

# Smart Garments and Accessories for Healthy Lifestyles

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## ABSTRACT

Wearable devices are trying to conquer the market and to enter the users' daily life. However, wearables show their limits when creating long-term engagement, which is crucial for helping the users to build healthy lifestyles that can accompany them during their lives. The main goal of this workshop is to bring together researchers and practitioners that can contribute with their expertise in creating common guidelines for the design of wearable devices.

## Author Keywords

Wearable; behavior change; design; UX; health; wellbeing; engagement.

## ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

## INTRODUCTION

The introduction of mobile computing in conjunction with the almost ubiquitous connection to the Internet profoundly changed human life. After this important technological revolution, the current society is undergoing a new paradigm shift: the mobile devices, which used to be transportable and handheld, are becoming wearable. In fact, the market is becoming more and more populated by devices that are integrated in garments and wearable accessories, such as glasses, bracelets, watches et cetera. This new paradigm brings both new exciting opportunities and thrilling challenges for the current scientific community, who has the chance to live this fascinating transformation. In fact, wearable sensors are paving the way for the future ultimate achievement of the quantified self, allowing users to have a thorough knowledge and monitoring of their body and behavior. This enables the

scientific community to design new services that can help users to change behaviors and adopt the desired healthy lifestyle to improve their own physical and mental wellbeing. At the same time, integrating computers in clothes presents new challenges related to user acceptability and engagement on the long-term. In fact, turning devices in “wearables” has to cope with ergonomic and aesthetics issues related to fashion and culture. This requires a more heterogeneous scientific community with new expertise in different domains; moreover, the user experience design becomes critical, needing for new guidelines and for further research. Therefore, we will build this new workshop on the success of the previous editions of the “Atelier of Smart Garments and Accessories” (ASGA) held in conjunction with the ACM International Joint Conference on Pervasive and Ubiquitous Computing (UbiComp) and the International Symposium on Wearable Computers (ISWC) in 2013 [1] and 2014 [2]. In fact, this allowed us to build a community that can help in designing new solutions for smart garments and wearable devices that can be fashionable and, at the same time, to provide a pleasant user experience. This year, we decided to apply this knowledge to the creation of new concepts and prototypes for the promotion of healthy lifestyles.

## RELATED WORK

A plethora of wearable devices have been launched in the market recently. In fact, in this area, both the industry and academia seem to be very active but the current main problem they are facing is the lack of common guidelines for the design of successful wearable devices that can also overcome the issue of achieving users' long-term engagement [7]. The big role played by the industry probably determined this lack of open knowledge about the design of effective wearables. Moreover, many off-the-shelf wearables adopt very similar solutions generating a sort standard de facto that risks falling in the pit of lack of innovation. A solution to this issue involves generating new comprehensive guidelines based on previous key-works that can help researchers and practitioners to develop effective wearable devices and services. Some researchers started to propose some methods [6], frameworks [8], design principles [4, 9] and findings from very relevant studies [5]. The problem is that this information is usually scattered in different publications or it tackles the issue from a unique

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perspective and do not provide a handbook to facilitate the work of other researchers and practitioners. Comprehensive guidelines could be particularly interesting to overcome the main problem with wearable devices that was highlighted by several studies [4, 5, 8]: providing to the user an engaging user experience that can be effective also on the long term.

### WORKSHOP TOPIC

The topic is focused on the design of wearable devices that can facilitate users to adopt healthy lifestyles. This particular area is located at the intersection point of different domains such as human-computer interaction, human factors, psychology, ergonomics, fashion design and many others. Despite the novelty of this topic, its relevance in both the industry and the academics is growing rapidly and this is the perfect time to debate about the opportunities and challenges that are arising in this exciting area.

### WORKSHOP GOALS

The main goal of this workshop is to bring together researchers and practitioners from the academia and the industry in order to discuss about the emerging opportunities and, especially, the new challenges arising in designing wearable devices and the services orbiting around them. In particular, participants will work together in order to generate new guidelines for the design of wearables and services that can enhance the user experience on the long term enabling a sustained engagement. This work will start during the workshop but the participants will be encouraged to continue this collaboration with the help of the organizers in order to create a common paper that can gather all the design guidelines suggested by the workshop participants. This paper will be submitted for publication in a journal or a conference that will be agreed by the authors. Moreover, the organizers of the workshop will have the possibility to validate these guidelines in the ongoing European PEGASO project.

