinity to neurons for recording neural activity, and sub-femto-tesla devices for fast low-field MRI.

The primary objective is to develop sensors based on Giant magnetoresistance (GMR) and/or Tunneling magnetoresistance (TMR) operating at room temperature with optimized stack composition, allowing high sensitivity, low hysteresis, and a linear response near zero field. Various device geometries are to be compared to find the ideal pattern of the sensors allowing lowest noise. The later stage involves characterization of these sensors in terms of noise and limit of detection, and integration of the sensors into minimally invasive magnetic probes. Finally, these sensors will be used to perform neuronal spike recording in vitro and in vivo.

The expected results involve identifying an ideal stack composition and device design enabling reduced noise and improved sensitivity in the sensors, with a limit of detection in the sub-nanotesla range at low frequency (< 1 kHz) and the sub-picotesla range at higher frequency (> 100 kHz). In vitro and in vivo spike recording using “magnetorodes,” and the use of flux concentrators to perform low-field MRI using the sensors, are also expected.

LONG-TERM CAREER OBJECTIVES (over 5 years):

1. Goals:
Academia: Postdoc / Permanent positions in the field of spintronics
OR
Research and Development roles in Semiconductor/ Spintronics/ Medical devices.
2. What further research activity or other training is needed to attain these goals?

SHORT-TERM OBJECTIVES (1-2 years):

1. Research results
 - Anticipated publications:
To be decided, Project started in November 2025.
 - Anticipated conference, workshop attendance, courses, and /or seminar presentations:
 - European-MRS Spring meeting 2026 (Abstract submitted) (May 25-29th).
 - The European school on Magnetism 2026 (Application starts: Feb 6th) (Aug 17-28th).
 - Colloque Louis Neel 2026 (September 8-11th).
2. Research Skills and techniques:
 - Training in specific new areas, or technical expertise, etc:

- Spintronics and magnetism.
 - Clean room microfabrication.
 - Photolithography and mask design.
 - Magnetometry, Magnetotransport and Noise measurements in ultra shielded room.
 - Current in plane tunneling (CIPT) measurements.
 - Magnetophysiology, Magnetic sensing.
 - Experiment design.
 - Analytical skills.
3. Research management:
- Fellowship or other funding applications planned (indicate name of award if known; include fellowships with entire funding periods, grants written/applied for/received, professional society presentation awards or travel awards, etc.).
4. Communication skills:
- Presentation skills.
 - Poster presentation.
 - Scientific writing.
5. Other professional training (course work, teaching activity):
- Training course on Grant writing.
 - Training course on efficient communications and meetings.
6. Anticipated networking opportunities
- European-MRS Spring meeting 2026 (Abstract submitted) (May 25-29th).
 - Research secondments part of Neuronanotech.
 - Colloque Louis Neel (September 8-11th).
7. Other activities (community, etc) with professional relevance:

Date & Signature of Doctoral Candidate:



03/02/2026

Date & Signature of supervisor



03/02/2026

Career Development Plan R5

Name of Doctoral Candidate: Rawan Ibrahim

Department: School of Electrical and Computer Engineering, TAU

Name of Supervisor: Yael Hanein

Date: 04/06/2026

BRIEF OVERVIEW OF RESEARCH PROJECT AND MAJOR ACCOMPLISHMENTS EXPECTED:

Project “Soft and adhesive neuronal implant” at Tel Aviv University focuses on the development of soft and adhesive neuronal interfaces with improved stability, biocompatibility, and performance. The research will address a central challenge in neurotechnology: achieving rapid and stable interfaces building on soft electronic films to the skin and to delicate neural tissue while maintaining high-quality recording and stimulation performance. The Doctoral Candidate will optimize adhesive coatings, mock skin setups for neural applications, develop and integrate printed impedance sensors using screen-printing techniques, and enhance electrode performance for simultaneous recording and stimulation. The retina will serve as the primary model system, while broader neural interface applications will also be explored.

Major expected accomplishments include:

- Development of an optimized mock and adhesive coating enabling stable neural anchoring.
- Fabrication and validation of screen-printed impedance sensors integrated into soft implants.
- Demonstration of simultaneous stimulation and recording from retinal tissue.
- Safety and performance validation.
- At least 2 peer-reviewed journal publications.

LONG-TERM CAREER OBJECTIVES (over 5 years):

3. Goals:

To build solid expertise in soft neural interfaces and bioelectronic implants.

To lead interdisciplinary research integrating materials science, electronics, and neurophysiology.

To contribute to the development of safer and more stable implantable neural devices.

To establish an international research network across academia and industry.

To develop the skills required to independently manage research projects.

4. What further research activity or other training is needed to attain these goals?

Continued hands-on experience in wearable and implant development and neural electrophysiology.

Advanced training in biomaterials and flexible electronics for medical applications.

Participation in international collaborations and secondments.

Training in scientific writing and grant proposal preparation.

Opportunities to supervise students or junior researchers to build leadership skills.

SHORT-TERM OBJECTIVES (1-2 years):

8. Research results

- Anticipated publications:

2 first-author peer-reviewed publications on adhesive coating optimization, implant anchoring, electrode performance and contribution to consortium-wide collaborative publication.

- Anticipated conference, workshop attendance, courses, and /or seminar presentations:

Presentation at international conferences (e.g., IEEE EMBS), TAU workshops and seminars.

Participation in NeuroNanoTech training schools and Brain Innovation Days.

9. Research Skills and techniques:

- Training in specific new areas, or technical expertise etc:

Screen printing and integration of impedance sensors.
Microfabrication and cleanroom processes.
Electrochemical characterization of neural electrodes.
Electrophysiological recording and stimulation protocols.
Quantitative signal processing and neural data analysis.

