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# WAHM - 4th Workshop on Ubiquitous Technologies to Augment the Human Mind: Sharing Experiences

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**Abstract**

A recurring science fiction theme is the *downloading of abilities from another human to one's own mind*. Emerging technologies beyond simple audio/video recordings such as: 360° videos, tactile recorders and odor recorders are promising tools to enable skill transfer and empathy. However, the produced large datasets require new means for selecting, displaying and sharing experiences. This workshop will bring together researchers from a wide range of computing disciplines, such as virtual reality, mobile computing, privacy and security, social computing and ethnography, usability, and systems research. Furthermore, we will invite researchers from related disciplines such as psychology and economics. The objective is to discuss how these trends are changing our existing research on sharing experiences and knowledge to augment the human mind.

**Author Keywords**

Cognitive Systems; Quantified Mind; BCI; Knowledge Log; Human Augmentation; Lifelogging; Memory Augmentation.

**ACM Classification Keywords**

H.5.2 [Interfaces and Presentation]: User Interfaces - Input devices and strategies.

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#### Important Dates

**Submission Deadline:**  
July 14, 2017

**Feedback to authors:**  
July 21, 2017

**Camera ready version:**  
August 04, 2017

**Workshop at UbiComp :**  
September 11, 2017

## Introduction

Sharing experiences and knowledge is essential for human development, enabling both skill transfer and empathy. A recurring science fiction theme is the *downloading of abilities from another human to one's own mind*. To realize such visions, computer scientists in wearable computing, ubiquitous computing, human computer interaction, affective computing, virtual and augmented reality have been working on enabling technologies to accelerate skill transfer and effective learning for years. For example, 24/7 experience capture by lifelogging cameras [1, 4] along with storage and processing developments could provide valuable insights about one's habits and skills. Such developments happened disjunct from each other. Thus, the key challenge remains in utilizing and presenting the captured data to extend cognitive and emotional capabilities, and to share experiences with others – developing not just one's own mind, but also societal knowledge and understanding.

With this seminar, we want to bring together the diverse computer science community complemented by experts in cognitive science, psychology (special emphasis on human perception) and education. The objective is to work on *practical scenarios and futuristic visions to augment and extend the human mind*. Ultimately, we believe this will lead to *"downloadable" experiences and abilities*. The effects may not be instant and is likely to be different from the SciFi theme. However, these differences are our central focus in this seminar.

## Topics

Our previous workshops on this topic have been highly successful (growing from around fifteen attendees in year one [3], to thirty-five last year [2]), but both discussion at the workshops and the associated submissions have shown a need to ensure an increasingly broad focus. While previ-

ous workshops have focused predominantly on cognition (e.g. human memory), this one will realise the community's broader interest in mind augmentation (e.g. emotion, creativity, attention as well as cognition). Furthermore, we will use this workshop as an opportunity to consider the role of ubiquitous and wearable technologies not only in enhancing existing human capabilities, but also in creating (and sharing) entirely new ones.

Our intention is to hold a workshop of broad appeal that targets submissions and discussion on the following themes, with a strong emphasis on their relevance to augmentation of the human mind:

**Sensing Technologies:** How do we utilise ubiquitous sensing devices to capture transferable cognitive and emotional state? How do signals gathered from such devices relate to cognitive processes? How can we design sensing and interaction modalities to better understand human behavior and sharing expectations for specific use cases? What are the important activities to focus on (e.g. fatigue detection, attention and concentration tracking)? How can functionality be provided within battery and processing constraints?

**Applied cognitive theories:** What is the interplay between technology interventions and existing cognitive function? How does our understanding of cognitive processes shape technology design and deployment? To what extent are cognitive functions able to be replicated, extended and even created?

**Innovative user interfaces:** On the output side, we are looking for innovative user interfaces for mind augmentation, including technologies for information priming and for lifelogging. For example, how can feedback through ambient large displays and personal mobile devices aid personal knowledge acquisition, retention, and attenuation?

**Knowledge acquisition points design:** Experiences and information consumption advance personal knowledge. Examples for acquisition points are: museum visits, reading activities, or classroom technologies. What is the design space of such acquisition points? How do these relate to attention? How do we extend knowledge acquisition experiences beyond the individual?

