Engineering Interactive Systems Embedding AI Technologies

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ABSTRACT

This workshop aims at bringing together researchers and practitioners interested in the engineering of interactive systems which embed AI technologies (as for instance, recommender systems engines). The objective is to identify (from experience reported by participants) methods, techniques, and tools to support the inclusion of such AI technologies in interactive systems. A specific focus will be on the guarantee that user-relevant properties such as usability and user experience are accounted for. Another focus will be on the identification and definition of architectures supporting those integrations.

CCS CONCEPTS

• **Human-centered computing**; • **Human computer interaction (HCI)**; • **HCI theory, concepts and models**; • **Software and its engineering**; • **Software creation and management**; • **Software development techniques**; • **Computing methodologies**; • **Artificial intelligence**;

KEYWORDS

Interactive Systems Engineering, Usability, Reliability, UX, AI technologies

1 INTRODUCTION AND AIMS AND GOALS

Automation is pervasive in interactive systems, as argued in [9]. While automation varies in nature and objectives, it is present

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in every layer of interactive systems architectures, from hardware input device driver level (e.g., mouse acceleration [1]), to interaction technique level (e.g., multimodal fusion such as finger clustering [2] or more sophisticated ones such as the bubble cursor [3] integrating both input and output automation) as well as at the interactive application level (e.g., a SPAM filter in a client email application).

Technologies coming from the AI domain (e.g., machine learning) claim and argue for more complex automation targeting the ultimate goal of autonomous systems, as demonstrated by the thriving autonomous driving application domain as depicted in J3016 standard [4]. Even though having larger automation might induce larger failures (known as the lumberjack analogy [16]), integrating such AI-related technologies can be performed at various levels, from micro to macro, requiring different (and maybe conflicting) engineering approaches.

Besides, due to their black-box nature, AI technologies bring issues at the operation level, i.e., when users are interacting with an interactive application embedding them [5]. In order to address this issue, a recent contribution [5] has demonstrated the potential benefit of opening up that box and adding explanations but usability issues remain, as demonstrated in the active domain of recommender systems [17].

At the engineering level, different issues appear depending on the type of AI-related technologies used and the type of interactions provided to the users of such systems. Indeed, beyond explanations, issues related to display/visualization [18] and control/command arise [19].

The main goal of this workshop is to offer a platform for scientists who are interested in the design, development, evaluation, and use of interactive systems involving AI technologies.

More precisely, **the first objective** is to identify and gather information about knowledge and practice in the workshop's domain:

- Get an overview of current R&D practices (methods/notations/tools) to *engineer* usable interactive systems embedding AI technologies, as well as lessons learned and recommendations;
- Get an overview of current R&D practices (methods/notations/tools) to *architect* usable interactive systems embedding AI technologies, as well as lessons learned and recommendations;

- Identify a systematic approach for describing AI technologies and assessing their impact on properties such as users' UX and systems' usability;
- Understand how the multiple stakeholders involved in interactive systems design and development identify properties, how they describe them, and how they assess their relative importance when they embed AI technologies (going beyond the classical UX and usability but also addressing performance, dependability, safety, ...);
- Identify an engineering approach to find an equilibrium between (AI-based) automation and human interaction.

The second objective is to elicit the main gaps in AI technologies which hinder their exploitation in the design and development of interactive systems, especially if a user-centered design process is followed.

The activities carried out during the workshop aim to identify the current state of knowledge in the scope of the workshop but also to outline a research agenda from bringing together diverse and sometimes competing views from multiple stakeholders.

2 TARGET AUDIENCE

The target audience is scientists interested in, using of and working on heterogeneous models and methods for engineering interactive systems. The workshop is open to everyone who is interested in the topic and who wants to participate in the discussion or thinks about starting to work in the area.

3 FORMAT AND DURATION OF THE WORKSHOP

3.1 Duration

The workshop will last one full day, including presentations from participants, interactive sessions, and the preparation of a joint summary to be presented during the conference.

3.2 Short Presentations

Participants with an accepted submission will present a summary of their contribution highlighting the relationship with the main topics of the workshop. The presentation should highlight explicitly: the application domain and its specificities, the AI technologies deployed (and their objective), the user interface and the interactions, the users' goals and tasks, and the engineering issues related to the integration of these AI technologies in the interactive system. Other aspects relevant to the workshop may also be presented, such as lessons learned, both negative and positive, about the tools and methods used during the engineering process.

3.3 Interactive Session and Panel

The afternoon will feature a panel discussion with the overall goal of discussing re-occurring problems and challenges, drawbacks, and benefits of integrating (or deciding not to) AI technologies. As basic material for the discussion, the workshop moderator will take notes during the presentations and start to structure these into categories.

Furthermore, in the call for participation, we will ask all authors to specifically indicate possible topics for the panel discussion.