10. Research management:

Participation in MSCA deliverables and reporting.
Planning and milestone tracking of implant development phases.
Involvement in experimental design.
Application for travel grants and early-career awards.

11. Communication skills:

Oral and poster presentations at international conferences and consortium events.
Scientific manuscript preparation and peer-review process.
Interdisciplinary communication across engineering and biomedical domains.

12. Other professional training (course work, teaching activity):

Teaching assistance or mentoring MSc students.
Advanced PhD coursework in neural engineering and biomaterials.

13. Anticipated networking opportunities

3-month secondment at IMDEA Nanoscience (nanostructured fabrication, impedance characterization).
2-month secondment at European Brain Council (policy exposure, Brain Innovation Days).
Collaboration with academic and industrial partners.

14. Other activities (community, etc) with professional relevance:

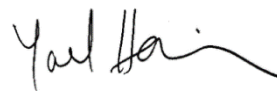
Participation in science outreach events.
Exposure to translational and commercialization strategy discussions.
Development of transferable skills (teamwork, intercultural collaboration).
Career development planning aligned with both academic and industry pathways.

Date & Signature of Doctoral Candidate:

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04/06/2026

Date & Signature of supervisor

A handwritten signature in black ink, reading "Yael Hain".

04/06/2026

Career Development Plan R6

Name of Doctoral Candidate: Sayar Das

Department: ATLAS Neuroengineering / KU Leuven - Dep. of Electrical Engineering (MNS)

Name of Supervisor: Arno Aarts

Date: 23/02/2026

BRIEF OVERVIEW OF RESEARCH PROJECT AND MAJOR ACCOMPLISHMENTS EXPECTED (half page should be sufficient):

LONG-TERM CAREER OBJECTIVES (over 5 years):

1. Goals:

With a background in magnetic materials, a degree in materials science, and a current PhD focused on magnetic sensors for neural recording at ATLAS Neuro and KU Leuven's electrical engineering department, the researcher aims to become an expert in neural sensor technologies, particularly magnetic sensors and their real-world applications. His goal during this PhD is to develop these sensors and bring them to an industry-ready level. In the long run, he aspires to enter the MedTech industry and play a key role in delivering improved diagnostic and therapeutic solutions to society.

2. What further research activity or other training is needed to attain these goals?

An important aspect of this project is to understand the fundamentals of spintronic sensors and their types. It is also important to evaluate the clinical requirements and the strategy to improve sensor design. The opportunity to undertake the secondments would allow the PhD candidate to meet these objectives. Working with expert scientists at ATLAS Neuro in fabrication and neuroscience, the researcher aims to get trained in order to bring the findings into a clinically approvable product. To broaden his perspective, he will also present the results developed during this project in different seminars and conferences, allowing him to gather feedback for both improvement and to gain insights from different scientists.

SHORT-TERM OBJECTIVES (1-2 years):

1. Research results

- Anticipated publications:
 - In-vitro neural recording using magnetic sensor in flexible probes.
 - Strategy to improve the neural recording of magnetic sensors.
- Anticipated conference, workshop attendance, courses, and /or seminar presentations:
 - Society for Neuroscience (SfN) 2027.
 - Joint European Magnetic Symposia (JEMS) 2027.
 - Federation of European Neuroscience Societies (FENS) 2028.
 - Society for Neuroscience (SfN) 2028.

2. Research Skills and techniques:

- Training in specific new areas, or technical expertise etc:
 - The PhD candidate plans to acquire key cleanroom fabrication techniques such as photolithography, sputtering, scanning electron microscopy (SEM), as well as in materials and sensor characterization.
 - He aims to develop expertise in the software tools required for these experiments.
 - Training on different insertion strategy for in-vivo experiments.

- Training on thesis writing and improving presentation skills.

3. Research management:

- Fellowship or other funding applications planned (indicate name of award if known; include fellowships with entire funding periods, grants written/applied for/received, professional society presentation awards or travel awards, etc.)
 - Fulbright scholarship for international students in the USA.
 - MSCA post-doctoral fellowship.

4. Communication skills:

To improve communication skills, the PhD candidate will present his work in the seminars offered through the KU Leuven doctoral school. Being able to convey complex ideas to a broader audience is essential, and engaging with scientists from around the world, whether through seminars, conferences, or ongoing research activities, will help Sayar refine their public-speaking abilities and overall communication skills.

5. Other professional training (course work, teaching activity):

The Arenberg Doctoral School (KU Leuven) provides opportunities for PhD researchers to supervise master students' thesis and to assist in delivering exercise courses. These experiences would strengthen the researcher's ability to train others and effectively transfer his expertise to peers.

6. Anticipated networking opportunities

The training networks that will take place both online and in-person during the NeuroNanotech project and the planned secondments will be the primary source for networking with the collaborators in the network and a necessary step to achieve the objectives of the doctoral program. Attending different international conferences will further enable him to engage with researchers around the globe.

7. Other activities (community, etc) with professional relevance:

The researcher also aims to learn the basics of the Dutch language to facilitate communication with his Belgian and Dutch colleagues, which would be particularly helpful during professional trips to Dutch-speaking regions in Europe.

