



# Advanced Doctoral Conference on Computing, Electrical and Industrial Systems

11<sup>th</sup>

## Technological Innovation for Life Improvement

July 1-3,  
Online - Portugal

Including the  
associated event:

**YEF-ECE 2020**

Young Engineers  
Forum on Electrical  
and Computer  
Engineering

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# Welcome Message

The eleventh edition of the Advanced Doctoral Conference on Computing, Electrical and Industrial Systems, **DoCEIS 2020**, aims at bringing together PhD students, researchers, and engineers from all over the world, interested in innovative ideas and techniques around **Technological Innovation towards Life Improvement**. Nowadays, life improvement has become a trending topic across different areas due to technological advancements that focus on human wellbeing. Different scientific areas, such as electronics, telecommunications, computing, and energy, are innovating and changing their paradigms to promote a digital-oriented world. Concepts and tools coming from the areas of artificial intelligence, collaborative networks, virtual and augmented reality, machine learning, big data, cyber-physical systems and internet of things, can be adopted to provide a better and sustainable future with high quality of life. The impacts of these technological developments can result in enhancement of health care, environment, manufacturing, transportation, and communication systems across the globe, namely through new products and services. This ongoing digital transformation has a huge potential to facing existing societal challenges, and increasing knowledge, wellbeing, quality of life and collaboration among companies, organizations, people, and systems.

The key objective of the DoCEIS advanced doctoral conference is to create a space for sharing and discussing ideas and results from doctoral research in these inter-related areas of engineering. Innovative ideas and hypotheses can be better enhanced when presented and discussed in an encouraging and open environment. DoCEIS is designed to provide such an environment, releasing PhD students from the pressure of presenting their propositions in more formal contexts. Furthermore, DoCEIS aims at **facilitating dialog among disciplines**, opening new perspectives to young researchers towards a **multi-disciplinary and interdisciplinary perspective**.

This edition of DoCEIS, which is sponsored by SOCOLNET, IFIP and IEEE Industrial Electronics Society, attracted a good number of paper submissions from a good number of PhD students (and their supervisors) from 18 countries. The selected papers correspond to an acceptance rate of 48%. I am particularly thankful to all of you that contributed with your high-quality work and therefore allowed us to prepare this Program that will offer a very enriching experience to all participants.

A special word of thanks goes to the members of the International Program Committee that carried the heavy task of evaluating all submissions.

This year we are pleased to also repeat, as an associated event, the **YEF-ECE 2020**, the 4th International Young Engineers Forum on Electrical and Computer Engineering, which attracted submissions from 6 countries and has an acceptance rate of 60%.

Unfortunately, due to the ongoing COVID-19 pandemic, this year the conference must take place remotely, via ZOOM platform. Nevertheless, we hope that all participants will take the opportunities offered by the digital platforms to exchange experiences and knowledge with colleagues from different universities and areas of research.

*Prof. Luis M. Camarinha-Matos*  
*Conference Chairman*

## Message from the Organizers

Greetings and welcome to DoCEIS 2020!

Although this year we are facing the epidemic COVID-19, science didn't stop and neither DoCEIS. Therefore, we hope that you enjoy the eleventh edition of the Advanced Doctoral Conference on Computing, Electrical and Industrial Systems, in a different format: an online conference. This conference, held on 1-3 July, is organized in the context of the Electrical Engineering doctoral programme of the Faculty of Sciences and Technology of NOVA University of Lisbon. The local organizing committee is composed mainly from PhD students or candidates from this doctoral programme. For us, co-organizing and being involved in all aspects of the conference, from program definition, dissemination, venue, sponsorship etc., has been quite an interesting challenge, more importantly an enriching and transformative experience which will accompany us in our careers.

We would like to thank our keynotes and invited speakers for their availability in providing their time and knowledge at this event. To all participants, we thank you for your interest in having submitted your papers and posters to this conference. To the International Program Committee, our appreciation for all the hard work in the reviewing process.

We are celebrating the 11th edition of DoCEIS this year. In the last ten years, DoCEIS has been an excellent venue for scientific dissemination for researchers, especially doctoral students that, often for the first time, have the opportunity to have their work divulged in an international conference, where they can discuss it with their peers.

In the previous editions, we provided participants with opportunities to create new contact networks, find collaboration opportunities or even just getting valuable feedback of their work by more experienced researchers. Although this year, the current situation does not allow for the same kind of personal interaction, our efforts were to provide an engaging and similar virtual social experience.

Our objective at DoCEIS is to continuously provide a rich scientific programme and an open atmosphere for sharing experiences and knowledge among all participants, instigating future collaborations. This year we count submissions from **18** countries, making this a great opportunity to dissect significant new developments, to expand scientific networks, with people from similar fields of research and interests, and for exploring new domains of knowledge.

We wish everyone a very pleasant and rewarding conference - may DoCEIS 2020 be a positively memorable event!

