

# Understanding and modeling the discovery of Human-Computer Interactions

**Duration:** 36 months

**Team:** [Loki](#) (Inria Lille – Nord Europe & CRISTAL)

**Supervisor:** Sylvain Malacria ([sylvain.malacria@inria.fr](mailto:sylvain.malacria@inria.fr))

**Application deadline:** April 8th 2022

The Loki research group at Inria (France) is looking for a student to start a PhD thesis in October 2022 on the understanding and modelling of the discovery of Human-Computer Interactions. This thesis is part of the [ANR JCJC Discovery](#) project. A research internship preceding the thesis (from May to August 2022) is possible and strongly encouraged

## Context

Interaction with emerging interactive devices (smartwatches, mixed reality headsets, etc.) relies on minimalist graphical user interfaces (GUIs) whose controls are not permanently displayed, or even never displayed for some of them. Consequently, these devices suffer from a problem of discoverability of interactions possible for the user. How are they supposed to know that they can interact with a component of the interface that is hidden by default, or by using a gesture that is not indicated by the system?

## Objectives

This Phd Thesis focuses on this problem of discoverability of interactions, especially when they are "hidden" by default [1,2,3]. More precisely, the aim is to understand how people discover hidden interactions in interactive systems, and to model the discovery of these interactions in order to provide design and evaluation support.

The first step will be to understand how users discover the graphical components of an interface when they are hidden by default. A possible approach would be to draw inspiration from the literature [4] to study how people create a mental map of the interface leading to the discovery of these hidden components.

In a second step, we will exploit the results obtained to develop a predictive model of the discovery of hidden graphical components of interfaces. To this end, different avenues can be explored, including machine learning methods based on reinforcement learning algorithms [5].

## The candidate

The PhD candidate will join the LOKI research group, based in the [Lille - Nord Europe Inria research center](#), located in the Lille area. Lille is at the northern tip of France and its metropolitan area, situated at the crossroads of northern continental Europe, is the 5th biggest in France.

A successful candidate must hold a MSc in Human-Computer Interaction (or equivalent) and demonstrate a strong research interest. He or she should have experience or a strong interest in software development, machine learning and strong programming skills. Creativity, independence, team spirit and communication skills are valuable assets. An excellent level of technical and scientific English is also required.

The candidate will join a dynamic and multicultural team of young researchers at Inria. The Loki team members come from different backgrounds (Germany, Colombia, Canada, China, France, etc.) and communicate daily in English.

If interested in this position, simply send an email to Sylvain Malacria ([sylvain.malacria@inria.fr](mailto:sylvain.malacria@inria.fr)). All applications are encouraged, regardless of age, gender, social or ethnic origin, sexual orientation or disability.

## References

- [1]- N. Pong Interacting with signifier-less designs — the case of swhidgets. PhD thesis, 2020.
- [2]- N. Pong and S. Malacria. Awareness, Usage and Discovery of Swipe-revealed Hidden Widgets in iOS. ISS 2019.
- [3]- S. Gustafson, D. Bierwirth and P. Baudisch. Imaginary interfaces: spatial interaction with empty hands and without visual feedback. UIST 2010.
- [4]-M. S. Uddin and C. Gutwin. The Image of the Interface: How People Use Landmarks to Develop Spatial Memory of Commands in Graphical Interfaces. CHI 2021.
- [5]-K. Todi, G. Bailly, L. Leiva and A. Oulasvirta. Adapting User Interfaces with Model-based Reinforcement Learning. CHI 2021.