Date & Signature of Doctoral Candidate:



23/02/2026

Date & Signature of supervisor

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23/02/2026

Career Development Plan R7

Name of Doctoral Candidate: Imo Ime Udotong

Department: Neuroscience Area, SISSA

Name of Supervisor: Laura Ballerini

Date: 04/02/2026

BRIEF OVERVIEW OF RESEARCH PROJECT AND MAJOR ACCOMPLISHMENTS EXPECTED (half page should be sufficient):

LONG-TERM CAREER OBJECTIVES (over 5 years):

1. Goals:

SISSA will contribute to the project by performing in vitro studies (D1.6) of the magnetic sensors on brain cultures, developed ad hoc from newborn or embryonic rodents, combined with live imaging, electrophysiology and confocal microscopy. Cell growth and functional parameters such as adhesion, morphology, viability, differentiation, live calcium imaging and neuronal electrical signalling will be studied. The detection by the magnetic sensors of dynamics of collective neuronal pathological or physiological behaviour, such as spontaneous or induced epileptiform activity or rhythmic patterns will be explored.

The final goal is to educate a researcher trained to independently develop, plan and obtain research products in the field and towards the project goals.

2. What further research activity or other training is needed to attain these goals?

In this framework, the PhD candidate will investigate how mild neuroinflammation reshapes long-term synaptic plasticity in neuronal circuits, mimicking conditions occurring in vivo during anxiety disorders and epilepsy. To this aim, he will develop the ability to produce dissociated hippocampal cultures and he will gain expertise in patch clamp recordings to focus on modifications in glutamatergic transmission, finally he will develop ad hoc calcium imaging technology to measure glia—neuron interactions at multiple levels: single cells and network systems. In details, combining measurements with magnetic and electric sensors, as well as live imaging and electrophysiology, will enable the researcher to elucidate the contribution of stimulated neuronal clusters to neural network states in physio-pathological conditions. All analysis skills related to these recording techniques will be also acquired by the researcher.

By attending training, courses and workshops at SISSA and in the network (secondments), the PhD candidate will develop competences and skills to fulfil the goals.

SHORT-TERM OBJECTIVES (1-2 years):

1. Research results

The PhD candidate is expected to produce and analyse reliable experimental data regarding the interplay between synaptic plasticity and neuroinflammation, and basic features of magnetic and/or electric sensors to detect neuronal network signalling in physio-pathological conditions. The findings are expected to be disseminated through publications, conference/workshop attendance, and /or seminar presentations.

2. Research Skills and techniques:

The PhD candidate is expected to attend training, courses and workshops, to reinforce his background in neurobiology, to develop competence in experimental design, relevant research methodologies, such

as preparation of in vitro brain cultures, live imaging, electrophysiology (patch clamp), structural analysis and confocal microscopy, and to apply these techniques in appropriate settings.

He is expected to become independent in data capture, analysis and statistics. He is expected to develop original, independent and critical thinking and the ability to critically analyse his and others' findings. Such skills should be implemented also in the context of foresight and technology transfer, grasp of ethics and appreciation of IPPR.

3. Research management:

The researcher will be encouraged to apply to short intramural fellowships grants or other funding applications dedicated to young researchers (SISSA-bridge project; travel awards; SISSA PhD best-Thesis prize, professional society presentation etc.) and he will attend specific classes on Scientific writing, presentation and dissemination with the intent to provide foundations also in grant writing. In addition activities promoted by the SISSA Interdisciplinary Labs (ILAS, <https://www.sissa.it/research/ilas>) and by the Committee for the wellbeing (CUG, <https://www.sissa.it/welfare/cus>) are open to all PhD students as well as Colloquia and other community initiatives.

4. Communication skills:

The PhD candidate is expected to develop skills in presentation of research results, such as journal clubs, oral communications, poster presentations, written reports and academic paper drafts. In addition, he will have to be able to defend research outcomes at seminars, conferences, etc., including disseminate scientific findings to a not specialized audience.

5. Other professional training (course work, teaching activity):

The PhD candidate will be involved in teaching or co-supervision of master students in the laboratory.

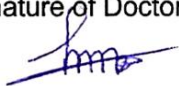
6. Anticipated networking opportunities

Develop/maintain co-operative networks and working relationships as appropriate with supervisor/peers/colleagues within the institution and the wider research community

7. Other activities (community, etc) with professional relevance:

SISSA organises regularly meetings among PhD students and previous alumni to reinforce career development skills by experience reporting.

Date & Signature of Doctoral Candidate:



04/02/2026

Date & Signature of supervisor



04/02/2026

Career Development Plan R8

Name of Doctoral Candidate: Martina Guttuso

Department: Molecular Biology, UAM

Name of Supervisor: Marta P. Pereira

Date: 10/02/2026

BRIEF OVERVIEW OF RESEARCH PROJECT AND MAJOR ACCOMPLISHMENTS EXPECTED (half page should be sufficient):

Martina will be developing the research project, titled "Neurogenesis in PSCs by electrical synergic stimulation on nanoplatforms," that aims to advance the field of regenerative medicine and neuroengineering by investigating the differentiation of human neural stem cells on cutting-edge nanostructured scaffolds.

The study of neurogenesis using human-derived models is of paramount interest, as it allows for the modelling of complex neuronal circuits and diverse phenotypes essential for understanding neurodegenerative diseases.

The proposed study complements animal studies by providing an initially simple system—starting with 2D cultures—that can progressively gain complexity in its design through 3D brain organoids. Importantly, this approach includes the human factor, which is vital since human neurons are functionally very different from neurons in other organisms. By focusing on human pluripotent stem cells (PSCs), this project provides a more accurate physiological context for exploring human neural tissue biology and potential therapies.

A central pillar of this research is the use of nanostructured materials as platforms for cell growth. These nanoplatforms integrate specific topographies and materials that replace the natural extracellular matrix, promoting neuronal attachment and supporting electrical conductivity. Our hypothesis is that the synergy between these nanomechanical stimuli (topography) and external electrical stimulation is a powerful driver of functional maturity. Identifying the optimal stimulation parameters is critical to directing cell differentiation toward specific lineages, such as the midbrain dopaminergic neuronal phenotype, and enhancing network activity.

