



IMT Atlantique
Bretagne-Pays de la Loire
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Post-Doctorate Offer

GUEVARA: Visual Guides for Learning in Augmented Reality

Research team: IMT Atlantique Brest, Computer Science Department (INFO), [INUIT research team](#)

Funding: 24 months (start before January 2023)

Keywords: Augmented reality, human-computer interfaces, perception, cognitive psychology, ergonomics

Contact: Etienne Peillard (etienne.peillard@imt-atlantique.fr)

Job description

The INUIT team (IMT Atlantique) is looking for a highly qualified young researcher with experience and motivation in the field of Augmented Reality (AR).

This position is open by IMT Atlantique Brest (France). The GUEVARA project aims at proposing visualization techniques for mixed reality adapted to spatially complex learning tasks, and in particular at exploring and proposing methods of representation and guidance with objects outside the user's field of view in AR.

Presentation of the research project

The principle of augmented reality (AR) lies in the fact of displaying virtual elements and real elements in a superimposed way. Thus, it allows to add virtual elements to reality or to modify real elements, and this in a co-located way. In such an application, the user can be surrounded by virtual elements linked to his environment. However, only the elements placed in front of him, in his field of vision, will be visible. All the other virtual elements will be invisible as long as they are not looked at; the information which is not in the field of vision is thus not perceived. The representation of information outside the field of vision is therefore a strong challenge for AR in order to make such information perceptible.

This problem is in fact twofold. On the one hand, it is a question of representing objects that are outside the user's field of vision in order to "inform" him of their presence (Petford 2019). On the other hand, techniques aiming not to represent objects but to guide the user's gaze can also be used (Biocca, 2007).



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In this context, the objective of this project will be to propose visual guides and methods for representing objects outside the field of vision in a specific situation: that of learning procedures in augmented reality.

1. We will first rely on existing proposals in terms of AR representation, evaluating them with respect to our application case in order to highlight their shortcomings and possible improvements.
2. We will then focus on an evaluation based on cognitive psychology and ergonomics to propose representation and guidance techniques adapted to a learning task.
3. These results will finally allow us to propose a set of techniques and best practices for the development of AR learning applications. These recommendations will be particularly suitable for an industrial use of AR, which enables learning of complex procedures (Bottani, 2019).

Research environment

IMT Atlantique is a technological university and offers very competitive salary conditions, with a postdoc salary corresponding to a junior assistant professor level. Successful candidates will also benefit from 49 days of paid vacation per year.

The INUIT team focuses on immersive technological solutions and their evaluation to improve their naturalness and concentrates on the proposal or improvement of these interaction devices. To improve this naturalness, the scientific themes are the study of immersion, research on tangible or gestural interfaces and multimodality (visual, haptic, sound).

The project is led by Étienne PEILLARD, associate professor, who joined the Lab-STICC and IMT Atlantique on December 1, 2020. He has a PhD in Computer Science, specializing in the study of the impact of mixed and augmented reality devices on perception.

Charlotte HOAREAU, associate professor at the Université Catholique de l'Ouest and associate researcher of the INUIT team will also be involved in the supervision of this project. She has a PhD in Cognitive Psychology and specializes in the development and evaluation of ergonomic recommendations for learner guidance in procedural learning situations.

Profile of the candidate

The successful candidate should have a PhD in Computer Science or Cognitive Psychology with a strong link to 3D computing. He/she should have experience in research work related to perception in virtual or augmented environments as well as expertise in software development related to these technologies. Any experience related to training or learning via immersive devices will be a plus.



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How to apply

Applicants should send their complete application by e-mail to project leader, including:

- A motivation letter.
- Complete CV with list of publications.
- PDF of a representative article (or slide show) by the candidate related to this project.
- Letters of recommendation (preferably sent directly from the mentor).

References:

- Biocca, F., Owen, C., Tang, A., & Bohil, C. (2007). Attention issues in spatial information systems: Directing mobile users' visual attention using augmented reality. *Journal of Management Information Systems*, 23 (4), 163-184.
- Bottani, E., & Vignali, G. (2019). Augmented reality technology in the manufacturing industry: A review of the last decade. *IIE Transactions*, 51 (3), 284-310.
- Petford, J., Carson, I., Nacenta, M. A., & Gutwin, C. (2019, May 2). A comparison of guiding techniques for out-of-view objects in full-coverage displays. *Conference on Human Factors in Computing Systems - Proceedings*.