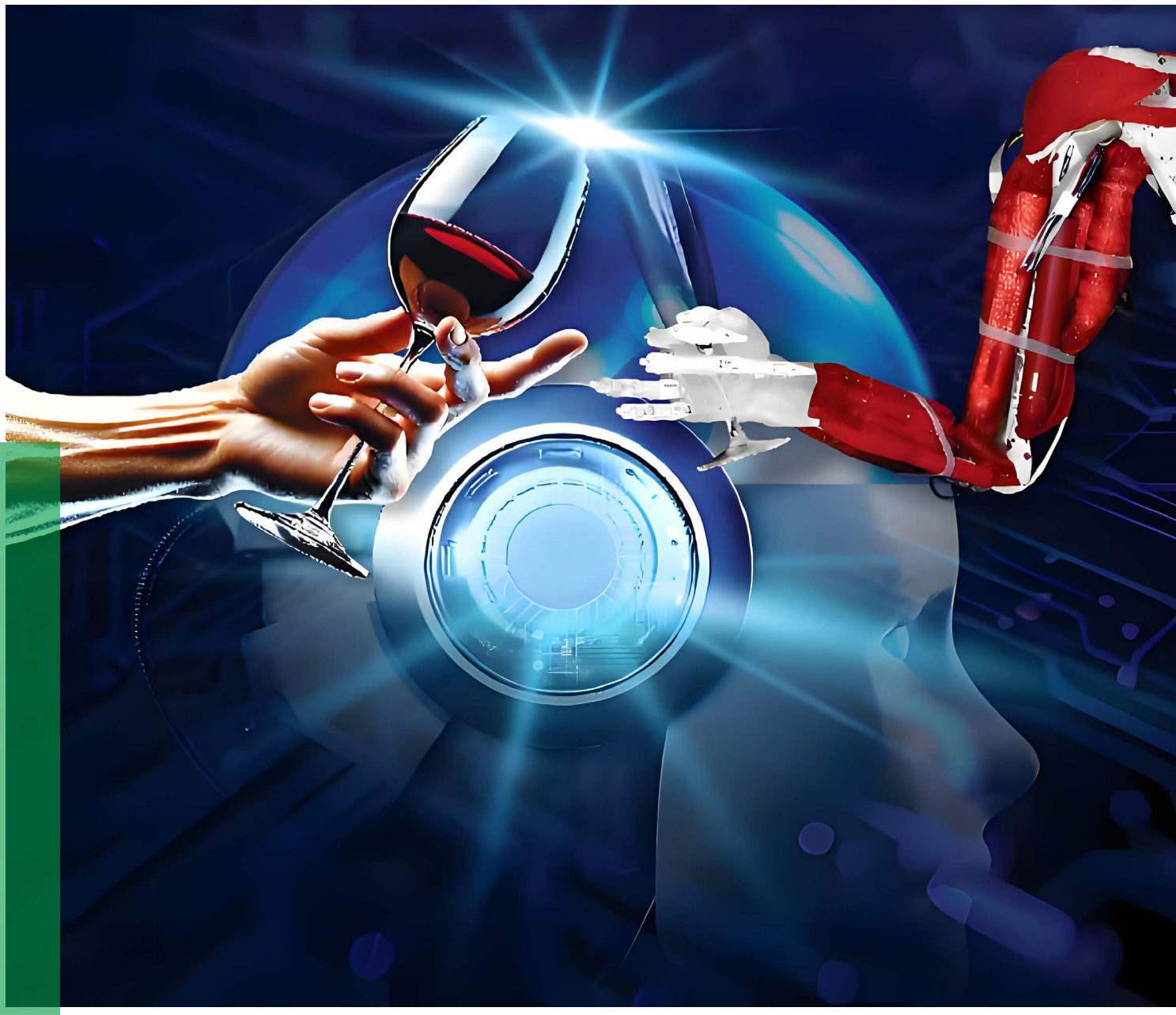
# NEWSLETTER

## International Society of Bionic Engineering

Volume 14, Issue 2, 2025



# Contents



*Cover Photo: Cover of the Journal: Advanced Bionics*

# Yujia Zhang

## École Polytechnique Fédérale de Lausanne (EPFL), Switzerland

Yujia Zhang is an Assistant Professor of Electrical and Microengineering at the Institute of Electrical and Microengineering at École Polytechnique Fédérale de Lausanne (EPFL). His research thrusts include iontronic hybrid tissues and wearable/implantable bioelectronics for applications in biomedicine. Recently, he has pioneered the area of dropletronics (Figure 1), in which networks of microscale soft droplets function as versatile bioelectronic/bioiontronic devices (Figure 2).

