DoCEIS 2021
12th

Advanced Doctoral Conference on Computing, Electrical and Industrial Systems

Technological Innovation for Applied Artificial Intelligence Systems

July 7-9

Caparica (Lisbon) – Portugal
[ONLINE]

Including the associated event:
YEF-ECE 2021

CONTENTS

Welcome Message

The twelfth edition of the Advanced Doctoral Conference on Computing, Electrical and Industrial Systems, **DoCEIS 2021**, aims at bringing together PhD students, researchers, and engineers from all over the world, interested in innovative ideas and techniques around **Technological Innovation for Applied AI Systems**. Artificial Intelligence (AI) is a branch of computer science which purpose is to replicate human intelligence based on computational means. AI is shaping and rebuilding society's basic constructs - such as economy, health, education, and lifestyle - and having a strong impact on people's lives, through the implementation of intelligent algorithms on everyday applications and promoting technological advancements that allow for a better and more sustainable quality of life. AI is expected to become an important vehicle for large-scale economic and technological growth, like previous revolutionary technologies, such as the steam engine, electricity, and the internet. AI techniques (e.g., machine learning and deep learning, automated reasoning, and planning, among others) can be applied to several knowledge areas, from electronics and energy to the biomedical field and industrial collaborative networks, providing technological developments that can impact and result in the enhancement of healthcare, the environment, manufacturing, transportation, and communication systems across the globe. AI is forecasted to have a substantial influence across all sectors of industry and services and is therefore of paramount importance for both industrial and research innovation.

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 PhD students (and their supervisors) from 16 countries despite the pandemic situation. 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 2021,** the 5th International Young Engineers Forum on Electrical and Computer Engineering, which attracted submissions from 8 countries.

Unfortunately, due to the ongoing COVID-19 pandemic and national and international restrictions still imposed, this is the second year in a row that the conference will 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 2021!

Another year has passed, and yet the world is still struggling to deal with the COVID-19 pandemic. Although, we would like to reinforce our last year message: science for sure did not stop and neither did DoCEIS, and because participants safety is our priority, the 12th edition of DoCEIS will again be held online. Therefore, we hope that you enjoy the twelfth edition of the Advanced Doctoral Conference on Computing, Electrical and Industrial Systems in this different, but already familiar format. The conference, held on 7-9 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 mainly composed 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 important and enriching experience that will accompany us throughout our careers, and will hopefully serve as a stepping-stone for the organization of future scientific events.

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 the conference. To the International Program Committee, our appreciation for all the hard work in the reviewing process.

We are celebrating the 12th edition of DoCEIS this year. In the last eleven years, DoCEIS has been an excellent venue for scientific dissemination for researchers, especially doctoral students that, often for the first time, are given the opportunity to have their work divulgated in an international conference, where they can discuss it with their peers in a familiar and welcoming environment.

In the previous editions we provided participants with opportunities to create new contact and collaboration networks, or even just getting valuable feedback on their work by more experienced researchers. Although for the second year in a row the ongoing pandemic 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 environment for sharing experiences and knowledge among all participants, instigating future collaborations. This year we count submissions from **16** countries, making DoCEIS a great opportunity to share and learn about significant scientific developments, to expand collaborative 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 2021 be a positively memorable event!

Message from the

Local Organizers.

DoCEIS 2021 Conference Organisation

Conference and Program Chair:

Luis M. Camarinha-Matos, Portugal

Organizing Committee Co-chairs:

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Pedro Pereira, Portugal

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João Pires, Portugal

Omid Nasrollahi, Portugal / Iran

Dyar Fadhil, Portugal / Irak

Ayman Abu Sabah, Portugal / Jordan

Luis Estrada, Portugal / Ecuador

Organizers of special session on Medical Devices

Hugo Gamboa, Portugal

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Alda Moreno, Portugal

Carla Pereira, Portugal

Cláudia Quaresma, Portugal

José Paulo Santos, Portugal

Valentina Vassilenko, Portugal

Ricardo Vigário, 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 DoCEIS2021 Secretariat at doceis@uninova.pt

Invited Keynote Speakers

Keynote 1: **Professor Iolanda Leite,** School of Electrical Engineering and Computer Science at KTH Royal Institute of Technology, Stockholm, Sweden

Title: `Social Robots in the Real World: Current Challenges and Future Directions`

