ENTRAIN VISION ESR Recruitment guidelines

DEADLINE EXTENDED TO 29th MAY 2020 ONLY FOR ESR4, ESR5, ESR6, ESR9, ESR10, ESR13, ESR14 and ESR15

European Network for integrated TRAINing on Innovative Therapies for VISion RestoratiON

About ENTRAIN VISION

The call for 15 ESR positions is based on the "**European Network for integrated TRAINing on Innovative Therapies for VISion RestoratiON**" (ENTRAIN VISION) project funded by the European Commission under the Grant Agreement 861423. This action involves 10 universities, research organisations and companies from 8 European countries, in collaboration with other European partners from the public and private sector.

Blindness is the most feared handicap leading to the greatest exclusion from society by reducing patient autonomy and mobility. There are still an estimated 39 million blind people worldwide. Clinical trials have demonstrated the possibility to regain some useful vision with retinal prostheses in patients having lost photoreceptors. New approaches are entering into clinical trials such as photovoltaic implants, optogenetic therapy and even cortical prostheses for patients having lost eye to brain connection.

In the ENTRAIN-VISION project, the Early Stage Researchers (ESRs) will work on these innovative technologies for restoring vision in blind patients. Their training in academic institutes or industry will be completed by several secondments, including one at an industry partner. In addition, several summer schools will address scientific subjects on vision restoration and transferable skills in technology transfer, clinical trials, start-up creation, communication to media.

The project will thus create a unique European network of researchers, clinicians and industrials on visual restoration. This network will provide a comprehensive training across multiple disciplines including neuroscience, vision, psychophysics, genetic, electronic, bio-engineering and computational modelling. It will prepare a new generation of leaders able to carry the new therapeutic strategies from bench to patients. ESRs will meet founders of start-ups and industrial partners enlarging thereby job opportunities to 1) remain in the career path of research & innovation, 2) contribute to clinical trials and/or develop the rehabilitation programs or 3) get involved in product manufacture, distribution and marketing throughout Europe. This project will generate great social and economic benefits in Europe by improving patient autonomy and daily life.

Participating host organisations

The network will recruit 15 Early Stage Researchers (ESR) who will be selected, hired, trained and supervised by senior researchers participating in the programme, both in the academic and industrial fields, in the following organisations:

- Sorbonne Université, Fance
- Ecole Polytechnique Federale De Lausanne (EPFL), Switzerland
- Carol Davila University of Medicine and Pharmacy (UMFCD), Romania

- Naturwissenschaftliches und Medizinisches Institut an der Universitaet Tuebingen (NMI), Germany
- Eberhard Karls Universitaet Tuebingen (EKUT), Germany
- Aalto Korkeakoulusaatio SR (Aalto University), Finland
- Universidad Miguel Hernandez De Elche (UMH), Spain
- Univerzita Karlova (CUNI), Czech Republic
- Fondazione Istituto Italiano di Tecnologia (IIT), Italy
- Streetlab, France

ESR projects

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ESR 1: Visual restoration with a whole diamond visual prosthesis

Objectives:

- Demonstrate functional efficacy of whole diamond visual prostheses ex vivo, in vivo
- Assess safety and stability of the diamond visual implants

Expected Results:

- Detailed characterization of the functional properties for the doped diamond electrodes as measured in vitro on an isolated retina recorded on a multielectrode array.
- Proof of concept for the in vivo activation of neurons on the visual system at the retinal and cortical levels.
- Stability of the implant in vivo by several months of in vivo monitoring and subsequent ex vivo characterization
- Safety of the implant by histological examination of the tissues following several months in vivo

Host institution: Sorbonne Université (Paris, France) – Supervisor: Serge Picaud

Lab description: The Institut de la Vision hosts on the same site, fundamental, clinical and industrial research. It is set up in the heart of Paris within the campus of the Quinze-Vingts National Hospital, which allows scientists to work hand-in-hand with clinicians. Its main building of 6000 m2 harbors 21 research teams (~280 researchers) working on different vision-related topics, with a focus on vision diseases (e.g., age-related macular degeneration). Twelve technology platforms are at the core of the Institut de la Vision's research activities, dedicated to: behavioral assessment in ecological conditions, preclinical studies on non-human primates, tissue and cell imaging by confocal microscopy, adaptive optics, full field optical coherence tomography, functional explorations, DNA-collection, transcriptome and proteome analysis, bioinformatics, patch clamp study of ionic channels, two-photon imaging and optogenetic tools, development of animal models, genetic therapy approaches, pharmalogical and light toxicity.

