
First Edition of the Very Large Internet of Things Workshop (VLIoT)

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ABSTRACT

This article is an editorial for the proceedings of the “Very Large Internet of Things (VLIoT 2017)” workshop in conjunction with the 43th International Conference on Very Large Data Bases (VLDB 2017), which takes place in Munich, Germany, from August 28th to September 1, 2017. The editorial of VLIoT@VLDB 2017 provides an overview over the aims and scope of the workshop, the review procedure, and the accepted papers. The proceedings of VLIoT@VLDB 2017 are published as special issue in the Open Journal of Internet of Things (OJIOT) (www.ronpub.com/ojiot), and the publisher of OJIOT is RonPub (www.ronpub.com).

TYPE OF PAPER AND KEYWORDS

Editorial: *Internet of Things, Databases, Very Large Internet of Things, VLIoT@VLDB 2017, Workshop, Open Access, Open Journal of Internet of Things, OJIOT, RonPub*

1 AIMS OF THE WORKSHOP

An increasing number of real-world objects are becoming accessible and manageable through the Internet. According to CISCO¹, the number of these devices will reach 50 billion by 2020, forming a very large Internet of Things (VLIoT). This massive number of “smart” objects will cooperate with each other, have their own metadata, and may continuously produce new data (in form of events, sensor data, or actuator states).

Data management will be a major challenge in the very large Internet of Things. Hence, efficient IoT infrastructure and technologies must be developed to handle masses of IoT data with high performance. This will include: new techniques to filter and store relevant data; efficient replication approaches for objects with constrained resources in order to increase availability and durability; new protocols for voting about decisions among objects; and smooth integration of heterogeneous objects.

¹http://www.cisco.com/c/dam/en_us/about/ac79/docs/innov/IoT_IBSG_0411FINAL.pdf

This paper is accepted at the *International Workshop on Very Large Internet of Things (VLIoT 2017)* in conjunction with the VLDB 2017 Conference in Munich, Germany. The proceedings of VLIoT@VLDB 2017 are published in the Open Journal of Internet of Things (OJIOT) as special issue.

The goal of this workshop is to bring together academic researchers and industry practitioners working in the field of IoT and to allow them to report and exchange their findings addressing these challenges. This workshop also intends to discuss other closely-related technologies such as nanotechnology, fog-, edge-, and dew-computing for IoT. These ideas may indeed

solve or attenuate the problems of a very large Internet of Things (w.r.t. performance, energy-efficiency, as well as security and privacy aspects).

1.1 Types of Papers

The first edition of the VLIoT workshop solicited papers of different types containing contributions describing original ideas, promising new concepts, and practical experience, namely:

- **Research papers:** proposing new approaches, theories or techniques related to IoT, including new data structures, algorithms, whole systems, and frameworks. They should make substantial theoretical and empirical contributions to the research field.
- **Experiments and analysis papers:** focusing on the experimental evaluation of existing approaches including data structures and algorithms for the IoT and bring new insights through the analysis of these experiments. Results of experiments and analysis papers can be, for example, showing benefits of well-known approaches in new settings and environments, opening new research problems by demonstrating unexpected behavior or phenomena, or comparing a set of traditional approaches in an experimental survey.
- **Application papers:** reporting practical experiences on Internet of Things applications. Application papers might describe specific application domains in the IoT such as smart homes/offices/cities, continuous health care, waste management, emergency response, intelligent response, and Industry 4.0.
- **Vision papers:** identifying emerging or future research issues and directions, and describing new research visions in the IoT area that may have a great impact on our society.

1.2 Topics of Interest

The topics of interest of the VLIoT workshop include:

- Semantic IoT
- Privacy-by-design and security-by-design in IoT
- System architectures for IoT, e.g.
 - things-centric,
 - data-centric,
 - event-centric, and
 - service-centric.
- IoT applications including:
 - smart homes/offices/cities,

- waste management,
- health care,
- emergency response, and
- intelligent shopping.

- Nano Technology including:
 - Nano Networks,
 - Nano communication,
 - Nano applications,
 - Nano computing, and
 - Internet of Nano Things.
- IoT programming toolkits and frameworks
- IoT prototypes and evaluation test-beds
- IoT data mining and analytics
- IoT management and interoperability
- Management of IoT streams
- Enabling technologies and standards for the IoT
- Spatial and temporal reasoning for IoT
- Sustainability of IoT platforms, e.g. business models for deployment and maintenance
- Societal challenges and IoT, e.g. urban planning and decision making tools
- Ownership of data in IoT scenarios
- Fog, Edge and Dew Computing for IoT
- IoT benchmarks and performance measurement
- Indexing and search in IoT environments
- IoT transactions, concurrency control and recovery
- Hardware accelerators and energy savers for IoT applications and core infrastructure
- IoT discovery of devices, services and data