Furthermore, the project emphasizes the sensing of electrical activity as a key strategy to understand the physiology of the human neuron. By integrating magnetic sensors into brain organoids, the research may validate the efficacy of real-time monitoring of neural network development during active stimulation. This approach allows for a deep analysis of how synergistic stimuli modulate the maturation and tissue complexity of organoids, including the introduction of oligodendrocytes to promote myelination.

Major accomplishments expected during the project include:

- The validation of magnetic sensors for monitoring electrical activity within 3D human brain organoids.
- The mapping of synergistic effects between topographical nanostructures and electrical stimulation protocols on stem cell differentiation.
- The establishment of optimal stimulation parameters that promote the maturation of mature, functional neuronal phenotypes, using dopaminergic neurons as prototype.
- The development of accurate and reproducible human-based models that facilitate the exploration of new therapeutic interventions for neurological disorders.

LONG-TERM CAREER OBJECTIVES (over 5 years):

1. Goals:

The primary goal is to successfully complete a doctoral thesis that serves as a cornerstone for a career at the intersection of stem cell biology, neuroengineering, and nanotechnology. Beyond the specific research outcomes, this includes:

Interdisciplinary expertise: Acquiring a high level of proficiency in cutting-edge techniques, such as 3D brain organoid cultures, human neural induction, and advanced methods for recording neural activity, alongside the application of electrical and nanomechanical stimulation protocols.

Versatile professional profile: Developing a professional identity that integrates seamlessly into engineering, biological, or clinical environments. The objective is to become an expert who understands the nuances of each field, facilitating the unification of criteria and the identification of common interests across different disciplines to solve complex biotechnological challenges.

Scientific Independence: Transitioning into an independent researcher capable of leading innovative projects that use human-based models to advance the understanding of human neural tissue biology and design new therapies.

2. What further research activity or other training is needed to attain these goals?

To achieve these broad objectives, we believe that the following activities and training are required:
Advanced technical specialization: Deepening the understanding of the physical properties of nanoplateforms and the engineering principles behind electrical stimulation to better bridge the gap between materials science and biology.
Translational training: Gaining insight into the clinical requirements for treating neurodegenerative diseases, ensuring that research on dopaminergic neuronal phenotypes remains relevant to medical needs. The research group actively collaborates with biomedical researchers in the clinical setting and Martina will benefit from this collaborations.

Management, leadership and cross-sectoral training: Participating in the soft skills training provided by the UAM and with the programmed secondment at MicroTech Lab to gain experience in specialized performance tests and preclinical validation of novel therapies, project management and technology transfer that all together will aid in the preparation for leading multidisciplinary teams.

Continuous academic development: Completion of the Molecular Bioscience Doctorate program and the Train@CBM program, that includes career orientation activities such as the Off-academia seminar series.

SHORT-TERM OBJECTIVES (1-2 years):

1. Research results

- Anticipated publications:

Academic papers in peer-reviewed, indexed journals detailing the maturation and network activity in human neuronal cultures and brain organoids.

- Anticipated conference, workshop attendance, courses, and /or seminar presentations:

Martina will present her research results in national and international conferences and workshops. As a CBM PhD student, she will be able to attend several training courses that will include the Scientific Integrity and Ethics School or the cross-disciplinary school. She will also have the opportunity to present her data in the Neuropathology Unit Seminar Series and the Students and Postdocs Workshop at CBM.

2. Research Skills and techniques:

- Training in specific new areas, or technical expertise etc:

Technical Training: Acquisition of advanced expertise in human induced pluripotent stem cell culture, specifically focusing on neural induction and the complex maturation processes of specific neuron subtypes (i.e. gabaergic, glutamatergic and dopaminergic neurons). This involves hands-on training in the maintenance and characterization of 2D cultures.

Acquisition of advanced expertise in 3D brain organoids, as well as the integration of oligodendrocytes in neuronal cultures to study myelination.

Methodological Proficiency: Developing high-level skills in experimental design, including the use of quantitative and qualitative methods for data capture and statistical analysis of neural network activity. The candidate will become proficient in applying electrical and nanomechanical stimulation protocols using specialized nanoplateforms.

Critical Thinking and Ethics: Cultivating original and independent thinking to critically evaluate findings and compare them with existing literature. This includes a thorough understanding of research ethics, especially regarding the use of human-derived stem cells, and a basic grasp of Intellectual Property Rights (IPR) and technology transfer within the neurotechnology sector. The participation in the Scientific Integrity and Ethics School, as part of the CBM Training Program will be one of the key elements to aid in the development of critical thinking skills.

3. Research management:

- Fellowship or other funding applications planned (indicate name of award if known; include fellowships with entire funding periods, grants written/applied for/received, professional society presentation awards or travel awards, etc.)

Grant and Project Preparation: Actively participate in the identification of potential funding sources and contribute to the preparation of research proposals and tenders for the research group. This includes collaborating on the design of new projects that explore the intersection of neurogenesis and nanotechnology, ensuring that proposals align with both group interests and clinical needs.

Mentoring and Supervision: Provide guidance and mentorship to younger students, specifically undergraduate (Bachelor's) and Master's students within the laboratory. This involves supervising their daily research activities, training them in core techniques such as human stem cell culture, and fostering their ability to work within a multidisciplinary team.

Project Oversight: Develop robust skills in work planning and deadline management, ensuring the timely delivery of research milestones for both individual and group projects.

Resource and Financial Planning: Gain experience in the management of laboratory resources and financial planning associated with project proposals, which is essential for transitioning into an independent research role.

