

2 Post-Doctoral Fellow positions

“Electro-oculometry for human-system interaction and physiological monitoring in real and virtual environments”



Start date: Fall 2019 (duration 20 months and 18 months)

Application deadline: 7 April 2019

Funding: ELOCANS Project (ASTRID Call 2018, Agence Innovation Défense, ANR-DGA)

Supervisors: Dr. Vsevolod Peysakhovich (ISAE-SUPAERO), Prof. Christophe Hurter (ENAC)

In numerous domains (aeronautics, medical, military, nuclear, command-and-control), visual activity is an essential element of the expertise. Therefore, eye tracking and the study of eye movements are omnipresent in neuroscience, psychology, industrial engineering, human factors, and computer science, to study the operator's state. In addition to the comprehension of the attentional processes, the voluntary eye movements can be used for human-system interaction. Nevertheless, due to the lack of appropriate software and hardware, the use of the gaze-based interaction in real and virtual environments is for now mostly restricted to the research domain. Nowadays, the most used eye tracking technique is video-based tracking using infrared illumination. However, the tools using this technique present a certain number of disadvantages. Notably, for the head-mounted tools, such systems obstruct the visual field and therefore are not suitable for integration in real operational environments. An alternative technique consists of measuring the changes in electric potential near the eye. The electro-oculography (EOG) requires only a few electrodes to place on the face and does not obstruct the visual field or unnecessarily illuminates the eyes with the infrared light. This technique is convenient for the head-mounted peripherals such as audio or virtual reality headset.

The ELOCANS project addresses this lack of software and hardware for gaze-based interaction in operational environments. In numerous activities such as air traffic control or piloting an aircraft, the operators are already equipped with peripherals (typically, headsets). We are looking to optimize the efficiency of these existing peripherals and integrate the EOG. By studying the EOG integration in these control/communication peripherals to enhance the human-system interaction and making possible the psycho-physiological monitoring (based on blink rate, for instance), this project has numerous possible applications in aeronautics (fighters, helicopters, UAV operation), naval systems, and control-command centers.

The positions are at the ISAE-SUPAERO (www.isae-supaeero.fr) and ENAC (www.enac.fr) at Toulouse, France.

Skills needed

- Doctoral qualifications in Computer Science, Bio-Medical Engineering, Human-Computer Interaction, Signal Processing, or a related discipline (non-traditional candidates with demonstrated technical skills are invited to apply).
- Interest in some of the following topics is essential: human-computer interaction, eye-tracking, bio-monitoring, electrical engineering. Experience in these topics is an advantage.
- A strong study record and strong track record in research are advantages.
- Strong analytical skills and good skills in programming (MATLAB, R, C#, C/C++, Java, Python).
- Good written and oral communication skills (in English)
- Be able to manage own workload and deliver results on time
- Be creative

Funding

The studentship is funded by Agence Nationale de la Recherche (ANR, French National Agency for Research) and Direction Générale de l'Armement (DGA, French Government Defense procurement and technology agency) as a part of ELOCANS Project. The applicant should be EU or Swiss citizen.

Application Procedure

The application deadline is 7 April 2019. The application materials must include curriculum vitae, a letter of motivation, a copy of study records, contact details of at least two references, and any other materials deemed relevant. Applications must be submitted by email to Vsevolod.Peysakhovich@isae-supaeero.fr. Candidates may be asked for an interview at ISAE-SUPAERO, ENAC or via phone or Skype.