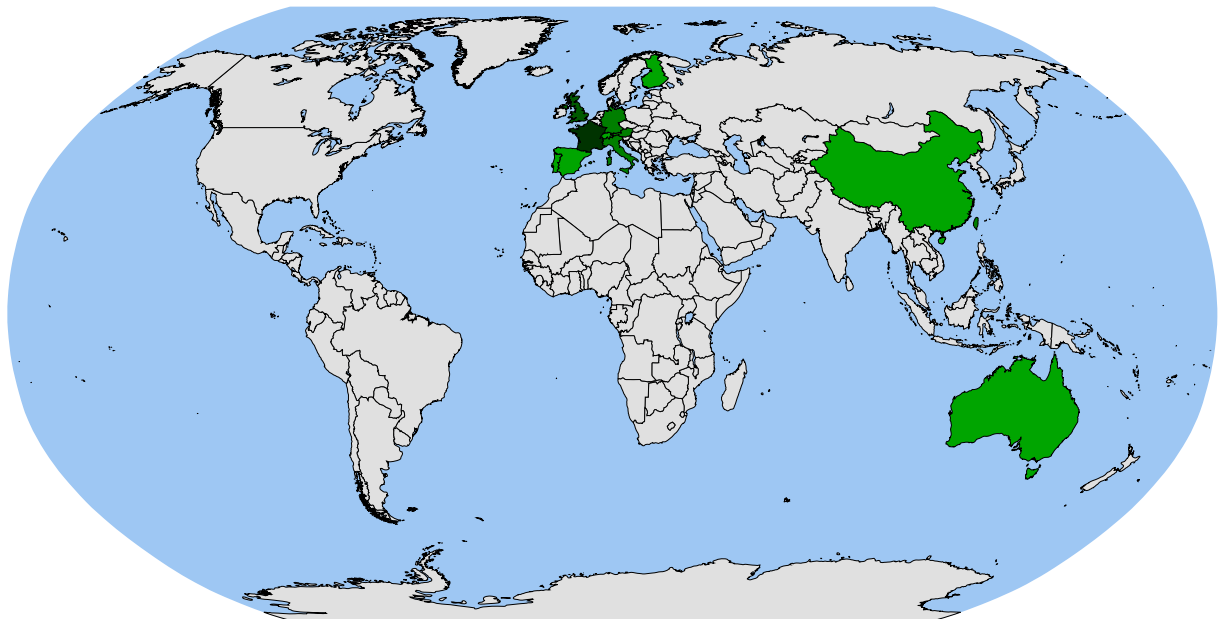
2 SUBMISSIONS AND REVIEWS

2.1 Diversity Considerations of the Program Committee

Two workshop chairs (see Appendix A) and nineteen program committee (PC) members (listed in Appendix B) are the experts on the topics of interest of the workshop. They are researchers and practitioners from academia and industry from twelve nations. Figure 1 presents a map of how many PC members reside in which country. Three of the PC members are women.

2.2 Submission Statistics and Review Procedure

The workshop received sixteen paper submissions, ten of which were accepted for presentation and publication in the workshop proceedings. Each paper



Legend

Program committee members and chairs: 1  4

Figure 1: Number of PC members per country

Table 1: Overview of the accepted papers and their categories

Category	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	Total
Vision Paper					✓		✓			✓	30%
Regular Research Paper	✓	✓	✓	✓		✓		✓	✓		70%
Security and Privacy			✓	✓	✓	✓	✓	✓		✓	70%
IoT Framework/Architecture	✓	✓	✓		✓	✓	✓	✓			70%
Cloud-Sensor Systems	✓	✓	✓				✓			✓	50%
Protocols for the Internet of Things	✓					✓		✓	✓		40%
Semantic Internet of Things	✓							✓			20%

was reviewed by at least two members from the program committee (by three members in most of the cases), who remained anonymous to the authors (*single blind review*). The reviewers evaluated the papers according to the following aspects:

- Relevance to the workshop
- Novelty and practical impacts
- Technical soundness
- Appropriateness and adequacy of:
 - Literature review
 - Background discussion
 - Analysis of issues
- Presentation, including:
 - Overall organization

- English
- Readability

3 ACCEPTED PAPERS

We deal with the accepted papers in this section. First we discuss why we have decided to publish the workshop proceedings in the Open Journal of Internet of Things (OJIOT)² in Section 3.1. Afterwards, we provide a short overview of the accepted papers in Section 3.2.

² <https://www.ronpub.com/ojiot>

3.1 Choosing the Publisher of the Workshop Proceedings

The open access model guarantees high visibility in the research community, usage of published results and hence may lead to a high impact. Therefore, we have chosen a journal applying the open access model for publishing the workshop proceedings of *Very Large Internet of Things* as special issue. Furthermore, we attach importance to a journal not asking for transferring copyright but applying the license model. Hence, we finally decided to choose the Open Journal of Internet of Things (OJIOT)², which is an open access, peer-reviewed, academic journal published by RonPub³. OJIOT distributes its articles under Creative Commons Attribution License⁴, which permits unrestricted use, distribution and reproduction free of charge in any medium, provided that the original work is properly cited. Furthermore, by publishing in OJIOT, the papers will be indexed in major scientific indexes and long-term preservation of the articles is ensured by the German National Library⁵.