4. Communication skills:

Improving presentation skills for both expert and non-expert audiences. This includes preparing technical reports for the NeuroNanotech consortium and contributing to public outreach activities to promote the understanding of human-based neural models and their role in reducing the use of laboratory animals. Participation in outreach activities will include the Unistem Day, which is an international devoted to explaining stem cell research to high school students.

Academic Writing: The Train@CBM program includes workshops focused on the improvement of academic writing for the preparation of high-quality manuscripts and outreach materials.

5. Other professional training (course work, teaching activity):

Successful completion of the mandatory modules within the Molecular Bioscience Doctorate program at UAM and the specialized Train@CBM program, covering advanced biochemistry and biotechnology is part of the professional development expected. It will be explored the opportunity to get involved in the supervision or mentoring of undergraduate students within the laboratory to develop pedagogical and leadership skills.

6. Anticipated networking opportunities

International Research Collaboration (SISSA): Execution of a three-month secondment at SISSA (Italy) under the supervision of Laura Ballerini. This stay provides a unique opportunity to interact within a very strong basic research environment, focusing on high-level performance tests in organotypic slice cultures.

Industrial and Business Sector Exposure (MTTL): Completion of a three-month secondment at MTTL under the supervision of Cristina Degrossi. This experience provides vital exposure to the business and corporate sector, offering a perspective on preclinical in-vitro inflammation studies that is highly relevant for a future career outside the academic sector.

Professional Relationship Building: Developing and maintaining co-operative networks and working relationships with supervisors, peers, and colleagues both within the Universidad Autónoma de Madrid (UAM) and the wider international research community. The Train@CBM program will also facilitate networking with experts that have developed successful careers after achieving their doctoral degree in sectors other than academia.

7. Other activities (community, etc) with professional relevance:

Martina will take an active role in the management of their own career progression by using this plan as a pro-active monitoring tool for growth.

Beyond research-specific techniques, emphasis will be placed on gaining transferable skills that are highly valued in the broader job market. These include presentation abilities, scientific writing, and the ability to identify Intellectual Property Rights (IPR), ensuring a well-rounded professional profile. The Train@CBM program will offer specific training on these skills.

In particular, the off academia seminar series will offer information and networking opportunities with experts that have successfully developed a professional career after the doctorate. A key strategy for developing employability is the unique nature of this project, which integrates stem cell biology, neuroengineering, and nanotechnology. This training in different scientific fields leads to exceptionally attractive profiles to potential employers, as they act as a bridge between engineering and clinical/biological perspectives. The ability to comprehend and integrate concepts from materials engineering into neural applications is a rare and highly sought-after skill.

Professional Networking and Community Engagement: Engagement with the wider scientific community through the NeuroNanotech consortium and international conferences will be used to build a robust professional network. This engagement serves not only to disseminate results but also to gain insights into emerging career paths and industry trends.

Date & Signature of Doctoral Candidate:

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12/02/2026

Date & Signature of supervisor

Firmado por PEREZ PEREIRA,
MARTA (FIRMA) el día
12/02/2026

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Career Development Plan R9

Name of Doctoral Candidate: Emmanuel González González

Department: Physiological Monitoring and Control - Biomedical Engineering Program (FIMA)

Name of Supervisor: Miguel Valencia (FIMA) / Eduardo Daniel Martín Montiel (CSIC)

Date: 18/02/2026

BRIEF OVERVIEW OF RESEARCH PROJECT AND MAJOR ACCOMPLISHMENTS EXPECTED (half page should be sufficient):

As part of the Horizon Europe Marie Skłodowska-Curie Doctoral Network NeuroNanotech, this research project—"In-vivo assessment of nanotechnologies for smart sensing and stimulation"—is designed to bridge the gap between advanced nanotechnology and clinical neuroscience. The project directly supports the consortium's overarching goal of creating a new generation of smart, less invasive, high-resolution neural implants that remain stable over time by leveraging ultra-sensitive spintronic magnetic sensors and nanostructured electrodes.

With a primary focus on Parkinson's disease (PD) and potential applications in epilepsy, this doctoral thesis project seeks to integrate the expertise of the "Neurophysiological Monitoring and Control Laboratory" at CIMA in Pamplona and the "Neurophysiology and Synaptic Plasticity Laboratory" at the Cajal Institute in Madrid to assess the suitability of nanotechnology-based neural interfaces in the challenge of restoring neural dynamics of motor control.

During the project, we will explore the use of nanostructured electrodes and ultra-sensitive spintronic magnetic sensors together with real-time signal processing to develop a proof of concept of a smart-stimulation framework to manipulate motor behaviour in animal models of Parkinson's disease or the prevention and abortion of epileptic seizures. The system will pursue high levels of tissue integration and stable performance in recording/stimulation and avoiding electrode degradation.

The candidate will work on key aspects of the development of the neuromodulatory solution such as:

- In-vivo assessment of long-term biocompatibility of the sensing and stimulation interfaces.
- Adaptation of the neuromodulation system for the use of in-vivo/freely moving animal models of epilepsy and Parkinson's disease as a proxy for future human use.
- Increase the knowledge of the relationship between magnetic and electrophysiological readings.
- Development of signal processing techniques to de-noise and enhance sensitivity of detection of proposed technologies.
- Assessment of the functional performance of the smart sensing and stimulation interfaces on the animal models of epilepsy and Parkinson's disease.

