

**Proceedings**

**2020 International Young  
Engineers Forum (YEF-ECE)**

Web event hosted by UNINOVA  
Portugal 3 July 2020

Sponsored by  
UNINOVA, Portugal  
Faculty of Science and Technology, Portugal  
Universidade NOVA de Lisboa, Portugal

Co-sponsored by  
The Institute of Electrical and Electronics Engineers (IEEE)  
IEEE Industrial Electronics Society (IES)

# **Proceedings**

# **2020 International Young Engineers Forum (YEF-ECE)**

Copyright and Reprint Permission: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923. For reprint or republication permission, email to IEEE Copyrights Manager at [pubs-permissions@ieee.org](mailto:pubs-permissions@ieee.org). All rights reserved. Copyright ©2020 by IEEE.

IEEE Part Number: CFP20K05-ART  
ISBN: 978-1-7281-5678-1

# Welcome to YEF—ECE 2020

On behalf of the Organization Committee of YEF-ECE 2020 it is our pleasure to welcome you to the fourth edition of the International Young Engineers Forum on Electrical and Computer Engineering. The Forum is organized by the Center of Technology and Systems (CTS) - UNINOVA, and Faculty of Sciences and Technology of NOVA University of Lisbon. The Conference is technically co-sponsored by the IEEE Industrial Electronics Society, and organized in association with DoCEIS 2020 – 11<sup>th</sup> Advanced Doctoral Conference on Computing, Electrical and Industrial Systems.

Electrical engineers apply electrical and electronic theories and methods to obtain solutions for problems related to the development, design and operation of electrical hardware and software, control systems, electrical machines and communication systems. Computer engineers are concerned with the design, development, and implementation of new and challenging computer technologies and solutions in a myriad of consumer, industrial, commercial, and military applications. All these areas are nowadays integrated in the so-called cyber-physical systems. Besides development, design, operation, 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, ranging from tiny electronic devices to large complex systems.

The International Young Engineers Forum looks for the latest contributions to systems development and innovative applications in electrical and computer engineering, dealing with systems' design and utilization, aiming at efficient devices and systems with appropriate control algorithms to meet the needs of business and industry in a global economy. This event is a unique opportunity for young engineers to connect with each other enabling experience's sharing and to become internationally involved.

Young engineers / graduating MSc students were encouraged to submit manuscripts with their latest innovative developments in Electrical and Computer Engineering, based on their MSc theses or early career projects. Each paper is jointly co-authored by a young engineer and his/her supervisor or mentor. The YEF-ECE International Program Committee reviewed all submitted full papers and

selected the best for presentation based on their innovative and original contribution to engineering solutions.

Unfortunately, due to the ongoing COVID-19 pandemic, the Forum, as well as many other Human activities, was also affected. All the uncertainties and concerns forced us to take some hard decisions in order to keep the Forum as close as possible to its original essence. All prospective Authors, Program Committee Members and Organization Team worked together to accomplish a high quality YEF-ECE 2020. The acceptance rate was 65%, with papers coming from six different countries. Although the Forum must take place remotely, via ZOOM platform, we are certain 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.

During this one-day event, the Forum offers one keynote presentation and 13 paper presentations. All accepted papers have been scheduled in inter-related oral sessions to allow a dynamic exchange of experiences among the researchers and a better understanding of the new concepts and presented ideas.

We would like to thank all authors, session chairs, and members of the International Program Committee, for their unconditional collaboration to make YEF-ECE 2020 an outstanding and unforgettable event.

We particularly would like to express our gratitude to the outstanding keynote speaker, Enrique Romero for adding significant scientific value to the event.

We hope that your participation in the YEF-ECE 2020 will be a rewarding experience and that you enjoy your stay in Costa de Caparica and Portugal.

Luís Camarinha-Matos and João Martins  
YEF-ECE 2020 Forum Co-Chairs