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## CONASENSE2022 Project Session – Next Generation IoT Flagship Projects

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### 1. INTRODUCTION

The CONASENSE2022 project session counted with presentations from 7 European flagship projects that are focusing their research efforts in the application of Edge computing and IoT, towards the European Sustainable Development Goals. Each of the projects brings use-cases applied to different vertical domains, e.g., manufacturing, energy, health, society, logistics, mobility. The aim of the session was to give awareness into the latest European research developments in this context, promoting discussion towards challenges faced by the next (6G) generation of IoT services and applications.

### 2. ASSIST-IoT, IGNACIO LACALLE UBELA, UNIVERSIDAD POLITECNICA DI VALENCIA

#### [Presentation](#)

**Abstract:** ASSIST-IoT is designing and developing an innovative reference architecture, envisioned as a decentralized ecosystem, where intelligence is distributed among nodes by implementing AI/ML close to data generation and actuation, and hyperconnecting nodes, in the edge-cloud continuum, over softwareized smart network. This is supported by several pillars: (i) innovative IoT architecture, to adapt to the NGI paradigm, including intelligence, security and privacy by design; (ii) moving from semantic interoperability to semantically-enabled cross-platform, cross-domain data transactions, within decentralized governance; (iii) development and integration of innovative devices, supporting context-aware computing; (iv) introduction of self-\* mechanisms, supporting self-awareness and (semi-)autonomous behaviours across IoT deployments, and (v) Tactile Internet support for latency applications, like AR/VR/MR, and human-centric interaction with IoT components. Finally, to validate research results, and developed solutions, and to ensure their wide applicability, extended pilot deployments with strong end-user participation are taking place in: (i) port automation; (ii) smart safety of workers, and (iii) cohesive vehicle monitoring and diagnostics, bringing about domain-agnostic aspect of the approach. In this talk, we will showcase the main relevant aspects of the project *vis-a-vis* Next Generation IoT features, will outline the demonstrator pilots and will provide information about our Open Call for funding to individual entrepreneurs like you!



**Mr. Ignacio Lacalle** (male) is a researcher working at the Universitat Politècnica de València (UPV), a public University at the South-East of Spain. Ignacio is a Telecommunications Engineer (2014) from UPV and is currently working on his PhD. The expertise of Ignacio is mainly rooted on Internet of Things field, having participated in 6 research projects related to interoperability, added value services, data processing and manageability, among others. Ignacio has performed various roles in those projects (ranging from Developer to Community Manager and Project Manager). In addition, most of those projects were focused on applying IoT-related innovations, in particular, to the field of maritime ports, one of the preferred verticals of the research group.

### **3. INTELLIoT: INTELLIGENT IOT ENVIRONMENTS, ARNE BRÖRING, SIEMENS AG**

#### Presentation

**Abstract:** Traditional IoT setups are cloud-centric and typically focused around a centralized IoT platform to which data is uploaded for further processing. Next generation IoT applications are incorporating technologies such as artificial intelligence, augmented reality, and distributed ledgers to realize semi-autonomous behaviour of vehicles, guidance for human users, and machine-to-machine interactions in a trustworthy manner. Such applications require more dynamic IoT environments, which can operate locally without the necessity to communicate with the Cloud. In this talk, we describe three use cases of next generation IoT applications and highlight associated challenges for future research. Based on this, we present the IntellIoT framework that comprises the required components to address the identified challenges.

**Arne Bröring** is a senior researcher at Siemens' corporate research labs in Munich (DE) since 2014. Previously, he has worked for the Environmental Systems Research Institute (ESRI) in Zurich (CH), the 52°North initiative (DE), the University of Münster (DE), and received his PhD in 2012 from the University of Twente (NL). His research interests lay in the area of pervasive systems and particularly the internet of things, semantic web technologies, the sensor web, participatory sensing, as well as mobile and location-based services. He has been the Scientific and Technical Coordinator of the project IntellIoT (<http://intelliot.eu>), as well as BIG IoT, and contributed to numerous other international innovation and research projects. His research has contributed to over 90 publications in refereed journals, conferences, and workshops resulting in an H-Index of 28.

#### 4. iNGENIOUS: NEXT-GENERATION IOT SOLUTIONS FOR THE UNIVERSAL SUPPLY CHAIN , ERIN SEDER, NEXTWORKS

##### PRESENTATION

**Abstract:** iNGENIOUS (Next-GENERATION IoT sOlutions for the Universal Supply chain, <https://ingenious-iot.eu/web/>) aims to build an holistic architecture for the next-generation supply chain by exploiting the wealth of data that the Internet of Things (IoT) can provide. In practice, iNGENIOUS tackles the digitalisation of supply chain management and aims at optimizing the various logistics processes involved, including sourcing, procurement, conversion, production, and management operations.

