



# The 2021 International Conference on Artificial Life and Robotics (ICAROB2021)

## 26th AROB Anniversary

### Call for Papers

#### Advisory Committee Chairs

Kazuo Ishii  
Kensuke Harada

#### General Chair

Masanori Sugisaka

#### Co-General Chairs

Yingmin Jia  
Takao Ito  
Ju-Jang Lee

#### Vice General Chairs

Ang, Chun Kit  
John L. Casti  
Jangmyung Lee  
Henrik Hautop Lund  
Luigi Pagliarini  
Mohd Rizon

#### Program Chair

Makoto Sakamoto

#### Co-Program Chair

Marion Oswald

### Conference Site



Higashi Hiroshima Arts & Culture Hall Kurara  
(<http://kurara-hall.jp/>)

### ICAROB Office

Mobile: +81-80-8565-8256  
email:  
[icarob@alife-robotics.co.jp](mailto:icarob@alife-robotics.co.jp)  
web:  
<http://alife-robotics.co.jp/>



Fukuoka Section



CCAI



<https://www.hiroshima-navi.or.jp/>



**Usa Shrine** (Before BC era three goddesses "Shikitusima-himemikoto, Hasizu-himemikoto, Tag iri-himemikoto descended on the earth of Usa from heaven.) The shrine is called Total Motomiya Hachiman Shrine Usa located in Oita Prefecture.

## The 2021 International Conference on Artificial Life and Robotics

**January 21 to 24, 2021, Higashi Hiroshima Arts & Culture Hall Kurara, Hiroshima, JAPAN**

The 2021 International Conference on Artificial Life and Robotics (ICAROB2021) will be held at **Higashi Hiroshima Arts & Culture Hall Kurara, Hiroshima, JAPAN, from January 21 to 24, 2021**. A series of *Proceedings of ICAROB* are included in both **CPCI-Web of Science** and **Scopus**. This Conference will provide new development of modern technologies concerning *Robotics, Networking and Artificial Life* (this journal is included in **ESCI**) researchers, and to share findings on how advancements in robotics, networking, complexity and artificial life technologies that relate to inter-disciplinary approach to the field such as artificial intelligence, virtual reality, and computer science are creating the basis for exciting new research and applications in various fields listed in the following topics. **Please submit papers to ICAROB2021 Web Site from <https://alife-robotics.co.jp/>**.

### Topics of interest include, but are not limited to

- Analysis of randomized algorithms
- Artificial nervous systems for robots
- Artificial living
- Bipedal robot
- Bio-inspired immune system
- Cognitive science
- Evolutionary computations
- Intelligent control
- Medical surgical robot
- Computational Molecular biology
- Nano-robotics
- Neuroscience
- Neuro-computer
- Neuromorphic systems
- Reinforcement learning system & genetic programming
- Software development support method
- System cybernetics
- Foundation of computation and its application
- Unmanned aerial systems technologies
- Artificial sciences
- Artificial mind research
- Brain science and computing
- Artificial intelligence & complexity
- adaptive behavior and metabolism
- Data mining
- Fuzzy control
- Human-welfare robotics
- Micro-machines
- Multi-agent systems
- Networking
- Pattern recognition
- Virtual reality
- Environment navigation and localization
- Facial expression analysis, music recommendation and augmented reality
- Applications in Kansei engineering
- Unmanned aero vehicles
- Unmanned aerial systems designing, controls and navigation
- Intelligence in biological systems
- Agent-based software
- Chaos
- Computer graphics
- DNA computing
- Genetic algorithms
- Image processing
- Management of technology
- Insect-like aero vehicles
- Nano-biology
- Neural circuits
- Unmanned underwater vehicles
- Quantum computing
- Robotics
- Visualization
- Disasters robotics
- Empirical research on network and MOT (Others etc.)

### Important Dates

- **November 25, 2020:** PS, IS, OS, GS, Poster S, TS abstract proposal submission deadline
- **November 25, 2020:** Final early bird registration deadline
- **November 28, 2020:** Letter of Acceptance deadline
- **December 15, 2020: (we don't accept papers after deadline): Final paper submission deadline**
- OS: Organized Session, GS: General Session, PS: Poster Session, IS: Invited Session, TS: Tutorial Session

### Publication

Accepted papers will be published in the Proceedings of the ICAROB Series that was included in **Scopus** and **CPCI-Web of Science**. Extended versions of the selected papers will be published in the international journal : *Robotics, Networking and Artificial Life* (JRNAL became **ESCI** journal) published by **Atlantis Press**.

