INVITED SPEAKERS

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University of Lyon
France

Anna Maria M. Bianchi
Politecnico di Milano
Italy

Robert Turner
Max Planck Institute for Human Cognitive and Brain Sciences
United Kingdom

Juan C. Augusto
Faculty of Science and Technology, Middlesex University
United Kingdom

SPECIAL SESSION CHAIRS

SPECIAL SESSION ON EUROPEAN REGULATIONS FOR MEDICAL DEVICES: WHAT ARE THE LESSONS LEARNED AFTER 1 YEAR OF IMPLEMENTATION?

Sylvia Pelayo, Tech4Health/F-CRIN, France

Thierry Chevallier, BESPIIM, CHU Nimes, France

Norbert Noury, University of Lyon, France
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Special Session on European Regulations for Medical Devices: What Are the Lessons Learned after 1 Year of Implementation?

Thierry Chevallier, CHU Nîmes, France
Norbert Noury, University of Lyon, France
Thomas Lihoreau, CHU Besançon, INSERM CIC 1431, Centre d’Investigation Clinique, France
Sylvia Pelayo, Tech4Health/F-CRIN, France

Selected Papers Book

A number of selected papers presented at BIOSTEC 2024 will be published by Springer in a CCIS Series book. This selection will be done by the Conference Co-chairs and Program Co-chairs, among the papers actually presented at the conference, based on a rigorous review by the BIOSTEC 2024 Program Committee members.
FOREWORD

This book contains the proceedings of the 17th International Joint Conference on Biomedical Engineering Systems and Technologies (BIOSTEC 2024). This conference is sponsored by the Institute for Systems and Technologies of Information, Control and Communication (INSTICC) and technically co-sponsored by the IEEE SMC - TC on Cyber-Medical Systems. It is also held in cooperation with the ACM Special Interest Group on Artificial Intelligence (ACM SIGAI), the Association for the Advancement of Artificial Intelligence (AAAI), the European Association for Signal Processing (EURASIP), the European Alliance for Medical and Biological Engineering and Science (EAMBES), the Finnish Society for Medical Physics and Medical Engineering (FSMPME), the Swiss Society for Biomedical Engineering (SSBE) and the Société Française du Génie Biologique et Médical (SFGBM). The 17th BOSTEC 2024 was held in Rome, Italy, from 21 to 23 February. The purpose of BOSTEC is to bring together researchers, professionals and practitioners interested in both theoretical advances and applications of information systems, artificial intelligence, signal processing, electronics, and other engineering implementations in knowledge areas related to biology and medicine.

BOSTEC is composed of five complementary and co-located conferences, each specialized in at least one of the aforementioned main knowledge areas:

- International Conference on Biomedical Electronics and Devices – BDEVICES;
- International Conference on Bioimaging – BIOIMAGING;
- International Conference on Bioinformatics Models, Methods and Algorithms – BIOINFORMATICS;
- International Conference on Bio-inspired Systems and Signal Processing – BIOSIGNALS;
- International Conference on Health Informatics – HEALTHINF.

The purpose of the International Conference on Biomedical Electronics and Devices (BDEVICES) is to bring together researchers, professionals and practitioners from electronics, mechanical engineering, physics, and related areas who are interested in developing, studying and using innovative materials, devices and systems inspired by biological systems and/or addressing biomedical requirements. Monitoring and diagnostics devices, sensors, and instrumentation systems, biorobotics and prosthetics, micro-nanotechnologies including microfluidics systems and biomaterials are some of the technologies addressed at this conference. The fabrication and evaluation of biodevices, including wearable and implantable devices is also addressed.

The International Conference on Bioimaging (BIOIMAGING) covers the complex chain of acquiring, processing, and visualizing structural or functional images of living objects or systems, including extraction and processing of image-related information. Examples of image modalities used in bioimaging are many, including (but not limited to): X-ray, CT, MRI and fMRI, PET and HRRT PET, SPECT, MEG and so on. Medical imaging and microscope/fluorescence image processing are important parts of bioimaging referring to the techniques and processes used to create images of the human body, anatomical areas, tissues, and so on, down to the molecular level, for clinical purposes, seeking to reveal, diagnose, or examine diseases, or medical science, including the study of normal anatomy and physiology. Both classic image processing methods (e.g. denoising, segmentation, deconvolution and registration methods, feature recognition and classification) and modern machine, deep learning techniques represent an indispensable part of bioimaging, as well as related data analysis and statistical tools.