Relevant use cases start right in the factories, where automated robots increase efficiency by working fully autonomously or by assisting human workers. To innovate logistics, IoT sensors shall monitor the safety-critical parts of land-based transport vehicles, thereby enabling longer maintenance intervals to reduce costs and ensuring reliable detection of defects that could otherwise lead to accidents. By integrating network technologies ranging from local-area wireless networks all the way up to satellites, the project aims to enable comprehensive tracking of assets in shipping containers across land and sea. iNGENIOUS also seeks to develop tools for optimising container loading and unloading in ports, as well as to exploit 5G networks to remotely control vehicles in situations, where humans would be in danger or exposed to adverse environmental conditions.

IoT data is centric in iNGENIOUS, where an interoperability layer, made by the integration of a data virtualization platform with several Distributed Ledger technologies enable the coexistence of heterogeneous Machine-to-Machine IoT platforms on the one hand for data collection and distribution, and AI/ML techniques on the other for data processing and service optimization.



**Bio:** Dr. Seder graduated with a PhD in Physics from the University of Connecticut in 2013, followed by postdoctoral work at Jefferson National Lab (USA) and CERN (Switzerland). Her recent research activities have been focused in the fields of IoT and AI/ML in Industry 4.0. Dr. Seder has been active in Horizon 2020 projects including 5G-TRANSFORMER, COREALIS, 5G-EVE, EFPF, 5GZORRO, iNGENIOUS, and HEXA-X. She is currently in the R&D division at Nextworks Srl in the role of system and software engineer.

## 5. TERMINET: NEXT GENERATION SMART INTERCONNECTED IOT', PANAGIOTIS SARIAGIANNIDIS, UNIVERSITY WESTERN MACEDONIA

### Presentation

**Abstract:** The vision of TERMINET is to provide a flexible, open, and decentralised next generation IoT reference architecture based on cutting-edge technologies such as software-defined networking, multiple-access edge computing, and virtualisation for new real-time capable solutions. This goal will be achieved by enabling secure and privacy-preserving IoT services, user-aware solutions, semi-autonomous devices, and self-aware mechanisms, frameworks, and schemes, supported by distributed AI and new intelligent IoT devices within a virtualized edge-platform-cloud environment. TERMINET envisages six realistic, compelling, and complementary use cases in IoT domains such as energy, smart buildings, smart farming, healthcare, and manufacturing.



**Prof. Panagiotis Sariagiannidis** is the Director of the ITHACA lab (<https://ithaca.ece.uowm.gr/>), co-founder of the 1<sup>st</sup> spin-off of the University of Western Macedonia: MetaMind Innovations P.C. (<https://metamind.gr>), and Associate Professor in the Department of Electrical and Computer Engineering in the University of Western Macedonia, Kozani, Greece. He received the B.Sc. and Ph.D. degrees in computer science from the Aristotle University of Thessaloniki, Thessaloniki, Greece, in 2001 and 2007, respectively. He has published over 250 papers in international journals, conferences and book chapters, including IEEE Communications Surveys and Tutorials, IEEE Transactions on Communications, IEEE Internet of Things, IEEE Transactions on Broadcasting, IEEE Systems Journal, IEEE Wireless Communications Magazine, IEEE Open Journal of the Communications Society, IEEE/OSA Journal of Lightwave Technology, IEEE Transactions on Industrial Informatics, IEEE Access, and Computer Networks. He has been involved in several national, European and international projects. He is currently the project coordinator of three H2020 projects, namely a) H2020-DS-SC7-2017 (DS-07-2017), SPEAR: Secure and PrivatE smArt gRid, b) H2020-LC-SC3-EE-2020-1 (LC-SC3-EC-4-2020), EVIDENT: bEhavioral Insihts anD Effective eNergy policy acTions, and c) H2020-ICT-2020-1 (ICT-56-2020), TERMINET: nexT gEneRation sMART INterconnectEd ioT, while he coordinates the Operational Program MARS: sMART fArming with dRoneS (Competitiveness, Entrepreneurship, and Innovation) and the Erasmus+ KA2 ARRANGE-ICT: SmartROOT: Smart faRming innOvatiOn

Training. He also serves as a principal investigator in the H2020-SU-DS-2018 (SU-DS04-2018), SDN-microSENSE: SDN-microgrid reSilient Electrical eNergy SystEm and in three Erasmus+ KA2: a) ARRANGE-ICT: pArtneRship foR AddressiNG mEgatrends in ICT, b) JAUNTY: Joint undergAduate coURses for smart eNergy managemenT sYstems, and c) STRONG: advanced firST RespONders traininG (Cooperation for Innovation and the Exchange of Good Practices). His research interests include telecommunication networks, internet of things and network security. He is an IEEE member and participates in the Editorial Boards of various journals, including International Journal of Communication Systems and EURASIP Journal on Wireless Communications and Networking.



