Cloud-of-Things 2013 (CoT'13)

Athens, Greece. 16-26th of July 2013

The Cloud-of-Things 2013 (CoT'13) is the first in a series of workshops that will explore the synergy offered by combining the Internet of Things, Cloud Computing, Intelligent Environments and embedded computing which are often discussed separately, each at their own specialist conference. The reasoning behind bringing these topics together is that we foresee practical deployments of such systems are likely to need combinations of these techniques from these hitherto separate research areas. As a response, the Cloud-of-Things workshop was formed to provide an opportunity for researchers from these areas to come together to discuss the issues in a more holistic way, so as to identify possibilities for synergy and cross-fertilization. This area of work is fuelled by massive market opportunities as, for example, some estimates suggest that this market could be worth between 22 billion and 50 billion dollars (made up of some 16 billion connected devices) by 2020. These figures seem plausible as there are already said to be of the order of 8 billion embedded-processors and around 1 billion smart phones produced each year, Thus, we believe this workshop is providing a timely opportunity to discuss the opportunities for research in this strategically important area.

The Outer Limits

This year's event includes a special session, "*The Outer Limits*", sponsored by the "*Creative Science Foundation*" (www.creative-science.org) that includes a small number of presentations to take a speculative look at future possibilities for the Cloud-of-Things area. These presentations use the *Science Fiction Prototyping* approach.

Incidentally, the name for this session *"The Outer Limits"* was derived from an American TV series that aired during the period 1963 to 1965 which had an emphasis on depicting stories on the outer edges of our familiar world, through the use of science fiction. We hope attendees or readers will find this small session an interesting and useful addition to the workshop.

The workshop consisted of 13 peer-reviewed papers; 9 regular papers and 4 Science Fiction prototypes (SFPs). The regular papers cover an interesting mix of topics with the first paper by Anasol PEÑA-RIOS et-al describing an application that seeks to combine physical and virtual networked objects within a holistic cloud supported system that allows Internet-of-Things developers on distributed geographical sites to collaborate on shared work. The second paper by Chien-Ming TUN et-al examines the business drivers and issues that arise from massive cloud based systems by examining Googles' operational model. The third paper from Alejandro Sosa et-al describes a solution to a fundamental problem (cyclic instability) that disrupts the proper operation of large interconnected Cloud-of-Things systems. The forth paper by Markos ZAMPOGLOU et-al describes work towards a large-scale cloud-based platform that offers virtual reality advertisements to end-users. The fifth paper by Gary SCOTT et-al provides a fascinating insight into how the Internet-of-Things can enter people's everyday lives by creating innovative smart object, illustrating the process via the design of an intelligent alarm clock. The sixth paper by Vasileios ANAGNOSTOPOULOS et-al enables enriched user content to be distributed (and redistributed) through a network of commercial and non-commercial services (Preservation Services), while ensuring a lasting relationship between the holder and owner of the intellectual content. The seventh paper by Idham ANANTA et-al explores how the massive user base of cloud based systems, that usually adds to complexity and problems, can be harassed to provide a crowd-based intelligence that improves the performance of such systems. The eighth paper by Malek ALRASHIDI explores the use of augmented reality in untangling the complexities of large Cloud-of-Things systems both as an educational tool and as an aid to developers. The ninth paper by Marc DAVIES et-al provides an account of work that enables the automatic generation of realistic artificial human-like characters that can be used for next generation games or as test-beds for Cloud-of-Things applications needing very large numbers of test subjects or environments. Apart from the regular papers, we have also created what we think is a novel session called '*The Outer Limits*'. It is a small session of 4 creative science papers that we hope will stimulate some forward things about research into the Cloud-of-Things. The first of these papers is from Tiina KYMÄLÄINEN who introduces an intelligent home for the aged that uses Cloud-of-Things technology to provides motivational and personalized activities, assistance, and memory. It probes the boundaries of this area by studying a do-it-yourself creation and configuration tool. The second paper by Yu HUAN et-al explores a world where augmented realities are realised through bionic lens. It raises some fascinating idea about the relationships between the virtual and physical, creating a complex world where total immersion brings possibilities beyond living and death. The third paper by Yevgeniya KOVALCHUK explores the consequences of using Cloud-of-Things technologies to augment people's physical body, mind, and consciousness beyond their current biological limits. The final paper, by Victor Callaghan, provides in insight into the current interest in maker-spaces and their relationship to Cloud-of-Things technologies along with presenting 4 vignettes speculating on possible future directions of this area.

