

Workshop EMPATHY: Empowering People in Dealing with Internet of Things Ecosystems

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Abstract

This is the proposal of the 4th International Workshop on 'Empowering People in Dealing with Internet of Things Ecosystems' (EMPATHY 2023).

1. Workshop Title

International Workshop on Empowering People in Dealing with Internet of Things Ecosystems (EMPATHY) – 4th edition.

2. Organizers' Names, Affiliations and Email Addresses

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 CEUR Workshop Proceedings (CEUR-WS.org)

4. Workshop Length

Half day.

5. Expected Number of Participants

15/20 participants are expected.

6. Motivation and Objectives

Nowadays the spreading of low-cost technologies integrating sensors and actuators favors the development of the so-called smart objects, a trend fostered by the Internet of Things (IoT), which creates a bridge between the physical and the digital world thanks to ubiquitous, connected sensors and actuators.

The opportunities offered by the IoT are amplified by the use of new approaches that, based on novel interaction paradigms, involve directly non-technical users in configuring the behavior of their smart objects. End-User Development (EUD) is defined as a set of methods, techniques, and tools that allow users of software systems, who are acting as non-professional software developers, to create, modify, or extend a software artifact [1]. To support EUD of IoT applications, we have to consider that only end-users can know the most appropriate ways their applications should react to contextual events. Thus, to reach a broad variety of users, tailoring environments should offer an easy-to-learn User Interface (UI), while allowing users to attain high value and even complexity of the software they create or customize [2]. In this way, it will be possible to obtain faster tailoring, better control over the application functionality, and improved user experiences.

Among the results that have benefited from the EUD approach, there are systems for configuring and assigning semantics to intelligent objects also using pattern recognition techniques [3] and interactive treasure hunt experiences through IoT smart objects and augmented cultural artifacts within cultural sites [4]. Another promising field in which EUD may have potential is education. Optimal integration of IoT devices in the educational setting is closely associated with empowering children to program their smart games [5] and providing educators with the possibility of defining each learner's curricula [6].

Moreover, the use of IoT devices can pose significant security and privacy risks to end-users. In fact, the large amount of sensitive data the devices can collect and make available makes them an attractive target for malicious individuals thus, it is necessary to provide end-users with tailored EUD solutions for protecting their security [7]. In addition, the end-user's mental model lacks, among other aspects [8], the capacity to recognize whether their interaction with EUD can lead to severe security and privacy risks [9, 10].

It is essential to educate users on the potential risks associated with the use of IoT devices in EUDs [11]. With the aim of supporting users at making better decisions when configuring an IoT-based environment, an alternative or complementary approach to education lies in the provisioning of personalized recommendations [12]. In fact, it has long been demonstrated that recommendations can improve system usability and user experience in the EUD domain [13]: for

example, they can help to make the design space more manageable by suggesting IF-THEN rules which fit the end users' goals [14], possibly taking into account also factors, such as personality traits, which could impact the perception, acceptance and appreciation of recommendations themselves [15].

Furthermore, it is to be considered how well the different composition paradigms that the tailoring systems implement can support the end-user activities on these platforms [16]. For instance, approaches based on conversational agents [17] or augmented reality [18] seem promising for designing more engaging and understandable rule creation tools.

Given the diffusion and the importance of these issues, this workshop will provide a venue for discussing ongoing research and sharing ideas for researchers and practitioners working on solutions to personalize the behavior of IoT ecosystems.

7. List of Topics

Topics include, but are not limited, to:

- End-User Development (EUD) for IoT;
- Interaction Paradigms for IoT;
- Usability of IoT Systems;
- Interface Design for IoT;
- Intelligent Interface for IoT Systems;
- Accessibility for IoT Systems;
- Virtual and Augmented Reality for EUD in IoT settings;
- Conversational User Interfaces for EUD;
- Usable Security and Privacy in IoT systems;
- Personalisation and Recommendations for IoT;
- IoT for Cultural Heritage;
- Ubiquitous computing and mobile human computer interaction;
- Human-centered artificial intelligence in IoT contexts;
- Explainable AI solutions for EUD;
- User centered design;
- Personalization for Humanoid Robots;
- Integrated and Visual Development Environments for IoT;
- Interaction Paradigms for IoT;
- Industry case studies.

8. Format and Required Services

This will be a half-day workshop, oriented towards discussions, hands-on sessions and paper presentations. The potential attendees will be informed about this workshop by the organizers via the most well-known international mailing lists (e.g., DBWORLD, CHI-Announcements, AIS-HCI, CVML, etc.) while the reference website will be published immediately upon acceptance of the workshop.

The workshop will start with the participants being welcomed and introduced to the workshop's goals and organizers. Then, the accepted papers will be presented following an order communicated by the organizers in the previous days.