Planned secondments: EPFL (Geneva, Switzerland), Instead Technologies (Elche, Spain).

ESR2: Optimization of optogenetic therapy by targeting a new retinal cell type

Objectives:

- Investigate the role of Amacrine in the retinal circuit by optogenetic therapy
- Assess a new optogenetic amacrine cell target to produce ON/OFF responses
- Provide the proof of concept for visual restoration with optogenetic activation of amacrine cells

Expected Results:

- Demonstrate amacrine specific cell targeting
- Responses to optogenetic activation of amacrine cells in a normal retina
- Provide evidence for restored ON/OFF responses in a blind rodent retina

- Characterize visual perception in a behavioral test for optogenetic therapy

Host institution: Sorbonne Université (Paris, France) – Supervisor : Olivier Marre
Lab description: The Institut de la Vision hosts on the same site, fundamental, clinical and industrial research. It is set up in the heart of Paris within the campus of the Quinze-Vingts National Hospital, which allows scientists to work hand-in-hand with clinicians. Its main building of 6000 m2 harbors 21 research teams (~280 researchers) working on different vision-related topics, with a focus on vision diseases (e.g., age-related macular degeneration). Twelve technology platforms are at the core of the Institut de la Vision's research activities, dedicated to: behavioral assessment in ecological conditions, preclinical studies on non-human primates, tissue and cell imaging by confocal microscopy, adaptive optics, full field optical coherence tomography, functional explorations, DNA-collection, transcriptome and proteome analysis, bioinformatics, patch clamp study of ionic channels, two-photon imaging and optogenetic tools, development of animal models, genetic therapy approaches, pharmalogical and light toxicity.
Planned secondments: Aalto University (Aalto, Finland), Artanim (Geneva, Switzerland)

ESR3: Use of virtual reality for a rational design of retinal prostheses

Objectives:

- Emulate prosthetic vision in a virtual immersive multi-sensorial environment
- Assess different designs of new prostheses in healthy subjects

Expected Results:

- Design Virtual reality scenari that are common in daily life.
- Measure behavioral performances of healthy subjects while emulating prosthetic vision with differentresolution, visual field and electrode distribution.
- Propose new protocols for assessing the benefit of visual prostheses in patients

Host institution: EPFL (Geneva, Switzerland) – Supervisor: Dieggo Ghezzi
Lab description: EPFL is one of the two Swiss Federal Institutes of Technology. Its main campus brings together over 14,500 persons, students, researchers and staff - with the status of a national school since 1969, the young engineering school has grown in many dimensions, to the extent of becoming one of the most famous European institutions of science and technology. The laboratory is located at the Fondation Campus Biotech Geneva (www.campusbiotech.ch), a new centre of excellence in biotechnology and life science research. FCBG is a joint initiative where research laboratories from several institutions (including EPFL) focus on pure science and its translation into practical outcomes that have an impact on society and the world, such as accelerating neuro-technology for human benefit. A facility for VR experimentation is fully available and accessible for the ESR work.
Planned secondments: Artanim (Geneva, Switzerland), CUNI (Prague, Czech Republic), Streetlab (Paris, France)

ESR4: Use of optical tweezers for retinal cells separation toward transplantation and optogenetic therapy

Objectives:

- Apply optical tweezers to retinal cell separation
- Dielectric characterization of retinal cells
- Separation of retinal cells for cell transplantation and optogenetic therapy

Expected Results:

- Protocols for label-free, contactless retinal cells characterization / selection
- Production of purified cell types for cell transplantation
- Preservation of purified retinal cell types