## Registration Fee

Registration fee ¥55,000 (¥50,000 for early birds) and ¥30,000 for Students (¥25,000 for early birds) :

### Organized by

International Steering Committee of International Conference on Artificial Life and Robotics (ICAROB)

### Technical co-sponsored by

IEEE Fukuoka Section (Japan)

### Co-Organized by

Chinese Association for Artificial Intelligence (CAAI, P. R. China)

### Sponsored by

ALife Robotics Corporation Ltd.

### Advisory Committee Chairs

Kazuo Ishii (Kyushu Institute of Technology, Japan)  
Kensuke Harada (Osaka University, Japan)

### General Chair

Masanori Sugisaka (ALife Robotics Co., Ltd., Japan, Visiting Prof., The Open University, UK)

### Co-General Chairs

Yingmin Jia (Beihang University, P. R. China)  
Takao Ito (Hiroshima University, Japan)  
Ju-Jang Lee (KAIST, Korea)

### Vice General Chairs

Ang, Chun Kit (University of UCSI, Malaysia)  
John L. Casti (International Institute for Applied Systems Analysis, Austria)  
(The company X-Event Dynamics - (Co-founder), Austria)  
Jangmyung Lee (Pusan National University, Korea)

Henrik Hautop Lund (Technical University of Denmark, Denmark)  
Luigi Pagliarini (Academy of Fine Arts of Macerata, Italy)  
Mohd Rizon (University of UCSI, Malaysia)

### Advisory Committee

Adam Grzech (Wroclaw University of Technology, Poland)  
Bruce Eisenstein (Drexel University, Former IEEE President, USA)  
Hidenori Kimura (RIKEN, Japan)  
Jeffrey Johnson (The Open University, UK)  
Jerzy Świątek (Wroclaw University of Technology, Poland)  
Joshua M. Epstein (The Johns Hopkins University, USA)  
Kai-Tai Song (National Chiao Tung University, Taiwan)  
Ken-ichi Tanaka (Executive Fellow, Mitsubishi Electric Corporation, Japan)

Masato Nakagawa (Executive Fellow, DENSO CORPORATION, Visiting Professor of Hiroshima University, Japan)  
Masayoshi Tomizuka (University of California Berkeley, USA)  
Moshe Kam (New Jersey Institute of Technology, Former IEEE President, USA)  
Paul Kalata (Drexel University, USA)  
Paul Oh (Drexel University, USA)  
Peter Herczfeld (Drexel University, USA)  
Steen Rasmussen (University of Southern Denmark, Denmark)  
Zengqi Sun (Tsinghua University, P. R. China)

### Program Chair

Makoto Sakamoto (The University of Miyazaki, Japan)

### Co-Program Chair

Marion Oswald (The Vienna University of Technology, Austria)

### International Organizing Committee

Akira Fukuda (Kyushu University, Japan)  
Akira Nakamura (AIST, Japan)  
Akinori Abe (Chiba University, Japan)  
Andrew Gadsden (University of Guelph, Canada)  
Caoli Wang (University of Shanghai for Science and Technology, P. R. China)  
Chan Gook Park (Seoul National University, Korea)  
Eiji Hayashi (Kyushu Institute of Technology, Japan)  
Evgeni Magid (Kazan Federal University, Russia)  
Fengzhi Dai (Tianjin University of Science and Technology, P. R. China)  
Fuzhong Wang (Henan Polytechnic University, P. R. China)  
Hazry Desa (University of Malaysia, Perlis, Malaysia)  
Hidehiko Yamamoto (Gifu University, Japan)  
Hideyuki Suzuki (The University of Tokyo, Japan)  
Hiroyuki Tamura (The University of Miyazaki, Japan)  
Hiroshi Kage (Mitsubishi Electric Corporation, Japan)  
Hiroshi Matsuno (Yamaguchi University, Japan)  
Hualin Zhao (Shanghai Institute of Technology, P. R. China)  
Jiwu Wang (Beijing Jiaotong University, P. R. China)  
Jovana Jovic (CNRS-AIST JRL, Japan, France)  
Junping Du (Beijing University of Posts and Telecommunications, P. R. China)  
Katsunori Shimohara (Doshisha University, Japan)  
Kazuo Ishii (Kyushu Institute of Technology, Japan)  
Kenichi Tanaka (Meiji University, Japan)  
Kenji Hashimoto (Waseda University, Japan)  
Kevin Voges (Canterbury University, New Zealand)  
Kunikazu Kobayashi (Aichi Prefectural University, Japan)  
Kuo-Hsien Hsia (Far East University, Taiwan)  
Kuo-Lan Su (National Yunlin University of Science and Technology, Taiwan)

