

# IATDR Proposal for a thesis subject supported by an Industrial Agreement of Training through Doctoral Research

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Date of submission: 7 June, 2018

- Name of the company\*: **ORTEC CEE SRL**
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- Contact person, address\*: Herman Wierenga, Managing Director ORTEC Global Operations & CEE
- Title of the Research Laboratory, Faculty of Automatic Control and Computers, University Politehnica of Bucharest (if already known): .....
- Scientific coordinator in the Faculty of Automatic Control and Computers (if already known): .....
- Title of research theme (without any confidential character)\*:

## **Mobile IoT gateway network for dispersed data collection and cloud-based analytics as input for optimization within the Physical Internet**

- Description of the research theme (without any confidential character)\* max. 600 words:

Several concepts arose in the last years in order to bring together informational (software, applications, etc) and physical (products, resources) objects. First, there was the Internet, which revolutionized the way we communicate and conduct commerce on a global scale, followed by the Internet of Things, which is making the products and resources we use (from home furnishings and appliances, such as lamps and home entertainment centres, to sensors embedded in controls on bridges, roadways, and buildings) even smarter and more efficient by enabling them to transmit information and connecting them through the cloud-based internet.

The next step forward is the Physical Internet, a relatively new concept that envisions applying the technologies and methodologies of the digital internet to the physical world. The Physical Internet is applying the principles of the Internet to logistics: a global, open, interconnected network, using a set of collaborative protocols and standardized smart interfaces, in order to send and receive physical goods contained in standard modules – instead of packets of information, as does the Internet.

In this context, where multiple actors (both people and companies) interact in order to deliver products and services in such a way that they are both time and cost effective while the process as a whole remains sustainable, requirements like real-time traceability, automatic collection of data from both fixed and mobile objects, integrating this data into the cloud to analyse it, optimize processes, predict unexpected events and take intelligent decisions become really necessary and of interest.

The proposed research work will consist in exploring different approaches for linking the physical and informational worlds and interconnect objects using different communication protocols, transferring and processing big volumes of heterogeneous data as close as possible to real time.

The candidate should have a solid background and a MSc in computer science or systems

engineering and computer skills needed such as: i) development of applications for embedded devices, ii) collecting field data and transmission using standard messaging protocols, iii) database and operating systems knowledge, iv) development of web applications, v) good communication skills (fluent in English and Romanian). Affinity with Logistics, Supply Chain Management and Optimization is preferred and we like candidates that are able to manage their own work, reliable, good humoured, motivated and ambitious.

The main deliverable of the project is the design and implementing solution of a mobile IoT gateway network with energy constraints which collects, processes and transmits data about the current state, location, and important parameters of entities (resources, products) measured by attached sensors. The collected data is sent to a cloud database which is interconnected with a business management application. The data will be used as input for ORTEC optimization software and algorithms (i.e. load building, road optimization). The IoT gateway can be used for monitoring individual products (intelligent product), during their life cycle (production and utilisation), and for containers ( $\pi$  container) during transportation.

This research work will be conducted as collaborative Ph.D. project between ORTEC ([www.ortec.com](http://www.ortec.com)) and the Doctoral school of Automatic Control and Computers, University Politehnica of Bucharest in the framework of the Public-Private Partnership for an Industrial Agreement of Training through Doctoral Research, IATDR, <http://doctorat.acs.pub.ro/en/public-private-partnership-for-an-industrial-agreement-of-training-through-doctoral-research-iatdr/>

Case studies:

- Product driven transport in supply chain
- Product driven automation in manufacturing
- $\pi$  containers in logistics
- Service management in public transport systems

\*Mandatory fields