Prior to his appointment at EPFL, he obtained his B.Sc. in Electronics and Information Science and Technology from the University of Science and Technology of China in 2016. Later, he completed his PhD in biomedical engineering and MEMS/NEMS technology at the Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, followed by one year as a visiting PhD at Stony Brook University, USA. In 2021, Yujia joined the Bayley group at the University of Oxford, UK, and started his MSCA postdoctoral research focusing on the development of multifunctional iontronic synthetic tissues for biotic interfaces and soft implants. In 2023, he became an independent early-career research fellow (Wellcome Trust Early-Career Award) hosted in the Department of Chemistry at the University of Oxford. In 2025, Yujia moved to EPFL and started his group, Laboratory for Bio-Iontronics (BION).

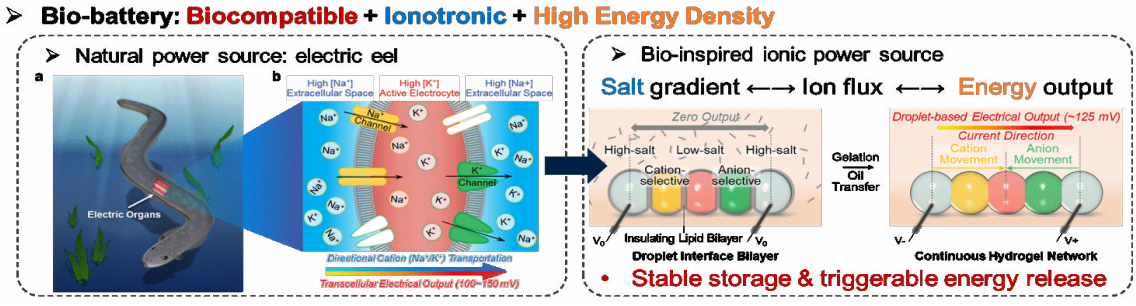



*Figure 1. Hydrogel iontronic devices can emulate biological functions and communicate with living matter. However, the fabrication of miniature, soft iontronic devices according to modular designs has not been achieved. Prof. Zhang developed the use of surfactant-supported assembly of freestanding microscale hydrogel droplets, termed dropletronics, to construct various ionic power sources, iontronic modules, circuits and biointerfaces.*

➢ Ionic modulation of brain organoids

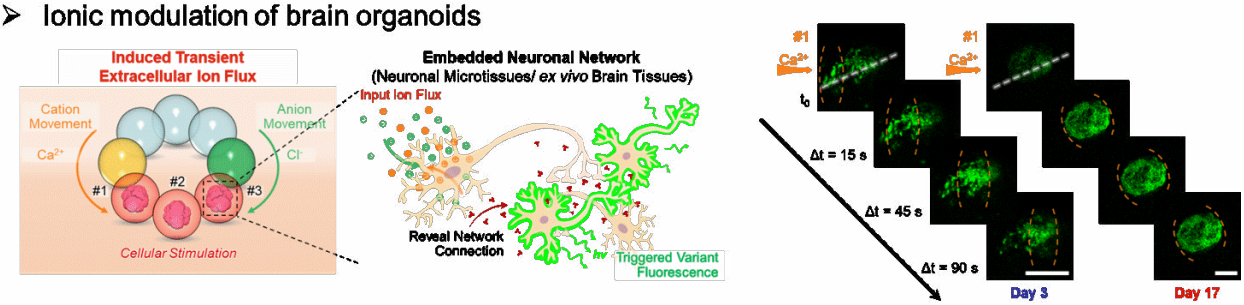



*Figure 2. The tiny, versatile dropletronic devices enable a variety of biomedical applications, including modulation of brain organoids, defibrillation and pacing of mouse hearts, and recording electrophysiological signals from sheets of human cardiomyocytes.*

# Yong He

## Zhejiang University, China

Yong He is a "Qiushi" distinguished professor and doctoral supervisor at the College of Mechanical Engineering, Zhejiang University, China. He received a PhD degree from Zhejiang University. He serves as the deputy director of the State Key Laboratory of Fluid Power & Mechatronic Systems. Additionally, he is an associate editor for the Bio-Design and Manufacturing journal and an editorial board member for the Biofabrication journal.

