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TOMOCON



Smart Tomographic Sensors for Advanced Industrial Process Control



FURTHER DETAILS

Smart Tomographic Sensors for Advanced Industrial Process Control

Engagement and PhD Positions

We are happy to announce and acknowledge that following positive evaluation the European Union is going to fund the TOMOCON European Innovative Training Network, with considerable participation of active IPT members and support by ISIPT.

About TOMOCON: The Innovative Training Network TOMOCON joins 12 international academic institutions and 15 industry partners, who work together in the emerging field of industrial process control using smart tomographic sensors. The network will lay the scientific and technological fundamentals of integrating imaging sensors into industrial processes and will demonstrate its functional feasibility on lab and pilot-scale applications. Our doctoral researchers will be trained and work in the fields of process tomography hardware, software and algorithms, control systems theory and design, industrial process design, multi-physics modelling and simulation, human-computer interaction, and massive parallel data processing.

The background: With the most recent progress in fast parallel data processing imaging sensors have reached the capability of being employed as advanced real-time sensors in control systems. Process tomography sensors are of particular value as they can give insights into opaque industrial systems. However, a good deal of fundamental research is still needed to qualify such sensors for industrial control. Hence we work on robust industrial sensor front-ends, fast data transmission and processing, intelligent parameter extraction from tomographic data, multi-physics process and sensor modelling and simulation as well as novel approaches for multi-parametric model based control systems and theory.

Content and objectives: TOMOCON comprises the further development of distinct tomographic imaging modalities, such as electrical resistance and capacitance

tomography, wire-mesh sensors, magnetic induction tomography, contactless inductive flow tomography, ultrasound tomography and microwave tomography. With respect to tomographic image processing a focus is given to intelligent and efficient parameter extraction algorithms on smart scalable parallel hardware architectures. Advanced multi-physics modelling of processes, sensors and actuators includes ultrasound, microwave, electrical fields and CFD multiphase and liquid metal flow simulations. Demonstrations of tomography-based process control are foreseen in the following industrial application areas: controlled inline fluids separation, microwave drying of porous materials, continuous steel casting and ultrasound-controlled batch crystallization.

Opportunities and perspectives for young researchers: Within TOMOCON we seek 15 excellent open-minded and team-spirited PhD candidates who will get unique international, interdisciplinary and inter-sectoral training in scientific and transferable skills by distinguished leaders from academia and industry. Details of the doctoral projects can be found below.

Beside their research projects early stage researchers will get a broad doctoral training. As part of the project PhD candidates will spend a few months in industry and other academic institutions of the network. Three summer schools in different European places, which are open to international young researchers, will give an in-depth training in relevant technical and soft skills. Moreover, our PhD candidates shall participate in network workshops and symposia as well as renowned conferences in the field of their research subject.

Eligibility: Candidates can be of any country or nationality. The candidate recruited in the TOMOCON project must be Early-Stage Researcher (ESR) and undertake transnational mobility (secondments, trainings, conferences). The candidate must be in the first four years from the date when the researcher obtained the degree entitling him or her to embark on a doctorate (e.g. master degree). It will be counted backward from the date of recruitment (in this case 01.03.2018). No doctoral degree has been awarded during these four years.

The candidate must not have resided or carried out her/his main activity (work, studies, etc.) in the country of the employee for more than 12 months in the 3 years immediately before the recruitment date. Compulsory national service, short stays such as holidays, and time spent as part of a procedure for obtaining refugee status under the Geneva Convention 1 are not taken into account.

Important dates:

- The official start of the network is 1st Sept. 2017
- Detailed offers for PhD candidates will be issued 8th Sept. 2017
- Application deadline is 25th Oct. 2017
- PhD candidates will begin their position on 1st March 2018 with a duration of 3 years

Partners: TOMOCON is constituted of the following network partners

Academic partners:

- Helmholtz-Zentrum Dresden-Rossendorf (Germany)
- Chalmers University of Technology (Sweden)
- Delft University of Technology (The Netherlands)
- Institut National Polytechnique de Toulouse (France)

- Karlsruhe Institute of Technology (Germany)
- Lappeenranta University of Technology (Finland)
- Technical University of Liberec (Czech Republic)
- University of Technology Lodz (Poland)
- University of Bath (UK)
- University of Eastern Finland (Finland)
- Technische Universität Dresden (Germany)
- Universidade Federal do Paraná Curitiba (Brasil)

Industry partners:

- Netrix S.A. (Poland)
- Teletronic Rossendorf GmbH (Germany)
- Rocsole Ltd. (Finland)
- CERG Fluides S.A.S. (France)
- Frames Group B.V. (The Netherlands)
- Vötsch Industrietechnik GmbH (Germany)
- Pinta Elements GmbH (Germany)
- Primetals Technologies Austria GmbH (Austria)
- Siemens AG (Germany)
- Linde AG (Germany)
- Total S.A. (France)
- Tata Steel Europe Ltd. (The Netherlands)
- Shell Global Solutions International BV (The Netherlands)
- DuPont Ltd. (Finland)
- Sulzer AG (Switzerland)

PhD projects (more details and links to job offers will be given until 8th Sept. 2017):

TOMOCON-ESR1:

Wire-mesh sensor (WMS) for controlled inline fluid separation
Helmholtz-Zentrum Dresden-Rossendorf, Germany

TOMOCON-ESR2:

Control in continuous casting using electrical and magnetic tomography
Helmholtz-Zentrum Dresden-Rossendorf, Germany

TOMOCON-ESR3:

Human-machine interfaces for tomography-based control
Chalmers University of Technology, Sweden

TOMOCON-ESR4:

Optimized controlled inline fluid separation
Delft University of Technology, The Netherlands

TOMOCON-ESR5:

Advanced simulation of liquid metal melt flows in controlled continuous casting
Delft University of Technology, The Netherlands

TOMOCON-ESR6:

Hybrid CFD simulation of two-phase flow in inline flow splitters using VOF and Lagrangian models

Institut National Polytechnique de Toulouse, France

TOMOCON-ESR7:

Microwave drying of porous products with novel tomography-assisted moisture control

Karlsruhe Institute of Technology, Germany

TOMOCON-ESR8:

Controlled batch crystallization with ultrasound actuation

Lappeenranta University of Technology, Finland

TOMOCON-ESR9:

Control systems based a multi-parametric data and exemplary application to continuous casting control

Technical University of Liberec, Czech Republic

TOMOCON-ESR10:

Qualification of ERT/ECT for real-time control of inline fluid separators

University of Technology Lodz, Poland

TOMOCON-ESR11:

ERT tomography for measuring the crystallization progress in a batch reactor

University of Technology Lodz, Poland

TOMOCON-ESR12:

Novel combined ECT/MIT sensor for controlled continuous steel casting

University of Bath, United Kingdom

TOMOCON-ESR13:

Ultrasound tomography for control of batch crystallization

University of Bath, United Kingdom

TOMOCON-ESR14:

ECT sensor for moisture distribution measurement in controlled microwave drying

University of Eastern Finland Kuopio, Finland

TOMOCON-ESR15:

Microwave tomography for control of microwave drying processes

University of Eastern Finland Kuopio, Finland

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