Host institution: UMFCD (Bucharest, Romania) – Supervisor: Tudor Savopol
Lab description: UMFCD is the leading high education institution in medicine and pharmacy of Romania. It has many subordinated research centers, including the Research Excellence Center for

Biophysics and Cell Biotechnology (head Prof. Tudor Savopol). This research group carries out activities and projects in the field of vision research, such as monitoring of the metabolic status of retinal photoreceptors by the evaluation of their electrical polarity due to the asymmetrical disposition of their ionic pumps.
Planned secondments: Sorbonne Université (Paris, France), Artanim (Geneva, Switzerlnd)

ESR5: Towards object encoding using electrical and optogenetic artificial retinal stimulation at high spatio-temporal resolution

Objectives:

- Evaluate the spatial, temporal and contrast sensitivity of spatio-temporally patterned optogenetically and electrically stimulated retinal circuits in blind ex vivo retina;
- Develop object encoding strategies for optogenetic and for electrical stimulation

Expected Results:

- Characterization of the spatio-temporal and contrast sensitivity responses tin blind retinas upon optogenetic and electric activation using 2 photo-imaging and multi-electrode array recording.
- Responses for patterned stimuli to both optogenetic and electrical approaches in blind retina.
- Object encoding strategies validated on blind retinas

Host institution: NMI (Tübingen, Germany) – Supervisor: Günther Zeck
Lab description: The NMI conducts cutting-edge applied research and development at the interface of the life sciences and material sciences. The core competences comprise the pharmaceutical sector, biotechnology and biomedical technology. The laboratory is equipped with unique electrophysiology setups that enable electrical stimulaltion and extracellular recording from retina at high spatial resolution (~ 10 µm).
Planned secondments: Sorbonne Université (Paris, France), MultiChannelSystems MCS GmbH (Reutlingen, Germany)

ESR6: Investigation of the electrical-stimulation induced beneficiary effects on diseased retina

Objectives:

- Characterize the emergence of neuroprotective markers induced by means of sustain electrical stimulation of retinal cell.
- Characterize the neuroprotective effect of electrical stimulation on the survival rate of the degenerating photoreceptors (role of retinal pitmen-epithelium).
- Comparison of the electro-stimulation induced neuroprotective effect on mouse retina (exvivo) with human retinal organoids (iPSC).

Expected Results:

- Enhance therapy: Provide enhanced trans-corneal electrical stimulation therapy for blinding people by slowing down the blindness and improving the visual acuity.
- Optimize the “seamless” transition from natural vision over blindness to electrical-implant aided vision: The retina and the visual pathway will be prepared for excitement by e-stim.
- Promote enhanced artificial vision aid at the onset of complete blindness: The pre-treatment of the retina by electrical stimulation would preserve the functionality of the secondary retinal neuronal circuitry (due to “fire & wire”). Especially the increased surviving rate of the dormant photoreceptors would promote an enhanced artificial vision aid driving the retinal ON and OFF pathway selectively (e-stim: dormant photoreceptors > Glutamate > ON/OFF Bipolar cells).

Host institution: EKUT (Tübingen, Germany) – Supervisor: Eberhart Zrenner
Lab description: The Professorship for Pathophysiology of Vision (Zrenner Lab) is focussed on retinal degeneration research (http://www.eye-tuebingen.de/zrennerlab/projects/). Its main goal is the translation of knowhow and results between basic and patient oriented research. Within the Zrenner

Lab two groups are working on experimental retinal prosthetics: 1. developing new electrical stimulation paradigms in degenerated mouse retinae with multi-electrode arrays and calcium imaging (Haq group) and 2. a systems approach exploring novel processing algorithms (Rathbun Group) that may improve prosthetic visual perception. The primary goal is understanding how visual images are processed in the healthy and degenerating mouse retina and how retinal neurons respond to extracellular electrical stimulation, applying this knowledge to applications in retinal neuroprostheses.
Planned secondments: EPFL (Geneva, Switzerland), Okuvision GmbH (Tübingen, Germany)

ESR7: Characterization of healthy and diseased mouse models from retinal circuits to visually guided behaviour

Objectives:

- Characterize the retinal ouput at different disease states in a model of retinal disease
- Correlate the retinal output to the animal behavior in the water mazer

Expected Results:

- Definition of the limit in ganglion cell output to trigger visual perception,
- Conclusions for expected visual perception during visual restoration based on the restored retinal output

Host institution: Aalto University (Aalto, Finland) – Supervisor: Petri Ala-Laurila
Lab description: Aalto University (Aalto) is the largest technology-oriented university in Finland. The Department of Neuroscience and Biomedical Engineering is located in the Otaniemi campus – one of the most important north-european technology hubs, with a high concentration of companies, and research institutes from the high-technology sector, and with a thriving culture of entrepreneurship. Dr Ala-Laurila has two laboratories (http://ala-laurila.biosci.helsinki.fi/): one at Aalto University and one at University of Helsinki. Both labs work in integrated collaboration and they are equipped with state-of-the art approaches to study retinal circuits and visually-guided behavior. They combine cutting-edge electrophysiological recording techniques with precise manipulations of retinal circuit function, mathematical modelling and quantitative behavioural measurements: https://www.youtube.com/watch?v=ZniIYFSIcT8. Apply now if you have a genuine interest in studying neural circuits, animal behavior and the underlying mechanisms (see also our recent papers: Neuron 2019, Current Biology, 2020).
Planned secondments: Sorbonne Université (Paris, France), Streetlab (Paris, France)

ESR8: From the retina to behavior: The absolute sensitivity limit of vision in healthy and diseased mouse models

Objectives:

- Quantify the visual performance of various mouse models with unprecedented resolution
- Correlate behavior response to retinal ganglion cell measurements
- Understand the functional implications of retinal circuit mechanisms in healthy and diseased animal models.

Expected Results:

- Define behaviour dysfunction according to retinal diseases
- Establish a rule between ganglion cell function and animal behaviour
- Break new frontiers in understanding both the functional implications as well as the mechanistic basis of retinal computations in healthy and diseased visual systems.

Host institution: Aalto University (Aalto, Finland) – Supervisor: Petri Ala-Laurila
Lab description: Aalto University (Aalto) is the largest technology-oriented university in Finland. The Department of Neuroscience and Biomedical Engineering is located in the Otaniemi campus – one of the most important north-european technology hubs, with a high concentration of companies, and research institutes from the high-technology sector, and with a thriving culture of entrepreneurship. Dr Ala-Laurila has two laboratories (http://ala-laurila.biosci.helsinki.fi/): one at Aalto University and

one at University of Helsinki. Both labs work in integrated collaboration and they are equipped with state-of-the art approaches to study retinal circuits and visually-guided behavior. They combine cutting-edge electrophysiological recording techniques with precise manipulations of retinal circuit function, mathematical modelling and quantitative behavioural measurements: https://www.youtube.com/watch?v=ZniIYFSIcT8. Apply now if you have a genuine interest in studying neural circuits, animal behavior and the underlying mechanisms (see also our recent papers: Neuron 2019, Current Biology, 2020).
Planned secondments: IIT (Genova, Italy), FEMTONICS (Budapest, Hungary)

ESR9: Imaging enhancement techniques for bioelectronic visual aids

Objectives:

- Implement bioinspired algorithms to maximize meaningfull information in a visual scene
- Develop such algorithm for patients with partial visual loss through augmented vision systems.

Expected Results:

- Developmet of different image enhancement techniques using parallel architectures in either mobile GPUs of FPGAs, to cover different power and/or speed requirements
- Validation of these techniques in patients suffering from either central or peripheral vision loss.
- Implementation of a bioinspired visual encoder optimized for cortical visual neuroprosthesis.

