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International Federation of Automatic Control

# 6<sup>th</sup> IFAC Conference on Intelligent Control and Automation Sciences ICONS 2022

Cluj-Napoca, Romania, 13–15 July 2022

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# 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 6<sup>th</sup> 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.

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