Short Bio: *Iolanda Leite is an Associate Professor at the School of Electrical Engineering and Computer Science at KTH Royal Institute of Technology. She holds a PhD in Information Systems and Computer Engineering from IST, University of Lisbon. Prior to joining KTH, she had postdoctoral appointments at Yale University and at Disney Research. Her research goal is to develop social robots that can perceive, learn from and respond appropriately to people in real-world situations, allowing for truly efficient and engaging long-term interactions with people. She is PI of a Starting Grant from the Swedish Research Council (2018-2021), the recipient of a globally competitive Early Career Fellowship awarded by the Jacobs Foundation, and was recently awarded one of the individual grants by the Swedish Foundation for Strategic Research's Future Research Leaders program (2020-2025). She is also a member of the HRI Steering Committee and the Co-editor in Chief of AI Matters, the newsletter of the ACM Special Interest Group in Artificial Intelligence (SIGAI).*

Abstract: As social robots move out of controlled laboratory environments to be deployed in the real world, a long-standing barrier is the need to respond and adapt to both users and to the dynamics of the environment over long periods of time. In this talk, I will present my past and current research towards enabling robots with the social capabilities that will enable them to engage people. I will also discuss limitations of the current state of the art in robotic technology suitable for realistic social environments, arguing that an improved understanding of how robots perceive, reason and act depending on their surrounding social context can lead to more natural, enjoyable and useful human-robot interactions in the long-term.

Keynote 2: **Professor George Theodorakopoulos**, School of Computer Science and Informatics, Cardiff university, Wales

Title: `Location privacy from a statistical perspective`

Short Bio: *George Theodorakopoulos received the Diploma degree from the National Technical University of Athens, Greece, in 2002, and the M.S. and Ph.D. degrees from the University of Maryland, College Park, MD, USA, in 2004 and 2007, all in electrical and computer engineering. He is a Senior Lecturer at the School of Computer Science and Informatics, Cardiff University, which he joined in 2012. From 2007 to 2011, he was a Senior Researcher at the Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland. He is a coauthor (with John Baras) of the book Path Problems in Networks (Morgan & Claypool, 2010). He received the Best Paper award at the ACM Workshop on Wireless Security, October 2004, for "Trust evaluation in ad-hoc networks" and the 2007 IEEE ComSoc Leonard Abraham prize for "On trust models and trust evaluation metrics for ad hoc networks." He coauthored "Quantifying Location Privacy," which was runner-up for the 2012 PET Award (Award for Outstanding Research in Privacy Enhancing Technologies).*

Abstract: One way to view privacy in general, and location privacy in particular, is as a statistical inference problem: The adversary makes noisy observations of the user's true information (location) and then tries to infer the actual value. This leads naturally to a game between the user and the adversary, in which the user may also be constrained in the amount of noise that can be added. This talk will explore past and current results in this area, and contrast the statistical point of view with other approaches to location privacy.

Keynote 3: **Professor Milos Manic**

Title: `Trusting AI: helping AI make the right decisions and fighting the bad bias`

Short Bio: *Dr. Manic is a Professor with the Computer Science Department and Director of VCU Cybersecurity Center at Virginia Commonwealth University. He completed over 40 research grants in data mining and machine learning applied to cyber security, critical infrastructure protection, energy security, and resilient intelligent control. Dr. Manic has given over 40 invited talks around the world, authored over 200 refereed articles in international journals, books, and conferences, holds several U.S. patents and has won 2018 R&D 100 Award for _Autonomic Intelligent Cyber Sensor (AICS_), one of top 100 science and technology worldwide innovations in 2018. He is an inductee of the US National Academy of Inventors (class of 2019) and a Fellow of Commonwealth Cyber Initiative (specialty in AI & Cybersecurity). He is an IEEE Fellow, recipient of IEEE IES 2019 Anthony J.Hornfeck Service Award, 2012 J. David Irwin Early Career Award, 2017 IEM Best Paper Award and serves as an associate editor of Transactions on Industrial Informatics, Open Journal of Industrial Electronics Society, and is IES Officer and Senior AdCom member. He served as associate editor of Trans. on Industrial Electronics, was a founding chair of IEEE IES Technical Committee on Resilience and Security in Industry, and general chair of IEEE IECON 2018, IEEE HSI 2019.*

Abstract: Trustworthy AI and explainable AI (XAI) have become burning issues in recent years. The proliferation of AI governed systems like autonomous vehicles or IoT devices is bringing a plethora of controversial questions of trustworthy AI including but not limited to secure, privacy preserving, explainable, reliable AI. In addition, AI or algorithmic bias have been reported in various instances of commercial tools.