Message from the

*Local Organizers.*

# DoCEIS 2020 Conference Organisation

## Conference and Program Chair:

Luis M. Camarinha-Matos, Portugal

## Organizing Committee Co-chairs:

Luis Gomes, Portugal

João Goes, Portugal

Pedro Pereira, Portugal

## International Program Committee

Antonio Abreu, Portugal

Andrew Adamatzky, Poland

Vanja Ambrozic, Slovenia

Amir Assadi, USA

Olga Battaia, France

Luis Bernardo, Portugal

Erik Bruun, Denmark

Barbora Buhnova, Czech Republic

Giuseppe Buja, Italy

Luis M. Camarinha-Matos, Portugal

Roberto Canonico, Italy

Laura Carnevali, Italy

Wojciech Cellary, Poland

Noelia Correia, Portugal

Jose de la Rosa, Spain

Stefano Di Carlo, Italy

Florin G. Filip, Romania

Maria Helena Fino, Portugal

José M. Fonseca, Portugal

Paulo Gil, Portugal

João Goes, Portugal

Luis Gomes, Portugal

Paul Grefen, The Netherlands

Michael Huebner, Germany

Ricardo Jardim-Gonçalves, Portugal

Vladimir Katic, Serbia

Asal Kiazadeh, Portugal

Paula Louro, Portugal

Marin Lujak, France

João Martins, Portugal

Rui Melicio, Portugal

Paulo Miyagi, Brazil

Renato Moraes, Brazil

Filipe Moutinho, Portugal

Horacio Neto, Portugal

Rodolfo Oliveira, Portugal

Luis Oliveira, Portugal

Joaquin Ordieres, Spain

Angel Ortiz, Spain

Peter Palensky, Austria

Luis Palma, Portugal

Nuno Paulino, Portugal

Pedro Pereira, Portugal

Duc Pham, UK

João Pimentão, Portugal

Paulo Pinto, Portugal

Armando Pires, Portugal

Ricardo J. Rabelo, Brazil

Luis Ribeiro, Sweden

Juan Rodriguez-Andina, Spain

Enrique Romero-Cadaval, Spain  
Carlos Roncero, Spain  
Thilo Sauter, Austria  
Eduard Shevtshenko, Estonia  
Thomas Strasser, Austria  
Kleanthis Thramboulidis, Greece

Damien Trentesaux, France  
Manuela Vieira, Portugal  
Ramon Vilanova, Spain  
Soufi Youcef, France  
Tamus Zoltán Ádám, Hungary

## **Organizing Committee (PhD Students)**

Fábio Seixas-Lopes, Portugal  
Helena Pereira, Portugal  
Nastaran Farhadi, Portugal/Iran  
Akashkumar Rajaran, Portugal/India  
Guilherme Guerreiro, Portugal  
Hugo Antunes, Portugal  
Alcides Gonçalves, Portugal/Angola

Amineh Mazandarani, Portugal/Iran  
Humberto Queiroz, Portugal/Brazil  
Sonia HosseinPour, Portugal/Iran  
Carolina Lagartinho-Oliveira, Portugal  
Dário Pedro, Portugal  
Luis Mateus, Portugal

# Conference Venue & Access Information

The conference is organised as online conference due to COVID-19 pandemic, as the safety and well-being of all conference participants is our priority.

The conference will be held using ZOOM platform and each participant will receive access codes prior to the event.

Participants will be welcome 15 minutes before the sessions, to assure a proper setup.

The conference will take place via Live Web with meetings in Zoom:

You can test if you can access a Zoom meeting via <https://zoom.us/test>. Review System Requirements for PC, Mac and Linux. Once you successfully connect to the test meeting, click Leave Meeting in the lower right corner of the meeting window.

We recommend that you install the zoom client : <https://zoom.us/support/download>. If it is not possible to install this client, then you can use the HTML5 Web client with Chrome as preferred web browser.

The audio for this conference is delivered through your computer. Before joining the conference, make sure to have your headset and microphone connected. Having a webcam can increase the interactivity but is not strictly necessary.

It would also be possible to access the Zoom meeting using your Telephone or Tablet: using the Mobile Zoom App.

Non-registered participants are not permitted to view the Live Web sessions. DoCEIS may disconnect without refund any participants who broadcast a live web session to non-registered participants.

For technical difficulties, e-mail DoCEIS2020 Secretariat at [doceis@uninova.pt](mailto:doceis@uninova.pt)

# Invited Speakers



**Keynote 1: Professor Catarina Silva**, Department of Informatics Engineering of the University of Coimbra, Portugal

**Title:** Interpretability, Privacy, and Ethics in Intelligent Systems

**Short Bio:** *Catarina Silva is Assistant Professor at the Department of Informatics Engineering of the University of Coimbra. She has a PhD degree in Computer Engineering, with 20 years experience teaching Computer Engineering BSc and MSc, while also supervising MSc and PhD students. She is a senior researcher at the Adaptive Computation Group of CISUC with machine learning and pattern recognition as main areas of research. Skilled at managing different sized projects and scientific entrepreneurship, involving people with different backgrounds, namely faculty, students, alumni and companies. Author and co-author of 4 books, circa 20 journal articles and 50 conference papers. Scientific committee and paper reviewer of several conferences and journals. President of the General Assembly of the Portuguese association of pattern Recognition, IEEE senior member of the Computational Intelligence Society. IEEE chair of the Portuguese Section.*

**Abstract:** Computational intelligence is becoming increasingly responsible for decisions in various areas of our society, leading to the awareness of the associated power and potential. Accompanying this evolution, citizens have a general feeling of discomfort regarding the (decision support) process and a perception of its latent dangers. The fact that many algorithms work as a black box, that is, without access to the explanation or the internal rules that led a certain exit (decision) to be reached, has led to a set of initiatives, namely through the EU High-Level Expert Group on Artificial Intelligence (AI HLEG), that aim to make the algorithms more transparent and accountable.

The new EU funding program for 2021-2027, Horizon Europe, directly defines the transversal need to apply open research data and FAIR (Findable, Accessible, Interoperable, Re-usable). The more comprehensive idea of “fair” algorithms is much more complex, and today it is actively under discussion, with the majority of researchers so far reaching the demotivating conclusion that it is not mathematically possible to satisfy all conditions of fairness.

