

## PREFACE

This book contains papers focusing on the implementation of new and innovative technologies which were presented at the 12th annual Days of BHAAAS in Bosnia and Herzegovina - International Symposium on Innovative and Interdisciplinary Applications of Advanced Technologies (IAT) 2021 in Mostar, Bosnia and Herzegovina, June 24-27, 2021. The symposium covered an extensive variety of disciplines and innovative technologies in Information and Communication Technologies, Advanced Electrical Power Systems, Computer Science, Mechanical Engineering, Civil Engineering, Geodesy and Geoinformatics, Computer Modelling, and Simulation for Engineering Applications, Trends, and Innovation in Geographic Information Systems and Sustainable Urban Development: Designing Smart, Inclusive and Resilient Cities.

Days of BHAAAS is a unique conference with a long tradition where prominent experts in a variety of special sessions present their research and new developments. The International Symposium on Innovative and Interdisciplinary Applications of Advanced Technologies was an international forum that allowed these experts to share their work with scientists, engineers, and students. The conference provided an opportunity for researchers, academics, scientists, and engineers to present their research, exchange ideas, and network for scientific and industrial collaborations. This volume contains papers that were peer-reviewed by at least two expert reviewers. In total, sixty-three papers were accepted for publication across all sessions.

**The first chapter** covers the Information and Communication Technologies - ICT 2021 where the innovative and interdisciplinary application of information and communication technologies were presented. The papers in the symposium described the development and application of the latest technologies in various areas of digital workplace transformation, the application of the fuzzy system, the application of the IoT system, exploring customers behavior through data analysis, and simulation of communication systems. Seven peer-reviewed papers were presented. The co-chairs of the session were Aljo Mujčić and Edin Mujčić.

**The second chapter** is devoted to the Advanced Electrical Power Systems session. This was an international forum for scientists, engineers, and students that provided them an opportunity to present their latest research and development results in all areas of Power Systems. Five peer-reviewed papers were presented. The session was moderated by co-chairs Mirza Šarić, Maja Muftić-Dedović, and Tarik Hubana.

The Computer Science symposium is presented in **the third chapter**. This session was primarily dedicated to the modern developments and innovative techniques in computer science. Topics covered were mostly related to Natural Language Processing, Text Mining, Video Games, Healthcare, and Covid-19. Research studies from four different continents were presented (Europe, Australia, Asia, and Africa), giving the symposium a truly international character. Moreover, almost all of the presented papers involved the contributions of Master's and Ph.D. candidates, giving them an exceptional opportunity to meet, network, and share their research ideas and results with world-class programmers, students, and researchers. Nine peer-reviewed papers were presented, and the session was moderated by co-chairs Zerina Mašetić, Jasmin Kevrić, and Dželila Mehanović.

**The fourth chapter** is devoted to the Mechanical Engineering session. The authors were final year students or Ph.D. candidates together with their mentors-professors from the Faculty of the Mechanical Engineering Department of the University of Sarajevo, Technical University in Bihać, as well as researchers from the industry. Thermal energy, hydropower, production engineering, the field of motor vehicles are professional and scientific fields from which the results of the research projects were presented. The session emphasized the transfer of knowledge and the potential of cooperation between universities and industry. The results of the research presented at this session provided clear guidelines to companies about collaborating with the faculty at the Mechanical Engineering departments at universities in Bosnia and Herzegovina. Seven peer-reviewed papers were presented in this session. The symposium was co-chaired by Izet Smajević, Hajrudin Džafo, and Anes Kazagić.

**The fifth chapter** covers different areas of Civil Engineering. The papers dealt with up-to-date themes, such as the high concentration of small harmful airborne particles encountered in the transportation sector. One of the aspects that were tackled during the session was the quality of the construction project management process as well as factors affecting the decision-making process at construction sites in Bosnia and Herzegovina. The importance of the energy-efficient building was also discussed at the session. In addition, interesting research regarding the seismic vulnerability of buildings in Bosnia and Herzegovina was presented, in hope of raising awareness of the important research in earthquake engineering. This was especially timely in light of the devastation of structures in the Zagreb and Petrinja earthquakes. Papers dealing with sanitary landfills and waste disposal centers as well as assessment of regional analyses methods for spatial interpolation of flood quantiles in the basins of Bosnia and Herzegovina and Serbia were presented as well. Nine peer-reviewed papers were presented. The session was moderated by co-chairs Naida Ademović, Adnan Ibrahimbegović, and Mirza Pozder.