This talk will illustrate some of the contemporary problems in AI deployment, and present approaches on how to fight bad bias with good bias, how to deal with uncertainty in AI, and how to ultimately help AI make right decisions for right reasons.

Program Overview

	Morning	Afternoon

Day 1
7 July
	• Opening Session
	• **Keynote 1**
	• **Sessions**
	    A1 Collaborative Networks
	    A2 Intelligent Decision Making I
		• **Sessions**
		    B1 CPS and Digital Twins
		    B2 Intelligent Decision Making II
		• **Horizontal Session I**
		• **Horizontal Session II**

Day 2
8 July
	• **Sessions**
	    C1 Smart Healthcare Systems
	    C2 Communication and Electronics
	• **Keynote 2**
		• **Sessions**
		    D1 Classification Systems
		    D2 Smart Energy Management
		• **Panel:**
		    "My Research and Applied AI Systems"

Day 3
9 July
	• **Sessions**
	    E1 Smart Manufacturing
	    Y1.1 YEF-ECE I
	    Y1.2 YEF-ECE I
	    F1 Medical Devices I
	    Y2.1 YEF-ECE II
	    Y2.2 YEF-ECE II
		• **Keynote 3**
		• **Sessions**
		    G1 Medical Devices II
		    Y3.1 YEF-ECE III
		    Y3.2 YEF-ECE III
		• **Closing Session & Awards**

Detailed Schedule DoCEIS 2021

Day 1 – Wednesday 7 July 2021

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

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

Social Robots in the Real World: Current Challenges and Future Directions

Iolanda Leite

Assistant Professor
School of Electrical Engineering and Computer Science
KTH Royal Institute of Technology, Stockholm, Sweden

11:30 – 11:40	**Break**

11:40 – 13:00	**Session A**

A1 – Collaborative Networks (Room: DoCEIS-A)

Chairs: Luis Estrada, Artem Nazarenko

- **AI and Simulation for Performance Assessment in Collaborative Business Ecosystems**
  Paula Graça and Luis M. Camarinha-Matos
- **The Benefits of Applying Social Network Analysis to Identify Collaborative Risks**
  Marco Nunes and António Abreu
- **A Mixed Method for Assessing the Reliability of Shared Knowledge in Mass Collaborative Learning Community**
  Majid Zamiri and Luis M. Camarinha-Matos

A2 – Intelligent Decision Making I (Room: DoCEIS-B)

Chairs: Carlos Marques, Rui Varandas

- **Matheuristic Algorithms for Production Planning in Manufacturing Enterprises**
  Eduardo Guzman, Beatriz Andres and Raul Poler
- **Assessment of Sentinel-2 Spectral Features to Estimate Forest Height with the New GEDI Data**
  João E. Pereira-Pires, André Mora, Valentine Aubard, João M. N. Silva and José M. Fonseca
- **Assessing Normalization Techniques for TOPSIS Method**
  Nazanin Vafaei, Rita A. Ribeiro and Luis M. Camarinha-Matos

13:00 – 14:00	Lunch Break

14:00 – 15:00	Session B

B1 – Cyber-physical Systems and Digital Twins (Room: DoCEIS-A)

Chairs: Guilherme Brito, Jack Chaplin

- **Verification of the Boundedness Property in a Petri Net-based Specification of the Control Part of Cyber-Physical Systems**
  Marcin Wojnakowski and Remigiusz Wiśniewski
- **Collaborative Cyber-Physical Systems Design Approach: Smart Home Use Case**
  Artem A. Nazarenko and Luis M. Camarinha-Matos
- **Digital Twin for Supply Chain Master Planning in Zero-Defect Manufacturing**
  Julio C. Serrano, Josefa Mula and Raúl Poler

B2 – Intelligent Decision Making II (Room: DoCEIS-B)

Chairs: Ali Gashtasbi, Yulia Berezovskaya

- **How Can e-grocers Use Artificial Intelligence Based on Technology Innovation to Improve Supply Chain Management?**
  Mar Vazquez-Noguerol, Carlos Prado-Prado, Shaofeng Liu and Raul Poler
- **A Conceptual Framework of Human-System Interaction Under Uncertainty-Based on Shadow System Perspective**
  Qingyu Liang and Juanqiong Gou
- **A New Challenge for Machine Ethics Regarding Decision-Making in Manufacturing Systems**
  Esmaeil Kondori and Rui Neves-Silva

15:00 – 15:10	Break

15:10 – 16:10	Horizontal Session I (Room: DoCEIS-A)

