2nd International Workshop on Empowering People in Dealing with Internet of Things Ecosystems (EMPATHY)

Giuseppe Desolda, Vincenzo Deufemia, Maristella Matera, Fabio Paternò, Fabiana Vernero, Massimo Zancanaro

2nd International Workshop on Empowering People in Dealing with Internet of Things Ecosystems (EMPATHY)

Giuseppe Desolda[1], Vincenzo Deufemia[2], Maristella Matera[3], Fabio Paternò[4], Fabiana Vernero[5], Massimo Zancanaro[6]

[1] University of Bari Aldo Moro, Bari, Italy
giuseppe.desolda@uniba.it
[2] University of Salerno, Salerno, Italy
deufemia@unisa.it
[3] Politecnico di Milano, Milan, Italy
maristella.matera@polimi.it
[4] CNR-ISTI, Pisa, Italy
fabio.paterno@isti.cnr.it
[5] University of Turin, Turin, Italy
fabiana.vernero@unito.it
[6] University of Trento, Trento, Italy
massimo.zancanaro@unitn.it

1 Motivation and Objectives

The design and development of the so-called smart objects have become a huge trend in the last decade, thanks to the proliferation of low-cost technologies embedded with sensors and actuators. A major role in further fostering this tendency has been played by the Internet of Things (IoT), which connects the physical world with the Internet via ubiquitous sensors and actuators.

In this scenario, end-users who may often lack specific technical skills are provided with the opportunity to configure the behavior of their smart objects, as well as their interactions with other objects and online services, thanks to novel interaction paradigms. Depending on the solution adopted, "IoT ecosystems" can leave their users completely free and unsupported in their configuration task, exploit intelligent techniques to automatically determine how smart objects should behave, or implement an intermediate approach. To this respect, a prominent example is represented by social and humanoid robots, i.e., integrated sets of sensors and actuators which can exhibit human-like behavior, which can guide and support end users in their configuration tasks.

The technological landscape, therefore, appears extremely variegated, with existing solutions offering different levels of user control and automation. Such possibilities can be exploited in a wide variety of application domains that can have an impact on our daily life, such as industry 4.0, ambient-assisted living, retail, smart home, cultural heritage, and education. In this perspective, it is also important to understand how to combine methods and tools from the artificial intelligence field and those developed in the area of End-User Development (EUD) to help users understand, control and modify the automation available in the surrounding context of use.

Given the diffusion and the relevance that these approaches have been gaining, this workshop aims to serve as a venue for discussing ongoing research and sharing ideas for researchers and practitioners working on solutions to personalize the behavior of IoT ecosystems.

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 Privacy and Security in IoT systems, Personalisation and Recommendations for IoT.

2 Workshop Format and Participants

It is a one-day workshop, oriented towards discussions, hands-on sessions, and presentations. The number of workshop participants is limited to 30, mainly from academia and companies. Participants were informed about the workshop via the most known international mailing lists (e.g., DBWORLD, CHI-Announcements, etc.). Workshop papers are made available on CEUR Workshop Proceedings while workshop results are published on the workshop website (https://empathy-ws.github.io/2021/).

Table 1. Workshop Schedule

Time	**Phase**
09.00 - 09.15	Welcome and Introduction
09.15 - 10.30	Paper Presentations I
10.30 - 11.00	Coffee Break
11.00 - 12.30	Paper Presentations II
12.30 - 13.00	Future directions and wrap up
13.00 - 14.30	Lunch with all participants
14.30 – 15.00	Presentation of challenges
15.00 – 16.00	Creative thinking
16.00 – 16.30	Coffee Break
16.30 – 17.00	Result presentation
17.00 – 17.45	Agenda Definition & Wrap-Up

Table 1 shows the workshop schedule. At the beginning of the workshop, participants are welcomed and introduced to the workshop's goals and organizers. Then the accepted papers are presented in two sessions. Participants are encouraged to provide short but provoking presentations that tackle questions in line with the workshop goals. They are granted 10/15 minutes for presentation and Q&A. The workshop thus

continues with a discussion on the main challenges, future directions, and controversial aspects that characterize the current landscape for the EUD of IoT systems.

In the afternoon, after lunch, the organizers present the challenges and future directions that emerged during the previous discussion, inviting the participants to use them as a ground for a creative thinking session. This activity takes 60 minutes and participants are divided into small groups; participants are provided with material for the illustrations of their ideas. Due to the COVID-19 prevention procedures recommended by the World Health Organization (https://www.who.int/emergencies/diseases/novel-coronavirus-2019), interaction among participants is supported both online, thanks to virtual collaborative environments, and in presence, considering appropriate distances. Participants are provided with digital tools to collaboratively sketch their ideas and to prepare posters, videos, or 'Wizard-of-Oz' prototypes, or use storytelling or role-playing. After the coffee break, each group presents their solution to the workshop audience. Finally, the workshop organizers and participants consolidate results and ideas into the production of a structured map of topics to be addressed in future research.

The workshop is wrapped by identifying ways to move forward, including the initiation of joint publications, the organization of a new edition of the workshop (e.g., at CHI 2022, or IS-EUD 2023), and journal special issues on the topic.

3 Previous history

Looking at the recent history of significant workshops in the same research area, at CHI 2019 two workshops have been organized on IoT for non-technical people [1, 2], while a workshop on the interaction with smart objects [3], which led to a TOCHI special on "End User Development for the Internet of Things", was organized at CHI 2018. A workshop on "Intelligent User Interfaces for Internet of Things" took place at IUI 2019. Last year at CHI 2020 a workshop on Automation experience across domains: designing for intelligibility, interventions, interplay and integrity was organized [4].