Host institution: UMH (Elche, Spain) – Supervisor: Eduardo Fernandez Jover
Lab description: The Miguel Hernández University is a public young dynamic university, in the Southeast of Spain, a high economical and enterprising potential area. The group is the result of collaborations between medical doctors, biologists and engineers from the Faculties of Medicine, Engineering, Chemical Technology and Computer Science. The UMH group has a large expertise in biomedical engineering and multidisciplinary research activities and belongs to the Bioengineering Institute and to the Biomedical Networking Research Center (CIBER), the consortium created under the leadership of the Spanish Health Institute to promote research excellence and build a critical mass of researchers in the field of Biomedicine and Health Sciences. A major topic in the team is the development of a cortical visual neuroprosthesis and the synergistic convergence of diverse and previously separated fields of science and technology to create key new neural interfaces. The group is also working on innovative treatments for several neurological diseases
Planned secondments: EPFL (Geneva, Switzerland), Okuvision GmbH (Tübingen, Germany)

ESR10: Development of a cortical visual neuroprosthesis for the blind

Objectives:

- Model patterned micro-stimulations expected from a cortical visual prosthesis
- Develop new strategies to provide functionally meaningful information to a cortical visual neuroprosthesis that can be specifically tailored for every patient's individual needs.
- Define the multimodal plasticity changes occuring following the loss of sight to improve the success of visual restoration.

Expected Results:

- Characterization of the degree of cross-modal plasticity in blind patients using Transcranial Magnetic Stimulation (TMS), Magnetic Resonance Imaging (MRI), functional Magnetic Resonance Imaging (fMRI), Diffusion Tensor Imaging (DTI) and Magnetic Resonance Spectroscopy) according to the level of blindness
- Protocols for testing visual perception with cortical prosthesis.
- Algorithms to design complex stimulating patterns through the multiple microelectrodes of a cortical prosthesis.

Host institution: UMH (Elche, Spain) – Supervisor: Eduardo Fernandez Jover

Lab description: The Miguel Hernández University is a public young dynamic university, in the Southeast of Spain, a high economical and enterprising potential area. The group is the result of collaborations between medical doctors, biologists and engineers from the Faculties of Medicine, Engineering, Chemical Technology and Computer Science. The UMH group has a large expertise in biomedical engineering and multidisciplinary research activities and belongs to the Bioengineering Institute and to the Biomedical Networking Research Center (CIBER), the consortium created under the leadership of the Spanish Health Institute to promote research excellence and build a critical mass of researchers in the field of Biomedicine and Health Sciences. A major topic in the team is the development of a cortical visual neuroprosthesis and the synergistic convergence of diverse and previously separated fields of science and technology to create key new neural interfaces. The group is also working on innovative treatments for several neurological diseases
Planned secondments: Okuvision GmbH (Tübingen, Germany), Instead Technlogies (Elche, Spain), CUNI (Prague, Czech Republic)

ESR11: Simulation of prosthetic stimulation in neural substrate

Objectives:

- Embed a model of retinal and cortical prosthetic device in existing models of early visual system.
- Calibration of simulations against in-vivo retinal and cortical data obtained inside the consortium.
- Understand how patterned stimulations interacts with the activity dynamics in neural circuitry.
- Formulate recommendations for specifications of future visual implants stimulation protocols.

Expected Results:

- Simulation software capable of predicting the outcome of stimulations in retina or cortex in biologically detailed model of retino-thalamo-cortical circuitry.
- Demonstration of adherence of the modelled optogenetic stimulation outcomes to corresponding data from in-vivo experiments.
- Detailed analysis of neural dynamics in retina, LGN and V1 under various configurations of optogenetic stimulation.
- Draft of specifications of implant hardware and associated stimulation protocols that would be optimal at inducing cortical activity patterns analogous to those due to normal vision.

Host institution: CUNI (Prague, Czech Republic) – Supervisor: Jan Antolik
Lab description: CUNI is one of the oldest universities in the world and largest and best ranked university in Czech Republic. The ESRs will be hosted at the School of Computer Science (SoCS) of the Faculty of Mathematics and Physics. The School of Computer Science is multi-national, hosting more than 20 foreign researchers and PhDs, as well as students from the Europe and the rest of the world. The key infrastructure pertaining to the research of incoming ESRs is computing facilities. The School of Computer Science is well equipped in this regard, being in possession of several computational clusters that can be used for the applicant's project. Of the 400+ courses taught at the School of Computer Science, more than 30 are dedicated to the discipline of machine learning pertinent to this application, including specialized courses such as 'Machine Learning and Bioinformatics' or 'Informatics and Cognitive Science'.
Planned secondments: EPFL (Geneva, Switzerland), Sorbonne Université (Paris, France), Inovatrics (Bratislava, Slovakia)

ESR12: Optogentic encoding schemes in retina, LGN and V1

Objectives:

- Develop neural data metrics for validating the quality of optogenetic stimulation.
- Develop machine learning based around specialzed DNN architectures for learning the encoding scheme of the visual input to replicate encoding at the level of retina, LGN and V1.