WLCG Computing and Big Data

João Pina

Computing Researcher at LIP, Lisbon

16:10 - 17:00	Horizontal Session II (Room: DoCEIS-A)

Networking Session:
Creative Innovation

10:30 – 11:50   Session C

C1 – Smart Healthcare Systems (Room: DoCEIS-A)

Chairs: João Pires, Esmaeli Kondori

- **Assessment of Visuomotor and Visual Perception Skills in Children: A New Proposal Based on a Systematic Review**
  Ana Isabel Ferreira, Carla Quintão and Cláudia Quaresma
- **Benefits, Implications and Ethical Concerns of Machine Learning Tools serving Mental Health Purposes**
  Patricia Gamboa, Cláudia Quaresma, Rui Varandas and Hugo Gamboa
- **Multi-agent System Architecture for Distributed Home Health Care Information Systems**
  Filipe Alves, Ana Maria A. C. Rocha, Ana I. Pereira and Paulo Leitão
  POSTER
- **Long-term unsupervised assessment of mobility in Parkinson's Disease**
  Pedro Ferreira

C2 – Communication and Electronics (Room: DoCEIS-B)

Chairs: Daniel Dias, Okatakyie Adu-Kankam

- **Detection of Signaling Vulnerabilities in Session Initiation Protocol**
  Diogo Pereira and Rodolfo Oliveira
- **Interference Power Characterization in Directional Networks and Full-Duplex Systems**
  Ayman T. Abusabah, Rodolfo Oliveira and Luis Irio
- **FEM-parameterized Sensorless Vector Control of PMSM Using High-Frequency Voltage Injection**
  Gergely Szabó and Károly Veszprémi
  POSTER
- **Memristive devices for neuromorphic applications based on amorphous oxide semiconductor nanoscale films**
  Maria E. Pereira, Jonas Deuermeier, Pydi Ganga Bahubalindruni, Pedro Barquinha, Rodrigo Martins, Elvira Fortunato and Asal Kiazadeh

| 11:50 – 12:00 | Break |

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

Location privacy from a statistical perspective

George Theodorakopoulos

Senior Lecturer
School of Computer Science and Informatics
Cardiff University, Wales, UK

| 13:00 – 14:00 | Lunch Break |

| 14:00 – 15:00 | Session D |

D1 – Classification Systems (Room: DoCEIS-A)

Chairs: Ayman Abu Sabah, Paula Graça

- **Deep Learning-Based Automated Detection of Inappropriate Face Image Attributes for ID Documents**
  Amineh Mazandarani, Pedro Miguel Figueiredo Amaral, Paulo da Fonseca Pinto and Seyed Jafar Hosseini Shamoushaki
- **Automatic Cognitive Workload Classification Using Biosignals for Distance Learning Applications**
  Rui Varandas, Hugo Gamboa, Inês Silveira, Patrícia Gamboa and Cláudia Quaresma
- **Design of an Attention Tool Using HCI and Work-Related Variables**
  Patricia Gamboa, Cláudia Quaresma, Rui Varanda, Helena Canhão, Rute Dinis de Sousa, Ana Rodrigues, Sofia Jacinto, João Rodrigues, Cátia Cepeda and Hugo Gamboa

D2 – Smart Energy Management (Room: DoCEIS-B)

Chairs: Daniel Dias, Nazanin Vafaei

- **Towards a Hybrid Model for The Diffusion of Innovation in Energy Communities**
  Kankam O. Adu-Kankam and Luis M. Camarinha-Matos
- **Towards Extension of Data Centre Modelling Toolbox with Parameters Estimation**
  Yulia Berezovskaya, Chen-Wei Yang and Valeriy Vyatkin
- **Power Transformer Design Resorting to Metaheuristics Techniques**
  Pedro Alves, P. M. Fonte and R. Pereira

"My Research and Applied AI Systems"

Panelists:

Ana Paiva
Full Professor at the Department of Computer Science and Engineering of Instituto Superior Técnico and Research Group Leader at Instituto de Engenharia de Sistemas e Computadores, Investigação e Desenvolvimento em Lisboa.