Participants will be encouraged to provide short but provoking presentations that tackle questions in line with the workshop goals and topics. More specifically, each presenter will have a few minutes to discuss their work (10 minutes for the presentation plus 3 or 5 minutes for Questions&Answers, depending on the number of accepted papers). The workshop will then continue with brainstorming sessions and discussions among the attendees, followed by the presentation of results and challenges coming from all the workshop contributions.

To conclude, a joint agenda will be defined which identifies ways to move forward, possibly including the initiation of joint publications, the organization of a new workshop edition and publications on the debated topics.

8.1. Schedule proposal

- 13.30-13.45 Welcome and introduction
- 13.45-14.45 Paper presentation (part I)
- 14.45-15.15 Coffee break
- 15.15-16.15 Paper presentation (part II)
- 16.15-17.15 Brainstorming and discussion
- 17.15-17.35 Presentation of the results and challenges
- 17.35-18.00 Agenda definition and Publication plans

9. Target Audiences

The number of workshop participants will be about 15/20 and limited to 30, mainly from Academia, Research Institutes, Companies and professionals (developers, UX experts, Interaction and UI designers, makers).

10. Proceedings

Final versions of the accepted papers will be submitted for publication in the CEUR Workshop Proceedings (<http://ceur-ws.org/>) indexed by Scopus, either in an individual volume or as part of the IS-EUD 2023 Adjunct Proceedings. Workshop results will be published on the website.

11. Workshop History

There have been three editions of the EMPATHY workshop, all of them eliciting good participation and considerable interest in themes and contributions. The first edition of the workshop, held at Island of Ischia (Italy) in conjunction with AVI 2020, was organized as a half-day event; there were 11 accepted papers authored by more than 25 researchers. The second edition was a full-day event held in Bari (Italy) in conjunction with the INTERACT 2021; there were 11 accepted papers authored by more than 35 researchers. The third edition of the workshop was

a full-day event held in Frascati (Italy) in conjunction with ACM AVI 2022 featuring 10 accepted works involving more than 35 researchers and conspicuous participation of foreign researchers.

12. Organizers' Bios

Margherita Andrao is a Ph.D. Student at the Department of Cognitive Science at the University of Trento with a scholarship founded by Fondazione Bruno Kessler. Her research interests include Human-Computer Interaction, Educational Technology, End-user Programming, and Cognitive Psychology. She served as a reviewer for the Interaction Design and Children (IDC) Conference.

Fabrizio Balducci is Assistant Professor at the Computer Science Department of the University of Bari 'A. Moro' (website: <http://ivu.di.uniba.it/people/balducci.htm>). His research interests include HCI, Pattern Recognition, Mobile software and UX. He has been TPC member of several international conferences, Online Experience co-Chair for IFIP INTERACT 2021, Associate Chair for ACM CHIPlay 2020, 2021, 2022 and serves as Associate Editor for the international journal SAGE *Simulation & Gaming*.

Bernardo Breve is a Post-Doc Research Fellow at the Department of Computer Science of the University of Salerno. His research interests include artificial intelligence, data science, and Human-Computer Interaction, with an emphasis on usable security and privacy for end-users. He has been a PC member of several international conferences, such as IEEE BigDataService, International Workshop on Conceptual Modeling for Life Sciences, and also at the International DMS Conference on Visualization and Visual Languages, during which he served as Publicity co-chair, a Program co-chair, and a Conference co-chair in 2021, 2022, and 2023 respectively. He served as a Lead-Guest Editor for the Special Issue on Sentient Multimedia Systems and Visual Intelligence in the Multimedia Tools and Applications journal. He also serves as a reviewer for several international journals, such as Multimedia Tools and Applications (MTAP), IEEE Access, and ACM Transactions on the Web (TWeb).

Andrea Mattioli is a research fellow at CNR-ISTI, HIIS Laboratory and a PhD student in Information Engineering at the University of Pisa. His research interests are in the field of Human-Computer Interaction, specifically in personalization for IoT applications, augmented reality, and recommendation systems for smart environments. He serves as a reviewer for international journals and conferences, such as ACM Transactions on Interactive Intelligent Systems (TIIS), International Journal of Human-Computer Studies (IJHCS), ACM Conference on Human Factors in Computing Systems (CHI), and ACM Conference on Intelligent User Interfaces (IUI).

Fabiana Vernero is Associate Professor at the Department of Computer Science, University of Turin (website: <https://www.unito.it/persona/fvernero>). Her research interests include intelligent user interfaces, recommender systems and persuasive technologies. She is among the organizers of CHITALY 2023, to be held in Turin in September 2023, and serves as a reviewer for several international journals and conferences. In the past, she contributed to the organization of UMAP 2020 and Hypertext 2022, was part of the PhD committee in Modeling and Data Science, University of Turin, and founded a startup in the mobile app industry.

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