

PREFACE

We are delighted to celebrate the appearance of the special issue of *Serdica Journal of Computing* dedicated to the **Internet of Things (IoT) Ecosystems**. This special issue contains selected papers that are supported by the National Scientific Fund, Bulgarian Ministry of Education and Science within the KoMEIN Project No DN 02/1 and project No DN 02/11 as well as by the European Commission under grant agreement No 763566 GATE Teaming 1 Project, and by the Scientific Fund of Sofia University within project 80-10-192/24.04.2017.

The Special Issue at hand intends to promote the dissemination of the projects results in form of innovative business models, architectures, Blockchain technologies and case studies pertaining to IoT ecosystems and the Future City platform that hosts, maintain and deliver a wide range of services to citizens, government and businesses through utilizing Big Data and IoT technologies.

The main objective of the Project KoMEIN is conducting theoretical and experimental activities for systematization and development of scientific knowledge about cutting-edge technologies and innovations of the Future Internet as well as field competence development by creating the IoT ecosystems conceptual models and prototypes of the communication infrastructure components, software platforms for intelligent solutions and Big Data analysis with application in medicine.

The GATE project research and development activities are focused on implementation of so called GATE Future City that is aimed at developing an extensible, proof-of-concept platform that hosts, maintain and deliver a wide

range of services to citizens, government and businesses through utilizing Big Data and IoT technologies. The objective of the platform is to improve the city sustainability and performance by supporting innovations in companies as well as speed-up the efficiency of city administration.

The first paper is “Conceptual Modeling of IoT Ecosystems: A Business-Oriented Approach” by Rumen Andreev, Svetozar Ilchev, Alexandre Chikalanov and Yuliyana Petkov. The authors present a new approach to the conceptual modeling of IoT ecosystems. Taking into consideration the business processes of an organization, this approach allows the creation of models which integrate IoT-devices and IoT-governed activities into the business flow of the company. The main purpose of this research is to help organizations make faster and more efficient choices based on formalized input/output from their IoT-resources and networks. The use of modeling and formal description is necessary in order to include IoT in ERP-systems, so that IoT is considered in the overall strategic planning and decision making on all levels.

The second paper is “Heterogeneous IoT Platform for Device Management and Environmental Sensor Data Gathering” by Svetozar Ilchev, Rumen Andreev and Zlatoliliya Ilcheva. A new IoT platform which supports the use of different wired and radio connections to manage devices and gather environmental sensor data is proposed. The authors discuss the pilot implementation of the new platform which deals with the smart control of air-conditioning devices in shopping malls. The building blocks of the platform—two types of electronic controllers originally designed by the authors are described in detail. The Internet connectivity of the platform enables the use of an Internet-based control center for storing historical data, performing statistical analyses, making automated corrections in the device control and providing possibilities for remote control by human operators. The end goal of the platform development is to achieve cost savings and increase the level of comfort of customers and employees.

The third paper is “Internet of Medical Imaging Things and Analytics in Support of Precision Medicine for Early Diagnostics of Thyroid Cancer” by Plamenka Borovska, Desislava Ivanova and Ivo Draganov. In this paper the role of advanced IT technologies such as Internet of medical imaging Things and analytics in support and promotion of precision medicine has been revealed considering the case study of early thyroid cancer diagnostics. The concept of precision medicine has been presented and analyzed from the point of view of computational science and the new paradigm for scientific research.

The focus of the paper is on the intersection of Internet of medical imaging Things and analytics ecosystem and precision medicine. The computational flow of in silico knowledge data discovery has been presented and analyzed and the beneficial outcomes for the case study of thyroid cancer diagnostics revealed. Finally, the architecture of experimental framework for in silico knowledge data discovery has been suggested based on thyroid cancer imaging analytics.

The fourth paper is “User Experience Design Models for Internet of Things” by Eugenia Kovatcheva. This paper is a promising new line of research that explores the possibilities of User Experience (UX) as a crossover of design, engineering, and customer service at its core. This paper is a review of user experience design models for IoT. The designing of a great connected product requires a holistic approach to user experience. The paper discusses wide range of design layers, not all of them immediately visible. It requires cross-discipline collaboration between design, technology, and business. The designer’s ability to meet those users’ needs depends on the models describing the IoT ecosystems, technology enablers and business models.

The fifth paper is “Future City: A Pilot Project of GATE Center of Excellence” by Dessislava Petrova-Antonova and Sylvia Ilieva. The authors reflect on their latest development of “BiG DATA for SmarT SociEty” GATE Center of Excellence that will be established as a joint initiative between Sofia University, Bulgaria and Chalmers University of Technology, Sweden. The GATE Future City aims to develop an extensible, proof-of-concept platform that hosts, maintain and deliver a wide range of services to citizens, government and businesses through utilizing Big Data and IoT technologies. The objective of the platform is to improve the city sustainability and performance by supporting innovations in companies as well as speed-up the efficiency of city administration. The concept of the pilot project is described, including main objectives and reference architecture. The possible application scenarios, covering different city dimensions, are discussed.

The sixth paper is “Challenges and Opportunities of Blockchain Technology in Industrial Applications” by Galia Novakova, Roumen Nikolov and Elena Shoikova. Digital technology is changing the world, one industry at a time. It is still unclear if and to what extent the manufacturing industry is impacted by the innovative Blockchain technology. Although a fairly new technology, it has many practical use cases and new applications of the technology are continuously introduced. The paper presents assessment of the

current maturity phase of Blockchain and evaluates the challenges and benefits of potential applications in the manufacturing industry. Therefore, the paper explores the potential use cases for the manufacturing industry by giving an overview of the existing Blockchain solutions. Moreover, it reports the highlights from the World Economic Forum 2017, where it is given a set of actions that will move this technology forward.

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Guest Editor