The first EMPATHY workshop was held at AVI 2020, it was well attended, and the discussion was stimulating and interesting. Thus, we felt useful proposing a new edition that includes the same topics of the previous one, and addresses also further aspects that can raise interest and participation.

4 Organizers

The organizing team is a group of researchers with different disciplinary training and experience levels. They are involved in the EMPATHY project, which has been funded by the Italian Ministry of Education, Universities and Research (MIUR) troughs a three-year basis, research projects of national interest (PRIN). Their interdisciplinary nature allows the team to appreciate the diverse backgrounds of workshop attendees and to stimulate a critical discussion during the workshop.

Giuseppe Desolda is Assistant Professor at the Computer Science Department of the University of Bari "Aldo Moro" (email: giuseppe.desolda@uniba.it, website: http://ivu.di.uniba.it/people/desolda.htm). His research interests lie in HCI, specifically Interaction with Ubiquitous Systems, IoT, EUD, and Usable Security. Among others, he chaired the "Human-centered cybersecurity" (CHItaly 2019) and the "SERVE: Smart Ecosystems cReation by Visual dEsign" (AVI '16) workshops.

Vincenzo Deufemia is Associate Professor at the Department of Computer Science of the University of Salerno (email: deufemia@unisa.it, website: http://docenti.unisa.it/vincenzo.deufemia). His research interests include data science, pattern recognition and Human-Computer Interaction, with emphasis on usable privacy and security for end users. He has been a member of the organizing committee of several international conferences.

Maristella Matera is Associate Professor at the Department of Electronics, Information and Bioengineering (DEIB) of Politecnico di Milano (email: maristella.matera@polimi.it, website: http://matera.faculty.polimi.it/). Her research focuses on aspects at the intersection between Web Engineering and Human-Computer Interaction, with emphasis on design methods and tools for Web application development. She has been a member of the organizing committee of several international events - among others, she was program co-chair of AVI 2016. She is an associate editor for the journals "Future Generation Computer Systems" (FGCS) and ACM Transactions on Web (TWeb). She is chair of the Italian chapter of the ACM SIGCHI.

Fabio Paternò is Research Director at CNR-ISTI, where he leads the laboratory on Human Interfaces in Information Systems (http://hiis.isti.cnr.it/Users/Fabio/). His research activity has mainly been carried out in the Human-Computer Interaction (HCI) field, with the goal to introduce computational support to improve usability, accessibility, and user experience for all in the various possible contexts of use. For this purpose, he has continuously led for several years numerous interdisciplinary and international projects. He has been co-organiser of several workshops in international conferences.

Massimo Zancanaro is a professor of Human-Computer Interaction at the Department of Psychology and Cognitive Science at the University of Trento (email: massimo.zancanaro@unitn.it; https://webapps.unitn.it/du/it/Persona/PER0004568/). His research interests are in the field on Human-Computer Interaction and specifically on the topic of Intelligent Interfaces for which he is interested in investigating aspects related to the design as well as to study the reasons for use and non-use. At present, he serves as vice-chair for the Italian Chapter of the ACM Special Interest Group in Computer-Human Interaction and as Associated Editor for the journal Behavior and Information Technology.

Fabiana Vernero is a Lecturer at the Department of Computer Science, University of Turin (email: fabiana.vernero@unito.it, website: https://www.unito.it/persone/fvernero). She is part of the PhD committee in Modeling and Data Science, University of Turin. Her research interests include intelligent user interfaces, recommender systems and persuasive technologies.

The primary contact person is Giuseppe Desolda. All the organizers plan to attend the workshop.

References

1. Peter Fröhlich, Matthias Baldauf, Thomas Meneweger, Ingrid Erickson, Manfred Tscheligi, Thomas Gable, Boris de Ruyter, and Fabio Paternò. 2019. Everyday Automation Experience: Non-Expert Users Encountering Ubiquitous Automated Systems. In *Extended Abstracts of the 2019 CHI Conference on Human Factors in Computing Systems* (CHI EA '19). ACM, New York, NY, USA.
2. Carolina Fuentes, Martin Porcheron, Joel E. Fischer, Enrico Costanza, Nervo Verdezoto, Valeria Herskovic, Oren Zuckerman, and Leila Takayama. 2019. New Directions for the IoT: Automate, Share, Build, and Care. In *Extended Abstracts of the 2019 CHI Conference on Human Factors in Computing Systems* (CHI EA '19). ACM, New York, NY, USA.
3. Florian Müller, Dirk Schnelle-Walka, Tobias Grosse-Puppendahl, Sebastian Günther, Markus Funk, Kris Luyten, Oliver Brdiczka, Niloofar Dezfuli, and Max Mühlhäuser. 2018. SmartObjects: Sixth Workshop on Interacting with Smart Objects. In Extended Abstracts of the 2018 CHI Conference on Human Factors in Computing Systems (CHI EA '18). ACM, New York, NY, USA.
4. Peter Fröhlich, Matthias Baldauf, Philippe Palanque, Virpi Roto, Thomas Meneweger, Manfred Tscheligi, Zoe Becerra, Fabio Paternò, Automation experience across domains: designing for intelligibility, interventions, interplay and integrity, Extended Abstracts of the 2020 CHI Conference on Human Factors in Computing Systems