

## ITC CONFERENCE GRANT SCIENTIFIC REPORT

This report is submitted for approval by the grant to the MC Chair.

**Action number: CA16228**

**Conference title: International Symposium on Innovative and Interdisciplinary Applications of Advanced Technologies – IAT 2021**

**Conference start and end date: 24/06/2021 to 27/06/2021**

**Conference attendance start and end date: 24/06/2021 to 27/06/2021**

**Grantee name: Aladin Crnkić, University of Bihac**

### ACTIVITIES DURING YOUR ATTENDANCE AT THIS CONFERENCE:

The conference has begun on Thursday, 24th of June, with participant registration. On the first day, we have participated in *BH Telecom and Information Technologies* as the first section that we attended. In this section we have listened interesting paper presentations about software development technologies, Internet of Things and communication technologies. The second section that we attended on the first day was *Advanced Electrical Power Systems*. In this section, we have listened to paper presentations about new technologies regarding electrical power systems. On the first day, we have participated in a roundtable discussion regarding renewable energy resources. Finally, we have attended on cultural entertainment event at the Mostar Cultural Center.

The presentation of our paper was on Friday, 25th of June. Our presentation was part of the section named *Computer modeling and simulations in engineering applications*. We have presented our research paper entitled *Interpolating rotations with the non-Abelian Kuramoto model*. After our presentation, we had an open discussion with other participants in our section. We have met and exchanged contacts with other professors in our section. We met with professor Elvedin Kljuno from the Mechanical Engineering Faculty, University of Sarajevo. Professor Elvedin Kljuno's Ph.D. thesis was Interpolation and its applicability in robotics, so we have exchanged various information and materials regarding this subject. Also, we have attended a lecture from a keynote speaker Seid Korić (the University of Illinois at Urbana-Champaign, National Center for Supercomputing Applications) about the supercomputer's role in modern engineering applications. The second section that we attended on Friday, 25th of June was the section *Computer Science*. In this section, we have listened to researches from several world countries, such as Libya, Australia, Kuwait, and the USA.

On the third day, we have attended presentations from the section Mechanical Engineering. In this section, we have met professor Hajrudin Džafo and exchanged interesting pieces of information about the applicability of our research paper in Mechanical Engineering. Also, in this section, we have attended a roundtable discussion where we had the privilege to participate in a conversation regarding a 5 year of establishment of the Society for the Development, Promotion, and Application of Advanced Technologies (DnT). Also, we have attended the 3 Minute Thesis competition that was held at Mostar Cultural Center. Besides that, we have also attended the ceremonial promotion of the conference monograph. Finally, we have attended a gala dinner that was held in the restaurant Radobolja in Mostar. Here we had the privilege to met other authors, professors, and participants of the conference. At this dinner, we have exchanged contacts with professor Ismar Volić (Wellesley College, USA) and received quality comments about our work. On the fourth day, we have attended a multidisciplinary section Covid-19 Research across disciplines where we have listened to interesting paper presentations in several fields. In this section, we have met with

professor Muris Torlak from the University of Sarajevo with whom we exchanged literature for our research. Finally, we have attended the closing ceremony of the conference.

#### **IMPACT ON YOUR RESEARCH AND FUTURE COLLABORATIONS (if applicable)**

The paper introduces a novel method for performing an interpolation between two rotations. We have acknowledged the financial support from this COST action in the paper.

The algorithm proposed in this paper can be used, for instance, for various cases in robotics, robotic hand movement, motion control, and object avoidance. For that purpose, it would be interesting to implement this algorithm in ROS (Robot Operating System). For this purpose, we have exchanged contacts with professor Elvedin Kljuno from the Mechanical Engineering Faculty, University of Sarajevo. We have met with professor Elvedin Kljuno during the conference days and agreed on a collaboration. Also, we have presented our results and received very helpful feedback from other participants of the conference. Our future research will be an optimization of this model regarding speed and memory usage, modification of the model for multiple rotation interpolation, and as I've mentioned an integration into a ROS. Our method is not dependable on the representation of rotations and is a novel and unique method that can gain the shortest and the most direct path for every rotation representation. This independence of rotation representation for rotation interpolation purposes was praised by all participants of our section. This research impact opened doors for various use cases and applications of our algorithm.

Besides that, we have met with professor Ismar Volić from Wellesley College, USA, and received very quality comments regarding the mathematical background of our algorithm. At this conference, we have made contacts with researchers from the Mechanical Engineering and Electrical Engineering Faculty, the University of Sarajevo that are interested in our field of research. We have found possible collaborators in our future research activities (ROS implementation, modification of algorithm, multiple rotation interpolation application of our algorithm, and etc.). We will consider the possibility of writing one publication that would be a continuation of this paper. The support of the COST action will be clearly acknowledged in the paper.