

# **IOT360 2014 - User-Centric IoT**

## **Preface**

This volume includes the proceedings of four conferences dedicated to the role the Internet of Things (IoT) plays in user-centric technologies and applications in different domains. The 44 revised full papers in this volume were carefully reviewed and selected from a total of 67 submissions. The conferences also featured six special contributions from recognized experts in the field.

The first conference, COIOTE, focused mainly on artificial intelligence techniques for the ever-growing field of the IoT, a field expected to produce deep transformations on physical things as their virtual counterparts become more and more capable of autonomous behavior.

The second one, PERGAMES, focused on how to best leverage on IoT-gathered data in many application domains, leading to the design and deployment of pervasive games for various sectors, such as health and well-being, ambient-assisted living, smart cities/societies, education, cultural heritage, tourism and more.

The third conference, HealthyIoT, provided the health-related flavor of IoT, relating to the use of more widely available and adopted wearables.

The fourth conference focused mainly on the integration of smart objects and on the most advanced operational technology trend of cloud-based “Everything as a Service” where an appropriate cloud should support a high level of “as a service” paradigm. This deployment paradigm will enable the easy adoption of IoT-based services and applications by end users, while calling for smart object providers as well as platform middleware providers to architect their solutions accordingly.

April 2015

Raffaele Giaffreda

# **First International Conference on Cognitive Internet of Things Technologies – COIOTE 2014 Rome – October 27, 2014**

## **Preface**

The First Conference on Cognitive Internet of Things Technologies, COIOTE 2014, took place on October 27 at the NH Leonardo Da Vinci hotel in Rome, Italy. The main focus of the conference was on artificial intelligence techniques for the ever-growing field of the Internet of Things (IoT), a field expected to produce deep transformations on physical things by making them more intelligent. We are pleased to confirm that the whole experience including delegates from industry and academia was very fruitful, with many interesting new ideas and technical discussions.

Our Technical Program Committee, co-chaired by Professors Artur Arsénio and Erik Mannens, assembled an excellent technical program consisting of 11 papers in the main track, including several invited submissions from top researchers in the field. Additionally, four other papers were grouped into a Special Session entitled “Affordance in the Internet of Things (AIoT)”.

Upon reviewing various successful stories of intelligent machines adding value and comfort to the human existence, Dr. Artur Arsénio highlighted in his keynote presentation the irrefutable benefits of bringing intelligence into objects, a topic that was highly appreciated among the attendees.

In the same agenda we included a COIOTE Panel session, organized by Dr. Franck Le Gall from Easy Global Market, on an interesting topic about the relations between IoT and the fields of cognitive sciences, nanotechnologies, and biotechnologies.

On behalf of the Organizing Committee of COIOTE 2014, we would like to thank all the authors who contributed their valuable work to the conference, and the TPC members and reviewers for maintaining the quality of the technical program. We would also like to thank our keynote speaker and panelists for contributing with their time, knowledge, and wisdom. We thank the organizers of the AIoT special session, Alice Ruggeri, Luigi Di Caro, and Alessio Antonini, for the added value to the conference. COIOTE 2014 would have not been possible without the dedicated work of all abovementioned individuals.

This event was part of the IoT360 summit, endorsed and organized by the European Alliance for Innovation (EAI) and technically sponsored by CREATE-NET. We are grateful to the EAI staff, particularly to Ms. Giorgia Nisi, who tirelessly looked after every detail in making this conference possible.

We hope that the papers included in these proceedings will serve as valuable reference for topics related to artificial intelligence in the context of the IoT.

Frederik Santens  
Radu-Laurentiu Vieriu

**International Conference on Pervasive Games**  
**PERGAMES 2014**  
**Rome, Italy, 26 October 2014**

**Preface**

PERGAMES 2014, the First International Conference on Pervasive Games, was held at LUISS Enlabs, Rome, on October 27, 2014, as a co-located event with the IoT360 Summit of EAI.

The conference focus was on understanding how to best design and deploy pervasive games for various sectors, such as health and well-being, ambient-assisted living, smart cities/societies, education, cultural heritage, tourism and more. It aimed at bringing together international researchers, IoT and game developers, as well as industry delegates to address issues and trends, research, and technological advances in the world of pervasive games for different application fields.

The conference was structured as a single-track, multi-session event. To encourage active participation and the potential formation of new collaborations among attendees, the atmosphere was kept informal and preceded by an organized group visit to the VIGAMUS (Video-Games Museum) in Rome. Also, two interactive and gamified sessions were carried out during the conference day, one focusing on group brainstorming for the design of innovative game solutions and the other focusing on discussing their deployment and exploitation challenges.

Contributions to the conference were solicited in the form of full and short research papers. After a thorough review process of the papers received, for which we thank the Technical Program Committee, nine were accepted for presentation at the conference.