KyungHo Park (U.S. ARMY, Japan and USA)  
Masao Kubo (National Defense Academy of Japan, Japan)  
Masanao Obayashi (Yamaguchi University, Japan)  
Maxim Sokolov (Innopolis University, Russia)  
Mehta Rajiv (New Jersey Institute of Technology, USA)  
Minsoo Kim (Pusan National University, Korea)  
Peter Sapaty (Ukrainian Academy of Science, Ukraine)  
Pierre Parrend (University of Strasbourg, France)  
Qiang Cai (Beijing Technology and Business University, P. R. China)  
Qu Yanbin (Harbin Institute of Technology, P. R. China)  
Shin Jisun (Pusan National University, Korea)  
Singo Mabu (Yamaguchi University, Japan)  
Takashi Kohno (The University of Tokyo, Japan)  
Takashi Ogata (Iwate Prefectural University)  
Teruhisa Hochin (Kyoto Prefectural University, Japan)  
Tetsuro Hattori (Kagawa University, Japan)  
Thi Thi Zin (University of Miyazaki, Japan)  
Thomas S. Ray (University of Oklahoma, USA)  
Toru Yamamoto (Hiroshima University, Japan)  
Victor Berdonosov (Komsomolsk-on-Amur State University of Technology, Russia)  
Yasunari Yoshitomi (Kyoto Prefectural University, Japan)  
Yi Chai (Chongqing University, P. R. China)  
Yoshifumi Morita (Nagoya Institute of Technology, Japan)  
Yoshiro Imai (Kagawa University, Japan)  
Yuji Shinano (Zuse Institute Berlin, Germany)  
Zengqiang Chen (Nankai University, P. R. China)

### International Program Committee

Abdul Rahman bin Dullah (Universiti Teknikal Malaysia Melaka, Malaysia)  
Akane Onishi (Doshisha University, Japan)  
Akinori Abe (Chiba University, Japan)  
Akira Utsumi (The University of Electro-Communications, Japan)  
Akihiro Yamaguchi (Fukuoka Institute of Technology, Japan)  
Akihito Kanai (Hosei University, Japan)  
Ali Selamat (University of Technology of Malaysia, Malaysia)  
Aminurafiu bin Zulkifli (Multimedia University, Malaysia)  
Amornphun Phonopas (King Mongkut's University of Technology, North Bangkok, Thailand)  
Andre Rosendo (ShanghaiTech University, P. R. China)  
Anne Jeannin-Girardon (University of Strasbourg, France)  
Anton Shiriaev (Nowegian University of Science and Technology, Norway)  
Artur Sagitov (Kazan Federal University, Russia)  
Ashi Gautam (The University of Tokyo, Japan)  
Atsuya Tange (The University of Tokyo, Japan)  
Ayumu Tominaga (Kyushu Institute of Technology, Japan)  
Bin Zhang (Beijing University of Posts and Telecommunications, P. R. China)  
Cecilia Zanni-Merk (INSA-Rouen, France)  
Chang-Hua Lien (National Kaohsiung University of Science and Technology, Taiwan)  
Chaoli Wang (University of Shanghai for Science and Technology, P. R. China)  
Cheng-Shion Shieh (Far East University, Taiwan)  
Chenyang Li (Beijing Jiaotong University, P. R. China)  
Chen Zhu (Waseda University, Japan)  
Chia-Nan Ko (Nan kai University of Technology, Taiwan)  
Chung-Wen Hung (National Yunlin University of Science & Technology, Taiwan)  
Congdao Han (Shanghai Institute of Technology, P. R. China)  
Cui Zhang (Beihang University, P. R. China)  
Cynthia Matuszek (University of Maryland, USA)  
Donglian Qi (Zhejiang University, P. R. China)  
Dongmei Ai (University of Science and Technology Beijing, P. R. China)  
Duangjai Jitkongchuen (Dhurakij Pundit University, Thailand)  
Dunwei Gong (China University of Mining and Technology, P. R. China)

