



Delft University of Technology

Foreword - Proceedings 6th IFAC Conference on Intelligent Control and Automation Sciences, ICONS 2022

Kocijan, Jus; Babuska, Robert; Guelton, Kevin; Lendek, Zsófia; Busoniu, Lucian

DOI

[10.1016/S2405-8963\(22\)01048-5](https://doi.org/10.1016/S2405-8963(22)01048-5)

Publication date

2022

Document Version

Final published version

Published in

IFAC-PapersOnline

Citation (APA)

Kocijan, J., Babuska, R., Guelton, K., Lendek, Z., & Busoniu, L. (2022). Foreword - Proceedings 6th IFAC Conference on Intelligent Control and Automation Sciences, ICONS 2022. *IFAC-PapersOnline*, 55(15), VI-VII. [https://doi.org/10.1016/S2405-8963\(22\)01048-5](https://doi.org/10.1016/S2405-8963(22)01048-5)

Important note

To cite this publication, please use the final published version (if applicable). Please check the document version above.

Copyright

Other than for strictly personal use, it is not permitted to download, forward or distribute the text or part of it, without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license such as Creative Commons.

Takedown policy

Please contact us and provide details if you believe this document breaches copyrights. We will remove access to the work immediately and investigate your claim.

International Federation of Automatic Control

6th IFAC Conference on Intelligent Control and Automation Sciences ICONS 2022

Cluj-Napoca, Romania, 13–15 July 2022

PROCEEDINGS

Edited by

Juš Kocijan

Jožef Stefan Institute, Ljubljana

University of Nova Gorica, Nova Gorica

Kevin Guelton

Université de Reims Champagne-Ardenne, CReSTIC



ELSEVIER

Copyright © 2022 the authors.
Open access publication under the CC-BY-NC-ND License
(<https://creativecommons.org/licenses/by-nc-nd/4.0/>)

IFAC PapersOnline — ISSN 2405-8963

Published by:
International Federation of Automatic Control (IFAC)
Hosting by Elsevier Ltd.

Available online at
www.sciencedirect.com

Publication date
July 2022

Copyright conditions

All publication material submitted for presentation at an IFAC-sponsored meeting (Congress, Symposium, Conference, Workshop) must be original and hence cannot be already published, nor can it be under review elsewhere. The authors take responsibility for the material that has been submitted. IFAC-sponsored conferences will abide by the highest standard of ethical behavior in the review process as explained on the Elsevier webpage (<https://www.elsevier.com/authors/journal-authors/policies-and-ethics>), and the authors will abide by the IFAC publication ethics guidelines (<https://www.ifac-control.org/events/organizers-guide/PublicationEthicsGuidelines.pdf/view>).

Accepted papers that have been presented at an IFAC meeting will be published in the proceedings of the event using the open-access IFAC-PapersOnLine series hosted on [ScienceDirect](https://www.sciencedirect.com) (<https://www.sciencedirect.com/>). To this end, the author(s) must grant exclusive publishing rights to IFAC under a Creative Commons license when they submit the final version of the paper. The copyright belongs to the authors, who have the right to share the paper in the same terms allowed by the end user license, and retain all patent, trademark and other intellectual property rights (including research data).

(<https://www.ifac-control.org/publications/copyright-conditions>).

6th IFAC Conference on Intelligent Control and Automation Sciences – ICONS 2022

Sponsored by

International Federation of Automatic Control (IFAC)

- IFAC Technical Committee on Computational Intelligence in Control, TC 3.2

Co-Sponsored by

- IFAC TC 1.2. Adaptive and Learning Systems
- IFAC TC 3.3. Telematics: Control via Communication Networks
- IFAC TC 4.3. Robotics
- IFAC TC 4.5. Human Machine Systems
- IFAC TC 5.1. Manufacturing Plant Control
- IFAC TC 6.4. Fault Detection, Supervision & Safety of Technological Processes (SAFEPROCESS)
- IFAC TC 7.5. Intelligent Autonomous Vehicles
- IFAC TC 8.2. Biological and Medical Systems

Organized by

- Technical University of Cluj-Napoca, Romania

International Programme Committee

Robert Babuška (NL), Chair
Kevin Guelton (FR), Vice-chair and co-editor
Gian Antonio Susto (IT), Vice-chair from industry
Juš Kocijan (SL), Editor

IPC Members

Laurent Arcese
Miguel Bernal
Saso Blazic
Shubhendu Bhasin
Catalin Buiu
Bing Chu
Thomas Desaive
Eva Henrietta Dulf
Ioan Dumitrache
Mehmet Onder Efe
Sarangapani Jagannathan
Jiri Kubalik
Tufan Kumbasar
Ivan Petrovic

