

## Postdoc position

Title:

**Collection and exploitation of eye-tracking data and region of interest in drone videos**

Position type: Postdoc

Functional area: Nantes

Team: IPI Image Perception Interaction

Scientific advisors: [vincent.ricordel@univ-nantes.fr](mailto:vincent.ricordel@univ-nantes.fr) and [matthieu.perreiradasilva@univ-nantes.fr](mailto:matthieu.perreiradasilva@univ-nantes.fr)

Duration: 12 months

Start date: from the 1<sup>st</sup> of January 2018

Net salary: 2100 euros per month

Nationality: the candidate must be European (UE or Swiss)

About LS2N and the IPI team

The **LS2N** “Laboratoire des Sciences du Numériques de Nantes” ([www.ls2n.fr](http://www.ls2n.fr)) is a new joint research unit associated with CNRS, it has been created in January 2017, and it results from the merge of the IRCCyN and LINA laboratories. The LS2N aims to bring together the research forces of Nantes in Cybernetics and Computer Sciences, in order to develop the digital sciences, opened to the other disciplines and in an awareness of the societal challenges that it implies. The LS2N is supported by 5 co-tutelles and partners (University of Nantes, CNRS, Ecole Centrale de Nantes, IMT Atlantique, and INRIA), it counts about 450 researchers and it is located on 5 geographical sites in Nantes.

Within the LS2N, the **IPI** “Image Perception Interaction” ([www.ls2n.fr/equipe/ipi](http://www.ls2n.fr/equipe/ipi)) team is the new version of the IVC team. The IPI team belongs to the SIEL cluster “Signal, Images, Ergonomics, Languages” of the LS2N, and IPI contributes to 3 transversal themes of the laboratory (Enterprise of the Future, Life Sciences, Digital Creation, Culture and Society). Exactly the research of the IPI team is grouped around five themes: Discrete representation of the information; Representation and perception (psycho-visual models); Interaction and perception (image quality and Quality of Experience); Multimedia representation and communication; Interpretation (learning and pattern recognition for structured handwritten documents).

About the Project ANR DISSOCIE

**DISSOCIE** stands for “Détection automatique des Saillances du point de vue des Opérateurs et Compression Intelligente des vidéos de drones” or “Automated Detection of Saliencies from Operators' Point of View and Intelligent Compression of Drone videos”.

The aerial surveillance, monitoring and observation with drone present major challenges in terms of defence, security and environment. For example, France and Britain have agreed to invest 2 billion euros in a project to build next-generation multi-role drones capable of carrying out surveillance and observation missions, identifying targets and launching strikes on enemy territory for future operational capacity beyond 2030. However, the observation, targets identification and surveillance missions are currently being carried out by human operators, who do not have the ability to fully and effectively exploit all available drone videos. The science and the technology of the eye-tracking study, visual attention modelling, human operator models, and intelligent compression opens up new possibilities to meet these challenges.

In this context, the DISSOCIE project aims to develop automatic and semi-automatic operator models capable of detecting salient areas from the point of view of human operators, by considering the low-level characteristics of the salient content in the videos, geo-temporally localized contextual information, and the expertise and the detection strategies of human operators. Machine learning can be used at different levels of this modelling process. The new HEVC video compression standard and the scalable coding will also be exploited in this project to improve the efficiency when the experts re-watch the videos. The originality of the project lies in an innovative approach to jointly address these challenges based on the complementarity and the strengthening of the scientific expertise gathered in the consortium: especially on eye-tracking analysis, visual fixation prediction, visual attention modelling, salient object detection and segmentation, human observer modelling, and video compression. The project is broken down into 4 tasks: Construction of a ground truth (T1 Task), Development of models and algorithms of geo-temporally localized saliency (T2 Task), Human operator modelling via machine learning and its integration with the geo-temporally localized saliency (Task T3), Intelligent compression based on salient regions and metadata insertion (T4 Task). The DISSOCIE initiative, from its consortium formed by three academic members (IETR/VADDER, IRISA/PERCEPT, LS2N/IPI), will implement an applied research program.

About the PostDoc subject:

The objective of the postdoc is to contribute mainly to T1 task of the project, so it aims at constructing the ground truth consisting of eye-tracking data and of regions of interest collected from the interpreter-expert observers during the viewing of drone videos. The goal is also to jointly analyze these oculometric data and regions of interest, and to propose a first observer model (so in link with T3 task). Note that this work is central in the project, because this ground truth is necessary to conceive the computational models of visual attention corresponding to the point of view of the military operators on the videos of drones. It is also a basis for T4 task of intelligent compression of drone videos.

Precisely, the postdoc will participate to the definition of the collection methods (eye-tracking data and regions of interest) and to the collection of the data itself, to the design and deployment of tools to track the objects within the drone videos, and to the joint analysis and exploitation of the data (oculometric data and regions of interest). He will also directly participate to the project life (production of the corresponding deliverables, meetings), and to the dissemination of the scientific results.

Skills and profile:

PhD in computer science, data science, signal/image processing, computer vision or applied maths.

Background in visual attention modeling, eye-tracking, computational modeling, image/video coding, image/video processing and computer vision.

Excellent programming skills.

Fluency in English.

Contact:

Send your CV and motivations

to Vincent Ricordel ( [vincent.ricordel@univ-nantes.fr](mailto:vincent.ricordel@univ-nantes.fr) )

and to Matthieu Perreira Da Silva ( [matthieu.perreiradasilva@univ-nantes.fr](mailto:matthieu.perreiradasilva@univ-nantes.fr) )