The AI HLEG published a proposal for the “Ethics Guidelines for Trustworthy AI” which argues that there should be a “human-centric” approach and highlights two main components for the definition of trust: (1) it must respect fundamental rights, applicable regulation and fundamental principles and values, ensuring an “ethical purpose” and (2) being technically robust and reliable, because, even with good intentions, the lack of technological mastery can cause unintended damage.

In this context, although there is still a long way to go, this talk presents an overview within the scope of decision semantics, that is, the interpretability of the results of computational learning algorithms, with the aim of making its application possible with greater confidence in sensitive areas.



**Keynote 2: Professor Stefan Poslad**, School of Electronic Engineering and Computer Science, Queen Mary University of London, England

**Title:** Activities of Daily Life (ADL) Recognition via Locomotion & Location Determination

**Short Bio:** *Stefan Poslad, PhD, Associate Prof., leads the IoT2US (Internet of Things to Ubiquitous, Computer, Science) Lab at QMUL. He has a PhD in medical sensing, is an Associate Professor / Senior Lecturer at the School of Electronic Engineering and Computer Science, Queen Mary University of London where he is a*



*member of the Centre for Intelligent Sensing (CIS) and Cognitive Science research groups. His research and teaching interests include ubiquitous computing, Internet of Things (IoT); smart-environments, intelligent systems and IoT security and privacy. He has been the lead researcher for QMUL on over 15 international collaborative projects with industry, worth £17 million. He is the sole author of a leading book on Ubiquitous Computing: Smart Devices, Environments and Interaction, that has nearly 800 research citations and is in use for teaching by over 70 institutes worldwide across 6 continents. He has published over 100 research papers in the past decade in high-profile journals and conferences. He is on the editorial board of 3 journals and has organised 2 special issue journals. He is course director of the MSc in IoT at QMUL. He can also be found on Google Scholar, Orchid, ResearchGate and Linkedin. He has been a member of the IEEE since 2002.*

**Abstract:** Our ability to perform our activities of daily life (ADL), e.g., ambulating, feeding, is an important indicator of our mental and physical health. The lack of this ability appears to be on the increase and causes a burden on society, in terms of disruptions, costs, safety issues, to others, etc. The baseline way to assess our health ability is to book an appointment for a professional medic to perform an infrequent, short duration, under artificial controlled conditions, health examination that is often not representative of our health under actual ADL conditions. In this talk we discuss how we can utilise locomotion & location determination techniques to perform a wider, actual, in-situ accurate assessment of ADLs. We review the challenges of monitoring ADLs, i.e., they are often performed indoors and we compare and contrast these monitoring techniques in terms of their strengths and weaknesses.



**Keynote 3: Professor Theo Tryfonas, University of Bristol, England**

**Title:** Smarter infrastructure monitoring and opportunities for innovation in asset management

**Short Bio:** *Theo Tryfonas is a computer scientist by background working in the field of Smart Cities. His work focuses on urban applications of the Internet of Things in intelligent transport, smart buildings, emerging energy systems etc. looking particularly into the challenges of their connectivity, security and resilience. He is Associate Professor with the Department of Civil Engineering, University of Bristol in the UK and holds a doctorate in Informatics from Athens University of Economics and Business. He is a chartered member of BCS, the Chartered Institute for IT and a Fellow of the Royal Society for the encouragement of Arts, Manufactures and Commerce (RSA).*

**Abstract:** Structural health monitoring is vital for infrastructure asset performance and can provide an abundance of data that could reveal more about the context of the asset use than originally intended. In this work we architect and deploy a low cost, low maintenance wireless sensor monitoring system at the Clifton Suspension Bridge, an iconic landmark of Bristol, and examine structural data with intend to identify and characterise patterns of traffic flowing through it. We discuss the challenges of building such a system, identify opportunities for innovation that extend beyond the health care monitoring of the structure and identify potential areas for applications of emerging technologies with multiple benefits.

# Preliminary Program Overview

	Morning	Afternoon
<b>Day 1</b> <b>1 July</b>	<ul style="list-style-type: none"> <li>Opening Session</li> <li><b>Keynote 1</b></li> <li><b>Sessions</b> <ul style="list-style-type: none"> <li>A1 Decision System</li> <li>A2 Communication System</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li><b>Sessions</b> <ul style="list-style-type: none"> <li>B1 Collaborative Network</li> <li>B2 Energy Control</li> <li>C1 Analysis &amp; Synthesis Algorithm</li> <li>C2 Power Transportation</li> </ul> </li> <li><b>Horizontal Session</b></li> </ul>
<b>Day 2</b> <b>2 July</b>	<ul style="list-style-type: none"> <li><b>Sessions</b> <ul style="list-style-type: none"> <li>D1 Digital Twins &amp; Smart Manufacturing</li> <li>D2 Power Systems</li> </ul> </li> <li><b>Keynote 2</b></li> </ul>	<ul style="list-style-type: none"> <li><b>Sessions</b> <ul style="list-style-type: none"> <li>E1 Optimization Systems</li> <li>E2 Biomedical Analysis &amp; Diagnosis</li> </ul> </li> <li><b>Panel</b></li> </ul>
<b>Day 3</b> <b>3 July</b>	<ul style="list-style-type: none"> <li><b>Sessions</b> <ul style="list-style-type: none"> <li>F1 Instrumentation &amp; Health1</li> <li>Opening Session YEF-ECE 2020</li> <li>Y1 – Image Processing</li> </ul> </li> <li><b>Keynote 3</b></li> </ul>	<ul style="list-style-type: none"> <li><b>Sessions</b> <ul style="list-style-type: none"> <li>G1 Instrumentation &amp; Health2</li> <li>Y2 – Power Electronics</li> <li>H1 Instrumentation &amp; Health3</li> <li>Y3 – Industry &amp; Buildings</li> </ul> </li> <li><b>Closing and Awards</b></li> </ul>