Major Accomplishments Expected:

- Engineering Excellence: Development of a C++/Python firmware and a custom Analog Front-End PCB compatible with the consortium's flexible graphene/CNT electrodes.
- Algorithmic Innovation: Successful implementation of embedded AI for real-time signal processing, demonstrating the superiority of Reinforcement Learning controllers over traditional PID systems in in silico and ex vivo environments.
- Translational Validation: Execution of a rigorous three-phase validation pipeline: Hardware-in-the-Loop (HIL) benchtop characterization, in vitro saline testing, and pilot in vivo trials using a PD and epilepsy animal models at CIMA facilities.

- **Open Science Contribution:** Publication of the platform's characterization and open-source code in high-impact journals (e.g., IEEE TNSRE) and international dissemination at the 18th IEEE ICSP conference, contributing to the consortium's goal of European technological leadership in neurotechnology.

LONG-TERM CAREER OBJECTIVES (over 5 years):

1. Goals:

- Consolidate a position as a senior researcher in translational neurotechnology, contributing to and leading interdisciplinary teams focused on the development of next-generation active implantable medical devices.

- Progress toward a leadership role within the European medical device industry or within a high-level clinical research institute, bridging technological innovation and clinical application.

2. What further research activity or other training is needed to attain these goals?

- Advanced specialization in regulatory affairs for medical devices and clinical trial frameworks to ensure effective translation from preclinical research to clinical implementation.

- Formal training in leadership and project management to coordinate large-scale international consortia and multidisciplinary research initiatives.

- Industrial immersion through planned secondments at Boston Scientific, enabling exposure to product development pipelines, regulatory pathways, and industry-driven innovation strategies.

SHORT-TERM OBJECTIVES (1-2 years):

1. Research results

The project is expected to generate high-quality scientific outputs, including at least one publication per year of the doctoral period in a prestigious internationally indexed journal. Special emphasis will be placed on promoting joint publications in collaboration with other members of the consortium, fostering interdisciplinary integration and strengthening the international impact of the research.

In addition, the candidate will present results at a minimum of one national or regional conference and one international conference per year to ensure broad dissemination and scientific visibility.

The potential intellectual property (IP) value of any technological developments arising from the project will be systematically assessed. Results with translational or commercial potential will be evaluated by the consortium in coordination with the University's Technology Transfer Office to define appropriate protection and exploitation strategies.

For the current/next year, we expect:

- Poster presentation at the 3rd Expert Summit on the Future of Deep Brain Stimulation, Würzburg 22-24th February 2026. E. Gonzalez-Gonzalez, et al. "A fully open-source closed-loop neuromodulation platform for real-time phase- and amplitude-based stimulation."

- Anticipated submission for publication of the manuscript "A Fully Open-Source Closed-Loop Neuromodulation Platform" considering IEEE Transactions on Neural Systems and Rehabilitation Engineering, Computer Methods and Programs in Biomedicine or any other high impact journal. (April 2026)

- Anticipated conference, workshop attendance, courses, and /or seminar presentations: Anticipated conference: Oral presentation at the 18th IEEE International Conference on Signal Processing (ICSP 2026) in Guiyang, China.

- Participation in the NeuroDataReHack 2026 Summer School to be held at HHMI Janelia Research Campus, Ashburn, VA July, 13-17th, 2026 (application sent).

2. Research Skills and techniques:

- Methods and technologies for in-vivo/freely moving electrophysiological recordings, surgery training (including stereotactic methods, multi-site multimodal recordings, and

stimulation), animal handling, methods for motor impairment assessment, and viral injections. Certified completion of the A+B+C Course in Animal Experimentation, providing the legal and technical qualification required to perform experimental procedures in animal models.

- Histological processing, confocal microscopy.
- Hardware development and control, real-time signal processing, integration of multimodal sources such as video, ephys and sound, data analysis and statistics including AI/ML.
- Embedded Systems: Proficiency in real-time C++ development and DSP implementation for the SMARTA+ algorithm.
- Micro-fabrication: Experience in Analog Front-End PCB design and testing for high-impedance neural interfaces.

3. Research management:

- Funding Identification and Acquisition:
 - The researcher will actively participate in the "Research funding landscape and proposal preparation" workshop (Training Event 6) to identify potential post-doctoral fellowships and national/international grants (e.g., AEI, ISCIII, EIC).
 - The PhD candidate will attend the specialized UNAV sessions "Investigación con Impacto: la fuerza de unir ciencia y empresa" and "Propiedad Intelectual y Transferencia de Tecnología" to learn how to secure industrial funding and manage R&D contracts.
 - The goal is to develop the ability to draft competitive grant applications, focusing on the valorisation of the open-source neuromodulation platform developed in this project.
- Project Management Skills (Programming, Deadlines, and Resources):
 - The researcher will be responsible for the end-to-end management of his research activities, ensuring the timely delivery of Researcher R9 specific deliverables (D1.7, D2.5, D3.1, D3.3) and scientific milestones (MS11, MS14).
 - Through the UNAV session "Organización del tiempo" and the "Tech Transfer: del labo al mercado" course, the PhD candidate will acquire skills in work programming, financial planning of laboratory resources, and deadline management for preclinical animal studies.
 - Emmanuel will gain experience in the administrative requirements of European projects by assisting in the progress monitoring reports of Work Package 3 (Smart Neuromodulation).
- Teambuilding and Collaborative Skills:
 - He will participate in the leadership and performance management workshops (TE4 and TE5) to develop skills in team coordination within a multicultural and multidisciplinary environment.
 - During his integration into the FIMA and CIMA labs, and the secondments at CEA and Boston Scientific, the researcher will practice professional negotiation with diverse stakeholders (funders, tech partners, and clinicians) to ensure successful project execution.