Luis Paulo Reis
Associate Professor at the University of Porto and President of the Portuguese Association for Artificial Intelligence

Nuno Fachada
Researcher at COPELABS and Assistant Professor at the Universidade Lusófona de Humanidades e Tecnologias

Miguel Cabrita
Chief Financial Office at Enlightenment.AI

Paulo Novais
Professor of Computer Science at the Department of Informatics in the School of Engineering of the University of Minho

Moderator: Pedro Pereira

10:30 – 11:50   Sessions E + YEF-ECE 1

E1 – Smart Manufacturing (Room: DoCEIS-A)

Chairs: Omid Nasrollahi, Amineh Mazandarani

- **Characteristics of Adaptable Control of Production Systems and the Role of Self-Organization Towards Smart Manufacturing**
  Luis Alberto Estrada-Jimenez, Sanaz Nikghadam-Hojjati and Jose Barata
- **Predictive Manufacturing: Enabling Technologies, Frameworks and Applications**
  Terrin Pulikottil, Luis Alberto Estrada-Jimenez, Sanaz Nikghadam-Hojjati and Jose Barata
- **Control of Manufacturing Systems by HMS / EPS Paradigms Orchestrating I4.0 Components Based on Capabilities**
  Jackson T. Veiga, Marcosiris A. O. Pessoa, Fabrício Junqueira, Paulo E. Miyagi and Diolino J. dos Santos Filho
- **A Framework for Self-Configuration in Manufacturing Production Systems**
  Hamood Ur Rehman, Jack C. Chaplin, Leszek Zarzycki and Svetan Ratchev

Opening YEF-ECE 2021 (Room: YEF-A)

Y1.1 – Advanced Systems and Services (YEF-ECE 2021) (Room: YEF-A)
Chair: Rodolfo Oliveira

- **A Comparative Study of Microservices Frameworks in IoT Deployments**
  Shani du Plessis, Bruno Mendes and Noélia Correia
- **Mathematical Model for Early Diagnosis of Diabetes Mellitus**
  Indira Uvaliyeva and Aigerim Ismukhamedova
- **Agent-based simulation of consumer occupancy distribution in shopping centers**
  Rui Baptista and Rui Neves-Silva
- **Synoptics of Things (SoT): An Open Framework for the Supervision of IoT Devices**
  Bruno Serras, Carlos Gonçalves, Tiago Dias and Luís Osório

Y1.2 – Control Systems (YEF-ECE 2021) (Room: YEF-B)
Chair: Rui Neves da Silva

- **NOVA.DroneArena: design and control of a low-cost drone testbed**
  Hugo Cabrita and Bruno Guerreiro
- **Model predictive control strategies for parcel relay manoeuvres using drones**
  Francisco Matos and Bruno J. Guerreiro
- **The Use of Bézier Curves for Optimal Motion Planning of Autonomous Vehicles**
  Thomas Berry and António Pascoal
- ** Integration of Remote Interfaces for Industrial Automation Applications**
  Maria da Graça Almeida, Daniel Santiago and Armando Cordeiro

11:50 – 12:00	Break

12:00 – 13:00	Sessions F and YEF-ECE 2

F1 – Medical Devices I (Room: DoCEIS-A)

Chairs: Pedro Ferreira, Patricia Gamboa

- **Analysis of Electromyography Signals for Control Models of Power-Assisted Stroke Rehabilitation Devices of Upper Limb System**
  Paulo Bonifacio, Valentina Vassilenko, Guilherme Marques and Diogo Casal
- **AI-based Classification Algorithm of Infrared Images of Patients with Spinal Disorders**
  Anna Poplavska, Valentina Vassilenko, Oleksandr Poplavskyi and Diogo Casal
- **Improvements on Signal Processing Algorithm for the VOPITB Equipment**
  Filipa E. Cardoso, Valentina Vassilenko, Arnaldo Batista, Paulo Bonifácio, Sergio Rico Martin, Juan Muñoz-Torrero and Manuel Ortigueira

Y2.1 - Electronics (YEF-ECE 2021) (Room: YEF-A)

Chais: Luis Oliveira

- **A sub-1V CMOS Instrumentation Amplifier for an AFE Interfacing with Carbon Nanotubes Sensors**
  Francisco Neves, João Oliveira and Henrique Oliveira
- **A Reconfigurable Switched-Capacitor DC-DC Step-up Converter Integrated in 130 nm CMOS**
  João Gerhardt, Luís Oliveira and Henrique Oliveira
- **Speed Test and Cluster Analysis Processing Method of Hydraulic Mechanism in High-voltage Circuit-Breakers**
  Li Wang, Xudong Deng, Liangfeng Guo, Fan Jiang, Jia Chen, Jinsong Xie, Lijiang Chen, Chuan Liu and Xiaojun Yan
- **Analysis and Implementation of a Charge Pump DC-DC Converter**
  Marta Gameiro, Luís Oliveira and Henrique Oliveira