- Ensure operability of the encoding schemes determined in 2 within the constraints of the prosthetic device hardware.

Expected Results:

- Specification of analysis protocols for determining the quality of optogenetic stimulation.
- Learned mapping from the visual stimulus to the retina, LGN or visual corticex with all transformations from the prosthetic input hardware (camera) to the implanted LED array.
- A ready-to-use implementation of the stimulation protocols on the specialized low-powered hardware of the prosthetic device.

Host institution: CUNI (Prague, Czech Republic) – Supervisor: Jan Antolik

Lab description: CUNI is one of the oldest universities in the world and largest and best ranked university in Czech Republic. The ESRs will be hosted at the School of Computer Science (SoCS) of the Faculty of Mathematics and Physics. The School of Computer Science is multi-national, hosting more than 20 foreign researchers and PhDs, as well as students from the Europe and the rest of the world. The key infrastructure pertaining to the research of incoming ESRs is computing facilities. The School of Computer Science is well equipped in this regard, being in possession of several computational clusters that can be used for the applicant's project. Of the 400+ courses taught at the School of Computer Science, more than 30 are dedicated to the discipline of machine learning pertinent to this application, including specialized courses such as 'Machine Learning and Bioinformatics' or 'Informatics and Cognitive Science'.

Planned secondments: GoodAI (Prague, Czech Republic), Inovatrics (Bratislava, Slovakia), Sorbonne Université (Paris, France)

ESR13: Development of membrane-targeted azobenzene-based compounds for vision restoration

Host institution: IIT (Genova, Italy) – Supervisor: Fabio Benfenati

Objectives:

- Development of new potent and persistent membrane-targeted azobenzene-based compounds for photoexcitation.
- Validation of the new photoswitch for visual restoration
- Production of photoswitch delivery system

Expected Results:

- Characterization of the mechanism of action of azobenzene-based compounds
- Characterization of the new photoswitch effects in neurons and retinal explants
- Setup of an efficient in vivo delivery system;
- Proof of concept in in vivo animal models of retinal diseases.

Host institution: IIT (Genova, Italy) – Supervisor: Fabio Benfenati

Lab description: IIT is a government sponsored Foundation to promote excellence in RTD and training within a national and international context. Within IIT, the Center for Synaptic Neuroscience and Technology (NSYN) has the objective to apply new technologies to the study of the central nervous system, with special reference to (i) the relationships between neural molecules and information coding and processing in the brain; (ii) pathogenesis of brain diseases (iii) neuron-to-chip systems allowing the implementation of new neuron-based biosensors and neuroprosthetic interfaces, namely retinal prostheses. The group has also long-standing experience in using viral vectors using silencing strategies or optogenetic strategies.

Planned secondments: Sorbonne Université (Paris, France), FEMTONICS (Budapest, Hungary), ON-IRIS Biomed (Milan, Italy)

ESR14: Development and testing of organic nanoparticle-based light actuators for retinal applications

Host institution: IIT (Genova, Italy) – Supervisor: Fabio Benfenati

Objectives:

- Develop microinjectable polymeric nanoparticles for high-resolution and minimally invasive retinal prosthetic devices
- Demonstrate safety and efficacy of the photosensitive polymeric nanoparticles.

Expected Results:

- Production of optimized polymeric nanoparticles;
- characterization of the light dependent effects in neurons and retinal explants
- Proof of concept (efficacy and safety) in an in vivo animal model of retinal diseases.

