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HISTORY

The International Conference on Artificial Life and Robotics (ICAROB) resulted from the AROB-symposium (International Symposium on Artificial Life and Robotics) whose first edition was held in 1996 and the eighteenth and last edition in 2013. The AROB symposium was annually organized by Oita University, Nippon Bunri University (NBU), and ALife Robotics Corporation Ltd., under the sponsorship of the Science and Technology Policy Bureau, the Ministry of Education, Science, Sports, and Culture (Monbusho), presently, the Ministry of Education, Culture, Sports, Science, and Technology (Monkasho), Japanese Government, Japan Society for the Promotion of Science (JSPS), the Commemorative Organization for the Japan World Exposition ('70),

Air Force Office of Scientific Research, Asian Office of Aerospace Research and Development (AFOSR/AOARD), USA. I would like to express my sincere thanks to not only Monkasho (annually fund support from 1996 to 2013) but also JSPS, the Commemorative Organization for the Japan World Exposition ('70), and various other Japanese companies for their repeated support. The old symposium (this symposium has been held every year at B-Con Plaza, Beppu, Oita, Japan except in Oita, Japan (AROB 5th '00) and in Tokyo, Japan (AROB 6th '01).) was organized by the International Organizing Committee of AROB and was co-operated by the Santa Fe Institute (USA), RSJ, IEEJ, ICASE (Now ICROS) (Korea), CAAI (P. R. China), ISCIE, IEICE, IEEE (Japan Council), JARA, and SICE. The old AROB-symposium expanded much by absorbing much new knowledge and technologies into it. This history and character of the former AROB symposiums are passed on the current ICAROB conference and to this journal, International Journal of Robotics, Networking and Artificial Life (JRNAL). From now on, ALife Robotics Corporation Ltd. is in charge of management of both the conference and the journal. The future of the ICAROB is brilliant from a point of view of yielding new technologies to human society in the 21st century. We also expect to establish an international research institute on Artificial Life and Robotics in the future with the help of Japanese Government and ICAROB. This conference invites you all.

AIMS AND SCOPE

The objective of this conference is the development of new technologies for artificial life and robotics which have been recently born in Japan and are expected to be applied in various fields. This conference presents original technical papers and authoritative state-of-the-art reviews on the development of new technologies concerning robotics, networking and artificial life and, especially computer-based simulation and hardware for the twenty-first century. This conference covers a broad multidisciplinary field, including areas such as:

- Artificial intelligence & complexity
- Artificial living
- Artificial mind research
- Artificial nervous systems for robots
- Artificial sciences
- Bipedal robot
- Brain science and computing
- Chaos
- Cognitive science
- Computational Molecular biology
- Computer graphics
- Data mining
- Disasters robotics
- DNA computing
- Empirical research on network and MOT
- Environment navigation and localization

Evolutionary computations
Facial expression analysis, music recommendation and augmented reality
Foundation of computation and its application
Fuzzy control
Genetic algorithms
Human-welfare robotics
Image processing
Insect-like aero vehicles
Intelligence in biological systems
Intelligent control
Management of technology
Medical surgical robot
Micro-machines
Multi-agent systems
Nano-biology
Nano-robotics
Networking
Neural circuits
Neuro-computer
Neuromorphic Systems
Neuroscience
Pattern recognition
Quantum computing
Reinforcement learning system & genetic programming
Robotics
Software development support method
System cybernetics
Unmanned underwater vehicles
Unmanned Aerial Systems Technologies
Unmanned Aerial Systems designing, controls and navigation
Unmanned Aero vehicles
Virtual reality
Visualization
Hardware-oriented submissions are particularly welcome. This conference will discuss new results in the field of artificial life and robotics

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MESSAGES



Masanori Sugisaka
General Chair
(President, ALife Robotics Co.,
Ltd. (Japan))
Masanori Sugisaka

Masanori Sugisaka

General Chair of ICAROB

It is my great honor to invite you all to The 2019 International Conference on Artificial Life and Robotics (ICAROB 2019).

This Conference is changed as the old symposium from the first (1996) to the Eighteenth (2013) annually which were organized by Oita University, Nippon Bunri University(NBU), and ALife Robotics Corporation Ltd. under the sponsorship of the Science and Technology Policy Bureau, the Ministry of Education, Science, Sports, and Culture (Monbusho), presently, the Ministry of Education, Culture, Sports, Science, and Technology (Monkasho), Japanese Government, Japan Society for the Promotion of Science (JSPS), The Commemorative Organization for the Japan World Exposition ('70), Air Force Office of Scientific Research, Asian Office of Aerospace Research and Development (AFOSR/AOARD), USA. I would like to express my sincere thanks to not only Monkasho (annually fund support from 1996 to 2013) but also JSPS, the Commemorative Organization for the Japan World Exposition ('70), Japanese companies for their repeated support.

The old symposium was organized by International Organizing Committee of AROB and was co-operated by the Santa Fe Institute (USA), RSJ, IEEJ, ICASE (Now ICROS) (Korea), CAAI (P. R. China), ISCIE, IEICE, IEEE (Japan Council), JARA, and SICE. The old AROB symposium was growing up by absorbing many new knowledge and technologies into it.

