

Master 2 Internship Proposal: (Re)designing Interfaces to Reduce Technology Waste

Vanessa Peña-Araya & Olivier Chapuis

*Université Paris-Saclay, CNRS, Inria
ILDA team at LISN*

November 6, 2022



Figure 1. On the left, a picture of the Fairphone, a smartphone aiming to have a lower environmental footprint and better social impact than others in the market. In particular, its modular internal hardware focus on accessible and easy repairation. On the right, a cardboard virtual reality headset for a smartphone.

Sustainable interaction design (SID), as defined by Blevis [3], talks about “the perspective that sustainability can and should be a central focus of interaction design”. This work, in addition to the one by Mankoff *et al.* [10] on the same year, are considered the foundational articles of Sustainable Human-Computer Interaction (SHCI). In the 15 years after their publication, SHCI has grown to become an important subfield of HCI. However, this growth has not been without criticism [4].

This internship focus on one of those critiques: new designs contribute to premature obsolescence and disposal, often as part of intentional business strategies [3, 11]. Following the categorization of adoption of SCHI critiques described by Bremer *et al.* [4], the work in this internship aims to address the call to re-imagine the economy and consider limits to growth. To do so, we define the goal of this internship as the exploration of Human-Computer interfaces design’s that can reuse current technological devices. Our long-term goal is to provide means to help users to decrease the amount of devices they possess.

Let us take the smartphone as example. It has been evolved from a simple device with the only goal of making phone calls to ubiquitous devices that are used to support our daily work, the social interaction with others and to give us access to almost any tools available in a laptop. Nonetheless, previous research about their obsolescence have shown that people have their smartphone for limited amounts of time, either by internal or external reasons [7]. Some initiatives, like Fairphone [5] (Figure 1, left) and Shifphone [6], has focused on the modularity of their hardware components in order to easily repair them. Other approaches use them as mediums to create more complex interaction environments, like virtual reality cardboard’s for smartphones (Figure 1, right). Although not perfect, these initiatives allow to increase the device lifespan and to reuse them in different contexts, reducing the need for new devices.

We mention the smartphone as a representative example of how a device can be modular in their internal design and in composition to additional accessories, becoming an incredibly versatile tool. However, the internship is not only constrained to the design of interactive interfaces only with the phone and we invite creative minds to think beyond this device.

For this purpose, the work of the internship will be divided in four main tasks:

- Create a critical review of the literature on Sustainable Human-Computer Interaction with a focus on the reuse of interactive devices.
- Evaluate the impacts and limitations of the approaches in the literature. This evaluation should consider how they align with the IPCC sixth report, in particular for the topic of mitigation of climate change [8], and the real impact of interactive devices on the ecological crisis [1, 2, 9].
- Propose (futuristic) designs and processes to help to stop, or at least decrease, the growth of the number of interactive devices used by humans.
- Evaluate and refine these designs with workshops with users and HCI experts.

Requirements for Applicants: basic of Human-Computer Interaction, and skills in interaction design and tools such as Figma, Sketch, *etc.* Any past experience in fabrication (*e.g.* laser cutter 3d printing) is a plus.

Duration and period: 5 or 6 months starting in March/April.

Location: Université Paris-Saclay, Building 660.

Contacts:

Vanessa Peña-Araya, email: vanessa.pena-araya@inria.fr

Olivier Chapuis, email: olivier.chapuis@lisn.upsaclay.fr

References

- [1] A. S. Andrae and T. Edler. On global electricity usage of communication technology: trends to 2030. *Challenges*, 6(1):117–157, 2015.
- [2] L. Belkhir and A. Elmeligi. Assessing ICT global emissions footprint: Trends to 2040 & recommendations. *Journal of cleaner production*, 177:448–463, 2018.
- [3] E. Blevis. Sustainable interaction design: Invention & disposal, renewal & reuse. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, CHI '07, page 503–512. ACM, 2007.
- [4] C. Bremer, B. Knowles, and A. Friday. Have we taken on too much?: A critical review of the sustainable hci landscape. In *Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems*, CHI '22. ACM, 2022.
- [5] F. B.V. Fairphone. <https://www.fairphone.com/>, 2022. Last accessed: 2022-11-02.
- [6] S. GmbH. Shiftphone. <https://www.shiftphones.com/>, 2022. Last accessed: 2022-11-02.
- [7] E. M. Huang and K. N. Truong. Breaking the disposable technology paradigm: Opportunities for sustainable interaction design for mobile phones. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, CHI '08, page 323–332. ACM, 2008.
- [8] IPCC. Summary for Policymakers. In *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, 2022.
- [9] J. Malmodin and D. Lundén. The energy and carbon footprint of the global ICT and E&M sectors 2010–2015. *Sustainability*, 10(9):3027, 2018.
- [10] J. C. Mankoff, E. Blevis, A. Borning, B. Friedman, S. R. Fussell, J. Hasbrouck, A. Woodruff, and P. Sengers. Environmental sustainability and interaction. In *CHI '07 Extended Abstracts on Human Factors in Computing Systems*, CHI EA '07, page 2121–2124. ACM, 2007.
- [11] D. Roedl, W. Odom, and E. Blevis. Three principles of sustainable interaction design, revisited. *Digital Technology and Sustainability: Embracing the Paradox*, 2017.