4. Communication skills:

- Report Writing and Academic Papers:
 - Completion of the "Writing Science" course (February 2026) to improve skills in drafting high-impact manuscripts, specifically for the submission of his first Q1 paper.
 - Attendance to the UNAV library sessions on "Gestión y uso de la información científica" and "Cómo publicar en revistas científicas de calidad" to master bibliography management and journal selection criteria.

- Presentation and Defence:
 - Participation in the "Elevator pitch: cómo venderse en pocos minutos" workshop to prepare for the oral defence of his research architecture at the scheduled national / international conferences
 - Presentation of preliminary results at the internal FIMA seminars and the NeuroNanotech Training Event 1 (TE1) to practice defending his research outcomes before a multidisciplinary audience of experts.
 - Public Understanding of Science (Outreach):
 - Contribution to the project's dissemination plan by participating in the "European Researchers' Night" and "Brain Awareness Week", translating complex neuronanotechnology concepts for the general public.
 - Attendance to the "Difusión de la investigación científica: Open Access" session to ensure the research data is findable, accessible, and compliant with FAIR principles.
5. Other professional training (course work, teaching activity):
- Specialized Coursework: Completed the accredited A+B+C certification for Animal Research, ensuring mastery of ethical and practical protocols for animal handling and surgery.
 - Doctoral Training: Mandatory UNAV Core Curriculum on "Ethics and Society" and laboratory safety certification ("Laboratorio ¿trabajamos seguros?").
 - Teaching Preparation: Enrolment in the "Curso de Formación General enfocado a la Docencia" (UNAV) for future academic mentoring roles.
6. Anticipated networking opportunities
- Participation in the Brain Innovation Days (BIDays) by the European Brain Council.
 - Quarterly interactions with experts from CEA, SISSA, and RU during NeuroNanotech Training Events.
7. Other activities (community, etc) with professional relevance:
- Training on Safe-and-Sustainability-by-Design (SSbD) models for nanotechnology.
 - Involvement in the Start-up Studio organized by the network to explore the commercial potential of the developed platform.

Date & Signature of Doctoral Candidate:



18/02/2026

Date & Signature of supervisor



18/02/2026

Career Development Plan R10

Name of Doctoral Candidate: Tonje Brunstad

Department: Donders Center of Neuroscience

Name of Supervisor: Timo Van Kerkoerle

Date: 0203/2026

BRIEF OVERVIEW OF RESEARCH PROJECT AND MAJOR ACCOMPLISHMENTS EXPECTED (half page should be sufficient):

LONG-TERM CAREER OBJECTIVES (over 5 years):

1. Goals:

• **Objective 1: Detecting magnetic signals from neural activity in acute hippocampal slice**

Research question: Can micron-scale magnetic sensors based on spintronics detect magnetic fields generated by neuronal activity in acute hippocampal slices, and what sensor placement and stimulation paradigms maximize detectability?

Measurable endpoints / success criteria: Significant magnetic signal detected above baseline noise (e.g., SNR > threshold defined during pilot studies), characterization of magnetic signatures, identification of optimal spatial configuration between magnetic sensor, stimulation electrode, and recording electrode.

Required skills and equipment: Brain slice preparation and acute slice electrophysiology, microscopy, micropositioning systems and extracellular recording amplifier, software: pClamp and Python for data analysis, GMR/TMR magnetic sensors (CEA), Wheatstone bridge and other circuit elements, signal processing and analysis.

Time frame: Months 1–18: learn slice electrophysiology, develop experimental protocol, perform iterative experiments, analyze data.

• **Objective 2: Evaluating and validating the SEMEG probe in vivo**

Research question: How can the SEMEG probe, developed by CEA, the University of Ulm, and DIXI Medical, be optimally configured and validated for semi-chronic implantation, and how robust is the technology during in vivo recordings in macaque monkeys?

Measurable endpoints / success criteria: Identification of optimal probe configurations for stable magnetic/electric recordings in vivo, successful execution of macaque experiments and acquisition of high-quality SEMEG data, clear documentation of probe stability, biocompatibility indicators, and signal characteristics across sessions, translation of experimental findings into actionable feedback for engineering teams.

Required skills and equipment: Training in macaque preparation, stereotactic procedures, and SEMEG recording protocols, data acquisition systems compatible with the SEMEG probe, competence in analyzing magnetic/electrophysiological data and reporting findings to hardware teams.

Time frame: Months 12–36 - acquire training, design experiments with RU and engineering teams, perform macaque experiments, analyze data, and provide iterative feedback for probe optimization.

• **Objective 3: Developing and validating mesoscale computational models for source reconstruction**

Research question: How can microscopic biophysical models of neuronal activity be linked to macroscopic EEG/MEG forward models to enable source reconstruction with SEMEG, and how well do these models predict experimentally measured magnetic signals?

Measurable endpoints / success criteria: Development of a mesoscale model coupling neural population activity to predicted magnetic/electric fields in collaboration with PhD-student at

UiO, validation of model predictions using data from slice experiments and macaque recordings, quantification of reconstruction accuracy and identification of factors influencing model–data mismatch.

Required skills and equipment: Python modelling; experience with NEURON/LFPy or similar biophysical simulators, access to experimental data from Objectives 1 and 2.

Collaboration with UiO and University of Twente for model integration and theoretical framework.

Time frame: Months 24–48: participate in model development; lead validation and reconstruction analysis; integrate results into thesis.

2. What further research activity or other training is needed to attain these goals?

SHORT-TERM OBJECTIVES (1-2 years):

1. Research results

- Anticipated publications:

During the PhD period, the main expected research outputs are publications related to:

- Detection of magnetic signals in acute hippocampal slices (Objective 1)
- In vivo validation of the SEMEG probe (Objective 2)
- Mesoscale modelling and source reconstruction framework (Objective 3)

- Anticipated conference, workshop attendance, courses, and /or seminar presentations:

- Conference presentations (poster/oral) at international neuroscience and neurotechnology conferences.
- Presentations at Lab meetings and Donders Seminars.
- Contributions to interdisciplinary workshops within the MSCA Doctoral Network.