Host institution: IIT (Genova, Italy) – Supervisor: Fabio Benfenati

Lab description: IIT is a government sponsored Foundation to promote excellence in RTD and training within a national and international context. Within IIT, the Center for Synaptic Neuroscience and Technology (NSYN) has the objective to apply new technologies to the study of the central nervous system, with special reference to (i) the relationships between neural molecules and information coding and processing in the brain; (ii) pathogenesis of brain diseases (iii) neuron-to-chip systems allowing the implementation of new neuron-based biosensors and neuroprosthetic interfaces, namely retinal prostheses. The group has also long-standing experience in using viral vectors using silencing strategies or optogenetic strategies.

Planned secondments: EKUT (Tübingen, Germany), FEMTONICS (Budapest, Hungary), ON-IRIS Biomed (Milan, Italy)

ESR15: Development of clinical endpoints of daily-life activity for low vision patients to assess the effect of visual restoration

Objectives:

- Develop a set of protocols to evaluate the therapeutic benefit of vision restoration using standardized daily-life tasks (reading, locomotion, spatial orientation, posture ...)
- Propose to regulatory authorities (e.g., FDA, EMEA, ANSM) new objective assessment criteria for the therapeutic benefit of visual restoration in clinical studies.

Expected Results:

- Identification of the behavioural markers of performance in low vision patients using the study of postural, sensorimotor and oculomotor changes in the daily-life tasks (e.g. reading, locomotion, visual search, spatial orientation and driving).
- A standardized experimental platform to measure, extract and analyze behavioural markers using (1) functional tests, (2) quality of life questionnaires, (3) performance in standard tasks of daily living, and (4) actual activity in daily life (actimetry and connected objects).
- Define the acceptability and sensitivity of this platform for therapeutic benefit of vision restoration
- Grade tests to define their availability among clinical investigation centres, contract clinical research organizations and health professionals for standardized and multicentric assessments.

Host institution: Streetlab (Paris, France) – Supervisor: Colas Authié

Lab description: StreelLab is a SME subsidiary of “Institut de la Vision”, an integrated research centre on vision pathologies located in Paris, France (20 employees, 1.5M€ Turnover). Streetlab provides co-design expertise and evaluation services to companies developing products and services aiming to improve the autonomy, accessibility, mobility and quality of life of visually impaired people. Streetlab has several evaluation platforms reproducing virtual or real immersive environments, ensuring a high standard of methodology. Its infrastructures include a driving simulator, an experimental apartment reproducing daily living environment, an artificial street (indoor virtual city street with sound and visual immersion, virtual reality headsets and simulators reproducing low vision conditions in urban and housing environments.

Planned secondments: OkuVision GmbH, (Tübingen, Germany), EPFL (Geneva, Switzerland)

Benefits and salary

ITNs are financially supported by the European Commission under the Marie Skłodowska-Curie Actions (MSCA) because they provide excellent research, training and career aspects. The benefits of being a PhD student in an ITN network include:

- the chance to participate in specially developed courses (e.g. on specific techniques, academic soft skills)
- building your personal professional network at a very early stage of your career due to the embedding of our PhD projects in an academic/industrial network
- being exposed to industry and the challenges in industry already during the PhD, as all ESR will be either hosted or seconded to a private sector partner
- the opportunity to spend some time in the labs of other partners (and get familiar with other disciplines, techniques, cultures etc.), as the research projects are designed such that they will mostly have interdisciplinary components
- Being advised by excellent group leaders – they are all outstanding in their research and training

The ITN programme offers a highly competitive and attractive salary and working conditions. The successful candidates will receive a salary in accordance with the MSCA regulations for early stage researchers. The salary includes a generous living allowance, a mobility allowance and a family allowance (depending on family situation) comprising:

- **Living Allowance** of €3270/month (gross) to be paid in the currency of the country where the Host Organisation is based and with a correction factor to be applied per country. The exact (net) salary will be confirmed upon offer and will be based on local tax regulations and on the country correction factor (to allow for the difference in cost of living in different EU Member States)
- **Mobility allowance** of €600/month to be paid to all ESRs recruited
- **Family allowance** of €500/month, depending on family situation.