His research focuses on 3D bioprinting and medical equipment. He has led six national-level projects under the National Natural Science Foundation of China (NSFC), including the Distinguished Young Scholars Fund, Excellent Young Scholars Fund, key program Fund, etc. He has authored two monographs on 3D bioprinting and holds over 50 invention patents. He has published more than 100 SCI papers in prestigious journals such as Science Translational Medicine (10.1126/scitranslmed.abo4272), Nature Reviews Bioengineering (10.1038/s44222-024-00218-w), Nature Communications (10.1038/s41467-022-30997-y, 10.1038/s41467-024-51248-2, 10.1038/s41467-024-53302-5), and Science Advances (10.1126/sciadv.adf2664, 10.1126/sciadv.adh2213), with an H-index of 70 and over 15,000 citations.

He is a deputy director of the Advanced Manufacturing Division of the Biomaterials Society and a standing committee member of the Biofabrication Division of the Mechanical Engineering Society. He created the EFL (Engineering for Life) brand, dedicated to fundamental research and technology transformation at the intersection of medicine and engineering.

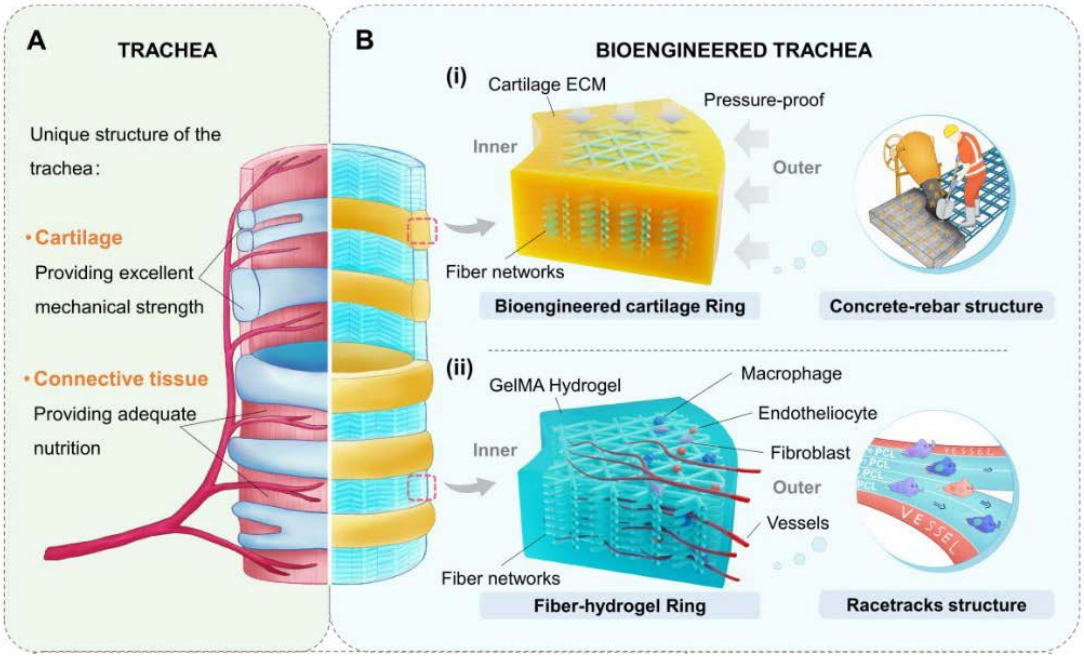



*Fig. 1 Bionic design and fabrication of engineered trachea*

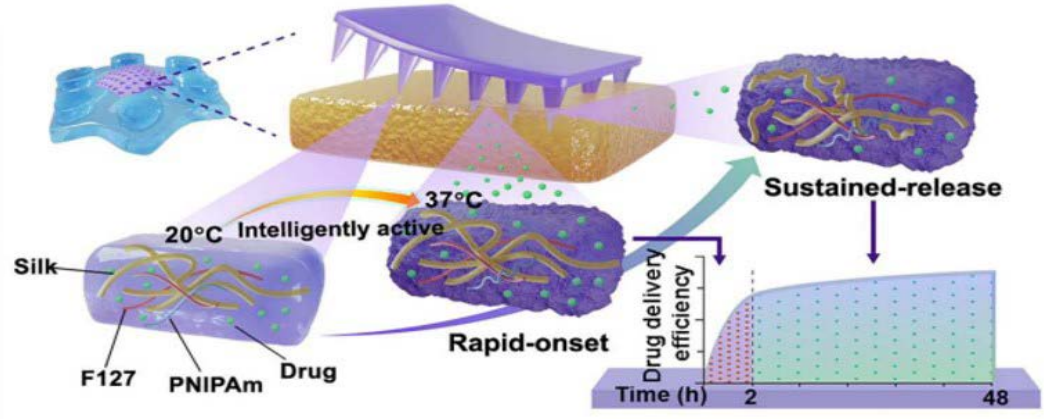



*Fig. 2 Drug-controlled release microneedles inspired by the blue-ringed octopus*

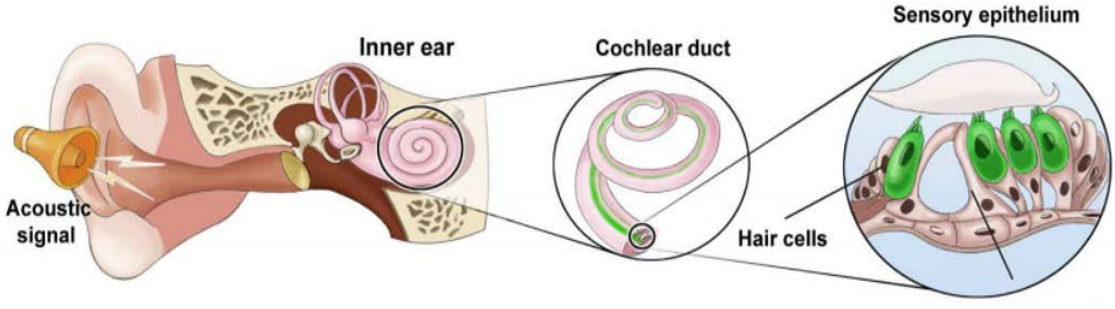
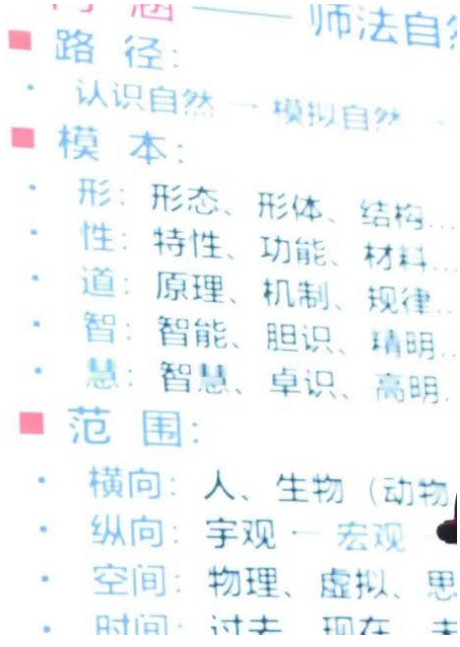



*Fig. 3 Varying mechanical forces drive sensory epithelium formation*