Y2.2 – Modelling and Localization (YEF-ECE 2021) (Room: YEF-B)

Chair: José Fonseca

- **Multi-image Super-Resolution Algorithm Supported on Sentinel-2 Satellite Images Geolocation Error**
  Miguel Vaqueiro, José Manuel Fonseca, André Mora and Henrique Oliveira
- **Flight Control of Hybrid Drones Towards Enabling Parcel Relay Manoeuvres**
  Bruno Neves and Bruno Guerreiro
- **Sensorless Switched Reluctance Machine and Speed Control: A Study to Remove the Position Encoder at High-speed of Operation**
  Jonathan V. Costa and Paulo J. C. Branco

13:00 – 14:00	Break

14:00 – 15:00	**Keynote 3** (Room: DoCEIS-A)

Trusting AI: helping AI make the right decisions and fighting the bad bias

Milos Manic

Professor
Virginia Commonwealth University, USA
Director, VCU Cybersecurity Center (CSeC), NSA CAE-CD, CAE-R
Joint Appt., Idaho National Laboratory (INL)

15:00 – 15:10	**Break**

15:10 – 16:10	**Sessions G + YEF-ECE 3**

G1- Medical Devices II (Room: DoCEIS-A)

Chairs: Diyar Fadhil, Filipe Alves

- **Pilot Study for Validation and Differentiation of Alveolar and Esophageal Air**
  Paulo Santos, Valentina Vassilenko, Carolina Conduto, Jorge M. Fernandes, Pedro C. Moura, Paulo Bonifácio
- **Application of Machine Learning Methods to Raman Spectroscopy Technique in Dentistry**
  Iulian Otel, J. M. Silveira, V. Vassilenko, A. Mata and S. Pessanha
- **Gas Chromatography-Ion Mobility Spectrometry Instrument for Medical Applications: A Calibration Protocol for ppb and ppt Concentration Range**
  Jorge M. Fernandes, Valentina Vassilenko, Pedro C. Moura and Viktor Fetter

Y3.1 – Power Electronics (YEF-ECE 2021) (Room: YEF-A)

Chair: João Murta Pina

- **A Multilevel Bidirectional Four-Port DC-DC Converter to Create a DC-Grid in Solid-State Transformers with Hybrid AC/DC Grids**
  Vitor Monteiro and Joao Afonso
- **A Bidirectional Multilevel DC-DC Converter Applied to a Bipolar DC Grid: Analysis of Operation under Fault Conditions**
  Cátia F. Oliveira, Vítor Monteiro and João L. Afonso
- **Wireless Power Transfer System Design and Implementation**
  Pedro Lopes, Pedro Costa and Sónia F. Pinto
- **Simulation analysis of a control system for a Solid-State Transformer**
  Mário Jorge Marques and Rui Araújo

Y3.2 – Systems Modelling and Decision (YEF-ECE 2021) (Room: YEF-B)

Chair: José Barata

- **Constrained-optimization in a 3D bin packing realistic problem**
  Yamil Mateo Rodriguez, Juan Carlos Dueñas López and Javier Andión Jiménez
- **Online Model Generation for Scalable Predictive Process Monitoring**
  Pedro Rico, Félix Cuadrado and Juan C. Dueñas
- **A heuristic model to identify organizational collaborative critical success factors**
  Marco Nunes, Antonio Abreu, Jelena Bagnjuk and Vanessa D'Onofrio
- **Mathematical Modeling of the Interests of Social Network Users**
  Zhenisgul Rakhmetullina, Raushan Mukhamedova, Roza Mukasheva and Bolat Batyrkhanov

16:10 – 16:20	**Break**

16:20 – 16:50	**Closing Session & Awards** (Room: DoCEIS-A)

Y3.2 – Systems Modelling and Decision (YEF-ECE 2021) (Room: YEF-B)

Chair: José Barata

- **Constrained-optimization in a 3D bin packing realistic problem**

Horizontal Session I

João Pina
Computing Researcher
LIP - Laboratório de Instrumentação e Física Experimental de Partículas
Lisbon, Portugal

Title: WLCG Computing and Big Data

Abstract: The Large Hadron Collider (LHC) experiments are located at CERN in Geneva Switzerland and are producing around 90 petabytes of data per year since the beginning of 2010. The data needs to be stored and made available for analysis to more than 12000 researchers spread across the globe. In order to achieve this, the Worldwide LHC Computing Grid (WLCG) project was created which aimed to develop, build, and maintain a global computing facility of more than 170 computing centres spread over 40 countries, linking up national and international grid infrastructures.