2. Research Skills and techniques:

- Training in specific new areas, or technical expertise etc:

- Research skills and knowledge.
- Responsible conduct of science.
- Personal effectiveness.
- Professional development.
- Leadership and management.
- Communication.
- Basic Python skills.
- Experience with LFPy.
- Electrophysiology.
- Neuroscience knowledge.
- Signal processing and analysis.

3. Research management:

- Fellowship or other funding applications planned (indicate name of award if known; include fellowships with entire funding periods, grants written/applied for/received, professional society presentation awards or travel awards, etc.)
- Contribution to an EIC Pathfinder grant application (planned submission in 2027).
- Potential co-authorship or contribution to additional collaborative grant applications depending on project development.

4. Communication skills:

- Introduction to Academic Writing and Research Methods for Computing Scientists (3 EC).
- Science presentation and visualisation (3 EC).

5. Other professional training (course work, teaching activity):

Course work:

- Course on Laboratory Animal Sciences (3 EC).
- Neurons & Synapses (6 EC).
- Neuro-analysis (3 EC).

Teaching:

- Neurons & Synapses (6 EC) – teacher assistant.

6. Anticipated networking opportunities

- Collaboration with CEA (sensor development).
- Collaboration with University of Ulm and DIXI Medical (probe integration).
- Collaboration with UiO and University of Twente (computational modelling).
- Participation in MSCA training schools and network meetings.
- Conference participation in neuroscience, neuroengineering, and biomagnetism communities.

7. Other activities (community, etc) with professional relevance:

Date & Signature of Doctoral Candidate:

A handwritten signature in black ink, appearing to be "JP", written over a light blue grid background.

02/03/2026

Date & Signature of supervisor

A handwritten signature in black ink, appearing to be "J. B.", written over a light blue grid background.

02/03/2026

Career Development Plan R11

Name of Doctoral Candidate: Leonard Tinius

Department: Department of Physics

Name of Supervisor: Gaute Einevoll & Torbjørn V. Ness

Date: 21/05/2026

BRIEF OVERVIEW OF RESEARCH PROJECT AND MAJOR ACCOMPLISHMENTS EXPECTED (half page should be sufficient):

LONG-TERM CAREER OBJECTIVES (over 5 years):

1. Goals:

Leonards' long-term goals in this research project and beyond are to develop the skills needed to become an independent researcher working at the intersection of neuroscience and physics. This project serves as an excellent starting point, helping him establish himself in theoretical neuroscience, building computational skills, as well as expanding on his theoretical understanding. In addition to this, he plans to build an extensive network within Europe and beyond, creating opportunities for future collaborations and partners to exchange and improve upon ideas. Alongside the scientific expertise he aims to develop, he also wants to establish himself as a science communicator, contributing to the democratization of science and the application of scientific results to policymaking. To achieve these goals, after completing his PhD within this network, he plans to pursue another position as a Postdoc or Research Fellow (ideally one with an explicit component of science communication or teaching) in the field of either biophysics of neurons or cognitive computational neuroscience.

2. What further research activity or other training is needed to attain these goals?

SHORT-TERM OBJECTIVES (1-2 years):

1. Research results

- Anticipated publications:
 - Paper about the application of the reciprocity theorem to magnetic stimulation in "Brain Stimulation".
 - Paper about the use of the magnetic reciprocity principle in mean-field models of networks of neurons to predict network level responses to magnetic stimulation.
- Anticipated conference, workshop attendance, courses, and /or seminar presentations:
 - Attendance at the Science Factory TMS-EEG summer school at Aalto University, Helsinki, May 23-28.
 - Contributed talk at the 2026 Bernstein Conference about magnetic reciprocity, September 28 - October 1.
 - Contributed talk at the CNS*2027 conference, Date TBD.
 - Contributed talk at the 2027 Bernstein Conference, Date TBD.
 - Courses:
 - • Science, Ethics and Society, Spring 2026, UiO.
 - Communicating Science, Fall 2026, UiO.
 - Computational Neuroscience, Fall 2026, NMBU.
 - Science and Technology Studies, Fall 2027, UiO.
 - Philosophy of Science, Fall 2027, UiO.

2. Research Skills and techniques:
 - Training in specific new areas, or technical expertise etc:
 - Expertise in computational modeling of biophysics.
 - Expertise in the theoretical foundations of TMS and application in treatment and research.
 - Management of Open-Source Code enabling use by other researchers.
3. Research management:
 - Fellowship or other funding applications planned (indicate name of award if known; include fellowships with entire funding periods, grants written/applied for/received, professional society presentation awards or travel awards, etc.)
4. Communication skills:
 - Ability to confidently give talks to senior scientists at conferences.
 - Writing informatively and engagingly, for both academic audiences as well as laypeople.
 - Hosting interactive science communication formats, i.e. (live) video or talks.
5. Other professional training (course work, teaching activity):
 - Mentorship of Master's students from the department of physics interested in computational neuroscience.
6. Anticipated networking opportunities
 - Participation in Journal Clubs with researchers from UiO, as well as at alma mater/secondment location at Radboud University.
7. Other activities (community, etc) with professional relevance:

Date & Signature of Doctoral Candidate:

A handwritten signature in black ink, appearing to be "L. J. van der...".

21/05/2026

Date & Signature of supervisor

A handwritten signature in black ink, reading "Gaute Einvoll".

21/05/2026