**Commercial applications:** The lab findings of memory augmentation research could be translated to impactful commercial products. Examples include: apps to support Alzheimer patients' recall their failing memories, augmenting meetings to detect and enhance the personal comprehension, mitigating potential misunderstandings. What such applications exist? What are the business models to drive their development and success? To what extent should applications be driven by commercial interest?

**Privacy:** Large-scale data capture and transfer has obvious privacy implications that, although often identified (e.g. bystander privacy, capture of private space, plausible deniability) are still unsolved. How will such issues be addressed in a world where technology becomes still more pervasive and unobtrusive? How do we ensure user control over data despite growing corporate interest?

**Societal implications:** Beyond privacy and data management, augmentation technologies raise important societal issues. For example, if extending one's mind with existing knowledge is dependant on access to technology, then how do we prevent such technologies from amplifying existing (negative) digital, educational and social divides?

## Publicity Plan

A website will be established for the workshop. The workshop will be advertised in a number of mailing lists (UbiComp, CHI, Lancaster UbiComp, BCS-HCI, Italian HCI, NordiCHI, German HCI, EUSSET, and Australian HCI). The workshop will be promoted via Facebook and Twitter. Three successful workshops on this theme have been organised previously, with increased interest as they have progressed (numbers have more than doubled since the first workshop). The workshop organizers will contact their peers who published on topics related to the workshop's themes. We will also go through the last three years of conferences proceedings with similar or matching interests, e.g., Communities and Technologies, UbiComp, Pervasive, CHI, CSCW, and DIS in order to promote the workshop and invite authors who published on similar topics.

## Activities

We propose a one-day workshop with presentation sessions in the morning, development of scenarios in the early afternoon, and group discussions on fundamental challenges in the late afternoon. We describe below the pre-workshop preparations and the post-workshop follow up.

### *Research and Industry Impact*

Two 'keynote' flash talks (10 min each) will prompt discussion and idea generation; these will be explicitly targeted to ensure both research and industry impact. We have tentatively invited *Thad Starner* to present his recent work in Passive Haptic Learning. In the event that Thad is unavailable, other potential areas of relevance include cognitive science, neuro-science or augmented reality. The second keynote will come from an industrial partner, provisionally *J/INS*<sup>1</sup>, a Japanese smart-glasses company.

<sup>1</sup><https://www.jins-jp.com/jinsmeme/en/>

### *Presentations*

The workshop introduction and keynotes (9:00-9:30) will be followed by short introductory presentations from accepted paper authors (5 minutes each). During the presentations, all participants will be asked to take notes on provided Post-Its, which we will share on a large whiteboard in order to prepare for the discussion sessions. The presentation session will be broken into two parts: (9:30-10:00) and (10:30-12:00) with a short coffee break in between (10:00-10:30). This will allow enough time to discuss different ideas coming out from the presentations.

### **Organizers**

**Sarah Clinch:** is a lecturer in the School of Computer Science at the University of Manchester, UK. She holds a PhD from Lancaster University. Her research is focuses on the development and deployment of data-centric pervasive computing architectures for new and emerging application domains including augmented cognition.

**Passant ElAgroudy:** is a researcher at the Institute for Visualization and Interactive Systems at University of Stuttgart. She received her MSc in Digital Media Engineering and Technology from the German University in Cairo. Her research focuses on designing memory augmentation solutions via visualizing lifelogs.

**Tilman Dingler:** is a senior researcher at the Institute for Visualization and Interactive Systems at University of Stuttgart. He received his PhD from the University of Stuttgart. Before research, he developed solutions for TinyCo and Yahoo! He focuses on concepts and applications in “Pervasive Computing”, developing context-aware systems that put users and their context at the center.

**Tsutomu Terada:** is an associate professor at Graduate School of Engineering, Kobe University. He holds a PhD

from Osaka Univeristy. He serves concurrently as executive board member on Wearable Computer Research and Development NPO, honorable visiting researcher in Lancaster University, and JST PRESTO researcher. He is also a member of ACM and IEEE. His research focuses on wearable, ubiquitous, and entertainment computing.

**Kai Kunze:** is an associate professor at Keio Media Design, Keio University. He previously held an assistant professorship at Osaka Prefecture University and has been a visiting researcher at the MIT Media Lab. He holds a PhD from University of Passau. His research focuses on tracking knowledge acquisition activities, especially reading and human enhancement technologies.

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