2018-00679 - Phd student : Generative Design using Instrumental Interaction, Substrates and Co-adaptive Systems

**Level of qualifications required :** Graduate degree or equivalent  
**Function :** PhD Position

### About the research centre or Inria department

Located at the heart of the main national research and higher education cluster, member of the Université Paris Saclay, a major actor in the French Investments for the Future Programme (Idex, LabEx, IRT, EquipeX) and partner of the main establishments present on the plateau, the centre is particularly active in three major areas: data and knowledge; safety, security and reliability; modelling, simulation and optimisation (with priority given to energy).

The 450 researchers and engineers from Inria and its partners who work in the research centre's 31 teams, the 100 research support staff members, the high-level equipment at their disposal (image walls, high-performance computing clusters, sensor networks), and the privileged relationships with prestigious industrial partners, all make Inria Saclay Île-de-France a key research centre in the local landscape and one that is oriented towards Europe and the world.

### Context

The Ex Situ group is exploring the design of novel interactive systems, with a particular focus on creative professionals, e.g. designers. We have developed a theoretical foundation that enables us to reinvent design technology that retains simplicity while adding power, to empower the user. We build on three conceptual foundations developed in the group:

- **Instrumental interaction** separates the tools used to manipulate objects from the objects themselves. Using the principles of reification, polymorphism and reuse, we can transform actions into instruments, with which users can compose in their own way, within a distributed, collaborative, and/or multi-surface environment.

- **Information substrates** are software artifacts that embody content, computation and interaction, effectively blurring the distinction between documents and applications. Substrates create a malleable medium that can be manipulated in a variety of ways, naturally supporting instrumental interaction and co-adaptation.

- **Co-adaptation** is the process by which users adapt to the tools they use as well as adapt the tools to their needs. Systems that support co-adaptation are discoverable, appropriable and expressive.

This thesis will explore how we can apply these concepts to the domain of graphic design, with an emphasis on supporting the early, exploratory stages of the design process, with a clear transition to the final implementation phase.

### References

### Assignment

**General Information**

- **Theme/Domain :** Interaction and visualization  
- **Scientific computing (BAP E)**  
- **Town/city :** GIF SUR YVETTE (PCRI - LRI)  
- **Inria Center :** CRI Saclay - Île-de-France  
- **Starting date :** 2018-10-01  
- **Duration of contract :** 3 years  
- **Deadline to apply :** 2018-05-11

### Contacts

- **Inria Team :** EX-SITU  
- **Recruiter :** Mackay Wendy / wendy.mackay@inria.fr

### About Inria

Inria, the French National Institute for computer science and applied mathematics, promotes “scientific excellence for technology transfer and society”. Graduates from the world's top universities, Inria's 2700 employees rise to the challenges of digital sciences. With its open, agile model, Inria is able to explore original approaches with its partners in industry and academia and provide an efficient response to the multidisciplinary and application challenges of the digital transformation. Inria is the source of many innovations that add value and create jobs.

### Conditions for application

**Defence Security :**  
This position is likely to be situated in a restricted area (ZRR), as defined in Decree No. 2011-1425 relating to the protection of national scientific and technical potential (PPST). Authorisation to enter an area is granted by the director of the unit, following a favourable Ministerial decision, as defined in the decree of 3 July 2012 relating to the PPST. An unfavourable Ministerial decision in respect of a position situated in a ZRR would result in the cancellation of the appointment.

**Recruitment Policy :**  
As part of its diversity policy, all Inria positions are accessible to people with disabilities.

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**Warning :** you must enter your e-mail address in order to save your application to Inria. Applications must be submitted online on the Inria website. Processing of applications sent from other channels is not guaranteed.
The goal of the thesis is to design and develop interactive tools to support designs, based on a combination of empirical studies with users and the application of co-adaptive instruments and substrates as a theoretical foundation.

Expected Results:
The thesis will result in novel interactive tools and techniques that help users express and explore complex creative concepts in a design field, such as graphic design. The thesis will also test the potential and the limits of co-adaptive instruments and substrates.

Main activities
This Ph.D. involves three main types of research activity:
• empirical studies of creative professionals, including graphic and other designers. Research methodology includes structured observation, critical object interviews and participatory design.
• technical development of novel interactive system(s) that are prototyped, implemented and tested with designers; and
• theoretical exploration and testing of the principles of co-adaptive instruments and substrates, with a special emphasis on the process of appropriation.

Skills
The ideal candidate will have a masters degree or equivalent experience in graphic, industrial, architecture or other design field, as well as training in Human-Computer Interaction. Solid programming skills and experience with Java, Javascript, C or C++, Processing or web programming are important. Fluency in written and spoken English is essential.

Benefits package
- Subsidised catering service
- Partially-reimbursed public transport
- Social security
- Paid leave
- Flexible working hours
- Sports facilities

Remuneration
Gross monthly salary (First and second year): 1982 euros
Gross monthly salary (third year): 2085 euros