On behalf of the Organizing Committee of PERGAMES 2014, we would like to thank EAI and CREATE-NET for technical sponsorship of the event. A special thank also to the volunteer students from the Faculty of Architecture, University of Rome La Sapienza, and to Prof. Ivan Paduano, in particular, for their local support and endless patience.

Last but not least, we would like to thank all the authors who submitted papers, making the conference possible, and the authors of accepted papers for their valuable contribution.

Edna Pasher  
Gabriel Bendersky  
Silvia Gabrielli

**First International Conference on IoT Technologies  
for HealthCare  
HealthyIoT 2014  
Rome, Italy, October 27–28, 2014**

**Preface**

In this dedicated Internet of Things technologies for healthcare section of the publication, it is our pleasure to introduce to you a wide selection of innovative and insightful research papers that were presented at the First International Conference on IoT Technologies for Healthcare. The HealthyIoT 2014 conference was an IoT co-located event which took place in Rome, Italy, during October 27–29, 2014, forming one of the main conferences in the IoT360 Summit.

HealthyIoT 2014 was the first one of an international scientific event series dedicated to the IoT and healthcare. The IoT, as a set of existing and emerging technologies, notions, and services, can provide many solutions to delivery of electronic healthcare, patient care, and medical data management. The event brought together technology experts, researchers, industry and international authorities contributing toward the assessment, development, and deployment of healthcare solutions based on IoT technologies, standards, and procedures.

The conference was organized by CREATE-NET in collaboration with the European Alliance for Innovation in Slovakia, and its partner, the European Alliance for Innovation, in Trento, Italy.

A total of 15 research papers are featured in this publication, with contributions by researchers from across Europe and around the world. The publication includes manuscripts written and presented by authors from different countries, including China, Germany, Greece, Italy, Portugal, Romania, Sweden, and the UK. Topics including healthcare support for the elderly, real-time monitoring systems, wearables, and healthcare security systems are covered.

In conclusion, we would like to once again express our sincere thanks to all the authors and attendees of the conference in Rome, Italy, and also the authors who contributed to the creation of this HealthyIoT publication.

Antonio J. Jara

**International Conference IoT as a Service  
IoTaaS 2014  
October 27–28, 2014, Rome, Italy**

**Preface**

These are the proceedings of the First Internet of Things as a Service (IoTaaS) Conference. IoTaaS is an international venue for publishing innovative and cutting-edge results on the convergence of next-generation technologies and methodologies reshaping our way of living. This conference focuses on the Internet of Things (IoT) in general and in particular on providing innovative and enabling capabilities “as a service.” The cloud serves as the central focal point for consumption and delivery of such technologies and applications.

The IoT era is widely seen as looming just around the corner, expected to have a significant impact on most aspects of entities of all kinds, from citizens through enterprises small and large to government bodies. The amount of smart devices is huge and grows at a staggering rate, while connectivity gets a wider coverage. Smart objects are immersed in everyday life and the amount and variety of contextual data they can produce, or the actions they can take on their immediate environment, is enormous. At the same time smart objects are becoming more capable and sophisticated by having stronger processing power, larger amounts of storage, and longer battery life.

For this trend to have a big impact, be successful, and be widely adopted and useful it needs to be tightly integrated with the most advanced operational technology trend of cloud-based “Everything as a Service.” IoT poses various specific challenges that are not yet covered by existing cloud offerings, chief among these are the heterogeneity, security, and scalability issues. In addition, developing and deploying IoT-based applications should be made as accessible as possible such that the entry barrier for new innovations in this area is lowered. Thus, an appropriate cloud should support a high level of “as a service” paradigm. This deployment paradigm will enable the easy adoption of IoT-based services and applications by end users, while calling for smart object providers as well as platform middleware providers to architect their solutions accordingly. Moreover, the same rule of thumb applies also for the ingestion and exposure of smart objects via the platform. The supporting business model would support a pay-as-you-go paradigm, enabling small to large entities to participate and contribute.

We received many good papers. These papers went through a rigorous review process that selected the papers in the program. The selected papers cover a wide spectrum of topics belonging to IoTaaS. We have papers on networking considerations for IoT, platforms for IoTaaS, adapting to the IoT environment, modeling IoTaaS, machine-to-machine support in IoT, as well as composite applications. We also have a

position paper on the third phase FI-PPP (Future Internet – Private Public Partnership) project encouraging SMEs to start experimenting in this challenging new area. To top all these interesting topics, we have two keynote talks. One by Aleardo Furlani from INNOVA, who discusses enabling IoT business opportunities. The other by Peter Niblett from IBM, with an industry view. We believe that this strong program laid a concrete foundation for this conference for years to come.

Eliezer Dekel  
Benjamin Mandler

**International Conference IoT as a Service  
IoTaaS 2014  
October 27–28, 2014, Rome, Italy**

**Preface**

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