The ESR will be contractually employed for 36 months by their host institution and will be covered under the social security scheme of the enrolling country. In addition to their individual scientific projects, all ESRs will benefit from further continuing education, which includes internships and secondments, a variety of training modules as well as transferable skills courses and active participation in workshops and conferences.

Eligibility criteria

Applicants need to fully comply with four eligibility criteria:

- **Academic Qualification**: The applicant has obtained a Degree that formally entitles them to embark on a doctorate in the host country. The degree should be in the area specified by the ESR project (or related disciplines).
- Early-stage researchers (ESR) are those who are, at the time of recruitment by the host, in the **first four years (full-time equivalent) of their research careers**. This is measured from the date when they obtained the first degree which formally entitles them to embark on a doctorate, either in the country in which the degree was obtained or in the country in which the research training is provided, irrespective of whether or not a doctorate was envisaged. Please note applicants cannot already hold a PhD.
- Conditions of **international mobility** of researchers: Researchers are required to undertake trans-national mobility (i.e. move from one country to another) when taking up the appointment. At the time of appointment by the host organisation, researchers must not have resided or carried out their main activity (work, studies, etc.) in the country of their host organisation for more than 12 months in the 3 years immediately prior to their recruitment. Short stays, such as holidays, are not taken into account. Researchers from any country (not only from European Union) are welcome to apply.

- **English language**: ESR candidates must demonstrate that their ability to understand and express themselves in both written and spoken English is sufficiently high for them to derive the full benefit from the network training.
- For all recruitments, the eligibility of the researcher will be determined at the **date of their first recruitment** in the action (1st September 2020). Due to the COVID-19 pandemic, the date of recruitment can be extended until end of December 2020 if duly justified.

Applications that don't meet the eligibility criteria won't be considered.

Application process

Applications must contain the following:

- Application form
- An up-to-date CV, without gaps
- A cover letter exposing the candidate motivation for the fellowship
- At least one reference letter from a (former) supervisor or professor
- Scanned copy of the degree (usually the master's degree) which would formally entitle the candidate to embark on a doctorate. If the degree has not been obtained yet, the applicant will have to provide a declaration of her/his university stating that the degree will be obtained before the expected starting date
- Transcript of records (applicant's ranking and marks) for both Bachelor degree and Master degree. In case the applicant has not obtained their Master degree yet, a copy of the most up-to-date Master grades should be provided.

Any document not originally in English must be provided together with an English translation.

All documents must be submitted as a single PDF file, named as follows: lastname_firstname.pdf.

Applications must be sent to recruitment@entrain-vision.eu.

The deadline for the submission of applications for ESR4, ESR5, ESR6, ESR9, ESR10, ESR13, ESR14 and ESR15 ONLY is extended to 29th May 2020, 16.00 CET (Paris time).

Selection process

Applications will be evaluated against the following criteria:

1. Educational record
2. Scientific quality of the applicant's CV
3. Expected impact and benefit to the fellow and to the project
4. Previous experiences in the area of the ENTRAIN VISION research programme
5. Personal interview

Applications will be checked for eligibility against the criteria listed in the section above. Eligible applications will be sent to the supervisor(s) of the selected ESR projects. Each supervisor will prepare a long-list and a short list of applications for ESR positions hosted by their institutions based on criteria evaluation criteria 1 to 4 above.

Due to the COVID-10 pandemic, short-listed applicants will be invited for panel interviews remotely (visio-conference), in place of the interviews initially planned to take place in Paris.

The selection panels consist of the respective supervisors and may be complemented by other supervisors for appropriate gender balance or intersectoral expertise.

The selection timeline is the following:

29th May 2020	Extended deadline for application submission for **ESR4, ESR5, ESR6, ESR9, ESR10, ESR13, ESR14 and ESR15 only**
April/May 2020	Eligibility check and selection of short-listed candidates (initial deadline and extended deadline)
May/June 2020	Panel interviews (remotely)
June 2020	Notification of the selected candidates
1st September 2020 until end of December 2020	Beginning of contracts

Eye by Flatart from the Noun Project