Clearly, we would not have been able to manage this workshop on our own and there are many people we need to thank. First, we would like to acknowledge the valuable contribution of our CoT'13 organizational team whose support and advice throughout the year has contributed greatly to the success of this event (especially their assistance with reviewing and revising papers), namely (in alphabetical order):

- Matt Ball, University of Essex, United Kingdom
- Susi Daryanti, Universitas Gadjah Mada, Indonesia
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- May Zhang, Shijiazhuang University, China

Also, we are grateful to the IE'13 organisers who are hosting this event and our sponsors, the Creative Science Foundation. Finally, and most importantly, we want to thank all our authors as, without their outstanding work, there would be no workshop.

If you found this workshop proceedings useful, then why not join us for CoT'14 (keep your eye on www.cloudofthings.org for more information)

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8th June 2013

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Regular CoT'13 Papers

1. *Developing xReality objects for mixed-reality environments* , Anasol Pena-Rios (University of Essex, UK)

2. *An Internet-Connected World: Google's Platform Strategies to Network Industry*, Chien-Ming Tung, Hsuan-Yi WU (National Taiwan University, Taiwan)

3. *Genetic Algorithms and Differential Evolution Algorithms Applied to Cyclic Instability Problem in Intelligent Environments with Nomadic Agents*, Alejandro Sosa, Vıctor Zamudio & Rosario Baltazar, (Instituto Tecnologico de Leon, Mexico), Vic Callaghan (University of Essex, UK) and Efren Mezura (Universidad Veracruzan. Mexico).

4. *A Content-Aware Cloud Platform for Virtual Reality Web Advertising*, Markos ZAMPOGLOU, Athanasios G. MALAMOS, Kostas KAPETANAKIS & Konstantinos KONTAKIS, (TEI of Crete, Heraklion, Greece), Emmanuel SARDIS, Vrettos MOULOS, and George VAFIADIS (Iroon Polytechniou, Athens, Greece), Anastasios DOULAMIS (Technical University of Crete, Chania, Greece)

5. *A DIY approach to the Internet of Things: A Smart Alarm Clock*, Gary SCOTT and Jeannette CHIN (Anglia Ruskin University, UK)

6. *Biopolis*, Vasileios Anagnostopoulos, Anastasios Doulamis, Emmanuel Sardis & Emmanuel Sardis (Institute of Communication and Computer Systems, Greece)

7. *iForest: Exploring Crowd-based Intelligence as a Means of Improving the Human-Computer Interface in the Cloud-of-Things*, Idham ANANTA, Jazi Eko ISTIYANTO, Susi DARYANTI (Universitas Gadjah Mada), Jeannette CHIN (Anglia Ruskin University, UK), Vic CALLAGHAN, Matthew BALL, Michael GARDNER (University of Essex, UK)

8. *ViewPoint: An Augmented Reality Tool For Viewing and Understanding Deep Technology*, Malek ALRASHIDI, Vic CALLGHAN & Micheal GARDNER (University Of Essex,UK), and Jennifer B. ELLIOTT (University of Cincinnati, USA).

9. *An Introduction to Genetic Profiling*, Marc DAVIES and Vic CALLAGHAN (University of Essex, Colchester, UK)

The Outer Limits – A CoT'13 Creative Science Session

10. *IF Alice Arrives, THEN Wonderhome Incites*, Tiina KYMÄLÄINEN, (Aalto University, Finland)

11. *The Programmer and the Widow: Exploring the Effects of Total Immersion in Augmented Realities*, Yu HUANG (University of Southern California), Hsuan-Yi WU (National Taiwan University, Taiwan)

12. *Talking Things*, Yevgeniya KOVALCHUK (King's College London, UK)

13. *The Maker Fables*, Vic CALLAGHAN (University of Essex, UK)