3.2 Overview of Accepted Papers

Seven of ten accepted papers (i.e., 70%) are regular research papers [1, 2, 3, 4, 6, 8, 9], and three vision papers [5, 7, 10].

Table 1 provides an overview of the categories of the accepted papers. 70% of the papers address security and privacy topics. Also 70% of the papers are dedicated to frameworks or architectures for the Internet of Things. Half of the papers envision a hybrid cloud-sensor system and describe the interplay between cloud and sensors. 40% deal with different or optimized IoT protocols. Two papers (20%) contribute to utilizing semantic technologies for the Internet of Things.

4 SUMMARY

Our workshop addresses solving the problems occurring in large-scale Internet of Things environments with special focus on data management. In this article, we analyze the topics of our accepted papers, which might provide hints for trends in IoT research.

We believe that our workshop is a great success and a (small but fine) step towards a breakthrough of IoT approaches in industry and daily life. We wish our readers enjoyment when reading our selection of papers in the addressed research area at the intersection of Internet of Things and databases.

³ <https://www.ronpub.com>

⁴ Creative Commons Attribution License
<http://creativecommons.org/licenses/by/4.0/>

⁵ http://www.dnb.de/EN/Home/home_node.html

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APPENDIX A - WORKSHOP CHAIRS

The workshop is organized by:

- Sven Groppe, University of Lübeck, Germany
- Carlo Alberto Boano, Graz University of Technology, Austria

APPENDIX B - PROGRAM COMMITTEE

Our Program Committee members include the following experts:

- Whai-En Chen, National Ilan University, Taiwan
- Jérôme Darmont, Université Lumière Lyon 2, France
- Mirian Halfeld Ferrari, Université d'Orléans, France
- Andrew Hudson-Smith, University College London, United Kingdom
- Abdessamad Imine, INRIA-LORIA Nancy Grand-Est, France
- Peiquan Jin, University of Science and Technology of China, China
- Verena Kantere, University of Geneva, Switzerland
- Abdelmajid Khelil, Landshut University of Applied Sciences, Germany
- Jan Lindström, MariaDB Corporation, Finland
- Uden Lorna, Staffordshire University, United Kingdom
- Pericles Loucopoulos, The University of Manchester, United Kingdom
- Riccardo Martoglia, University di Modena and Reggio Emilia, Italy
- Cédric du Mouza, Conservatoire National des Arts et Métiers, France
- Luis Muñoz, University of Cantabria, Spain
- Elaheh Pourabbas, National Research Council of Italy, Italy
- Sherif Sakr, School of Computer Science and Engineering University of New South Wales, Australia, and King Saud bin Abdulaziz University for Health Sciences, Saudi Arabia
- Klaus-Dieter Schewe, Johannes-Kepler-Universität Linz, Austria
- Mu-Chun Su, National Central University, Taiwan
- Marco Vieira, University of Coimbra, Portugal

AUTHOR BIOGRAPHIES



Sven Groppe earned his diploma degree in Informatik (Computer Science) in 2002 and his Doctor degree in 2005 from the University of Paderborn. He earned his habilitation degree in 2011 from the University of Lübeck. He worked in the European projects B2B-ECOM, MEMPHIS, ASG and TripCom. He was a member of the DAWG

W3C Working Group, which developed SPARQL. He was the project leader of the DFG project LUPOSDATE, an open-source Semantic Web database, and one of the project leaders of two research projects, which research on FPGA acceleration of relational and Semantic Web databases. He is also the chair of the Semantic Big Data workshop series, which is affiliated with the ACM SIGMOD conference (so far in 2016 and 2017), and of the Very Large Internet of Things workshop in conjunction with the VLDB conference in 2017. His research interests include databases, Semantic Web, query and rule processing and optimization, Cloud Computing, peer-to-peer (P2P) networks, Internet of Things, data visualization and visual query languages.



Carlo Alberto Boano is an assistant professor at the Institute for Technical Informatics of Graz University of Technology (TU Graz), Austria. He received a doctoral degree sub-auspiciis praesidentis from TU Graz in 2014 with a thesis on dependable wireless sensor networks and holds a double

Master degree from Politecnico di Torino, Italy, and KTH Stockholm, Sweden. Before joining TU Graz, Carlo Alberto was researcher at the University of Lübeck, Germany (2009-2013) and at the SICS Swedish ICT, Sweden (2008-2009). Carlo Alberto's research interests encompass the design of dependable networked embedded systems, with emphasis on the energy-efficiency and reliability of low-power wireless communications, as well as on the robustness of networking protocols against environmental influences. More info at: <http://www.carloalbertoboano.com>.