International Workshop on Networking and Object Memories for the Internet of Things (NOMe-IoT 2011) *

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INTRODUCTION

Following the prognosis that predicts 50 to 100 billions of Internet-connected things by 2020, we are now at the cross section of a paradigm shift and observing the metamorphosis that everyday things are going through: from things that learned-to-do to things that are learning-to-think, and finally to things that will learn-to-perceive (sense and response). The Internet of Things (IoT, [2–4]) technology is at the heart of this metamorphosis, and is rapidly gaining global attention from academia, industries, and governments. Manifold definitions of IoT trace back to the ITU vision [1], and also available from European Commission. In general, the IoT concept allows bidirectional communications among device, network, and backend data centers. It covers a wide scope of technologies including wireless/wired sensing, networking, computing and control, which together build feasible complex cyber physical systems (CPS) to support diverse applications, including smart grid, healthcare, intelligent transportation, and logistics, etc.

An integral part of IoT systems is object memories, comprise hardware and software components that physically and/or conceptually associate digital information with real-world objects in an application-independent manner. Such information can take many different forms (structured data and documents, pictures, audio/video streams, etc.) and originate from a variety of sources (automated processes, sensors in the environment, users, etc.). If constantly updated, digital object memories over time provide a meaningful record of an object's history and use.

ACM NOMe-IoT seeks to provide a foundation for discussing these challenges and to layout the future roadmap for IoT research. It is also the successor of two two successful workshop series, ACM DIPSO/DOMe-IoT 2007-2010, in conjunction with UbiComp 2007-2010. By bringing in several system and networking experts from academia and industry, this year's event extends the workshop's scope and aims to provide a forum to discuss and exchange ideas on recent research work, point out the directions for future research, and seek collaboration opportunities on all aspects of the IoT Systems.

For the past three years, IoT has nurtured a theoretical and practical vocabulary across cultural contexts as well as technical applications. The exchange of experiences and insights across what remains an emerging technology is beginning to offer a critique of an IoT that has previously been logistical, and in its place a understanding for the platform that values a social dimension. The purpose of NOMe for IoT remains in bringing together researchers from a variety of disciplines (computer scientist, electrical engineers, design-

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ers, social scientists, etc.) to discuss various aspects of Digital Object Memories, and its significance with respect to IoT applications. Last year's DOMe for IoT 2010 workshop investigated advantages of Digital Object Memories over e.g. paper-based memories, and the importance of Digital Object Memories w.r.t. to the general Internet of Things vision. The workshop made significant progress toward understanding the conceptual and practical experiences that consumers are beginning to face as tagging technologies become more ubiquitous. Using the UK Research Council funded project Tales of Things[1] as a platform for experimentation, workshop participants applied printed QR tags to artefacts and associated immaterial information with the material artefact. The Tales of Things website allows owners of objects the ability to print unique QR codes and associate them with a variety of media assets (text, images, YouTube or AudioBoo clips). The project smart phone applications further allow others to read these stories and add comments to them. Through a cycle of reading and then writing back to these tags, workshop teams began to gain insight into how the traditional linear model of production and consumption maybe contested by allowing people to write back to an object and influence its identity and its potential trajectory. As a result, participants agreed in the hypothesis that digital object memories contribute to the embodiment of the IoT.

For this the fifth workshop, the teams are keen to sustain the enquiry into how diverse audiences will further challenge the identity of an artefact and better understand the implications for how objects that leave a factory with one function and meaning, may mutate or be transformed as they enter the public sphere. Based upon the early findings from this workshop series, value and meaning for objects in the near future are likely to increase in subjectivity according to the cultural environments that they enter. As the ability to write back to an artifact becomes commonplace through software platforms such as StickyBits[2], the control over the value of an object will no longer remain in the hands of the manufacturer or producer, but move in to the hands of the consumer. The workshop at UbiComp 2011 will allow members the opportunity to explore the implications of a future in which a Coke can may no longer be interpreted as a Coke can because its association with immaterial data out weighs the reading of the brand.

GOALS AND TOPICS

The primary goal of the workshop is to bring together technical experts, artists, designers, and possible end-users of IoT systems to discuss and to leverage cooperation in future activities. Suggested topics for NOMe-IoT include, but are not limited to,

- IoT System and Functional Architecture
- Technology for enabling Digital Object Memories (e.g., Architecture, Representation and Modeling)
- Protocol Designs for IoT (e.g., MAC, Routing, TCP, Admission control, etc.)
- Security and Privacy issues for IoT
- IoT Network Operations, Management, and Optimizations
- IoT Naming, Address Management and End-to-End Addressability
- Real-time and Historical Data Management for IoT
- Web Technologies and Cloud Computing for IoT
- Novel Interfaces and Interactions Techniques for IoT
- Social Implications and Studies reporting IoT Systems
- IoT Applications (e.g., Healthcare, Logistics, Smart Grid, Transportation Systems, etc.)
- IoT Standardization Activities

This year, we have selected 9 papers to present new techniques, introduce new methodologies, propose new research directions, or discuss strategies for resolving open problems spanning all aspects of an IoT system. These presentations are grouped into two sessions, one in the morning and one in the afternoon, namely: Systems, and Design and Applications. Throughout the day, discussion breakouts are organized by forming concrete themes to facilitate the interactions among participants from various research domains.

EXPECTED OUTCOME

We expect three types of results from the workshop:

1. Submitted position papers and a documentation of the group discussions (slides) will be provided on the workshop homepage. Furthermore, we aim at publishing a special journal issue or book series volume considering the quality and novelty of the submitted papers.
2. Design case studies have been solicited as an explicit submission category for the workshop. From our previous experience we anticipate that this category will be particularly attractive to designers and digital media artists. Contributions from creative practice disciplines have significant potential both to stimulate discussion around non-traditional notions of Digital Object Memories in the Internet of Things.
3. We would present the results of the workshop in the conference either in the form of a poster or a short talk and promise to identify priorities for new directions of research, and/or to initiate the appropriate collaborations and building community around a theme of interest.

ADDITIONAL AUTHORS

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[1] http://www.talesofthings.com
[2] http://www.stickybits.com