# “Bionic Technology Boosting New Quality Productive Forces Conference” was held

The "Bionic Technology Boosting New Quality Productive Forces Conference" co-hosted by Jilin University and the ISBE was held in Wendeng District, Weihai from May 17 to 19. The event gathered over 520 Chinese and foreign academicians, university leaders, and experts from more than 100 institutions, including Tsinghua University, Zhejiang University, Beihang University, Harbin Institute of Technology, Wuhan University, The Hong Kong Polytechnic University, and the Chinese Academy of Sciences etc.

Luquan Ren, Emeritus President of the ISBE and an academician of the Chinese Academy of Sciences, delivered a keynote speech. He systematically outlined technological breakthroughs and application potentials of bionics in materials, equipment, intelligent systems, and other fields, emphasizing: "Bionic technology not only supports human progress and the continuity of human civilization but also serves as an indispensable



driver for developing modern new productive forces. Bionics is boosting new productive forces through multi-dimensional approaches, including factor quality enhancement, technological innovation, new business form cultivation, bottleneck breakthroughs, and institutional innovation." Lei Guo, a CAS academician and professor at Beihang University, shared innovative explorations in bionic theory and practice from the perspective of aerospace bionic intelligence. Zuankai Wang, an academician of the Hong Kong Academy of Engineering Sciences and professor at The Hong Kong Polytechnic University, discussed the application of interface field matching theory in energy.