The International Conference on Bioinformatics Models, Methods and Algorithms (BIOINFORMATICS) aims to bring together researchers, professionals and practitioners interested in the design and application of modelling frameworks, algorithmic concepts, computational methods, and information technologies to address challenging problems in Bioinformatics and Biomedical research. There is a tremendous need to explore how mathematical, statistical and computational techniques can be used to better analyse, predict, and understand biological processes and systems. In the face of the massive amount of currently available
biological data, novel methodologies and tools are required. There is also a pressing need for integrative approaches and multi-omics novel approaches that can synthesize diverse data types and scales to uncover deeper insights into biological systems and processes. Areas of interest to this community include systems biology and biological networks (regulatory, neuronal, predator-prey, ecological ones, etc.), sequence analysis, biostatistics, graph models, image analysis, scientific data management and data mining, machine learning, pattern recognition, computational evolutionary biology, structural bioinformatics and structure prediction, computational genomics, transcriptomics and proteomics, and related areas.

The goal of the International Conference on Bio-inspired Systems and Signal Processing (BIOSIGNALS) is to bring together researchers, professionals and practitioners from multiple areas of expertise working at the intersection of engineering, mathematics, statistics, computer science, data science, biology and medicine, who design, develop and apply algorithmic tools, models and techniques to solve challenging problems in biology and medicine. A diversity of signal types can be found in this area, including video, audio, electrophysiological signals, medical imaging, and other biological sources of information. The analysis and use of the diverse types of data seem across these applications often requires cross-disciplinary expertise and collaborative efforts and this conference aims to be a high quality forum to celebrate many of these ongoing interactions and research efforts.

The International Conference on Health Informatics (HEALTHINF) aims to bring together researchers, professionals and practitioners interested in the specification, design, development and application of information and communication technologies (ICT) to healthcare and medicine in general and to the support of persons with special needs in particular. Big data, networking, graphical interfaces, data mining, machine learning, pattern recognition and intelligent decision support systems are just a few of the technologies and research areas currently contributing to medical informatics. Mobility and ubiquity in healthcare systems, physiological and behavioural modelling, standardization of health records, procedures, and technologies, certification, integration, scaling-up, privacy and security are some of the issues that medical informatics professionals and the ICT industry and research community in general are addressing to promote ICT in healthcare further. In the case of medical rehabilitation, assistive technologies, home monitoring, smart homes, research in and applications of ICT have contributed greatly to the enhancement of quality of life and full integration of all citizens into society.

The conference is also enriched by the satellite events organized with the conference, namely:

- Workshop on Emerging Business Models in Digital Health - Scale-IT-up 2024
- Special Session on European Regulations for Medical Devices: What Are the Lessons Learned after 1 Year of Implementation? - ClinMed 2024

The BIOSTEC includes a Doctoral Consortium on Biomedical Engineering Systems and Technologies that brought together Ph.D. students within the biomedical field to discuss their research in an international forum.

In 2024, BIOSTEC features four invited talks delivered by internationally distinguished speakers: Juan C. Augusto (Middlesex University, United Kingdom), Anna Maria M. Bianchi (Politecnico di Milano, Italy), Norbert Noury (University of Lyon, France) and Robert Turner (Max Planck Institute for Human Cognitive and Brain Sciences, Germany).

The BIOSTEC joint conference received 242 paper submissions, including special sessions and workshops from 43 countries in all continents, of which 26% were accepted as full papers. The submission’s high quality imposed difficult choices during the review process. To evaluate each submission, a double-blind paper review was performed by the Program Committee, whose members are highly qualified independent researchers in the five BIOSTEC Conferences’ topic areas.

As in previous editions of BIOSTEC, based on the reviewers’ evaluations and on the quality of the presentations, a short list of authors will be selected and invited to submit extended revised versions of their papers for a book that will be published by Springer with the best papers of BIOSTEC 2024. A short list of papers presented at the BIOSTEC will also be selected for publication of extended and revised versions in a special
We would like to express our thanks to all participants. First, to the authors, whose quality work is the essence of this joint conference. Next, we thank all the members of the program committee and the auxiliary reviewers for their diligence and expert reviewing. Also, we would like to deeply thank the invited speakers for their excellent contribution in sharing their knowledge and vision. Finally, we gratefully acknowledge the professional support of the INSTICC team for all organizational processes, especially given the need to introduce online streaming, forum management, direct messaging facilitation and other web-based activities in order to make it possible for authors to present their work and share ideas with colleagues in spite of the logistic difficulties. We hope that the papers accepted and included in the proceedings will be helpful references in future works for all those who need to address topics in any of the BIOSTEC knowledge areas.

We wish you all an inspiring conference and we hope to meet you next year for BIOSTEC 2025, details of which will soon be available at https://biostec.scitevents.org/.

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