This history and character was inherited also from ICAROB2014(The 2014 International Conference on Artificial Life and Robotics, included a series of ICAROB proceedings in [SCOPUS](#) and [CPCI](#) now. From now on, ALife Robotics Corporation Ltd. is in charge of management. This year we have The 2019 International Conference on Artificial Life and Robotics (ICAROB2019) (24th AROB Anniversary). The future of The ICAROB is brilliant from a point of view of yielding new technologies to human society in 21st century.

I hope that fruitful discussions and exchange of ideas between researchers during Conference (ICAROB2019) will yield new merged technologies for happiness of human beings and, hence, will facilitate the establishment of an international joint research institute on Artificial Life and Robotics in future.

Yingmin Jia

Co-General Chair of ICAROB



Yingmin Jia
Co-General Chair
(Professor, Beihang University,
R .P. China)

A handwritten signature in black ink, appearing to read 'Yingmin Jia', written over a horizontal line.

It is my great pleasure to invite you to The 2019 International Conference on Artificial Life and Robotics (ICAROB 2019), in B-Con Plaza, Beppu, Oita, Japan from January 10 to 13, 2019.

ICAROB develops from the AROB that was created in 1996 by Prof. Masanori Sugisaka and will celebrate her 24 th birthday in 2019. Doubtless, new mission and big challenges in the field of artificial life and robotics will promote ICAROB to start a new stage and attract wide interests among scientist, researchers, and engineers around the world.

For a successful meeting, many people have contributed their great efforts to ICAROB. Here, I would like to express my special thanks to all authors and speakers, and the meeting organizing team for their excellent works. Looking forward to meeting you at ICAROB in Beppu and wishing you enjoy your stay in Japan.



Takao Ito
Co-General Chair
(Professor Hiroshima
University, Japan)

A handwritten signature in black ink that reads "Takao Ito".

Takao Ito

Co General Chair of ICAROB

It is my great honor to invite you all to The 2019 International Conference on Artificial Life and Robotics (ICAROB 2019). This Conference is changed as the old symposium (ISAROB) from the first (1996) to the Eighteenth. I am pleased to welcome you to The 2019 International Conference on Artificial Life and Robotics in the wonderful city of Beppu, Oita city, Oita Prefecture, Japan.

The ICAROB has its long history. The former organization of the ICAROB was developed under the strong leadership of the President, famous Professor Masanori Sugisaka, the father of AROB. We gathered many researchers, faculty members, graduate students from all over the world, and published many high-quality proceedings and high-reputational journals every year.

Over the years, dramatic improvements have been made in the field of artificial life and its applications. The ICAROB has becoming the unifying the exchange of scientific information on the study of man-made systems that exhibit the behavioral characteristic of natural living systems including software, hardware and wetware. Our conference shapes the development of artificial life, extending our empirical research beyond the territory circumscribed by life-as-we-know-it and into the domain of life-as-it-could-be. It will provide us a good place to present our new research results, excellent ideas, and valuable information about artificial intelligence, complex systems theories, robotics, and management of technology.

The conference site is B-con Plaza, one of the most famous international convention centers in Kyushu island, Japan. You can find many fantastic scenic spots and splendid historical places in Beppu, Oita city. Enjoy your stay and take your time to visit Beppu, Oita city.

I am looking forward to meeting you in Beppu, Oita city, during the ICAROB 2019 and to sharing the most pleasant, interesting and fruitful conference with you.



Ju-Jang Lee
Co-General Chair
(Professor, KAIST)

A handwritten signature in black ink, appearing to read 'jlee'.

Ju-Jang Lee

Co-General Chair of ICAROB

The First International Conference on Artificial Life and Robotics (ICAROB) was held in Oita City, Oita, Japan from Jan. 11th to 13th, 2014. This year's Conference will be held amidst the high expectation of the increasingly important role of the new interdisciplinary paradigm of science and engineering represented by the field of artificial life and robotics that continuously attracts wide interests among scientist, researchers, and engineers around the globe.

Distinguished researchers and technologists from around the world are looking forward to attending and meeting at ICAROB. ICAROB is becoming the annual excellent forum that represents a unique opportunity for the academic and industrial communities to meet and assess the latest developments in this fast growing artificial life and robotics field. ICAROB enables them to address new challenges, share solutions, discuss research directions for the future, exchange views and ideas, view the results of applied research, present and discuss the latest development of new technologies and relevant applications.

In addition, ICAROB offers the opportunity of hearing the opinions of well-known leading experts in the field through the keynote sessions, provides the bases for regional and international collaborative research, and enables to foresee the future evolution of new scientific paradigms and theories contributed by the field of artificial life and robotics and associated research area. The twenty-first century will become the century of artificial life and intelligent machines in support of humankind and ICAROB is contributing through wide technical topics of interest that support this direction.

It is a great honor for me as a Co-General Chair of the 6th ICAROB 2019 to welcome everyone to this important event. Also, I would like to extend my special thanks to all authors and speakers for contributing their research works, the participants, and the organizing team of the 6th ICAROB.

I'm looking forward to meeting you at the 6th ICAROB in Beppu, Oita Prefecture and wishing you all the best.