Benoit Marx
Sean Francis McLoone
Nadhir Messai
Radu-Emil Precup
Antonio Ruano
Vicenc Puig
Antonio Sala
Dan Selisteanu
Florin Stoican
Stefan Sosnowski
Gian Antonio Susto
Domagoj Tolic
Hao Xu
Jianhua Zhang

National Organizing Committee

Zsófia Lendek (RO), Chair
Lucian Buşoniu (RO), Co-chair
Frank Wolf (DE), Industry vice-chair
Teodora Sanislav, registration chair
Tassos Natsakis, communication chair
Paula Raica
Szilárd Enyedi

IFAC-PapersOnline Editorial Board

Editor-in-Chief

Juan A. de la Puente
Universidad Politécnica de Madrid
Spain

Deputy Editor-in-Chief

José-Luis Díez
Universitat Politècnica de Valencia
Spain

Advisor

Carlos Eduardo Pereira
Universidade Federal de
Rio Grande do Sul, Brazil

Editors

Systems and Signals

Hideaki Ishii
Tokyo Inst. of Technology, Japan

Design Methods

Laura Menini
Università di Roma "Tor Vergata",
Italy

Computer, Cognition and Communication

Thierry Marie Guerra
Université de Valenciennes et
Hainaut-Cambrésis, France

Mechatronics, Robotics and Components

Andreas Kugi
TU Wien, Austria

Cyber-Physical Manufacturing Enterprises

Benoit Iung
CRAN, France

Process and Power Systems

Jay H. Lee
KAIST, Republic of Korea

Transportation and Vehicle Systems

Lars Eriksson
Linköping University, Sweden

Bio & Ecological Systems

Ronald van Nooijen
TU Delft, Netherlands

Social Systems

Lawrence (Larry) Stapleton
Waterford Institute of Technology,
Ireland

Associate Editors

Alessandro Chiuso
Università di Padova, Italy

Tiago Roux Oliveira
Universidade Federal do Rio de
Janeiro, Brazil

Carla Seatzu
Università degli Studi di Cagliari

Yilin Mo
Tsinghua University, China

Maurice Heemels
TU Eindhoven, Netherlands

Sergio Galeani
Università di Roma Tor Vergata,
Italy

Silviu-Iulian Niculescu
CNRS-CentraleSupélec, France

Christophe Priour
Gipsa-lab Grenoble, France

Erik Kerrigan
Imperial College, United Kingdom

Mario Sznajder
Northeastern University, USA

Yann Le Gorrec
ENSMM, France

Birgit Vogel-Heuser
TU München, Germany

Kevin Guelton
Université de Reims, France

Lei Ma
Southwest Jiaotong University,
China

Tsu-Chin Tsao
UCLA, USA

Ivan Petrovic
University of Zagreb, Croatia

Jianhua Zhang
East China University of Science
and Technology, China

Marco Macchi
Politecnico di Milano, Italy

Dmitry Ivanov
Hochschule für Wirtschaft &
Recht Berlin, Germany

Georg Weichhart
PROFACTOR GmbH, Austria

Wei Ren
University of California, Riverside
USA

Rolf Findeisen
Otto-von-Guericke-University
Magdeburg, Germany

Chris Aldrich
Curtin University, Australia

Yrjö Majanne
Tampere University, Finland

Vicenç Puig
Universitat Politècnica de
Catalunya, Spain

Per Tunestal
Lund Institute of Technology,
Sweden

Roberto Galeazzi
Technical University of Denmark

Antonios Tsourdos
Cranfield University,
United Kingdom

Tankut Acarman
Galatasaray Üniversitesi, Turkey

Zdzisław Kowalczyk
Politechnika Gdańska, Poland

Manoj Karkee
Washington State University
USA

Thomas Desaive
University of Liege, Belgium

Marialisa Volta
Università di Brescia, Italy

Alejandro Vargas Casillas
UNAM, Mexico

Fei-Yue Wang
Chinese Academy of Sciences,
China

Mariana Netto
Université Gustave Eiffel, France

Qing-Shan (Samuel) Jia
Tsinghua University, China

Antonio Visioli
Università di Brescia, Italy

Peter Kopacek
TU Vienna, Austria

FOREWORD

The IFAC International Conference on Intelligent Control and Automation Sciences (ICONS) is the flagship triennial conference series of the IFAC Technical Committee on Computational Intelligence in Control (TC3.2). It is recognized as one of the major scientific events in the field of Intelligent Control, where recent theoretical advances, breakthrough cross-disciplinary researches, industry and society applications are discussed and disseminated.

