future internet

MDPI

Editorial

Recent Advances in Internet of Things and Cyber-Physical Systems

Iwona Grobelna

Institute of Automatic Control, Electronics and Electrical Engineering, University of Zielona Góra, 65-516 Zielona Góra, Poland; i.grobelna@iee.uz.zgora.pl

1. Introduction

Rapid technological advancement has significantly accelerated the development of intelligent and interconnected systems. In particular, the growing adoption of the Internet of Things (IoT) has become a key driver of digital transformation, enabling enterprises to enhance their adaptability and readiness for future challenges. At the same time, cyber-physical systems (CPSs) play a crucial role by tightly integrating sensing, computation, control, and communication within physical processes, effectively bridging the gap between the digital and physical worlds. This convergence introduces a wide range of research challenges spanning hardware, software, and their interaction.

Building on the success of the previous (first) edition [1], this Special Issue aims to further explore interdisciplinary advances in IoT and CPS. It involves high-quality contributions addressing both fundamental theoretical developments and practical implementations. The included papers highlight some of the emerging challenges and opportunities associated with the integration of advanced technologies in human–machine systems, IoT networks, and intelligent cyber–physical environments. They collectively emphasize the role of artificial intelligence, machine learning, and novel architectural approaches in enhancing system performance, interoperability, and decision-making capabilities, while also addressing issues related to safety, security, and real-world applicability.

2. Contributions

Mourtzis, Angelopoulos, and Panopoulos [2] provide a literature review on Human–Machine Interface (HMI) in Society 5.0. Their article identifies the capabilities and distinguishing characteristics of both humans and machines. It lays the groundwork for improving human–machine interaction. The authors use the notion of "Humachine" to refer to the integration of humans and machines, using the strengths of both to enhance their overall capabilities. The role of artificial intelligence (AI) is emphasized as a tool for mitigating inherent limitations. The authors argue that decision-making processes with significant societal impact should remain under human control, and that responsible use of AI is essential to avoid potential misuse and negative consequences.

Bocciarelli and D'Ambrogio [3] propose a TOSCA-based conceptual architecture to support the federation of heterogeneous MSaaS (Modeling & Simulation-as-a-Service) infrastructures. It is used for identifying building blocks and relevant capabilities that a concrete MSaaS infrastructure architecture should provide to effectively deal with federations. The role of TOSCA is evaluated as a valuable standard to foster modeling and simulation service interoperability and portability. Some experimental results are presented based on a maritime defense scenario.

Check for updates

Received: 2 April 2026
Accepted: 2 April 2026
Published: 3 April 2026

Copyright: © 2026 by the author. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license.

Lancelot, Rimal, and Dennis [4] evaluate performance of a lane correction module stress test and present field test results for a Tesla Model 3. The authors present a methodology for systematic data collection, which enabled the identification of a critical error in the lane correction module. The study highlights the importance of analyzing the interaction between the human operator and the vehicle within a cyber-physical context, emphasizing both safety and security aspects. The results underline the necessity of rigorous post-production testing of automotive software and hardware to ensure reliable system performance.

Karras et al. [5] introduce a set of TinyML (Tiny Machine Learning) algorithms designed and developed to improve Big Data management in large-scale IoT systems. They enable efficient processing and intelligent decision making directly on IoT devices, reducing the reliance on central systems and minimizing data transmission needs. The proposed algorithms operate together to enhance data processing, storage, and quality control in IoT networks, although their individual roles and performance characteristics differ depending on the specific application context.

Garg, Kumar, and Mahanti [6] propose an intelligent mitigation technique for IoT botnets, named IMTIBoT. The approach leverages stacked ensemble classifiers to create a robust intelligent system, which was evaluated on an experimental testbed of IoT nodes and sensors. The distinguishing classifier models for classification and regression tasks were implemented to predict model performance. A comparative evaluation of the classifiers across multiple performance metrics demonstrates that the proposed ensemble learning approach outperforms individual classifiers such as KNN, CNN, RF, DT, and ANN.

Acknowledgments: The guest editor wishes to thank all the contributing authors, the professional reviewers for their precious help with the review assignments, and the excellent editorial support from the *Future Internet* journal at every stage of the publication process of this Special Issue.

Conflicts of Interest: The author declares no conflict of interest.

References

1. Grobelna, I. Internet of Things and Cyber–Physical Systems. *Future Internet* **2022**, *14*, 337. [CrossRef]
2. Mourtzis, D.; Angelopoulos, J.; Panopoulos, N. The Future of the Human–Machine Interface (HMI) in Society 5.0. *Future Internet* **2023**, *15*, 162. [CrossRef]
3. Bocciarelli, P.; D'Ambrogio, A. A TOSCA-Based Conceptual Architecture to Support the Federation of Heterogeneous MSaaS Infrastructures. *Future Internet* **2023**, *15*, 48. [CrossRef]
4. Lancelot, J.; Rimal, B.P.; Dennis, E.M. Performance Evaluation of a Lane Correction Module Stress Test: A Field Test of Tesla Model 3. *Future Internet* **2023**, *15*, 138. [CrossRef]
5. Karras, A.; Giannaros, A.; Karras, C.; Theodorakopoulos, L.; Mammassis, C.S.; Krimpas, G.A.; Sioutas, S. TinyML Algorithms for Big Data Management in Large-Scale IoT Systems. *Future Internet* **2024**, *16*, 42. [CrossRef]
6. Garg, U.; Kumar, S.; Mahanti, A. IMTIBOT: An Intelligent Mitigation Technique for IoT Botnets. *Future Internet* **2024**, *16*, 212. [CrossRef]

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.