The conference set up six parallel forums, and concurrently held a forum on the high-quality development of bionics journals. Ding Yun, Chief Editor of Journal of Bionic Engineering, Zhang Chengchun, Chief Editor of Droplet, and Zhao Jie, Chief Editor of Advanced Bionics, respectively delivered work reports on the journals. Twenty-three colleagues from the China Association of University Science and Technology Journals, Science Press, Springer-China Region, and the Journal of Jilin University, conducted in-depth discussions on the construction ideas and experiences of first-class journals.

Twenty-three participating expert representatives conducted on-site inspections of enterprises and institutions such as the Weihai Bionic Research Institute of Jilin University, Weihai Weigao Group Co., Ltd., Weihai Claytphill Fan Co., Ltd., Shandong New Beiyang Information Technology Co., Ltd., and Tianrun Industrial Technology Co., Ltd etc. They conducted research on bionic technology integration to facilitate collaborative innovation among industry, academia, and research institutions.

As a key driving force for new productive forces, bionic technology is opening a new chapter of symbiosis between humanity and technology with the wisdom of "learning from nature". The success of this conference has injected strong momentum into technological innovation and industrial development in the bionic field.


# ISBE encourages the establishment of Student Chapters

In an effort to enhance services rendered to student members and actively foster communication and cooperation among them, the International Society for Bionic Engineering (ISBE) resolved to initiate the establishment of student chapters within universities and research institutions starting from 2024. Through self - initiated applications and subsequent approval by the society, student chapters till now have been formally set up at Jilin University, Henan University of Technology, Fuzhou University, and Changchun University of Science and Technology. Notably, Jilin University and Henan University of Technology respectively held their chapter - establishment ceremonies in December 2024 and January 2025.



The mission of the ISBE student chapters is to integrate students in the field of bionics to enhance the professional capabilities and overall qualities of young individuals, and further promote the growth of talents and the development of bionic science and engineering, by carrying out activities such as academic exchanges, talent cultivation, technology competitions, career planning, social practices, and public engagement services, etc.

ISBE warmly welcomes other applications for the establishment of Student Chapters. Welcome to fill in the registration form (https://isbe-online.com/?ui=english&mod=info&act=view&id=5312) and send to the ISBE secretariat (secretariat@isbe-online.org) for approval.

# Professor Seeram Ramakrishna Ranks in Singapore's Top Four Scientists based on the Stanford/Elsevier Top 2% Scientists List

**Field:** Enabling & Strategic Technologies

**Specialty:** Nanoscience & Nanotechnology

**Overall Rank:** 475

**Subfield Rank:** 13 out of 135,958

**Seeram Ramakrishna | National University of Singapore**

**The Stanford/Elsevier Top 2% Scientists List just announced that our founder Professor Seeram Ramakrishna is among the top four scientists of Singapore. More than 50,000 researchers work in Singapore. Professor Seeram** is recognized for his contributions to nanotechnology, particularly in the development of nanofibers and advanced materials.

He is among the World's Most Influential Minds (Thomson Reuters) and a Highly Ranked Scholar (Scholar GPS) with more 500 Q1 journal papers which received 213 H-Index and 212,000 citations.

He made seminal contributions in understanding and enhancing the biological, chemical, electrical, mechanical, and physical responses. He elucidated the influence of nanofibers on the cells function and behavior, thus contributing to the emerging domains such as regenerative medicine, tissue engineering, drug delivery, and smart | intelligent biomaterials. His research facilitated innovations in small diameter vascular grafts, peripheral nerve regeneration, neural interfaces, skin regeneration, wound dressing, and transparent anti-viral face masks. He further advanced nanofibers for non-invasive healthcare via monitoring of body temperature, movements, heart rate, and sweat and breath biochemistry.

He pioneered bioengineering and nanotechnology in Singapore and Asia.

More information can be found at https://top2percentscientists.com/top-10-scientists-in-singapore-2024/

# Prof. Mohd Sapuan Salit received Frontier Researcher, Malaysia's Research Star Award from Clarivate

Prof. Ir. Dr. Mohd Sapuan Salit has won the award in the category of "Frontier Researcher" during the Malaysia's Research Star Award (MRSA 2025) ceremony at Marriott Hotel, Putrajaya, Malaysia on 13 February 2025. This award was presented by the Minister of Higher Education, Malaysia, Datuk Seri Diraja Dr. Zambry Abd Kadir. This award presented to the local researchers as a recognition for the commitment in publishing papers in high quality journals as a contribution to the development of the country.