Three to four persons (including some of the workshop organizers) will set up the panel. In a first round, each panelist has the chance for a very short introduction followed by a short first statement on the points for discussion. Subsequently, a moderated discussion of the points identified will happen that include questions and contributions by the audience. We plan to open the panel to other interested participants of the workshop who are thus not required to submit a position paper but would be interested in the workshop topics.

3.4 Break down into Smaller Groups

To foster interaction between workshop participants and to produce diverse outcomes, the second part of the afternoon will be dedicated to working in groups with topics to be selected from the panel topics.

4 PRE-WORKSHOP AND POST-WORKSHOP PLANS

The workshop has three phases: first, submission of position papers of 2-8 pages before the workshop, which the workshop committee will peer-review, and second, the full-day workshop along EICS 2023, including the presentation of the accepted papers and the previously presented panel discussion. The accepted authors (at least one) will be required to attend the workshop to present their position papers. Participants that also attend the conference will get the opportunity to co-create and co-present a summarizing poster to be presented during the EICS conference.

The workshop will be advertised through the workshop web page (https://sites.google.com/view/engineering-is-ai), while the submission and review process are handled by easychair (https://easychair.org/my/conference?conf=eiseait2023). The web page presents the timeline for submission, reviewing, and camera-ready deadline, such that all submissions are available to workshop attendees. Beyond, workshop attendees will be offered the opportunity to revise and extend their submission, which will, after reviewing, be included in the post-workshop proceedings to be published by Springer in the LNCS series.

5 ORGANIZERS

Alan, J, Dix is Director of the Computational Foundry at Swansea University, Professorial Fellow at Cardiff Metropolitan University and general chair for EICS 2023. He has worked at the boundaries of HCI and AI over many years including co-founding an intelligent internet interface start-up in the dot-com years and more than 30 years ago publishing on the dangers of social, gender and racial bias in black-box machine learning algorithms [10] as well as speaking more recently on the topic [11]. Amongst other things, he is currently writing a book on AI for HCI and a second edition of an earlier AI textbook [12].

Sven Mayer is an assistant professor of computer science at LMU Munich (Germany). His research sits at the intersection between Human-Computer Interaction and Artificial Intelligence, where he focuses on the next generation of computing systems. He uses artificial intelligence to design, build, and evaluate future human-centered interfaces. In particular, he envisions enabling humans to outperform their performance in collaboration with the machine.

He focuses on areas such as augmented and virtual reality, mobile scenarios, and robotics. He has served as a program committee member at numerous conferences, e.g., ACM CHI, and in various organizing committees, e.g., as General Chair for the International Conference on Hybrid Human-Artificial Intelligence (HHAI'23).

Philippe Palanque is Professor in Computer Science at the University Toulouse 3 "Paul Sabatier" in Toulouse France. Since the late 80s he has been working on the development and application of formal description techniques for interactive system. For more than 20 years he has been working on automation and its integration in interactive systems [9]. For instance, he was involved in the research network HALA! (Higher Automation Levels in Aviation) funded by SESAR programme which targeted at building the future European air traffic management system. The main driver of Philippe's research over the last 20 years has been to address in an even way Usability, Safety and Dependability [8] in order to build trustable safety critical interactive systems. As for conferences, he is a member of the program committee of conferences in these domains such as SAFECOMP 2023 (42nd Conference on Computer Safety, Reliability and Security), DSN 2014 (44th conference on Dependable Systems and Networks), EICS 2023 (15th annual conference on Engineering Interactive Computing Systems).

Emanuele Panizzi Emanuele Panizzi is an Associate Professor in Computer Science at Sapienza University of Rome, Italy. He directs a research team focusing on human-computer interaction, app design, gamification, and context-aware mobile interaction. In the two areas of smart parking and earthquake detection, his current study uses AI to recognise users' behaviour and context. Designing mobile user interfaces with implicit interaction and crowdsensing applications is the experimental component of this study. He served as the conference's program chair for Advanced Visual Interfaces AVI2022. He is currently serving as Associate Chair for ACM AutomotiveUI '23. He teaches HCI and software architecture. He has served as a consultant for major national and international corporations.

Lucio Davide Spano is an Associate Professor at the Univerity of Cagliari since 2019. He is chair of the IFIP 2.7/13.4 WG on User Interface Engineering since June 2022 and Delegate for the Research of the Extended Committee of SIGCHI-Italy. He has been a member of the Model-Based User Interface WG of the World Wide Web Consortium (W3C). He has been Programme Co-Chair for ACM Intelligent User Interfaces in 2020, and an associate editor for a special issue in ACM Transactions on Intelligent Interactive Systems. He is a member of the Senior Programme Committee of high-level international conferences in Human-Computer Interaction (e.g., IUI, INTERACT, EICS, NordiCHI). He is currently investigating the relationship between the logic reasoning style (inductive, abductive, deductive) in eXplainable AI (XAI) interfaces. He published results considering image, text [6] and temporal series [7] data types.

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