# Detailed Schedule DoCEIS'20

Day 1 – Wednesday 1 July 2020

**10:00 – 10:30**      **Opening session (Room: DoCEIS-A)**

**10:30 – 11:30**      **Keynote 1 (Room: DoCEIS-A)**

## **Interpretability, Privacy, and Ethics in Intelligent Systems**

**Catarina Silva**

*Assistant Professor  
Department of Informatics Engineering  
University of Coimbra  
Portugal*

**11:30 – 11:40**      **Break**

**11:40 – 13:00**      **Session A**

## **A1 – Decision Systems (Room: DoCEIS-A)**

*Chairs: Amineh Mazandarani, Paula Graça*

- **Selecting Normalization Techniques for the Analytical Hierarchy Process**  
*Nazanin Vafaei, Rita A. Ribeiro and Luis M. Camarinha-Matos*
- **ColANet: A UAV Collision Avoidance Dataset**  
*Dário Pedro, André Mora, João Carvalho, Fábio Azevedo and José Fonseca*
- **A Decision-Making Tool to Provide Sustainable Solutions to a Consumer**  
*Ricardo Santos, J. C. O. Matias and António Abreu*
- **A Risk Assessment Model for Decision Making in Innovative Projects**  
*Vitor Anes, Luis Reis, Elsa Henriques and António Abreu*

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## **A2 – Communication Systems (Room: DoCEIS-B)**

*Chairs: Helena Rico Pereira, Omid Nasrollahi*

- **Cooperative Communication Mechanisms Applied to Wireless Sensor Network**  
*Suelen Laurindo, Ricardo Moraes and Carlos Montez*
- **Probabilistic Network Coding for Reliable Wireless Sensor Networks**  
*Eman Al-Hawri, Farooq Al-Tam, Noelia Correia and Alvaro Barradas*
- **Joint Channel and Information Estimation on Symbol Decomposition-based Secure Point-to-point Communications**

Akashkumar Rajaram, David Borges, Paulo Montezuma, Rui Dinis, Dushnatha Nalin K. Jayakody and Marko Beko

- **Self-interference in Multi-tap Channels for Full-Duplex Wireless Systems**  
*Ayman T. Abusabah, Rodolfo Oliveira and Luis Irio*

<b>13:00 – 14:00</b>	<b>Break</b>
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<b>14:00 – 15:00</b>	<b>Session B</b>
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### **B1 – Collaborative Networks (Room: DoCEIS-A)**

Chairs: Paulo Lourenço, Luis Alberto Estrada

- **Performance Indicators of a Collaborative Business Ecosystem – A Simulation Study**  
*Paula Graça and Luis M. Camarinha-Matos*
- **Towards a Reference Model for Mass Collaborative Learning**  
*Majid Zamiri and Luis M. Camarinha-Matos*
- **A Framework for Behavioural Change Through Incentivization in a Collaborative Virtual Power Plant Ecosystem**  
*Kankam O. Adu-Kankam and Luis M. Camarinha-Matos*

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### **B2 – Energy Control (Room: DoCEIS-B)**

Chairs: Leonardo Martins, Filipa Cardoso

- **Prospects for the Improvement of Energy Performance in Agroindustry Using Phase Change Materials**  
*Carlos Simão, João Murta-Pina, Luís Coelho, João Pássaro, Rui Amaral Lopes, Fernando Reboredo, Tiago Jorge and Diogo Lemos*
- **Modeling of Asymmetric Supercapacitor Cells Based on Electrode's Laboratorial Test Data**  
*Leonardo Malburg and Rita Pereira*
- **Design of a SFCL with an Inductive Stage in Series with a Resistive Stage which Transits by Magnetic Field**  
*Belén Rivera, Alfredo Álvarez and Belén Pérez*

<b>15:00 – 15:10</b>	<b>Break</b>
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<b>15:10 – 16:10</b>	<b>Session C</b>
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### **C1 – Analysis & Synthesis Algorithms (Room: DoCEIS-A)**

Chairs: Humberto Queiroz, João Pires

- **Reachability Graph of IOPT Petri Net Models Using CUDA C++ Parallel Application**  
*Carolina Lagartinho-Oliveira, Filipe Moutinho, and Luís Gomes*
- **Automatic Flat-Level Circuit Generation with Genetic Algorithms**  
*Miguel Campilho-Gomes, Rui Tavares, and João Goes*

- **Towards the Detection of Malicious URL and Domain Names Using Machine Learning**

*Nastaran Farhadi Ghalati, Nahid Farhady Ghalaty, and José Barata*

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## **C2 – Power Transportation (Room: DoCEIS-B)**

Chairs: Ana Ferreira, Kankam O. Adu-Kankam

- **Study of Electrical Integrity of Low Voltage Nuclear Power Cables in Case of Plant Life Extension**

*Ehtasham Mustafa, Ramy S. A. Afia, Semih Bal and Zoltán Ádám Tamus*

- **Investigating the Complex Permittivity of Low Voltage Power Cables Under Different Stresses**

*Ramy S. A. Afia, Ehtasham Mustafa, Semih Bal and Zoltán Ádám Tamus*

- **Investigation of Power Line Sag Uncertainty in Day-Ahead DLR Forecast Models**

*Levente Rácz, Dávid Szabó, Gábor Göcsei and Bálint Németh*

<b>16:10 - 17:00</b>	<b>Tutorial Session (Room: DoCEIS-A)</b>
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*Rui Amaral Lopes*

**Using Energy Flexibility to Improve the Grid Interaction of nearly Zero-Energy Buildings**

## **Day 2 – Thursday 2 July 2020**

<b>10:30 – 11:50</b>	<b>Session D</b>
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## **D1 – Digital Twins & Smart Manufacturing (Room: DoCEIS-A)**

