INSTITUT DES SYSTEMES INTELLIGENTS ET DE ROBOTIQUE
INTERNSHIP OFFER

Internship form

Internship subject : Design and evaluation of advanced interaction techniques based on computer vision to facilitate target selection for people with motor impairments

Supervisors: Julien Gori

Internship start date: Between January and March 2026

Internship duration: 5-6 months

Desired level of education: M2, final year of engineering school

Host laboratory: ISIR (*Institut des Systèmes Intelligents et de Robotique*), Campus Pierre et Marie Curie, 4 place Jussieu, 75005 Paris.

Contact

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Send your application by email, with [subject of the internship] in the subject line, a CV and cover letter, and a copy of your academic transcripts.

Internship description (in English)

Subject: Design and evaluation of advanced interaction techniques based on computer vision to facilitate target selection for people with motor impairments

Abstract: This internship aims to improve computer accessibility for people with reduced upper body mobility. Using a new innovative tool that automatically detects targets on the screen, the goal will be to adapt and then test advanced interaction techniques. The project will be based on a participatory design approach: the users concerned will be involved in design choices through cycles of testing and improvement. Once the solutions have been refined, they will be experimentally evaluated to measure their concrete benefits in terms of speed, accuracy, and comfort.

Context : Interacting with computers is a fundamental professional and personal need. However, this interaction often relies on selecting small visual targets: icons, buttons in submenus, interactive areas, etc. This seemingly simple action is difficult for people with reduced or impaired upper body motor skills, for example due to tremors, muscle atrophy, neurodegenerative disease, or more generally as a result of aging.

Prototypes of interaction techniques have already been proposed to facilitate the selection of small targets (e.g., Bubble Cursor or Semantic Pointing), but their practical implementation has remained limited. This is because they require precise knowledge of the size and position of the targets, which is information that is rarely available in third-party applications.
We have recently developed a tool (under subsmission) that circumvents this limitation by using computer vision to detect all targets in real time from a screenshot. This tool makes it possible to

implement advanced interaction techniques at the system level, rather than just in isolated prototypes. A demonstration of this system is available at https://jgori-ouistiti.github.io/academic/project/targetfinder/

Existing Solutions :
Various approaches exist to improve the accessibility of target selection, such as hardware solutions (adapted devices such as trackballs, ergonomic mice, or specialized joysticks) and software solutions (accessibility features built into operating systems such as zoom, cursor enlargement, pointer control via touchpad or keyboard, etc.).
Most of these solutions are complementary, but none currently offer a generalizable advanced selection mechanism based on automatic detection of all targets. The tool developed therefore opens up a new avenue that can enrich the digital accessibility toolbox, working in synergy with existing solutions rather than competing with them.

Internship objectives :
- Adapt and design advanced interaction techniques to facilitate target selection, specifically for people with mild to moderate upper body motor impairments (these individuals are able to use a mouse, but with significantly lower performance than people without impairments).
- Experimentally evaluate the effectiveness of these techniques by comparing performance with traditional solutions.

Methodology :
The approach will combine participatory design and experimental evaluations.
Exploratory phase (qualitative):
- Present the prototypes (Bubble Cursor, Semantic Pointing) to the individuals concerned.
- Observe their interactions, collect their feedback, and identify limitations.
- Adapt the techniques according to the needs expressed.
- Repeat this iterative cycle if necessary.

Evaluation phase (quantitative):
- Conduct a controlled study with a sample of the target population.
- Evaluate performance gains (speed, accuracy, ease of use).

Preliminary observations will be used to estimate the effect size and perform a power analysis, ensuring a sufficient sample size.

Required Profile: Computer science, Human Computer Interaction

Required skills : programming (Python), optionnally but valued : computer vision, empirical studies, pyQT, user-centered design