SCWT: A joint workshop on Smart Connected and Wearable Things

Dirk Schnelle-Walka
Harman International - Connected Car Division
dirk.schnelle-walka@harman.com

Lior Limonad
IBM Reseaarch
liorli@il.ibm.com

Tobias Grosse-Puppendahl
Microsoft Research
tgp@microsoft.com

Joel Lanir
University of Haifa
ylanir@is.haifa.ac.il

Florian Müller
TU Darmstadt
mueller@tk.informatik.tu-darmstadt.de

Massimo Mecella
Sapienza University of Rome
mecella@dis.uniroma1.it

Kris Luyten
Hasselt University - tUL - iMinds, Expertise Centre for Digital Media
kris.luyten@uhasslet.be

Tsvi Kuflik
University of Haifa
tsvikak@is.haifa.ac.il

Oliver Brdiczka
Vectra Networks
brdiczka@acm.org

Max Mühlhäuser
TU Darmstadt
max@informatik.tu-darmstadt.de

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for thirdparty components of this work must be honored. For all other uses, contact the owner/author(s). Copyright is held by the author/owner(s).
IUI'16 Companion, March 7âĂŞ10, 2016, Sonoma, CA, USA.
ACM 978-1-4503-4140-0/16/03.
DOI http://dx.doi.org/10.1145/2876456.2882849

Abstract
The increasing number of smart objects in our everyday life shapes how we interact beyond the desktop. In this workshop we discuss how advanced interactions with smart objects in the context of the Internet-of-Thingsshould be designed from various perspectives, such as HCI and AI as well as industry and academia.

Author Keywords
smart objects; interent of things; smart spaces; HCI; novel interaction; multimodal and adapter interaction; context-awareness; embodied interaction; tangible interaction; enabling techologies

ACM Classification Keywords
H.5.m [User Interfaces: Miscellaneous]

Interacting With Smart Objects
There is an ongoing trend to put computing capabilities into everyday objects and and onto body-worn devices [6]. Well known examples range from smart kitchen appliances (smart coffee machines, smart knifes and cuttings boards) [1, 2], over smart (tangible) objects [4, 5] smart cars [10], fitness trackers, smart glasses up to even urban infrastructures [7]. Other examples deal with the fabrication of smart objects [9], smart sensory augmentation [8] and smart spaces [3] like smart meeting rooms.

Workshop Content

The SCWT workshop integrates the SmartObjects and IoWT workshops. It is aimed at focusing on the advanced interactions with smart objects in the context of the Internet-of-Things (IoT), and on the increasing popularity of wearables as advanced means to facilitate such interactions. The combined focal point is in good fit with the IUI conference overall aim to blend between HCI and the AI communities, and also between academia and industry. Consequently, the proposed workshop is aimed at bringing together researchers and practitioners interested in IoT and wearable-computing based applications, including also the interesting interplay between this emerging field and the more mature areas of mobile and ubiquitous computing.

From the perspective of the smart objects, many of the objects are functional on their own, but added value is obtained through communication and distributed reasoning. While other venues have focused on the many technical challenges of implementing smart objects, far less research has been done on the topic of how the intelligence situated in these smart objects can be applied to improve their interaction with the users. This field of study poses unique challenges and opportunities for designing smart interaction. From the perspective of wearables, the enablement of new wearable-based solutions requires synergy among multiple disciplines, such as Machine Learning, Signal Processing, Human-Computer Interaction, Data and Knowledge Representation, Information Visualization, Computational Neurosciences, and even Education. For example, there are many implications to mental and emotional signals that can be revealed via the use of wearables (e.g., EEG, heart-rate variability, GSR) as a means to determine whether the user is capable of performing her tasks, let it be a field worker, a combat pilot, a stock broker, or an elder user living alone.

The blending of smart objects and wearables enables the creation of new solutions that combine data of multiple sensors and data stores as the basis for a more intimate and timely interaction with things and users, and high level of situational awareness. Special attention may be given to the creation of innovative solutions, not only applicable to consumers, but also to the enterprise. This can possibly be the basis for newly created business services.