Prof. Ir. Dr. Mohd Sapuan Salit said, the recipient of this award was selected based on the achievement of the researcher to publish papers in journals indexed in database Web of Sciences, Clarivate, USA. Prof Mohd



Sapuan is a Member of International Society of Bionic Engineering (ISBE) and the recipient of Outstanding Contribution Award 2022, ISBE. He was also the recipient of TWAS Award in Engineering Sciences and IET Leadership Award. He is a Fellow, Academy of Sciences, Malaysia and The World Academy of Sciences. His research interests include biocomposites, circular economy, design for sustainability and nanocellulose composites.

## Prof. Yuying Yan won David Kenning Award

Prof. Yuying Yan was conferred the David Kenning Award by the UK National Heat Transfer Committee in 2024, in recognition of his outstanding achievements in phase change heat transfer— particularly for leveraging nature-inspired solutions to enhance heat transfer performance.


Reviewed by the international committee, the award is bestowed upon exceptional academic researchers worldwide, with only one recipient every two years.

# Hot papers in the field of biomimetics in 2024

| | |
|---|---|
| 1 | **Hippopotamus optimization algorithm: a novel nature-inspired optimization algorithm [Citations: 118]** By: Amiri Mohammad Hussein, Hashjin Hashjin Nastaran Mehrabi, Montazeri Mohsen, et al.<br>***SCIENTIFIC REPORTS***<br>Volume: 14 Issue: 1 DOI:10.1038/s41598-024-54910-3 Published: FEB 29 2024<br>Corresponding author: Hashjin Nastaran Mehrabi (Shahid Beheshti University, Iran) |
| 2 | **Nanoparticles in tumor microenvironment remodeling and cancer immunotherapy [Citations: 109]**<br>By: Lu Qiang, Kou Dongquan, Lou Shenghan, et al.<br>***JOURNAL OF HEMATOLOGY & ONCOLOGY***<br>Volume: 17 Issue: 1 DOI:10.1186/s13045-024-01535-8 Published: APR 2 2024<br>Corresponding author: Sethi Gautam (National University Singapore) |
| 3 | **Intelligent Machinery Fault Diagnosis With Event-Based Camera [Citations: 79]**<br>By: Li Xiang, Yu Shupeng, Lei Yaguo, et al<br>***IEEE TRANSACTIONS ON INDUSTRIAL INFORMATICS***<br>Volume:20 Issue:1 Page: 380-389 Published: JAN 2024<br>Corresponding author: Yang Bin (Xi An Jiao Tong University, China) |
| 4 | **Tumor Cell-Targeting and Tumor Microenvironment-Responsive Nanoplatforms for the Multimodal Imaging-Guided Photodynamic/Photothermal/Chemodynamic Treatment of Cervical Cancer [Citations:66]** By: Wang Ying, Xu Yiyan, Song Jiayu, et al<br>***INTERNATIONAL JOURNAL OF NANOMEDICINE***<br>Volume:19 DOI:10.2147/IJN.S466042 Published: 2024<br>Corresponding author: Zhang Yunyan (Central South University, China) |
| 5 | **Single-Atom Nanozymes for Catalytic Therapy: Recent Advances and Challenges [Citations:59]** By: He Weiyi, Wu Jiahao, Liu Jianli, et al<br>***ADVANCED FUNCTIONAL MATERIALS***<br>Volume:34 Issue:16 DOI:10.1002/adfm.202312116 Published: APR 2024<br>Corresponding author: Liu Jianli (Beijing Institute of Technology, China) |
| 6 | **A facile method for constructing scalable and low-cost superhydrophobic coating with anti-corrosion and drag-reduction properties [Citations: 52]**<br>By: Deng Yuanting, Li Zihao, Yin Zuozhu, et al.<br>***INDUSTRIAL CROPS AND PRODUCTS***<br>Volume:216 DOI:10.1016/j.indcrop.2024.118732 Published: SEP 15 2024<br>Corresponding author: Yin Zuozhu (Nanchang Hangkong University, China) |
| 7 | **Reversibly Modulating the Selectivity of Carbon Dioxide Reduction via Ligand-Driven Spin Crossover [Citations:48]** By: Tang Yuan, Zhu Xiangyu, Luo Qiquan, et al.<br>***JOURNAL OF PHYSICAL CHEMISTRY LETTERS***<br>Volume:16 Issue:1 Page1-8 Published: DEC 17 2024<br>Corresponding author: Li Xingxing (University of Science and Technology of China) |
| 8 | **Photoredox-Catalyzed [3+2] annulation of Aromatic Amides with Olefins via Iminium Intermediates [Citations: 32]** By: Tang Zhanyong; Yao Zhenying; Yu Yueyang, et al.<br>***ANGEWANDTE CHEMIE-INTERNATIONAL EDITION***<br>Volume:63 Issue:52 DOI:10.1002/anie.202412152 Published: DEC 20 2024<br>Corresponding author: Zhao Depeng (Sun Yat-sen University, China) |
| 9 | **Collective dynamics of adaptive memristor synapse-cascaded neural networks based on energy flow [Citations: 30]** By: Zhang Shaohua, Wang Cong, Zhang Hongli, et al.<br>***CHAOS SOLITONS & FRACTALS***<br>Volume:186 DOI:10.1016/j.chaos.2024.115191 Published: SEP 2024<br>Corresponding author: Wang Cong (Xinjiang University, China) |

