UbiTtention 2018: 3rd International Workshop on Smart & Ambient Notification and Attention Management

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Abstract
In the advancing ubiquitous computing, users are increasingly confronted with a tremendous amount of information proactively provided via notifications from versatile applications and services, through multiple devices and screens in their environment. The human's attention is becoming a new significant bottleneck. Further, the latest computing trends with emerging new devices including versatile IoT devices, and contexts, such as smart cities and vehicles, are even accelerating this situation. In such situations, "attention management", including attention representation, sensing, prediction, analysis, and adaptive behavior in the computer systems, are needed in our computing system. Following last years' successful UbiTtention 2016 and UbiTtention 2017 workshops with up to 50 participants, the UbiTtention 2018 workshop brings together researchers and practitioners from academy and industry to explore the management of human attention and notifications with versatile devices and smart situations to overcome information overload and overchoice.

Author Keywords
Notifications; Attention Management; Ambient Interfaces; Smart Cities; Internet of Things

ACM Classification Keywords
H.5.m. [Information Interfaces and Presentation (e.g. HCI)]: Miscellaneous

Figure 1: This alarm clock uses ambient light to softly wake up its user. We envision that it could also be used as an helpful output device for other information, e.g., incoming phone calls or reminders.

Figure 2: Audience at the UbiTtention 2017 workshop at UbiComp 2017 in Mauii.

Figure 3: Discussion at the UbiTtention 2017 workshop at UbiComp 2017 in Mauii.

Background

In times of an increasing amount of information, human attention becomes a bottleneck. Many ubiquitous devices and services therefore proactively seek peoples attention through *notifications*: visual, auditory, or tactile alerts intended to draw attention to events that took place outside of a user's focus [5]. Notifications are rapidly becoming integral to many ubiquitous computing platforms, such as smartphones, desktop computers, or even cars, and are used by an increasing number of applications and services [14, 17]. Notifications inform us about new social network updates, announce the arrival of new emails, or inform drivers about potential trouble with the car.

Research in different contexts has repeatedly shown that notifications can be distractive, which may cause negative effects on task performance [2, 4, 5, 7, 15]. Since notifications in daily life are often created by messengers and social networks [3, 11, 14], social expectations towards responsiveness create pressure to attend notifications timely. Thus, disabling notifications, despite their known disadvantages, for many people is not an option [5, 7].

Yet, it becomes increasingly exhausting to pay attention and respond to all these interruptions in appropriate ways, especially in the advancing ubiquitous computing with emerging ICT-based contexts, such as IoT, smart cities and smart vehicles. As a consequence, users might miss crucial information and become less efficient or, in case of a missed personal message, appear rude [12]. In addition, the presence of so many different applications and services makes it hard to choose the best and most appropriate one, which can lead to stress and frustration. Eventually, this leads to the problems of *information overload* and *overchoice*—in our opinion two of the most relevant problems in information technology for the next few decades. In the era of the Internet of Things (IoT) we have to handle incoming notifications from all "our" devices as well as "other" devices. Together with developments in smart city environments or with smart mobility the information overload will grow.

Recently, we have been seeing an increase in novel attempts to address these problems by using contextual data to deliver notifications at more opportune moments [6, 8, 9, 10, 13, 16], the use of ambient information presentation (see Figure 1) or using augmentation, or by making it easier to deal with interruptions [1]. However, there are significant challenges still remaining to bring these works together and apply the right strategy in the right moment.

UbiTtention 2018 Workshop

In this workshop, we will bring together people from industry and academia who are active in the areas of attention research, context-aware and ubiquitous computing, and ambient and multi-modal interaction. The main objective of UbiTtention 2018 is to share the latest research on user attention and notification management in several research areas and contexts. These areas include HCI, systems research, user studies, IoT, smart cities, smart homes and smart vehicles (as shown in Table 1). Further, the workshop aims to identify future research challenges, research opportunities, and applications of our research outcomes to the society. The workshop is a follow-on from the successful *Smarttention, Please!* workshops at MobileHCI 2015[1] and 2016[2], and the *UbiTtention* workshops at UbiComp 2016[3] and 2017[4]. Last year, the UbiTtention workshop received 15 innovative papers and more than 50 participants on the venue of UbiComp 2017 (cf. Figures 2 and 3).