Another important goal is to build a network of researchers and practitioners that will be engaged on the long term in dealing with the issues related to the design and development of wearable devices in order to prepare joint projects, funding applications and work towards a series of workshops. The workshop will discuss the development of a coherent but multi-disciplinary research agenda for the future of wearables design and agree detailed proposals for future work in the area. Moreover, the members of this future community can evaluate the possibility of creating an open wiki in order to democratize the knowledge produced during this collaboration.

### ISSUES TO BE ADDRESSED

The issues to be addressed in this workshop are mainly related to the long-term use of wearables. In particular, participants will be asked to think about possible solutions for the design of persuasive technologies that can change behaviors on the long-term in order to build healthy habits that will accompany the users for the rest of their lives.

Other issues are related to the interface design that allows for economic interactions that are suitable to long interacting sessions and information visualization that are not too demanding on the level of cognitive load; at the same time these interfaces and information representation techniques must be affective for the users' persuasion. Another issue is related to the acceptability and specific design requirements of particular segments of the population (e.g., teenagers and older adults). Also the ergonomics requirements for the wearables design represent a crucial issue in the context of devices that are worn and used for a long time. Finally, the issue related to fashion, with its unpredictable dynamism of trends and cultural inter-influences, can play a determinant role in the definition of the success or failure of a wearable device.

### WORKSHOP PLAN

Here the schedule for the workshop organization.

- April 18, 2015: Publication and distribution of the call for papers with relative website.
- May 29, 2015: Paper submission deadline.
- June 15, 2015: Notification of acceptance to the authors.
- June 22, 2015: Deadline for the submission of the camera-ready papers.
- September 8, 2015: Workshop as in the proposal.

The following paragraphs describe the work that will be performed for the organization of the workshop divided in three phases.

#### Before

Before the workshop, we will create a website presenting the most relevant information about the event: the call for papers, the important dates, the program and complementary organizational information (e.g., organizers and program committee). In parallel, social media such as LinkedIn and Twitter will be adopted to advertise the event, share information and to start preliminary discussions about the topic. All of the organizers are working in the PEGASO European project, which allows for good networking. Moreover, Maurizio Caon, Elena Mugellini and Giuseppe Andreoni already organized the “Atelier of Smart Garments and Accessories” workshop at UbiComp/ISWC 2013 (please, visit: <https://sites.google.com/site/ateliersmartgarments/>) and 2014 (please, visit: <https://sites.google.com/site/2014asga/>), and the “Wearable Technologies for Automotive User Interfaces” workshop at AutomotiveUI 2014 where they created a multidisciplinary community interested in wearable technology [3] (please, visit: <https://sites.google.com/site/wearautoui2014/>). Alexandra Lang and Sarah Atkinson organized the workshop on Teen Interaction at the 28th British HCI Conference.

#### During

The workshop is thought as a full day event. During the morning, researchers from the academia and the industry

will present their position papers in a 1-minute madness session. We expect to have between 5 and 10 position papers and related presentations. In order to provide a complete overview of the topic, the presentations will be selected to represent the different facets involved in the design of wearables for behavior change and sustaining motivation. Then all the other workshop participants will introduce themselves. After that, we will start the discussion adopting the World Café method: participants sit at a small table where they can talk about the workshop topic in a relaxed manner (the number of small tables will depend on the number of participants); every 20 minutes the participants will be mixed in order to make participants to talk with everyone and to make everyone contribute. Pens, paper, and sticky notes will be provided to help in the discussion.

After the small groups (probably in the afternoon), individuals are invited to share insights or other results from their conversations with the rest of the large group. The rest of the time will be dedicated to write down these insights in order to respond to a precise need: the conception of a first draft of guidelines for the design of wearable devices for behavior change and sustained engagement.

#### **After**

The participants willingly to continue with the definition of the guidelines for the design of wearable devices in the specific field of behavior change will be encouraged to create an online workgroup to continue the work begun during the workshop. Opportune web tools will be used in order to facilitate this collaboration. The first aim is to produce a publication and then, according to the authors' opinion, it will be considered to create a public wiki in order to democratize these guidelines.

In addition, we will provide an ideal test bed for the evaluation of the defined guidelines: the PEGASO European project (<http://pegasof4f.eu>). In the framework of this project, it will be possible to adopt the proposed guidelines in a concrete scenario: the prevention of obesity in teenagers.

#### **CALL FOR PAPERS**

Designing wearable technology encouraging healthier lifestyles is a cross-disciplinary challenge that requires combining knowledge from different domains such as fashion design, human factors and ergonomics, human-computer interaction, psychology, electronics and computer science.