**The data was from the Web of Science (Tracking time: 28 March 2024).*

# Biomimetics in 2024: An Academic Progress Report

For this report, Thomson Reuters Web of Science Database (WoS) was taken as the source of publications. Data were tracked during March of 2024 to retrieve publications of the year 2024. Topic including the title, abstract and keywords were taken as the searching fields. Keywords tracked included biomimicry, biomimetic, biomimetics, biomimic, bio-inspired, bioinspired, bionic, nature-inspired, biologically inspired, bioinspiration, bio-inspiration, and biomimicking.

The total number of research papers retrieved in 2024 was 13,431 with 188 highly cited papers and 9 hot papers. The growth trend indicated that biomimetic research has got a boost in 2024 with a growth rate of about 20%. there were 116 countries and regions in total involved in the publishing of biomimetic research papers, among which the top 20 covered over 87% of the total papers, while the rest only accounted for nearly 13% (Fig 1). There were 16 institutions in total publishing 150 or more biomimetic research papers in 2024 (Table 1). It can be seen that in recent years more and more biomimetic achievements have been published in the high-level journals such as Advanced Functional Materials, Advanced Materials, ACS Nano, Nature Communications, Advanced Science, etc., indicating that bimimetic research has received more and more attention from academic fields.

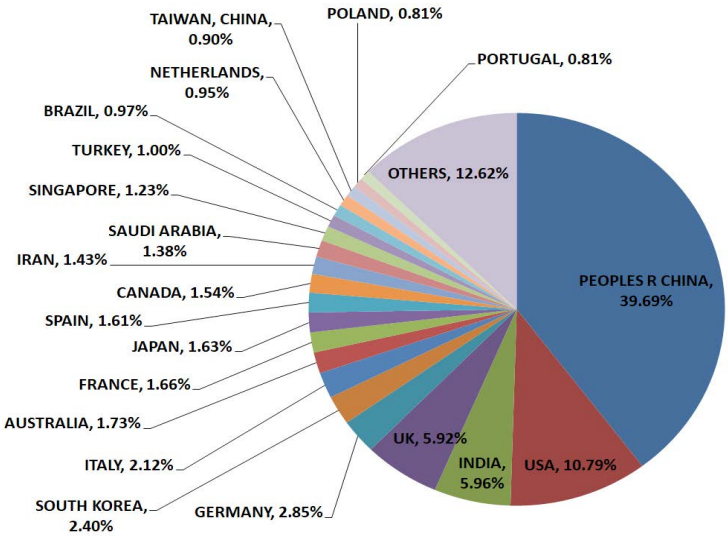



*Fig 1 Distribution of biomimetic research papers among different countries/regions in 2024*

Table 1 The top 16 institutions in 2024 (The number included co-authored papers)