**Chapter sixth** is devoted to the symposium on Geodesy and Geoinformation which was organized for the first time. This meeting provided the opportunity for presentations of state-of-the-art analyses of a broad spectrum of geospatial data. Thanks to tremendous advances in instrumentation and computational abilities in recent years, geodesy and geoinformatics became an even more exciting scientific field. Technological advances over recent years enabled Geodesy and Geoinformatics to develop under a wide spectrum of interactions, including theory, science, engineering, technology, observation, and practice-oriented services. This session primarily showcased

various kinds of investigations and results in advanced methods of solving geodetic problems, estimating parameters, contributions illustrating the use of new methods of satellite positioning on real data in various branches of geodetic sciences, such as the geodetic reference frames, photogrammetry, and laser scanning, metrology, and geo-information system applications.

Five invited speakers, all eminent European and regional scientists, delivered lectures on the state of the art topics using geodetic observation satellite data: Contributions of geodesy to monitoring natural hazards and global change; Atmosphere monitoring; Monitoring the earthquake in Zagreb, Croatia; Applications of geo-information systems; 3D scanning for repairing the damage on buildings after the earthquake; and Challenges and benefits of the academia-business cooperation for excellence in geoinformatics. Seven peer-reviewed papers were presented, and the session was moderated by Medžida Mulić and Džana Halilović.

**Chapter seven** covers Computer Modeling and Simulation for Engineering Applications. Many engineering problems are nowadays solved very efficiently and with good accuracy using computer models and simulations. These methods are in many cases preferred to traditional, experimental ones, due to their repeatability, flexibility, and immense data processing speed. Thanks to continuous and significant progress in the development of computer technologies, numerical and other mathematical methods, and software design, very complex problems regarding geometry, underlying physical and chemical processes, as well as data structures and amount of data, are successfully solved. The papers included in this session presented and discussed experiences and research results for several instances of modeling, computing, and simulation relevant to modern technologies and engineering applications. Eight peer-reviewed papers were presented, while the session was moderated by co-chairs Adnan Mujezinović and Muris Torlak.

The session on Trends and Innovation in Geographic Information Systems is covered in **Chapter eight**. This symposium aimed to bring together scientists, researchers, and research scholars to exchange and share their experiences and results in geo-spatial data and knowledge, observation, representation, processing, visualization, sharing and managing. The papers focused both on information communication and technologies (ICT) as well as management information systems and knowledge-based systems. The session also provided an interdisciplinary platform for researchers, practitioners, and educators to present and discuss the most recent innovations, trends, and concerns as well as practical challenges, as well as the solutions adopted in the fields of Geographical Information Systems. Five peer-reviewed papers were presented. The session was moderated by co-chairs Mirza Ponjavić, Jasminka Hasić Telalović, and Almir Karabegović.

**The ninth chapter** is devoted to the symposium on Sustainable Urban Development: Designing Smart, Inclusive and Resilient Cities which was organized for the first time, creating an opportunity for a multidisciplinary approach in planning for an urban future and knowledge exchange between experts in different fields. With 70% of the global population projected to live in cities by the year 2050, human action continuously threatening to create irreversible damage to the planet and acute shocks like the current pandemic, it is imperative to put the focus on smart, equitable, inclusive, resilient, and sustainable development approaches. The topics presented at the symposium varied from solutions to sustainability challenges in informal settlements of the Philippines and Bosnia and Herzegovina, lessons from vernacular architecture, healthy urban environments to renewable energy solutions through photovoltaic power plants along national corridors. Six peer-reviewed papers were presented, while the session was moderated by co-chairs Tijana Tufek-Memišević, Maja Muftić-Dedović, and Ajla Merzić.