**Anna Triantafyllou** was born in Ioannina, Greece. She received the Diploma degree (5 years) from the Dept. of Informatics and Telecommunications Eng., University of Western Macedonia, Greece, in 2017. She received a Graduation Excellence Award from the Technical Chamber of Greece in 2018. She is a Ph.D. student in the Dept of Electrical and Computer Engineering, University of Western Macedonia, Greece. Her main research interests are in the area of internet of things, communication protocols, and LoRaWAN. Up until now, she has published 11 papers in international journals and conferences, including Wireless communications and mobile computing, MDPI Information, Computer Networks and IEEE Open Journal of the Communications Society. Recently she received the award of “Best Communication Systems Paper” in the 9<sup>th</sup> International Conference on Modern Circuits and Systems Technologies (MOCASST) on Electronics and Communications 2020. Ms Triantafyllou is also a Research Associate in national and European funded research projects in the same University. More specifically, she was involved in the Operational Program DIAS: Drone Innovation in saffron Agriculture Surveillance (Competitiveness, Entrepreneurship, and Innovation). Currently she participates in the following research projects: the H2020-SU-DS-2018 (SU-DS04-2018-2020), SDN-microSENSE: SDN-microgrid reSilient Electrical eNergy SystEm, the H2020-ICT-2018-20 (ICT-56-2020) TERMINET: nexT gEneRation sMart INterconnectEd ioT and the H2020-LC-SC3-2018-2019-2020 (LC-SC3-EC-4-2020) EVIDENT: bEhaVioral Insgihts anD Effective eNergy policy acTions.

## 6. VEDLIOT - VERY EFFICIENT DEEP LEARNING IN IOT, JENS HAGEMEYER, BIELEFELD UNIVERSITY

### [Presentation](#)

**Abstract:** The VEDLIoT project targets the development of energy-efficient Deep Learning for distributed AIoT applications. A holistic approach is used to optimize algorithms while also dealing with safety and security challenges. The approach is based on a modular and scalable cognitive IoT hardware platform. Using modular microserver technology enables the user to configure the hardware to satisfy a wide range of applications.

VEDLIoT offers a complete design flow for Next-Generation IoT devices required for collaboratively solving complex Deep Learning applications across distributed systems. The methods are tested on various use-cases ranging from Smart Home to Automotive and Industrial IoT appliances.

**Jens Hagemeyer** is research associate at Bielefeld University, within the group Cognitronics and Sensor Systems, as part of the technical faculty.

His research interests are in the area of heterogeneous and reconfigurable computing, applied to various applications in the area of cloud and edge computing. He is also co-founder of ParaXent GmbH, a spin-off established in 2018 which targets the development and efficient utilization of heterogeneous hardware accelerators. With his team, he is continuously involved in several international research projects and acts as coordinator of the H2020 project VEDLIoT, dealing with the integration of IoT and deep learning.

## 7. IOT-NGIN PROJECT PRESENTATION, JONATHAN KLIMT, RWTH, AACHEN

### [Presentation](#)

**Abstract:** This talk shall provide an overview on the ICT-56 IoT-NGIN project.



**Jonathan Klimt**, M.Sc. has studied Electrical Engineering at the the Technical University Munich (TUM) and the RWTH-Aachen with a focus on computer engineering and embedded systems. He is currently working as a researcher at the Institute for Automation of Complex Power Systems at RWTH-Aachen and is researching on Unikernels, Cloud and High-Performance Computing, Embedded Systems and Programming Languages. In the IoT-NGIN project, he is pushing the use of Unikernels in the cloud and edge-clouds further, enhancing performance and security in the IoT backend landscape.

## 8. EFPP, USMAN WAJID, INFORMATION CATALYST

### Presentation

**Abstract:** EFPP is an EC H2020 funded innovation project that aims to establish a federated digital platform for connected smart factories. The federated platform developed in the project interlinks different stakeholders of the digital manufacturing domain and enables users to utilise innovative functionalities, experiment with disruptive approaches and develop custom Industry4.0 solutions to maximise connectivity, interoperability and efficiency across the supply chains. At the core of EFPP platform is an interoperability mechanism called 'Data Spine' that provides open interfaces to support the integration of distributed systems and platforms with their toolset and services. Through the Data Spine based connectivity and interoperability, the EFPP platform aims to realise and support a connected and smart ecosystem of the future. To support the ecosystem development, the project has already provided 2.5million Euros as cascade funding to 20 experiments that will validate EFPP solutions in different industrial scenarios or add new functionalities in the EFPP federation. Moreover, the EFPP platform is now open for access and experimentation. For further details, please consult the project website: <https://www.efpf.org/> or drop a line to: [info@ef-foundation.com](mailto:info@ef-foundation.com)



**Dr Usman WAJID** is a Technical Director at Information Catalyst (ICE), an innovative ICT SME operating in the domains of Software, Data, and Services with specialism in Process Engineering and Data Analytics.

Usman is increasingly interested in the development and promotion of innovative solutions - with modern views on data capabilities in business transformation - bringing together cutting-edge research and innovation from Industry4.0, IoT, Big Data and AI disciplines into user centric solutions. At ICE, he is also responsible for initiating and leading research & innovation projects in diverse industrial sectors such as manufacturing, eHealth, Big Data and Cybersecurity. Usman's successful collaborations with research and industrial partners have resulted in a number of European funded projects (such as EFPP) in the areas of digital manufacturing, ehealth and big data analytics. With proven experience of managing digital transformation projects and solution development life-cycle in multiple domains, Usman actively collaborates with research, industry and standardisation bodies to develop innovation roadmaps and align individual agendas with research and innovation frameworks.