Moeko Tominaga (Kyushu Institute of Technology, Japan)  
Mohammad Al-Shabi (University of Sharjah, United Arab Emirates)  
Mohammad Biglarbegian (University of Guelph, Canada)  
Mou Chen (Nanjing University of Aeronautics and Astronautics, P. R. China)  
Nan Xiao (Northeastern University at Qinhuangdao, P. R. China)  
Naoki Toyoshima (The University of Tokyo, Japan)  
Nicolas Monmarché (University of Tours, France)  
Noriaki Kuwahara (Kyoto Prefectural University, Japan)  
Noritaka Sato (Nagoya Institute of Technology, Japan)  
Norrima Mokhtar (University of Malaya, Malaysia)  
Palakorn Tantrakool (King Mongkut's Institute of Technology, North Bangkok, Thailand)  
Ping Wang (North China Electric Power University, P. R. China)  
Pierre David (University of Strasbourg, France)  
Pierre Guillaume (University of Strasbourg, France)  
Ricardo Q. Figueroa (National Polytechnic Institute, Mexico)  
Rizauddin bin Ramli (Universiti Kebangsaan Malaysia, Malaysia)  
Roman Lavrenov (Kazan Federal University, Russia)  
Ruztameen bin Jenal (Universiti Teknikal Malaysia Melaka, Malaysia)  
Ryohei Anshi (Kyushu Institute of Technology, Japan)  
R.K.P.S. Ranaweera (University of Moratuwa, Sri Lanka)  
R.P.C. Janaka Rajapakse (Tainan National University of the Arts, Taiwan)  
Satoshi Ikeda (The University of Miyazaki, Japan)  
Sanjay S. Joshi (University of California, USA)  
Seong-Ik Han (Pusan National University, Korea)  
Shahriman Abu Bakar (Universiti Malaysia Perlis, Malaysia)  
Shanbi Wei (Chongqing University, P. R. China)  
Shifang Xu (Shanghai Institute of Technology, P. R. China)  
Shihao Sun (Beihang University, P. R. China)  
Shin-ichi Asakawa (Tokyo Woman's Christian University, Japan)  
Shing-Tai Pan (Kaohsiung University, Taiwan)  
Shin Wakitani (Hiroshima University, Japan)  
Shinichi Imai (Tokyo Gakugei University, Japan)

