UNIVERSITÀ DI PISA

DIPARTIMENTO DI INGEGNERIA DELL'INFORMAZIONE

Dottorato di Ricerca in Ingegneria dell'Informazione

Doctoral Course

"Human-centred Automations in Smart Daily Environments"

Fabio Paternò

CNR-ISTI, HIIS Laboratory – Pisa, Italy

E-mail address: fabio.paterno@isti.cnr.it

Short Abstract: The combination of the Internet of Things and Artificial Intelligence has made it possible to introduce numerous automations in our daily environments. Many new interesting possibilities and opportunities have been enabled, but there are also risks and problems. Often these problems are originated from approaches that have not been able to consider the users' viewpoint sufficiently. We need to empower people in order to actually understand the automations in their surroundings environments, modify them, and create new ones, even if they have no programming knowledge.

The course discusses these problems and some possible solutions to provide people with the possibility to control and create their daily automations. It aims to allow attendees to gain knowledge and skills in addressing possible user problems such as managing complex or conflicting automations or being aware of privacy or security risks, and obtaining solutions enabling end-user understanding, creation, control, monitoring, and debugging automations that can be deployed in their daily environments (home, office, shops, industry, …). It will provide a discussion of the possible design space in terms of concepts, techniques, and tools, with particular attention to those supporting the trigger-action paradigm for representing the automations.

Course Contents in brief:

- Introduction Course
- The technological trends (IoT + AI) and their impact on daily automations
- Understanding Users and their Tasks
- Design criteria for transparency of intelligent environments
- Trigger-action Programming (TAP)
- Visual tools for TAP: Data-Flow, Wizards, Block-based
- Real-world deployment, execution, monitoring
- Security and Privacy in TAP
- Configuring smart environments with multiple active automations
- Explainable automations
- Conversational Agents for end-user creation of automations

- Humanoid Robots and automations
- Augmented reality-based support for automation control
- Intelligent automation recommandations
- Usability evaluation: methods, metrics, user tests
- Accessibility Evaluation
- Final Exercise Presentations and Discussion

Total # of hours of lecture: 16

References:

Will Brackenbury, Abhimanyu Deora, Jillian Ritchey, Jason Vallee, Weijia He, Guan Wang, Michael L. Littman, Blase Ur: How Users Interpret Bugs in Trigger-Action Programming. ACM CHI 2019 conference: 552, ACM Press.

Marco Manca, Fabio Paternò, Carmen Santoro, Remote Monitoring of End-User Created Automations in Field Trials, Journal of Ambient Intelligence and Humanized Computing, 2021

Marco Manca, Fabio Paternò, Carmen Santoro, Luca Corcella, Supporting end-user debugging of trigger-action rules for IoT applications, International Journal of Human-Computer Studies, 2019, Vol.123, 56-69

Andrea Mattioli, Fabio Paternò. "A Mobile Augmented Reality App for Creating, Controlling, Recommending Automations in Smart Homes.", Proceedings Mobile HCI 2023, ACM Press

Ben Shneiderman (2020) Human-Centered Artificial Intelligence: Reliable, Safe & Trustworthy, International Journal of Human–Computer Interaction, 36:6, 495-504

CV of the Teacher

Fabio Paternò is Research Director at CNR-ISTI, where he founded and leads the Laboratory on Human Interfaces in Information Systems. He has been author or co-author of 300+ publications in peer-reviewed conferences or journals. He has been co-editor of books and journal special issues relevant to the topics addressed in the course. He is an ACM Distinguished Scientist and a SIGCHI Academy Member. He has already given courses or tutorials at several international conferences. For several years he has been the scientific coordinator of several projects related to the course topics.

Final Exam: Exercises during the course and final presentation and discussion

Room and Schedule

Room: *Aula Riunioni del Dipartimento di Ingegneria dell'Informazione, Via G. Caruso 16, Pisa – Ground Floor*

Schedule:

Day1: 05/02/2024 – time 9.00 – 13.00

Day2: 07/02/2024 – time 9.00 – 13.00

Day3: 13/02/2024 – time 9.00 – 13.00

Day4: 15/02/2024 – time 9.00 – 13.00