[1] http://mhci15.smarttention.com/
[2] http://mhci16.smarttention.com/
[3] https://www.ubittention.org/2016/
[4] https://www.ubittention.org/2017/

1. Detection/prediction of users' status around attention and notifications, such as availability, interruptibility, attentional status and cognitive load for interruption
2. Exchanging/sharing, analysis and feedback on such capability above (beyond detection and prediction)
3. Versatile types of information presentation methodologies including ambient, peripheral, distributed and multi-modal presentation
4. Infrastructures, frameworks and tools for the development of smart attention systems
5. Strategies for attention management against emerging computing with IoT devices
6. Understanding users' behavior and habits around notifications and interruption, including longer term "user engagement" and "behavior change"
7. Use of ambient representations for "big-data analysis"
8. Management of information overload in various emerging computing venues such as smart city and smart mobility

Table 1: Non-exclusive overview of workshop topics.

While the Smarttention workshops focused more on mobile notifications, the follow-on UbiTtention workshops focus on a larger understanding of the different roles notifications can play in a wide variety of computing environments including the office, the home, in cars, and other smart environments.

Relevance and impact to UbiComp: We are facing an advancing "ubiquity" of computing with increasing types of computing devices (including IoT), services, and computing venues (home, office, cities, vehicles). Our research on user attention and notifications is related to all of the ubicomp research fields above, and has significant potential to impact and contribute to all such areas horizontally.

Long-term objectives: The workshop will lead to a deeper understanding of notifications and attention management. We plan to build an active and long-lasting community around the workshop's theme. For example, we want to use the workshop's drive to prepare a special issue of a journal, e.g., IEEE Pervasive. We plan to make an open call but we will especially invite workshop participants to submit. We also aim to consolidate the findings from the workshop in an article that highlights the main insights. A potential venue for publishing the article is ACM Interactions.

A central component to disseminate the gained insights will be the workshop's website[5]. We will use the website to present all individual workshop contributions as well as the results of the discussions. Also, our Facebook page will be used to distribute information, so researchers including prospective authors and participants can join together.

[5] https://www.ubittention.org/2018/

Workshop Papers

Our workshop will ask for papers outlining new insights in the topics listed in Table 1. The submissions will be peer-reviewed by at least two reviewers from an international PC of renowned researchers and experts. The acceptance criteria will be a mixture of relevance, novelty, writing and research quality, and provocativeness. With the aforementioned measures, we are confident to attract a large number of submissions, which will allow us to assemble a high-quality workshop.

Workshop Structure

We plan UbiTtention'18 as a full-day workshop, aiming to bring together people from industry and academia. After a round of introductions and an inspiring keynote talk, we will have a series of informative paper presentations.

In the afternoon we will have an extensive discussion phase. We will productively discuss several topics, that will be identified by the organizers based on the workshop paper submissions in advance of the workshop. The possible themes include (but not limited to) (1) further significant research challenges and opportunities, (2) possible collaborative research theme, and (3) expected applications on top of our research outputs and deployment to the society. In the discussion session, we will first split into small subgroups, which will be asked to come up with answers and solutions to a specific agenda. In the end of the workshop, each group is asked to present their findings, which will then be briefly discussed and summarized.

The workshop will conclude with a wrap-up session that summarizes the key discussion points, and which will be used to discuss future collaborations and actions.

09:00–09:10	Introductions
09:10–10:00	Keynote Lecture
10:00–10:30	Coffee Break
10:30–12:00	Presentation Session
12:00–13:00	Lunch Break
13:00–14:30	Break-out Discussions
14:30–15:00	Coffee Break
15:00–16:0	Discussion of Group Findings
16:30–17:00	Wrap-up Session & Plan of Future Actions

Table 2: The workshop will be a mixture of inspirational talks, creative group discussions, and a summative wrap-up session.

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