Endra Joelianto (Bandung Institute of Technology, Indonesia)  
 Enrico Di Mari (Kyushu Institute of Technology, Japan)  
 Fabio Guigou (University of Strasbourg, France)  
 Fei Hao (Beihang University, P. R. China)  
 Fenghua Shan (Northwestern Polytechnical University, P.R. China)  
 Fuzhong Wang (Henan Polytechnic University, P. R. China)  
 Haibo Li (Royal Institute of Technology, Sweden)  
 Haisheng Li (Beijing Technology and Business University, P. R. China)  
 Haruhisa Okuda (Mitsubishi Electric Corporation, Japan)  
 Haruka Tsuboi (The University of Miyazaki, Japan)  
 Haruna Matsushita (Kagawa University, Japan)  
 Heeje Kim (Pusan National University, Korea)  
 Hidetsugu Suto (Muroran Institute of Technology, Japan)  
 Hideyuki Tanaka (Hiroshima University, Japan)  
 Hiroki Fukushima (Kyusyu Women's University, Japan)  
 Hiroyuki Iizuka (Osaka University, Japan)  
 Hong Niu (Tianjin University of Science and Technology, P.R. China)  
 Hongbo Li (Tsinghua University, P. R. China)  
 Hongji Ma (Shandong University of Science and Technology, P. R. China)  
 Hongjiu Yang (Yanshan University, P. R. China)  
 Hongpeng Yin (Chongqing University, P. R. China)  
 Hsien-Huang Wu (National Yunlin University of Science and Technology, Taiwan)  
 Huaping Liu (Tsinghua University, P. R. China)  
 Hussein Abbass (University of New South Wales, and ADFA, Australia)  
 I-Hsien Liu (National Cheng Kung University, Taiwan)  
 Ilya Afanasyev (Innopolis University, Russia)  
 Istvan Harmati (Budapest Institute of Technology and Economics, Hungary)  
 Ivan Tanev (Doshisha University, Japan)  
 Jiandong Zhao (Beijing Jiaotong University, P. R. China)  
 Jiao Jia (Beihang University, P. R. China)  
 Jingchuan Wang (Shanghai Jiao Tong University, P. R. China)  
 JJ Merelo (University of Granada, Spain)  
 Joono Cheong (Korea University, Korea)  
 Julio Navarro Lara (University of Strasbourg, France)  
 Jun Kobayashi (Kyushu Institute of Technology, Japan)  
 Jung-Shian Li (National Cheng Kung University, Taiwan)  
 Junhg-Perng Su (National Dong Hwa University, Taiwan)  
 Jumpei Ono (Digital Arts Sendai, Japan)  
 Junping Du (Beijing University of Posts and Telecommunications, P. R. China)  
 Kazuo Kawada (Hiroshima University, Japan)  
 Kei Sahara (Doshisha University Japan)  
 Keiji Kamei (Nishinippon Institute of Technology, Japan)  
 Keisuke Watanabe (Tokai University, Japan)  
 Keita Honda (Gifu university, Japan)  
 Ke Zhang (Chongqing University, P. R. China)  
 Ken-ichi Tanaka (Meiji University, Japan)  
 Kensuke Ogata (Osaka City University Japan)  
 Khairul Salleh bin Mohamed Sahari (Universiti Tenaga Nasional, Malaysia)  
 Khoyratee Farad (The University of Tokyo, Japan)  
 Kouichi Takeuchi (Okayama University, Japan)  
 Konstantin Yakovlev (Russian Academy of Sciences, Higher School of Economics, Russia)  
 Kui Xiang (Wuhan University of Technology, P. R. China)  
 Leonid Freidovich (Umea University, Sweden)  
 Levi Timoth  e (The University of Tokyo, Japan)  
 Liming Chen (Beihang University, P. R. China)  
 Lin Li (University of Shanghai for Science and Technology, P. R. China)  
 Lin Zhao (Qingdao University, P. R. China)  
 Mamoru Yoshimura (The University of Miyazaki, Japan)  
 Manabu Yamada (Nagoya Institute of Technology, Japan)  
 Masahide Ito (Aichi Prefectural University, Japan)  
 Masahiro Ushio (Kyushu Institute of Technology, Japan)  
 Masahiro Yokomichi (The University of Miyazaki, Japan)  
 Masamichi Hori (The University of Miyazaki, Japan)  
 Masanori Takahashi (Tokai University, Japan)  
 Masayoshi Kano (Chukyo University, Japan)  
 Masayoshi Tabuse (Kyoto Prefectural University, Japan)  
 Masaomi Hatakeyama (University of Zurich, Switzerland)  
 Max Talanov (Kazan Federal University, Russia)  
 Meng Duan (Beihang University, P. R. China)  
 Mingguo Zhao (Tsinghua University, P. R. China)  
 Minoru Kumano (University of Miyazaki, Japan)  
 Shoichiro Fujisawa (Tokushima Bunri University, Japan)  
 Shumin Fei (Southeast University, P. R. China)  
 Shyi-Ming Chen (National Taichung University of Education, Taiwan)  
 Stephany Mai Nishikawa (The University of Tokyo, Japan)  