Chairs: Akashkumar Rajaram, Nazanin Vafaei

- **The Role of Digital Twins in Collaborative Cyber-Physical Systems**

*Artem A. Nazarenko and Luis M. Camarinha-Matos*

- **Production Process Modelling Architecture to Support Improved Cyber-Physical Production Systems**

*Fábio A. Seixas-Lopes, Jose Ferreira, Carlos Agostinho and Ricardo Jardim-Goncalves*

- **The Impact of Additive Manufacturing on Supply Chain Resilience**

*Bardia Naghshineh and Helena Carvalho*

- **Big Data Acquisition Architecture: An Industry 4.0 Approach**

*Felipe A. Coda, Diolino J. Santos Filho, Fabrício Junqueira and Paulo E. Miyagi*

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## **D2 – Power Systems (Room: DoCEIS-B)**

Chairs: Hugo Antunes, Sonia Hosseinpour

- **Study of Electric Field Emissions in Wireless Energy Transfer**

*Elena N. Baikova, R. Melicio, and S. S. Valtchev*

- **Scenario Reduction for Stochastic Optimization Applied to Short-Term Trading of PV Power**

*Isaias L. R. Gomes, Rui Melicio, and Victor M. F. Mendes*

- **Model Predictive Current Control of Switched Reluctance Motor Drive: An Initial Study**

*Manuel Pereira and Rui Esteves Araújo*

- **A Simple Analysis to Determine the Limits of a CMOS Technology to Implement SC DC-DC Converters**

*Ricardo Madeira and Nuno Paulino*

**11:50 – 12:00      Break**

**12:00 – 13:00      Keynote 2 (Room: DoCEIS-A)**

### **Activities of Daily Life (ADL) Recognition via Locomotion & Location Determination**

**Stefan Poslad**

*Associate Professor*

*School of Electronic Engineering and Computer Science*

*Queen Mary University of London*

*England*

**13:00 – 14:00      Break**

**14:00 – 15:00      Session E**

### **E1 – Optimization Systems (Room: DoCEIS-A)**

*Chairs:* *Carolina Lagartinho-Oliveira, Nastaran Farhadi Ghalati*

- **Distributed Approach to Traffic Management Automation Implemented according to IEC 61499**  
*Dmitry Elkin and Valeriy Vyatkin*
- **Formal Verification of IEC 61499 Enhanced with Timed Events**  
*Viktor Shatrov and Valeriy Vyatkin*
- **Thin Film Refractive Index and Thickness**  
*Paulo Lourenço, Manuela Vieira and Alessandro Fantoni*

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### **E2 – Biomedical Analysis & Diagnosis (Room: DoCEIS-B)**

*Chairs:* *Dario Pedro, Fabio A. Seixas Lopes*

- **Combination of Medical Imaging and Demographic Data for Parkinson's Disease Diagnosis**  
*Helena Rico Pereira, José Manuel Fonseca and Hugo Alexandre Ferreira*
- **Ventricular Assist Device in Health 4.0 Context**  
*Marcelo Barboza, Fabricio Junqueira, Eduardo Bock, Tarcisio Leão, Jeferson Dias, Jonatas Dias, Marcosiris Pessoa, José Ricardo Souza and Diolino dos Santos*
- **RehabVisual: Application on Subjects with Stroke**  
*Ana Ferreira, Patrícia Santos, Pedro Dias, Amélia Alves, Beatriz Carmo, Filipe Vilhena, Sofia Costa, Cláudia Quaresma and Carla Quintão*

- Development of Raman Fiber Optic Probe for In-vivo Dental Research  
(Poster)

*Iulian Otel, J. M. Silveira, V. Vassilenko, A. Mata, M. L. Carvalho, J. P. Santos, S. Pessanha*

**15:10 – 17:00**

**Panel Session (Room: DoCEIS-A)**

## Panel - “My Research for Life Improvement”



**Hugo Gamboa**

*Assistant Professor at Department of Physics  
FCT NOVA*



**Inês Oliveira**

*Assistant Professor at Department of Electrical and Computer Engineering  
FCT NOVA*



**André Mora**

*Assistant Professor at Department of Electrical and Computer  
Engineering  
FCT NOVA*



**Maria Marques**

*Researcher at CTS UNINOVA*



**João Pires**

*PhD Student at Department of Electrical and Computer Engineering  
FCT NOVA*



**João Rodrigues**

*PhD Student at Department of Physics  
FCT NOVA*

**Moderator: Pedro Pereira**

## Day 3 – Friday 3 July 2020

**10:30 – 11:50**      **Sessions F + YEF-ECE**

### **F1 - Instrumentation & Health 1 (Room: DoCEIS-A)**

*Chairs: Ricardo Madeira, David Borges*

- **Algorithm for Automatic Peak Detection and Quantification for GC-IMS Spectra**  
*Jorge M. Fernandes, Valentina Vassilenko and Paulo H. Santos*
- **Algorithm for Automated Segmentation and Feature Extraction of Thermal Images**  
*Anna A. Poplavska, Valentina B. Vassilenko, Oleksandr A. Poplavskyi, Sergei V. Pavlov and Fernando M. Pimentel-Santos*
- **Development and Validation of an Experimental Protocol to Evaluate Posture Control**  
*Daniel Noronha Osório, Emanuela Teixeira, Fernando Pimentel-Santos, Hugo Silva, Hugo Gamboa and Cláudia Quaresma*
- **A Genetic Algorithm to Design Job Rotation Schedules with Low Risk Exposure**  
*João Rodrigues, Hugo Gamboa, Nafiseh Mollaei, Daniel Osório, Ana Assunção, Carlos Fajão and Filomena Carnide*

