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Editors

Advances in Digital Health and Medical Bioengineering II

Volume 1 - Medical Devices, Measurements, and Artificial Intelligence Applications

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ISSN 1680-0737
ISBN 978-3-032-24723-0
Number of Pages XXXVIII, 966

E-ISSN 1433-9277 (electronic)
ISBN 978-3-032-24724-7 (eBook)

Part of the book series: IFMBE Proceedings (IFMBE, volume 142)
https://link.springer.com/book/9783032247230

This Springer imprint is published by the registered company Springer Nature Switzerland AG The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland.

PREFACE

The three volumes of Advances in Digital Health and Medical Bioengineering, part II, gathers all accepted and presented papers at the 13th International Conference on E-Health and Bioengineering, EHB-2025, November 13–14, 2025, Iași, Romania (www.ehbconference.ro).

This hybrid conference was organized by the Grigore T. Popa University of Medicine and Pharmacy of Iași / Faculty of Medical Bioengineering, International Society for Digital Health and Education, and co-organized by the Institute of Computer Science of Romanian Academy - Iasi Branch. The conference was mainly dedicated to the e-health systems, medical bioengineering and biomedical engineering, but also addresses related fields. Its specific aim and objectives are to promote concepts and advanced hardware and software technologies in the emerging domains of e-health, medical devices and instrumentation, biosignal and image processing, medical informatics, artificial intelligence in healthcare, biomechatronics, biomaterials, biotechnologies, medical physics, healthcare management, teaching and (e)learning, rehabilitative and assistive technologies, environmental protection, food technologies, as well as in some younger disciplines such as bioinformatics, and systems biology. Thus, EHB 2025 was an international forum for fundamental and applied research and applications in bioengineering and biomedical engineering. EHB 2025 brought together researchers from academic and research institutions, leading industrial companies, and government laboratories worldwide to promote and popularize the scientific fundamentals and applications of digital health and bioengineering.

The conference motto was *Innovation for a better healthcare*, and we have to stress that the ultimate goal of medical systems, we mean a better quality of life, from medical and social points of view, cannot be achieved without an efficient use of information and management systems and of biomedical technology.

The EHB Conference is the largest medical bioengineering conference in Romania and Eastern Europe. This year it received 478 submissions from 51 countries across six continents. Following a rigorous double-blind, two-round peer-review process, authors revised their papers based on reviewers' feedback, resulting in an acceptance rate of about 61%. We sincerely thank the authors, conference committee members, session chairs, and especially the reviewers—without their dedication, this conference and book would not be possible. Extended versions of selected best papers will be published in Advances in Electrical and Computer Engineering, Revue Roumaine des Sciences Techniques, Série Électrotechnique et Énergétique, and special issues of Sensors and Applied Sciences (MDPI). Special thanks are also due to our honorary chair, Prof. Constantinos Pattichis (University of Cyprus), and to all committee members and external reviewers for their expertise and support.

Also, thank you very much to the plenary speakers: Prof. Radu-Emil Precup (Politehnica University of Timișoara, Romania), Omneya Attallah (Arab Academy for Science, Technology, and Maritime Transport, Alexandria, Egypt), Martin Rožánek (Czech Technical University in Prague, Czech Republic), and Carlo Ricciardi (University of Naples Federico II, Italy) for sharing their knowledge, expertise and experience. We appreciate very much the implication of the young researchers as authors, and the partnership with IFMBE, Springer Nature, EasyChair, iThenticate plagiarism verification, and with our sponsor (Applied Sciences journal, MDPI) for their essential support during the preparation of EHB 2025 and this book.

The book **Advances in Digital Health and Medical Bioengineering II**, published by Springer Nature, is structured in three volumes that cover the major scientific disciplines in digital health and medical bioengineering.

- **Volume 1: Medical Devices, Measurements, and Artificial Intelligence Applications** presents state-of-the-art research on medical devices and measurement technologies, together with advanced artificial intelligence methods for healthcare research and practice.
- **Volume 2: Health Technology Assessment, Biomedical Signal Processing, Medicine and Informatics** brings together contributions focused on the evaluation and optimization of health technologies, advanced biomedical signal processing methods, and modern medical informatics solutions.
- **Volume 3: Telemedicine, Biomaterials, Environmental Protection, Medical Imaging, and Biomechanics** presents interdisciplinary research spanning remote and technology-assisted healthcare, biomaterials and biotechnologies for medical applications.

This volume, *Medical Devices, Measurements, and Artificial Intelligence Applications*, comprises 63 chapters, organized into two thematic sections.

One section focuses on recent developments in ***Medical Devices and Measurements*** technologies and includes 21 contributions covering a broad range of topics in these fields. The studies present novel, practical, and innovative medical devices, advanced instrumentation setups, and solutions for measuring and monitoring physiological parameters aimed at supporting the treatment of various diseases. Additional application areas include neuromotor rehabilitation, assistive technologies, and educational tools for supporting autism therapy. The section also explores specialized systems for digital biomarkers, timely medication dispensing, energy harvesting through flywheel kinetic energy for powering electronic devices, additive manufacturing approaches, and modern healthcare system architectures.

The second section gathers 42 chapters dedicated to ***Artificial Intelligence Applications*** in healthcare. A significant number of studies focus on decision support systems for medical diagnosis and prognosis, highlighting the growing role of AI in clinical decision-making. Further research addresses medical data security, healthcare management, and a broad spectrum of machine learning and deep learning applications tailored to medical use cases. Hospital informatics is also extensively covered, alongside contributions on modern bioinformatics technologies for healthcare. The section is further enriched by studies on AI-supported learning processes and by analyses of ethical issues in medicine, offering a balanced perspective on both technological advances and their societal implications.

January 2026

Hariton-Nicolae Costin
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Gabriela- Gladiola Petroiu

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