 Stephen Wilkerson (York College of Pennsylvania, USA)  
 Takashi Kuremoto (Yamaguchi University, Japan)  
 Takayoshi Yamada (Gifu University, Japan)  
 Takuya Fuginaga (Kyushu Institute of Technology, Japan)  
 Takuya Nanami (The University of Tokyo, Japan)  
 Taishiro Kishimoto (Keio University, Japan)  
 Taisuke Akimoto (Kyushu Institute of Technology, Japan)  
 Tarik bin Abd Latef (Universiti Malaya, Malaysia)  
 Taro Shibasaki (Ibaraki University, Japan)  
 Taro Takagi (National Institute of Technology, Maizuru College, Japan)  
 Teruhisa Hochin (Kyoto Prefectural University, Japan)  
 Tetsuro Katayama (The University of Miyazaki, Japan)  
 Thomas Noel (University of Strasbourg, France)  
 Thunyaseth Sethaput (Thammasat University, Thailand)  
 Tianping Zhang (Yangzhou University, P. R. China)  
 Tomohiko Takagi (Kagawa University, Japan)  
 Tomohiro Henmi (National Institute of Technology, Kagawa Collage, Japan)  
 Toshihiro Inukai (DENSO Wave Incorporated, Japan)  
 Toshinori Nawata (Kumamoto National College of Technology, Japan)  
 Tsunehiro Yoshinaga (Tokuyama National College of Technology, Japan)  
 Ussath Martin (The University of Potsdam, Germany)  
 Wan Khairunizam Wan Ahmad (Universiti Malaysia Perlis, Malaysia)  
 Wang Jie (Pusan National University, South Korea)  
 Wanjuan Yu (Shanghai Institute of Technology, P. R. China)  
 Weicun Zhang (University of Science and Technology Beijing, P. R. China)  
 Wei-Lung Mao (National Yunlin University of Science and Technology, Taiwan)  
 Weiwei Yu (Northwestern Polytechnical University, P.R. China)  
 Weixin Zeng (Beijing Jiaotong University, P.R. China)  
 Wenhao Zheng (Beihang University, P. R. China)  
 Wenlin Li (Beihang University, P. R. China)  
 Wisanu Jiviriya (King Mongkut's University of Technology North Bangkok, Thailand)  
 Xiaocan Wang (Northwestern Polytechnical University, P. R. China)  
 Xiaofeng Su (Beijing Institute of Astronautical Systems Engineering, P. R. China)  
 Xiaoyan Chen (Tianjin University of Science and Technology, P. R. China)  
 Xiaoyan Fu (Capital Normal University, P. R. China)  
 Xuemei Ren (Beijing Institute of Technology, P. R. China)  
 Xuhui Lu (Beihang University, P. R. China)  
 Yafan Liu (Beijing Jiaotong University, P. R. China)  
 Yan Cui (Shanxi Normal University, P. R. China)  
 Yasunori Takemura (Nishinippon Institute of Technology, Japan)  
 Yeong-Jeu Sun (I-Shou University, Taiwan)  
 Yo Horikawa (Kagawa University, Japan)  
 Yongqiang Qi (China University of Mining and Technology, P. R. China)  
 Yoshihiro Kita (Tokyo Institute of Technology, Japan)  
 Yoshihiro Ohnishi (Ehime University, Japan)  
 Youji Kawamura (Kindai University, Japan)  
 Yu-an Zhang (Qinghai University, P. R. China)  
 Yuanlin Wang (Northwestern Polytechnical University, P. R. China)  
 Yue Lin (Beijing Institute of Control Engineering, P.R. China)  
 Yueqian Liang (China Academy of Electronics and Information Technology, P. R. China)  
 Yuji Minami (National Institute of Technology, Ube College, Japan)  
 Yujie Yan (Tianjin University of Science and Technology, P. R. China)  
 Yuki Hayashi (Chiba University, Japan)  
 Yunju Chen (Shiga University, Japan)  
 Yunxiang Liu (Shanghai Institute of Technology, P. R. China)  
 Yunzhong Song (Henan Polytechnic University, P. R. China)  
 Yuxing Ouyang (Tianjin University of Science and Technology, P. R. China)  
 Yuya Nishida (Kyushu Institute of Technology, Japan)  
 Zacharie Mbatiga (National Institute of Technology, Okinawa College, Japan)  
 Zakri bin Ghazali (Universiti Malaysia Pahang, Malaysia)  
 Zengqiang Chen (Nankai University, P. R. China)  
 Zhao Peng (Huazhong University of Science and Technology, P. R. China)  
 Zhengquan Yang (Civil Aviation University of China, P. R. China)  
 ZhiLi Song (Shanghai Institute of Technology, P. R. China)  
 Zhongxin Liu (Nankai University, P. R. China)  
 Zuradzman bin Mohamad Razlan (Universiti Malaysia Perlis, Malaysia)

#### Local Arrangement Committee

Makoto Sakamoto (The University of Miyazaki, Japan)  
 Masanori Sugisaka (ALife Robotics Corporation Ltd., Japan)  
 Takao Ito (Hiroshima University, Japan)