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IFIP is the global non-profit federation of societies of ICT professionals that aims at achieving a worldwide professional and socially responsible development and application of information and communication technologies.

IFIP is a non-profit-making organization, run almost solely by 2500 volunteers. It operates through a number of technical committees and working groups, which organize events and publications. IFIP's events range from large international open conferences to working conferences and local seminars.

The flagship event is the IFIP World Computer Congress, at which both invited and contributed papers are presented. Contributed papers are rigorously refereed and the rejection rate is high.

As with the Congress, participation in the open conferences is open to all and papers may be invited or submitted. Again, submitted papers are stringently refereed.

The working conferences are structured differently. They are usually run by a working group and attendance is generally smaller and occasionally by invitation only. Their purpose is to create an atmosphere conducive to innovation and development. Refereeing is also rigorous and papers are subjected to extensive group discussion.

Publications arising from IFIP events vary. The papers presented at the IFIP World Computer Congress and at open conferences are published as conference proceedings, while the results of the working conferences are often published as collections of selected and edited papers.

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Luis M. Camarinha-Matos ·
Pedro Ferreira · Guilherme Brito (Eds.)

Technological Innovation for Applied AI Systems

12th IFIP WG 5.5/SOCOLNET
Advanced Doctoral Conference on Computing,
Electrical and Industrial Systems, DoCEIS 2021
Costa de Caparica, Portugal, July 7–9, 2021
Proceedings

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Preface

This proceedings, which collects selected results produced in engineering doctoral programs, focuses on research and development in technological innovation for applied Artificial Intelligence systems. Artificial Intelligence (AI) is a branch of computer science for which purpose is to replicate human intelligence based on computational means. AI is shaping and rebuilding society's basic constructs - such as the economy, health, education, and lifestyle - and having an impact on people's lives through the implementation of intelligent algorithms in 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) can be applied to several knowledge areas, from electronics and energy to the biomedical field and industrial collaborative networks, providing impactful technological developments that can 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 12th Advanced Doctoral Conference on Computing, Electrical and Industrial Systems (DoCEIS 2021) aimed to provide a venue for the exchange and discussion of ideas and results from doctoral research in various inter-related areas of engineering, while promoting a strong multi-disciplinary dialog. Furthermore, the conference aimed to create collaborative opportunities for young researchers as well as an effective way of collecting valuable feedback from colleagues in a welcoming environment. As such, participants were challenged to look beyond the specific technical aspects of their research question and relate their work to the selected theme of the conference, namely, to identify in which ways their research topics can contribute to the technological innovation in applied AI systems. Furthermore, current trends in strategic research programs point to the fundamental role of multi-disciplinary and interdisciplinary approaches in innovation. More and more funding agencies are including this element as a key requirement in their research agendas. In this context, the challenge proposed by DoCEIS 2021 contributed to the process of acquiring such skills, which are becoming essential in the research profession [1].

DoCEIS 2021, which was sponsored by SOCOLNET, IFIP, and IEEE IES, attracted a good number of paper submissions from a good number of PhD students and their supervisors from 16 countries. This book comprises the works selected by the International Program Committee for inclusion in the main program and covers a wide

spectrum of application domains. As such, research results and on-going work are presented, illustrated, and discussed in areas such as

- Collaborative Networks
- Smart Manufacturing
- Cyber-Physical Systems and Digital Twins
- Intelligent Decision Making
- Smart Energy Management
- Communications and Electronics
- Classification Systems
- Smart Healthcare Systems
- Medical Devices

We hope that this collection of papers will provide readers with an inspiring set of new ideas and challenges, presented in a multi-disciplinary context, and that by their diversity these results can trigger and motivate richer research and development directions.

We would like to thank all the authors for their contributions. We also appreciate the efforts and dedication of the DoCEIS International Program Committee members, who both helped with the selection of articles and contributed valuable comments to improve the quality of papers.

April 2021

Luis M. Camarinha-Matos
Pedro Ferreira
Guilherme Brito

Reference

1. L. M. Camarinha-Matos, J. Goes, L. Gomes, P. Pereira (2020). Soft and Transferable Skills Acquisition through Organizing a Doctoral Conference. *Education Sciences* 10(9), 235. DOI: <https://doi.org/10.3390/educsci10090235>

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12th IFIP/SOCOLNET Advanced Doctoral
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