Smart objects typically have only very limited interaction capabilities. Yet, their behavior exhibits an amazing amount of intelligence. For example, several digital cameras are able to recognize faces in a scene automatically and adjust the focus accordingly. For first time users this can be quite surprising, and for experts this is a feature they probably want to turn off. The challenge is to design intuitive interaction with smart objects in a way the user feels in control of the smart object and understands the behavior and capabilities of the object.

Interaction with smart objects is situated in the physical environment of the user, i.e., it does not take necessarily place in a desktop setting. A smart object often uses additional cues from its context to improve the interaction with the user, thereby, making the interaction between user and smart object feel more natural. Furthermore, a smart object is a physical object which allows to exploit approaches from tangible and embodied interaction to enhance the interaction.

From the practical point of view, it is critical to not only study the theoretical foundations but also accumulate and generalize the knowledge that is gathered by industry in building corresponding technological infrastructures, methods, and tools to simplify the interaction with the smart objects and to ease the development and operation of wearable-centric

solutions across different markets (e.g., wellness & healthcare, banking, insurance, security & safety, transportation).

Program Committee

PC members helped the organizers to publicize the event in more scientific communities and allowed for a competent peer-review process. All submissions were peer-reviewed by at least two reviewers. The list of program committee members is as follows.

For the workshop on Interacting with Smart Objects: **Bo Begole** (Samsung, USA), **Marco Blumendorf** (smartB, Germany), **Aba-Sah Dadzie** (Open University, United Kingdom), **Alexander Kröner** (Technische Hochschule Nürnberg, Germany), **Germán Montoro** (UAM, Spain), **Patrick Reignier** (Inria, France), **Geert Vanderhulst** (Alcatel-Lucent Bell Laboratories, Belgium) and **Raphael Wimmer** (Universität Regensburg, Germany).

For the Workshop on Internet of Wearable Things: **Sourav Bhattacharya** (Bell labs), **George DeCandio** (IBM Research), **Marlon Dumas** (University of Tartu), **Dan Feldman** (University of Haifa), **Antonio Kruger** (Saarland Univesrity and DFKI), **Mudhakar Srivatsa** (IBM Research) and **Anthony Tang** (University of Calgary).

REFERENCES

1. Filipponi, L., Vitaletti, A., Landi, G., Memeo, V., Laura, G., and Pucci, P. Smart city: An event driven architecture for monitoring public spaces with heterogeneous sensors. In *Sensor Technologies and Applications (SENSORCOMM), 2010 Fourth International Conference on*, IEEE (2010), 281–286.
2. Hartmann, M., Schreiber, D., Luyten, K., Brdiczka, O., and Mühlhäuser, M. Workshop on interacting with smart objects. In *Proceedings of the 16th international conference on Intelligent user interfaces*, ACM (2011), 481–482.
3. Helal, S., and Tarkoma, S. Smart spaces. *IEEE Pervasive Computing*, 2 (2015), 22–23.
4. Kortuem, G., Kawsar, F., Fitton, D., and Sundramoorthy, V. Smart objects as building blocks for the internet of things. *Internet Computing, IEEE 14*, 1 (2010), 44–51.
5. Molyneaux, D., and Gellersen, H. Projected interfaces: enabling serendipitous interaction with smart tangible objects. In *Proceedings of the 3rd International Conference on Tangible and Embedded Interaction*, ACM (2009), 385–392.
6. Molyneaux, D., Izadi, S., Kim, D., Hilliges, O., Hodges, S., Cao, X., Butler, A., and Gellersen, H. Interactive environment-aware handheld projectors for pervasive computing spaces. In *Pervasive Computing*. Springer, 2012, 197–215.
7. Shepard, M. *Sentient City: Ubiquitous Computing, Architecture, and the Future of Urban Space*. The MIT Press, 2011.
8. Shull, P. B., and Damian, D. D. Haptic wearables as sensory replacement, sensory augmentation and trainer–a review. *Journal of neuroengineering and rehabilitation 12*, 1 (2015), 59.
9. Tanenbaum, J. G., Williams, A. M., Desjardins, A., and Tanenbaum, K. Democratizing technology: Pleasure, utility and expressiveness in diy and maker practice. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, CHI '13, ACM (New York, NY, USA, 2013), 2603–2612.
10. Wu, Z., and Pan, G. Smart car space: An application. In *SmartShadow: Models and Methods for Pervasive Computing*, Springer (2013), 101–127.