

# COMPUTER AND CONTROL ENGINEERING

## DAUIN - Designing User Interfaces that Promote Digital Wellbeing

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<b>Context of the research activity</b>	<p>This PhD proposal investigates the design, implementation, and evaluation of user interfaces that promote people's digital wellbeing by respecting and preserving users' time and attention. Possible outcomes include intelligent and effective mitigation strategies for contemporary dark patterns, educational tools, as well as the development of intelligent systems that can proactively improve the interaction between users and their digital services.</p>
	<p>In the contemporary attention economy, tech companies adopt design patterns, e.g., content autoplay and infinite scroll, that exploit people's psychological vulnerabilities and manipulate users into spending time and attention on digital services. These "attention-capture" dark patterns often lead people to experience a lost sense of control and time over technology use and a later sense of regret. As a result, concerns about technology overuse and addiction have gained momentum, and researchers, public media, and some tech industries have started highlighting the need to design user interfaces that better align with people's digital wellbeing, a term that refers to the impact of digital technologies on people's lives.</p> <p>The main research objective of this PhD proposal is to explore the relationships between dark patterns and people's digital wellbeing, thus promoting the development of user interfaces that positively impact people's digital wellbeing, rather than diminishing it. The PhD student will study, design, develop, and evaluate proper models and novel technical solutions (e.g., tools and frameworks) in this domain, starting from the relevant scientific literature and performing studies involving users.</p> <p>In particular, possible areas of investigation include:</p> <p>a) Development of mitigation strategies that can limit the drawbacks and negative impacts brought by attention-capture dark patterns (ACDPs). A possible example is the usage of appropriate nudges in an educational environment. Nudges are changes in the design architecture of a system that target users' cognitive biases. One of their main goals is to allow people to know the underlying system better and make deliberate choices, i.e., they</p>

## Objectives

can be seen as a way to make users exercise their own agency. In this proposal, nudges could promote awareness on the negative consequences of technology on people's digital wellbeing. Examples of nudges might include informative splash screens listing all the dark patterns exploited by a given mobile app, and widgets highlighting when a pattern is operating, e.g., during intensive scrolling.

b) Development of alternative design patterns that respect and preserve the user's attention. These patterns promote users' awareness by design and support reflection by offering the same functionality as ACDPs. Examples include recommender systems that take into account user's past problematic behaviors, e.g., to avoid viral suggestions for users that already showed signs of addictive behaviors, or social networks' newsfeeds listing friends' posts in chronological order, only, e.g., through pagination.

c) Development of intelligent tools to proactively improve the interaction between users and digital services like web and mobile applications. Through the usage of artificial intelligence and machine learning models, these tools may detect when the user is trapped by a dark pattern, e.g., during intensive scrolling, and may automatically apply a suitable mitigation strategy or even modify the design of the user interface.

The proposal will adopt a human-centered approach and it will build upon the existing scientific literature from different interdisciplinary domains, mainly from Human-Computer Interaction. The work plan will be organized according to the following four phases, partially overlapped:

\* Phase 1 (months 0-6): literature review about digital wellbeing and attention-capture dark patterns; focus groups and interviews with designers, practitioners, and end users; definitions and development of a set of use cases and promising strategies and alternative patterns to be adopted.

\* Phase 2 (months 6-24): research, definition, and experimentation of mitigation strategies and alternative design patterns for attention-capture dark patterns, starting from the outcome of the previous phase. Here, the focus will be on the most commonly used devices, i.e., the smartphone and the PC, with the design, implementation, and evaluation of one or more mobile applications and browser extensions.

\* Phase 3 (months 12-36): research, definition, and experimentation of intelligent tools that make use of artificial intelligence and machine learning models to proactively apply the mitigation strategies and alternative design patterns identified in the previous phase.

\* Phase 4 (months 24-36): extension and possible generalization of the previous phases to include additional devices; evaluation in real settings over long period of times to assess at which extent the proposed solutions can address the negative impact of attention-capture dark patterns and increase any positive outcome on our digital wellbeing.

Part of the work will be guided from and conducted within the PRIN 2022 project entitled "Improving digital wellbeing with and for teens: a gamified and personalized intelligent system".

## Skills and competencies for the development of the activity

A candidate interested in the proposal should ideally:

- \* be able to critically analyze and evaluate existing research, as well as gather and interpret data from various sources;
- \* be able to effectively communicate research findings through writing and presenting, both to specialist and non-specialist audiences;
- \* have a solid foundation in computer science/engineering and possess the relevant technical skills;
- \* have a good understanding of HCI methods;

\* be aware of ethical considerations related to the investigated topics, particularly when conducting research on human subjects.