

Wearable Devices for Assisting Visually Impaired People in Mobility

Master's Internship proposal by Simon Perrault, Singapore University of Technology and Design, & Christophe Jouffrais, IRIT, Toulouse & IPAL, Singapore

Context

Thanks to miniaturization in the last few decades, wearable devices (e.g. smart watches, smart rings) are getting more powerful and embed a lot of sensors. Such devices are usually always worn by their owner and are thus always available for interaction.

On the other hand, 441.5 million people have mild to severe vision impairment¹ and need assistance in their everyday life. While a lot of existing technologies can provide assistance, they are usually bulky or impractical to in mobile contexts (e.g. while walking or sitting on a bus).

Internship Project

The proposed project aims at designing new interaction techniques and devices to help visually impaired people in their everyday life. Potential tasks include, but are not limited to, indoor/outdoor navigation, finding specific objects in space, or rendering visual information in a non-visual way.

During the project, the student is expected to produce a prototype that will be tested and evaluated with users and iterate on said prototype.

The usual steps of such a project include: identifying a specific task one wants to work on, find out the limitations of the most common solutions, then propose an early concept.

The next steps include developing a first prototype (hardware and/or software), then test it and iterate. A prototype/concept is considered as being satisfying if it can make tasks easier to perform (objectively and/or subjectively).

Required Skills

Applicants should have the following skills:

- Knowledge of HCI and User Centered Design
- Good programming skills (Python or Java preferred, but most languages are acceptable)
- Some knowledge of hardware (Arduino, soldering, etc...)
- English Language, both written and spoken (B2 or above)

¹ <http://www.who.int/news-room/fact-sheets/detail/blindness-and-visual-impairment>

- Optional:
 - Computer Vision
 - Machine Learning

Outcome

Depending on your master's program requirements, the primary outcome will likely be a master's thesis, summarizing all the activity (research, implementation and testing) of your internship.

Best performing interns are also expected to submit to premier scientific venues in HCI. Examples include conferences: ACM SIGCHI (CHI), UIST, CSCW or journals: ToCHI (ACM), IJHCS (Elsevier) and HCI (T&F).

Another outcome will be the hardware and software solutions developed. Software solutions could then be released as applications on relevant platforms, while hardware solutions could be improved and potentially transferred in a longer term.

Supervision & Contact

The thesis will be co-supervised by Dr Simon Perrault and Pr Christophe Jouffrais.

Singapore University of Technology and Design, Singapore

Simon Perrault is a newly appointed Assistant Professor at the Singapore University of Technology and Design (SUTD). Dr Perrault's research focuses on wearable devices and how to make interaction smoother in mobile context. He has developed several prototypes of smart bands/watches, smart rings and designed indoor navigation techniques for smart glasses. While most research projects tend to stay in the lab, Dr Perrault's focus is to offer a rich experience in any context, which means validating prototype in situ. SUTD offers a great infrastructure for research in both hardware and software, including a state-of-the-art fabrication lab and space for tinkering and conducting research

« Cherchons pour Voir » lab @IRIT, Toulouse, France

“Cherchons pour Voir” is a common research lab between IRIT (Toulouse Institute of Computer Science) and the Institute of Blind Youth in Toulouse. The laboratory focuses on research projects aimed at improving the autonomy and quality of life of people with visual impairments, but also at improving adapted tools for the practitioners (specialized teachers, trainers, etc.) The lab can bring together researchers, practitioners, and people with visual impairment around a research problem, whether fundamental or applied. The method is based on participatory design.

Christophe Jouffrais, DR CNRS, is the director of the CPV lab. He has a background in Cognitive Science, with a focus on visual impairment and its cognitive consequences. He will bring strong support on the topic of non- visual human perception and cognition, non-visual Human-Machine Interaction but also Assistive Technology.

Contact

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Send a complete CV with cover letter, academic transcripts of Bachelor and Master studies (if available). Any additional document is appreciated, including Graduate Record Examinations (GRE), Test of English (TOEFL or IELTS) if your studies were not in English.

Dates and place

The internship can start two months after successful application and will last 6 months. The intern will stay at the Singapore University of Technology and Design, Singapore, in the group of S. Perrault.