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### **Opening YEF-ECE 2020 (Room: DoCEIS-B)**

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### **Y1 – Image Processing (YEF-ECE 2020) (Room: DoCEIS-B)**

*Chairs: André Mora*

- **Pixel-based and object-based change detection methods for assessing fuel break maintenance**  
*João E. Pereira-Pires, Valentine Aubard, João M. N. Silva, Rita A. Ribeiro, José M. C. Pereira, José Manuel Fonseca, Manuel L. Campagnolo and André Mora*
- **FPGA-based Satellite Image Classification for Water Bodies Detection**  
*Carlos Garcia, Rui Tavares, André Mora, José Fonseca, Henrique Oliveira and Luís Oliveira*
- **Infrared Fire Alarm for Vehicle Protection**  
*José Curva, Nuno Paulino, João Pedro Oliveira, Luís Oliveira and Henrique Oliveira*
- **Assessment of Using Superconducting Magnetic Energy Storage for Current Harmonic Compensation**  
*Francisco Luís Simões, Victor Fernão Pires and João Murta Pina*

**11:50 – 12:00**      **Break**



**12:00 – 13:00**      **Keynote 3 (Room: DoCEIS-A)**

**Smarter infrastructure monitoring and opportunities for innovation in asset management**

**Theo Tryfonas**

*Associate Professor  
University of Bristol  
England*

**13:00 – 14:00**      **Break**

**14:00 – 15:00**      **Sessions G and YEF-ECE**

**G1 – Instrumentation & Health 2 (Room: DoCEIS-A)**

*Chairs: Pedro C. Moura, Anna A. Poplavska*

- **Real Time Mental Stress Detection through Breath Analysis**  
*Paulo Santos, Peter Roth, Jorge M. Fernandes, Viktor Fetter and Valentina Vassilenko*
- **Multi-Sensor Synchronization Model for Sensor Fusion Applied to Innovative Cardiovascular Markers**  
*Paulo Bonifacio, Valentina Vassilenko, Andreia Serrano, Filipa Cardoso and Stanimir Valtchev*
- **Device Development for Evaluation of Gingiva Microcirculation**  
*Hojat Lotfi, Valentina Vassilenko, Paulo Bonifacio and Bibiana Falcao*

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**Y2 – Power Electronics (YEF-ECE 2020) (Room: DoCEIS-B)**

*Chairs: Anabela Pronto*

- **A Novel Topology of Modular Multilevel Bidirectional Non-Isolated dc-dc Converter**  
*Vitor Monteiro*
- **Modular Multilevel Converter in Electrified Railway Systems: Applications of Rail Static Frequency Converters and Rail Power Conditioners**  
*Mohamed Tanta, Luis Barros, Gabriel Pinto, Antonio Martins and João Afonso*
- **Power-Train ECU programming using Rapid Prototyping through Matlab/Simulink**  
*Carmen Romero-Saiz, María Isabel Milanés-Montero, Enrique Romero-Cadaval and Jaime Pando-Acedo*
- **Fault Diagnosis in DC-DC Power Converters Based on Parity Equations**  
*Willer Jorge Mattos and Rui Araújo*
- **Grid-Connected PV System Using a T Type qZS Inverter with an Integral Time Derivative Approach to Ensure MPP and Decoupled Current Control**  
*Manuel Pina and Vitor Pires*

**15:00 – 15:10**      **Break**

### **H1- Instrumentation & Health 3 (Room: DoCEIS-A)**

*Chairs: Leonardo Malburg, Ricardo Santos*

- **Arterial Stiffness and Central Hemodynamic Assessment by Novel Portable Device**

*Andreia Serrano, Valentina Vassilenko, Beatriz Ramalho, Paulo Bonifácio and Anna Poplavska*

- **Indoor & Outdoor Air Profiling with GC-IMS**

*Pedro C. Moura, Valentina Vassilenko, Jorge M. Fernandes and Paulo H. Santos*

- **Idle Tone Detection in Biomedical Signals Using Time-Frequency Techniques**

*Filipa E. Cardoso, Arnaldo Batista, Valentina Vassilenko, Andreia Serrano and Manuel Ortigueira*

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### **Y3 – Industry & Buildings (YEF-ECE 2020) (Room: DoCEIS-B)**

*Chairs: André Rocha*

- **A New Risk Assessment and Management Approach for Agile Projects**

*Vitor Anes, António Abreu and Ricardo Santos*

- **Industrial Network Topology Generation with Genetic Algorithms**

*Christoph Fischer, Maximilian Berndt, Dennis Krummacker, Janis Zemitis, Daniel Fraunholz and Hans Dieter Schotten*

- **Forecasting Heating and Cooling Energy Demand in an Office Building using Machine Learning Methods**