The main goals of the workshop are to establish a multidisciplinary community interested in bridging the gap among different research domains in the specific topic of the workshop, as well as, laying the foundations for the establishing of multifaceted guidelines for the design of wearables for behavior change.

Researchers from academia and industry are invited to submit 4-8 page position papers in SIGCHI Extended Abstract format that will be peer-reviewed by the workshop program committee.

We solicit stimulating and original ideas. We further encourage papers that propose new research directions or could generate lively debate at the workshop.

The workshop major topics comprehend and are not limited to:

- Persuasive (wearable) technologies and services: design methods and frameworks
- Behavior change approaches based on wearable devices
- Interaction design for smart garments and accessories
- Case studies and applications of wearables for behavior change
- Psychological and ethnographic investigations (e.g., user acceptance)
- Ergonomics requirements for long-time wearing (intensive use)
- Fashion design for wearable devices

The position papers will be included in the ACM Digital Library and supplemental proceedings of the conference.

Please, note that as requirement to participating at the workshop at least one author of each accepted position paper must attend the workshop and all participants must register for the workshop and for at least one day of the conference.

#### **BIO OF THE ORGANIZERS**

Dr. **Maurizio Caon** is currently a postdoctoral researcher at the University of Applied Sciences and Arts Western Switzerland (CH) as member of the HumanTech Institute. He holds a PhD in Human-Computer Interaction issued by the University of Bedfordshire (UK). His research domains are in the area of human-computer interaction: gestural interfaces, activity recognition, persuasive technology, context-aware ambient intelligence and wearable computing.

Dr. **Stefano Carrino** is currently a researcher at the University of Applied Sciences and Arts Western Switzerland, Fribourg (EIA-FR) as member of the HumanTech Institute. He holds a PhD in Computer Science received from the University of Fribourg in a joint research with the University of Applied Sciences and Arts Western Switzerland, Fribourg. His research domains are in the area of Human Computer Interaction, Ambient Intelligence and Persuasive Technologies.

Dr. **Elena Mugellini** is Professor at the Information and Communication Department of the University of Applied Sciences and Arts Western Switzerland. She is head of the HumanTech Institute. She is also member of the Telematics

Technology Laboratory at the University of Florence. She holds a PhD in Telematics and Information Society received from the University of Florence in 2006. Her current research interests are on the areas of Ambient Intelligence, Multimodal Interaction, Tangible User Interface, Personal Information Management, Document Engineering.

Dr. **Alexandra Lang** is a Human Factors Research Fellow at the University of Nottingham. Alex is currently working in the Human Factors Research Group and Horizon Digital Economy Research Institute on projects largely associated with technology for adolescent health promotion and the use of remote technologies and data in hospitals. Her research interests are the application of human factors approaches and user centred design in medical technology development and healthcare contexts, with particular interest in how these approaches can impact adherence to medical regimens.

Dr. **Sarah Atkinson** is a Senior Research fellow with a PhD in Ergonomics and 20 years of experience in ergonomics research and consultancy, prior to joining the IOE she worked within the Health and Safety Ergonomics Unit and the Vibration, Biomechanics and Noise Research Group at Loughborough University where she worked on a number of research projects. She is a registered member of the Ergonomics Society, holds an MSc in Human Factors and a first degree in Applied Consumer Sciences. Sarah currently works also as an Ergonomics consultant.

Dr. **Marco Mazzola** obtained a Master Degree in Biomedical Engineering in 2007 at the Bioengineering Department of Politecnico di Milano, and a PhD in Industrial Design at INDACO Department in 2011. He contributed to the foundation of LyPhE (Laboratory of Physical Ergonomics) in 2008. He currently has a research fellowship in Ergonomics at INDACO department where he coordinates and manages research practice at LyPhE. He is member of the International Society of Human Simulation since its foundation in 2011.

Dr. **Giuseppe Andreoni** received the Laurea Degree in Electronic Engineering in 1993 and the PhD in Biomedical Engineering in 1998 at the Politecnico di Milano, where he is associate Professor at the Industrial Design Faculty and Department. Currently, he is director on the Campus Point, and at the same time he is the coordinator of the Sensibilab (Biomedical Sensors and Systems Lab.) and of the LyPhE (Laboratory of Physical Ergonomics) at the INDACO (Industrial Design, Art, Communication and fashion) Dept. of the Politecnico di Milano.

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