Even though WLCG has been operating a distributed computing infrastructure for the past 15 years and currently most of the LHC computing resources are being provided by the classical grid sites, over the last years the LHC experiments have been using more and more public clouds and High-Performance Centers. Till talk will present the past, current, and future challenges of WLCG computing and how to handle one of the most emblematic Big Data challenges of today.

Short Bio: João Pina [M], is a computing researcher at LIP. He has a Ph.D. in Physics with research work in the ATLAS detector at the CERN Large Hadron Collider (LHC). He joined the LIP computing group as a post-doc researcher, to work on grid computing technologies acting as a contact point for the Portuguese LHC community. In 2013 joined the European Grid Infrastructure (EGI) and currently, he is responsible for the coordination of the EGI software stack and liaising between the several international development teams. He also is the Regional Contact Point for the EGI Spanish federation and National Infrastructure Liaison for Portugal. He participated in major e-infrastructure projects like EGI-Inspire and EOSC-Hub as well as in the WLCG and IBERGRID infrastructures. He is currently collaborating with the Portuguese National Distributed Computing Infrastructure (INCD) acting as a technical advisor.

Horizontal Session II

Creative Innovation

Description: In this session participants will be divided in groups and asked to create and give a new life to an existent device, looking into it from a different approach, focusing on its Design, Engineering, AI, Versatility. Then the groups will rejoin and share their work with each other.

Proceedings

DoCEIS 2021 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.

5th International Young Engineers Forum on Electrical and Computer Engineering
(YEF-ECE 2021)
Innovation in Electrical and Computer Engineering Solutions

Scope

Following the success of the 2017, 2018, 2019 and 2020 editions we are proud to organize the 2021 International Young Engineers Forum on Electrical and Computer Engineering – YEF-ECE 2021.

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.

The 2021 International Young Engineers Forum combines the latest developments and applied research in electrical and computer engineering, dealing with systems' design and utilization, looking forward to efficient devices and systems with appropriate control algorithms to meet the needs of business and industry in a global economy. This event will be a unique opportunity for young engineers to connect with each other enabling experience's sharing and to become internationally active.

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Detailed Schedule YEF-ECE 2021

Friday, July 9, 2021

10:30 – 10:40 Opening Session	YEF-ECE Opening Session
10:40 – 11:50 **Session Y1.1:** Advanced Systems and Services	**Chair: Rodolfo Oliveira**
	A Comparative Study of Microservices Frameworks in IoT Deployments *Shani du Plessis, Bruno Mendes and Noélia Correia*
	Mathematical Model for Early Diagnosis of Diabetes Mellitus *Indira Uvaliyeva and Aigerim Ismukhamedova*
	Agent-based simulation of consumer occupancy distribution in shopping centers *Rui Baptista and Rui Neves-Silva*
	Synoptics of Things (SoT): An Open Framework for the Supervision of IoT Devices *Bruno Serras, Carlos Gonçalves, Tiago Dias and Luís Osório*
Session Y1.2: Control Systems	*Chair: Rui Neves da Silva*
	NOVA.DroneArena: design and control of a low-cost drone testbed *Hugo Cabrita and Bruno Guerreiro*
	Model predictive control strategies for parcel relay manoeuvres using drones *Francisco Matos and Bruno J. Guerreiro*
	The Use of Bézier Curves for Optimal Motion Planning of Autonomous Vehicles *Thomas Berry and António Pascoal*
	Integration of Remote Interfaces for Industrial Automation Applications *Maria da Graça Almeida, Daniel Santiago and Armando Cordeiro*
11:50 – 12:00	Break
12:00 – 13:00 **Session Y2.1:** Electronics	*Chair: Luis Oliveira*
	A sub-1V CMOS Instrumentation Amplifier for an AFE Interfacing with Carbon Nanotubes Sensors *Marta Gameiro, Luís Oliveira and Henrique Oliveira*
	A Reconfigurable Switched-Capacitor DC-DC Step-up Converter Integrated in 130 nm CMOS *João Gerhardt, Luís Oliveira and Henrique Oliveira*
	Speed Test and Cluster Analysis Processing Method of Hydraulic Mechanism in High-voltage Circuit-Breakers *Li Wang, Xudong Deng, Liangfeng Guo, Fan Jiang, Jia Chen, Jinsong Xie, Lijiang Chen, Chuan Liu and Xiaojun Yan*
	Analysis and Implementation of a Charge Pump DC-DC Converter *Marta Gameiro, Luís Oliveira and Henrique Oliveira*
Session Y2.2: Modelling and Localization	*Chair: José Fonseca*
	Multi-image Super-Resolution Algorithm Supported on Sentinel-2 Satellite Images Geolocation Error *Miguel Vaqueiro, José Manuel Fonseca, André Mora and Henrique Oliveira*
	Flight Control of Hybrid Drones Towards Enabling Parcel Relay Manoeuvres *Bruno Neves and Bruno Guerreiro*
	Sensorless Switched Reluctance Machine and Speed Control: A Study to Remove the Position Encoder at High-speed of Operation *Jonathan V. Costa and Paulo J. C. Branco*