*Xavier Godinho, Hermano Bernardo, Joao C. Sousa and Filipe Oliveira*

- **Demand Response Model for Hardware Implementation**

*Bruno Capitão, João Lagarto, Rita Pereira, Pedro Fonte and Paulo Almeida*

# Tutorial Session



**Rui Amaral Lopes**

*Invited Professor at NOVA School of Science and Technology*

**Title:** sing Energy Flexibility to Improve the Grid Interaction of nearly Zero-Energy Buildings

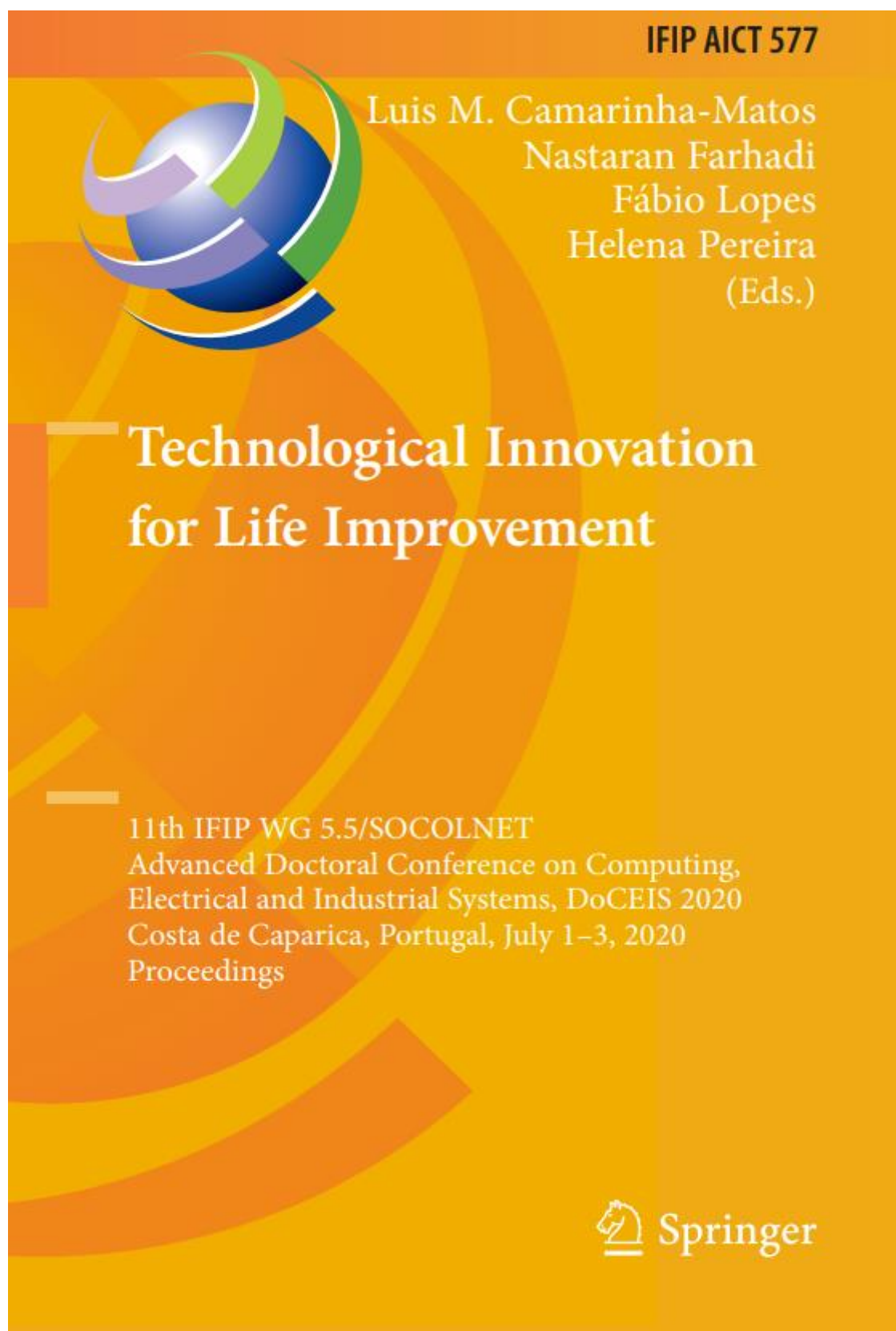
**Abstract:** The nearly Zero-Energy Building concept is foreseen as a reference for the future of the European building stock. While several factors contribute to the introduction of legal instruments that promote a fast adoption of these buildings (e.g. energy efficiency), their relationship with low voltage distribution grids is far more complex than the one of the regular buildings. In order to improve the grid interaction of nearly Zero-Energy Building in particular, and of regular buildings equipped with distributed generation systems in general, Energy Flexibility can be used to improve load matching while respecting users' comfort needs.

This presentation will focus on the main components of the nearly Zero-Energy Building concept and illustrate positive and negative impacts associated with the integration of such buildings in low voltage distribution grids. Additionally, it will show how Energy Flexibility can be used to mitigate possible negative impacts.

**Short Bio:** Rui Amaral Lopes was born in Lagos, Portugal, in 1989. He received the M.Sc and Ph.D. degrees in Electrical and Computer Engineering from the Faculty of Sciences and Technology of NOVA University of Lisbon, Portugal, in 2012 and 2017, respectively. He is now working with the Electrical and Computers Engineering department of this institution as Invited Assistant Professor. Additionally, since 2013 he has been with the Center of Technology and Systems (CTS) – UNINOVA, Portugal, where he is currently working on several national and international projects. His research interests include energy flexibility; demand side management; energy efficiency; integration of renewable energy sources; power distribution; and nearly zero-energy buildings and communities.

## Proceedings

DoCEIS 2020 Proceedings are published by Springer, under its IFIP AICT series.



Similar to previous years, these proceedings are indexed in ISI Web of Science, SCOPUS and DBLP.



## 4th International Young Engineers Forum on Electrical and Computer Engineering (YEF-ECE 2020)

Innovation in Electrical and Computer Engineering Solutions

### Scope

Electrical engineers apply electrical and electronic theory to obtain solutions for problems related to the development, design and operation of electrical hardware and software, control systems, electrical machines and communications systems. Computer engineers are concerned with the design, development, and implementation of new and challenging computer technology in a myriad of consumer, industrial, commercial, and military applications. Besides development, design, operations, and research, electrical and computers engineers are typically involved in the manufacture, installation, and maintenance of computational devices, electrical and electronic equipment and systems employed by a wide variety of organizations which produce, use or provide services to such equipment, and ranging from tiny electronic devices to large complex systems.

