

# Preface

We proudly present the Proceedings of the 20th Polish Conference on Biocybernetics and Biomedical Engineering, which will be held in Krakow from September 20 to 22, 2017. The conference was organized by the Committee of Biocybernetics and Biomedical Engineering of the Polish Academy of Sciences and the Polish Society of Biomedical Engineering and hosted by the AGH University of Science and Technology. The biannual meetings of the Polish Conference on Biocybernetics and Biomedical Engineering have been held for nearly four decades and attract scientists and professionals from the fields of engineering, medicine, physics, and computer science. After 30 years, this prestigious event returned to AGH University of Science and Technology and, thanks to English as the working language and an International Program Committee, opened to the scientists from the entire world. The 20th PCBBE was a great opportunity for an exchange of ideas and presentation of the latest developments in all areas within the field of biomedical engineering including biomedical signal processing, imaging and image processing, biosensors and bioinstrumentation, biomicro-/nanotechnologies, biomaterials, biomechanics, robotics and minimally invasive surgery, cybernetics, biomimetic and modeling of biological systems, neural and rehabilitation engineering, artificial organs, molecular, cellular and tissue engineering, bioinformatics and computational biology, clinical engineering and health technology assessment, health informatics, e-health and telemedicine and biomedical engineering education.

The conference attracted a total of 104 submissions, and after the refereeing process, only 27 were accepted for publication in this volume. Here, we would like to thank our participants, invited speakers, and reviewers for their scientific and personal contributions to the conference. In this Proceedings volume, the accepted papers are organized in five chapters concerning:

- signal processing,
- medical image analysis methods and applications,
- cell and tissue engineering,
- modeling in medicine and many others.

Aiming at high scientific merit of the meeting and international recognition of the Proceedings, all submissions are subjected to a thorough peer review process (three to four independent reviews per paper) and only those with a consistent and strong recommendation from reviewers have been accepted. We believe that this book will become a great reference tool for scientists working in the area of biocybernetics and biomedical engineering. The readers are kindly encouraged to contact the corresponding authors for further details of their research.

Many thanks and much appreciation are due to the peer reviewers from Belgium, Czech Republic, France, Germany, Hungary, Italy, Latvia, Poland, Portugal, and Slovakia, who have greatly contributed to a critical selection of the best papers and whose remarks and suggestions have helped the authors considerably improve the quality of the papers.

The 20th Polish Conference on Biocybernetics and Biomedical Engineering was an outstanding event thanks to the remarkable keynote speeches given by distinguished guest lecturers:

Prof. Metin Akay (USA),  
 Prof. n. med. Leszek Królicki (Poland),  
 Prof. Adam Liebert (Poland).

The scientific program of the conference was organized in plenary lectures, regular domain-oriented oral sessions, and poster sessions. Besides the topics traditionally covered by the conference (e.g., biomaterials, biosignal processing, modeling, cybernetics, artificial organs, imaging, sensors, e-health, telemedicine, rehabilitation engineering), we enjoyed five special sessions:

- Award nomination and presentation session for laureates of the Polish Society of Biomedical Engineering competition for the best BME Master’s Thesis,
- Education and certification system for clinical engineers,
- Celebration of 70th birthday of Professor Ryszard Tadeusiewicz—one of the founding fathers of biocybernetics and biomedical engineering in Poland—with personal recollections from his colleagues,
- Work in progress—review of the best ongoing research projects, and
- Turning the idea into a commercial product—session on innovation, start-up initiatives, and support.

The conference was technically sponsored by Polish Chapter IEEE Signal Processing Society and was granted by the honorary patronage of His Magnificence Rector of AGH University of Science and Technology.

Finally, we would like to thank members of Local Organizing Committee in Krakow: Piotr Augustyniak (Chairman), Andrzej Izworski, Anna Broniec, Mirosława Długosz, Joanna Grabska-Chrzastowska, Daria Hemmerling, Katarzyna Heryan, Joanna Jaworek-Korjakowska, Aleksandra Jung, Elias Kańtoch,

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Piotr Augustyniak  
Roman Maniewski  
Ryszard Tadeusiewicz

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