13:00– 14:00	Lunch Break
14:00– 15:00	**Keynote 3** *"Trusting AI: helping AI make the right decisions and fighting the bad bias"* **Milos Manic**
15:00 – 15:10	Break

15:10 – 16:10 **Session Y3.1:** Power electronics	*Chair: João Murta Pina*
	A Multilevel Bidirectional Four-Port DC-DC Converter to Create a DC-Grid in Solid-State Transformers with Hybrid AC/DC Grids *Vitor Monteiro and Joao Afonso*
	A Bidirectional Multilevel DC-DC Converter Applied to a Bipolar DC Grid: Analysis of Operation under Fault Conditions *Cátia F. Oliveira, Vítor Monteiro and João L. Afonso*
	Wireless Power Transfer System Design and Implementation *Pedro Lopes, Pedro Costa and Sónia F. Pinto*
	Simulation analysis of a control system for a Solid-State Transformer *Mário Jorge Marques and Rui Araújo*
Session Y3.2: Systems Modelling and Decision	*Chair: José Barata*
	Constrained-optimization in a 3D bin packing realistic problem *Yamil Mateo Rodriguez, Juan Carlos Dueñas López and Javier Andión Jiménez*
	Online Model Generation for Scalable Predictive Process Monitoring *Pedro Rico, Félix Cuadrado and Juan C. Dueñas*
	A heuristic model to identify organizational collaborative critical success factors *Marco Nunes, Antonio Abreu, Jelena Bagnjuk and Vanessa D'Onofrio*
	Mathematical Modeling of the Interests of Social Network Users *Zhenisgul Rakhmetullina, Raushan Mukhamedova, Roza Mukasheva and Bolat Batyrkhanov*
16:10 – 16:20	Break
16:20– 16:50	**Closing Session & Awards**

Proceedings

Proceedings of YEF-ECE 2021, including the papers presented at the event, will be proposed to be published by IEEE and included in IEEE Xplore Digital Library.
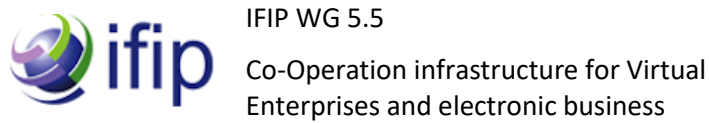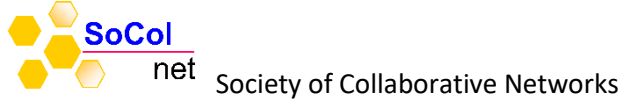
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Lisbon / London time zone

Wednesday – 7 Jul 2021

Time	Session
10:00	**Opening Session**
10:30	**Keynote 1**
11:30	
11:40	A1 — Collaborative Networks / A2 — Intelligent Decision Making I
12:40	

Time	Session
14:00	B1 — CPS and Digital Twins / B2 — Intelligent Decision Making II
15:00	
15:10	Horizontal session
16:10	Horizontal session
17:00	

Thursday – 8 Jul 2021

Time	Session
10:30	C1 — Smart Healthcare Systems / C2 — Communication and Electronics
11:50	
12:00	**Keynote 2**
13:00	

Time	Session
14:00	D1 — Classification Systems / D2 — Smart Energy management
15:00	
15:10	Panel — "My Research and Applied AI Systems"
17:00	

Friday – 9 Jul 2021

Time	Session
10:30	E1 — Smart Manufacturing / Opening YEF-ECE 2021 — Y1.1 YEF-ECE / Y1.2 YEF-ECE
11:50	
12:00	F1 — Medical devices I / Y2.1 YEF-ECE / Y2.2 YEF-ECE
13:00	

Time	Session
14:00	**Keynote 3**
15:00	
15:10	G1 — Medical devices II / Y3.1 YEF-ECE / Y3.2 YEF-ECE
16:10	
16:20	
16:50	**Closing Session & Awards**