After Faro (Portugal) in 2003, Istanbul (Turkey) in 2009, Chengdu (China) in 2013, Reims (France) in 2016 and Belfast (Northern Ireland) in 2019, the 6th IFAC International Conference on Intelligent Control and Automation Sciences (ICONS 2022) has been organized by the Technical University of Cluj-Napoca (Romania) on July 13-15, 2022.

Mainly sponsored by the IFAC TC3.2, the ICONS 2022 edition was also co-sponsored by TC1.2 on Adaptive and Learning System, TC3.3 on Telematics: Control via Communication Networks, TC4.3 on Robotics, TC 4.5 on Human Machine Systems, TC 5.1 on Manufacturing Plant Control, TC 6.4 on Fault Detection, Supervision & Safety of Technological Processes, TC 7.5 on Intelligent Autonomous Vehicles and TC 8.2 on Biological and Medical Systems.

Because of the uncertainties brought by the COVID-19 pandemic and to mitigate concerns about the conflict in Ukraine (Romania's neighboring country), a survey among the authors of accepted papers and invited speakers has been made to decide whether to hold ICONS 2022 in person in Cluj-Napoca, or to make it hybrid or online. Following the results of this survey, the ICONS 2022 edition has been held online. Despite this special context and acknowledging that most of 2020 and 2021 IFAC events have been postponed to 2022, which led to a much stronger competition for papers than would normally be expected, we received 5 Open Invited Track proposals and 43 initial papers submissions, with authors from 26 different countries. Among these submissions, 2 Open Invited Tracks were retained, 31 papers were accepted to be published in the present IFAC-PapersOnLine volume, and 1 extended abstract was accepted to be presented during the conference. In addition, two panel sessions were organized. The first one by Prof. Gian-Antonio Susto, TC3.2 Vice-chair on Industry, entitled "Intelligent Control, Automation, and AI: The Industry Perspective", and the second one by Prof. Jimmy Lauber, TC3.2 Vice-chair on Education, on the topic "Learning with Fun". Moreover, three renowned speakers graced us with their inspiring plenary lectures. The first, given by Prof. Kazuo Tanaka (University of Electro-Communications, Tokyo, Japan), recipient of the IEEE CIS Fuzzy Systems Pioneer Award in 2021 (among others), was entitled "Recent Advances in Polynomial Fuzzy Systems Control: A Sum-of-Squares Design Framework". The second, "From Reinforcement Learning to AI", was given by Prof. Doina Precup (DeepMind and McGill University, Canada). Finally, Prof. Hajime Asama (University of Tokyo, Japan), IFAC President for the 2020-2023 triennium, inspired us with his talk entitled "Robot Technology for Disaster Prevention & Response and its Societal Dissemination". The success of the conference is also attested by the number of attendees (96 unique persons).

To stimulate the involvement of young scientists and engineers in IFAC, as well as to recognize top-level contributions of the younger generation in our field and to support their careers, IFAC stimulated a Young Author Award at every IFAC symposium and conference. We received 6 nominations and 3 finalists were selected by the ICONS 2022 Award Committee: James Oubre for his paper entitled "Towards a Fully Autonomous Robotic System for Detection and Removal of Surface Defects in Fiber Glass Panels", Antonios Georgantas for his paper entitled "Highway Traffic Control with Ramp Metering Utilizing Variational Autoencoders", and Bálint Szabó for the paper entitled "Comparison of Gated Recurrent Unit vs. Mixture Density Network in Insulin Sensitivity Prediction". We would like to congratulate all of them, and especially Antonios Georgantas, who finally received the IFAC Young Author Award at ICONS 2022.

We are extremely grateful to all authors, invited speakers, panelists, IPC members and conference organizers, who managed to maintain the high standard of the conference, making ICONS 2022 a success. We hope the readers will find, like us, many sources of inspiration in these proceedings for their future works. We are confident that, in view of the enthusiasm of the participants and the dynamism of our scientific community, we can meet again in the near future at the next IFAC events.

Juš Kocijan, *Editor,*
Jožef Stefan Institute, Slovenia

Kevin Guelton, *IPC co-chair and co-editor,*
Université de Reims Champagne-Ardenne, France

Robert Babuska, *IPC chair,*
Delft University of Technology, The Netherlands

Zsófia Lendek and Lucian Busoniu, *NOC Chairs,*
Technical University of Cluj-Napoca, Romania