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## Detailed Schedule YEF-ECE 2020

Friday, July 3, 2019

10:30 – 10:40 Opening Session	YEF-ECE Opening Session
10:40 – 11:50 Session Y1: Image Processing	<p><i>Chair: André Mora</i></p> <p>Pixel-based and object-based change detection methods for assessing fuel break maintenance <i>João E. Pereira-Pires, Valentine Aubard, João M. N. Silva, Rita A. Ribeiro, José M. C. Pereira, José Manuel Fonseca, Manuel L. Campagnolo and André Mora</i></p> <p>FPGA-based Satellite Image Classification for Water Bodies Detection <i>Carlos Garcia, Rui Tavares, André Mora, José Fonseca, Henrique Oliveira and Luís Oliveira</i></p> <p>Infrared Fire Alarm for Vehicle Protection <i>José Curva, Nuno Paulino, João Pedro Oliveira, Luís Oliveira and Henrique Oliveira</i></p> <p>Assessment of the Opportunity of Using Superconducting Magnetic Energy Storage for Current Harmonic Compensation <i>Francisco Luís Simões, Victor Fernão Pires and João Murta Pina</i></p>
11:50– 12:00	Break
12:00– 13:00	<p><b>Keynote - Theo Tryfonas</b></p> <p>Smarter infrastructure monitoring and opportunities for innovation in asset management</p> <p>Associate Professor University of Bristol England</p>
13:00– 14:00	Break
14:00 – 15:00 Session Y2: Power Electronics	<p><i>Chair: Anabela Pronto</i></p> <p>A Novel Topology of Modular Multilevel Bidirectional Non-Isolated dc-dc Converter <i>Vitor Monteiro</i></p> <p>Modular Multilevel Converter in Electrified Railway Systems: Applications of Rail Static Frequency Converters and Rail Power Conditioners <i>Mohamed Tanta, Luis Barros, Gabriel Pinto, Antonio Martins and João Afonso</i></p> <p>Power-Train ECU programming using Rapid Prototyping through Matlab/Simulink <i>Carmen Romero-Saiz, María Isabel Milanés-Montero, Enrique Romero-Cadaval and Jaime Pando-Acedo</i></p> <p>Fault Diagnosis in DC-DC Power Converters Based on Parity Equations <i>Willer Jorge Mattos and Rui Araújo</i></p>

	Grid-Connected PV System Using a T Type qZS Inverter with an Integral Time Derivative Approach to Ensure MPP and Decoupled Current Control <i>Manuel Pina and Vitor Pires</i>
15:00 – 15:10	Break
15:10 – 16:10	<i>Chair: André Rocha</i>
Session Y3: Industry & Buildings	A New Risk Assessment and Management Approach for Agile Projects <i>Vitor Anes, António Abreu and Ricardo Santos</i>
	Industrial Network Topology Generation with Genetic Algorithms <i>Christoph Fischer, Maximilian Berndt, Dennis Krummacker, Janis Zemitis, Daniel Fraunholz and Hans Dieter Schotten</i>
	Forecasting Heating and Cooling Energy Demand in an Office Building using Machine Learning Methods <i>Xavier Godinho, Hermano Bernardo, Joao C. Sousa and Filipe Oliveira</i>
	Demand Response Model for Hardware Implementation <i>Bruno Capitão, João Lagarto, Rita Pereira, Pedro Fonte and Paulo Almeida</i>
16:10 – 16:20	Break
16:20– 16:50	<b>Closing Session &amp; Awards</b>

## Proceedings



Proceedings of YEF-ECE 2020, including the papers presented at the event, will be proposed to be published by IEEE and included in IEEE Xplore Digital Library.

## Contacts

DoCEIS Secretariat

Faculdade de Ciências e Tecnologia  
Dep. Engenharia Electrotécnica  
2829-516 Caparica, Portugal

Tel: (+351) 21 294 85 45

Fax: (+351) 21 294 85 32

Monday - Friday 09:00 a.m. - 06:00 p.m.

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## DoCEIS 2020 & YEF-ECE 2020

### Wednesday – 1 Jul 2020

10:00	<b>Opening Session</b>	
10:30	<b>Keynote 1</b>	
11:30	<b>A1</b> Decision Systems	<b>A2</b> Communication Systems
11:40		
13:00		
14:00	<b>B1</b> Collaborative Networks	<b>B2</b> Energy Control
15:00	<b>C1</b> Analysis & Synthesis Algorithms	<b>C2</b> Power Transportation
15:10		
16:10	<b>Horizontal session</b>	
17:00		

### Thursday – 2 Jul 2020

10:30	<b>D1</b> <i>Digital Twins &amp; Smart Manufacturing</i>	<b>D2</b> Power Systems
11:50		
12:00	<b>Keynote 2</b>	
13:00		
14:00	<b>E1</b> Optimization Systems	<b>E2</b> Biomedical Analysis & Diagnosis
15:00	<b>Panel</b>	
15:10		
17:00		

### Friday – 3 Jul 2020

10:30	<b>F1</b> Instrumentation & Health 1	<b>Opening YEF-ECE 2020</b>
11:50	<b>Y1</b> YEF-ECE	
12:00	<b>Keynote 3</b>	
13:00		
14:00	<b>G1</b> Instrumentation & Health 2	<b>Y2</b> YEF-ECE
15:00	<b>H1</b> Instrumentation & Health 3	<b>Y3</b> YEF-ECE
15:10		
16:10	<b>Closing Session &amp; Awards</b>	
16:20		
16:50		