

## MESSAGES



### Hiroshi Tanaka

**General Chair**

**Professor Emeritus, Tokyo Medical and Dental University  
Specially appointed professor, Tohoku University**



It is my great pleasure and honor to welcome you all to the AROB-ISBC-SWARM2022, a joint symposium of the 27th International Symposium on Artificial Life and Robotics (AROB2022), the 7th International Symposium on Bio-Complexity (ISBC2022), and the 5th International Symposium on Swarm Behavior and Bio-Inspired Robotics (SWARM2022). By organizing the joint symposium of AROB, ISBC and SWARM, we could broaden the scope of this symposium to cover all the fields of complex systems dealing with anything, related to and inspired by life.

As is needless to say, Alife together with bio-complex systems and biologically-inspired Robotics now attracts wide interests as a new paradigm of science and engineering. For example, the bio-complex systems theory and methodology is now increasing its importance on entering upon the healthcare in “Big Data Era”, as a promising approach to promote “cutting-edge medicine”, such as to reveal and conquer the cancer progression mechanism or to explore the efficient reprogramming method of cells/tissues in regeneration medicine (iPS cells). Furthermore, in the era of Big Data in medicine and healthcare, artificial intelligence (AI) is expected to play an important role to analyze and interpret the innovative knowledge that the medical big data contains. In recent years, especially Artificial Intelligence (AI) has attracted an enthusiastic interests again from all branches of society, due to the extraordinary capability of “Deep Learning”, from the very high performance of image understanding to time series analysis of continuous signals and powerful supports in drug discovery. In our fields of AROB, the impact of AI is outstanding and would revolutionize the total landscape of our discipline.

Also in the biologically-inspired robotics field, rapid progresses in various types of robot systems have been remarkable such as bipedal humanoid, multi-agent robots and so forth. Also in the real world, nursing care robot is gradually being in practice. Furthermore, in wider sense, “molecular robots”, small DNA-based devices which identify receptors in cell surface and target the cells causing diseases is expected to achieve drug-like function within human body. These examples show the Alife and biologically-inspired Robotics approach are exerting a wide influence on the development of a new paradigm for next generation of science and engineering

These trends could be seen already in this year’s symposium

In organizing this year AROB symposium, we are in debt to many Japanese academic associations such as SICE, RSJ, IEEJ, IEICE, ISCIE, JSST, IEEE Robotics and Automation Society Japan Chapter, and JSOM. I would like to express my sincere thanks to all of those who make this symposium possible.

We hope this symposium becomes a forum for exchange of the ideas of the attendants from various fields, who are interested in the future possibility of Alife, biocomplexity and biologically-inspired Robotics approach. I am looking forward to meeting you.

### Welcome Message

Welcome to AROB/ISBC/SWARM2022; a joint symposium of the 27th International Symposium on Artificial Life and Robotics (AROB2022), the 7th International Symposium on Bio-Complexity (ISBC2022), and the 5th International Symposium on Swarm Behavior and Bio-Inspired Robotics (SWARM2022). This joint symposium was originally scheduled to take place in Beppu, Japan as a hybrid style. However, due to the COVID-19 pandemic in January 2022 in Japan, we should consider the risk of meeting in person in Beppu. As the global pandemic is still ongoing, AROB/ISBC/SWARM2022 is now being organized as an online meeting. We hope that we would be able to meet in person in Beppu in 2023.

In this AROB/ISBC/SWARM2022, we have 384 general presentations in 31 general and 40 organized sessions from 11 countries. We are honored to have three plenary talks by Prof. Rudiger Dillmann (KIT/FZI Karlsruhe, Germany), Prof. Mizuki Oka (University of Tsukuba, Japan), and Prof. Seul Jung (Chungnam National University, Korea), and eleven invited talks by Prof. Leonardo De Mattos (Italian Institute of Technology, Italy), Dr. Ali Israr (Facebook Inc., USA), Prof. Jun Ueda (Georgia Institute of Technology, USA), Prof. Kiminao Kogiso (The University of Elector-Communications, Japan), Prof. Masahiro Takinoue (Tokyo Institute of Technology, Japan), Prof. Hiroto Tanaka (Tokyo Institute of Technology, Japan), Dr. Kamilo Melo (EPFL, Switzerland), Prof. Evgeni Magid (Kazan Federal University, Russia), Prof. Ryohei Kanzaki (The University of Tokyo, Japan), Prof. Deborah Gordon (Stanford University, USA), and Prof. Nathaniel Virgo (Tokyo Institute of Technology, Japan). This symposium shall provide the best possible opportunity to all the participants for the exchange of research ideas and information related to artificial life, robotics, control, AI, bio-complexity, swarm behavior, etc.

We would like to sincerely thank our speakers for the plenaries and invited talks, and session organizers. We especially thank the authors and attendees for their valuable contributions and participation. We are also grateful to the advisory, organizing, executive and program committee members, AROB office, and to the persons, who generously contributed their precious time and effort in preparing and organizing this symposium.

We sincerely hope that you will be fully satisfied with AROB/ISBC/SWARM2022, and hope that you and your families, and your colleagues remain safe and in good health through these challenging times.



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**Fumitoshi Matsuno**  
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**Vice Program Chair**  
**Ken Naitoh**  
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**Chair**  
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