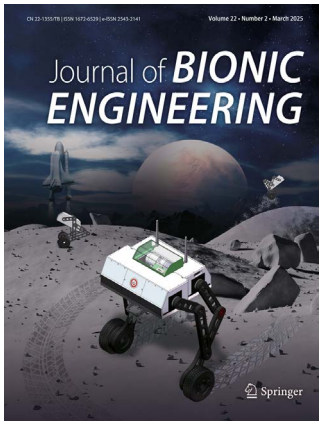
| Rank | Institution | Number of papers | Rank | Institution | Number of papers |
|---|---|---|---|---|---|
| 1 | CHINESE ACADEMY OF SCIENCES | 927 | 9 | UNIVERSITY OF SCIENCE TECHNOLOGY OF CHINA | 189 |
| 2 | UNIVERSITY OF CHINESE ACADEMY OF SCIENCES CAS | 354 | 10 | CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNR | 188 |
| 3 | JILIN UNIVERSITY | 301 | 11 | HARBIN INSTITUTE OF TECHNOLOGY | 169 |

| | | | | | |
|---|---|---|---|---|---|
| 4 | SHANGHAI JIAO TONG UNIVERSITY | 285 | 12 | FUDAN UNIVERSITY | 162 |
| 5 | ZHEJIANG UNIVERSITY | 274 | 13 | BEIHANG UNIVERSITY | 157 |
| 6 | SICHUAN UNIVERSITY | 233 | 14 | UNIVERSITY OF CALIFORNIA SYSTEM | 156 |
| 7 | INDIAN INSTITUTE OF TECHNOLOGY SYSTEM | 219 | 15 | XI AN JIAOTONG UNIVERSITY | 154 |
| 8 | TSINGHUA UNIVERSITY | 198 | 16 | PEKING UNIVERSITY | 150 |

Table 2 The top 20 journals in 2024

| Rank | Journal | IF (2023-2024) | Number of papers |
|---|---|---|---|
| 1 | CHEMICAL ENGINEERING JOURNAL | 13.4 | 326 |
| 2 | **BIOMIMETICS** | 3.4 | 317 |
| 3 | ACS APPLIED MATERIALS INTERFACES | 8.5 | 300 |
| 4 | ADVANCED FUNCTIONAL MATERIALS | 18.5 | 275 |
| 5 | ADVANCED MATERIALS | 27.4 | 194 |
| 6 | SMALL | 13 | 176 |
| 7 | INTERNATIONAL JOURNAL OF BIOLOGICAL MACROMOLECULES | 7.7 | 168 |
| 8 | ADVANCED SCIENCE | 14.3 | 149 |
| 9 | ACS NANO | 15.8 | 145 |
| 10 | NATURE COMMUNICATIONS | 14.7 | 131 |
| 11 | SCIENTIFIC REPORTS | 3.8 | 117 |
| 12 | ADVANCED HEALTHCARE MATERIALS | 10.0 | 108 |
| 13 | ANGEWANDTE CHEMIE INTERNATIONAL EDITION | 16.1 | 99 |
| 14 | **BIOINSPIRATION BIOMIMETICS** | 3.1 | 90 |
| 15~16 | **JOURNAL OF BIONIC ENGINEERING** | 4.9 | 75 |
| 15~16 | JOURNAL OF THE AMERICAN CHEMICAL SOCIETY | 14.5 | 75 |
| 17 | JOURNAL OF MATERIALS CHEMISTRY B | 6.1 | 73 |
| 18 | IEEE ROBOTICS AND AUTOMATION LETTERS | 4.6 | 68 |
| 19 | OCEAN ENGINEERING | 4.6 | 66 |
| 20 | PHYSICS OF FLUIDS | 4.1 | 65 |

(by ISBE Secretariat)




# Journal of Bionic Engineering

Journal of Bionic Engineering (JBE) applies insight from nature and biological systems to solve bionic engineering challenges; offers research on kinematical mechanics and control of animal locomotion; explores bioinspired computation methods and artificial intelligence.

**The topics of Journal of Bionic Engineering (JBE) include but are not limited to:**

• Mechanisms, kinematical mechanics and control of animal locomotion, development of mobile robots with walking (running and crawling), swimming or flying abilities inspired by animal locomotion.

• Structures, morphologies, composition and physical properties of natural and biomaterials; fabrication of new materials mimicking the properties and functions of natural and biomaterials.

• Biomedical materials, artificial organs and tissue engineering for medical applications; rehabilitation equipment and devices. Development of bioinspired computation methods and artificial intelligence for engineering applications.

**Journal Homepage:** *http://www.springer.com/journal/42235*

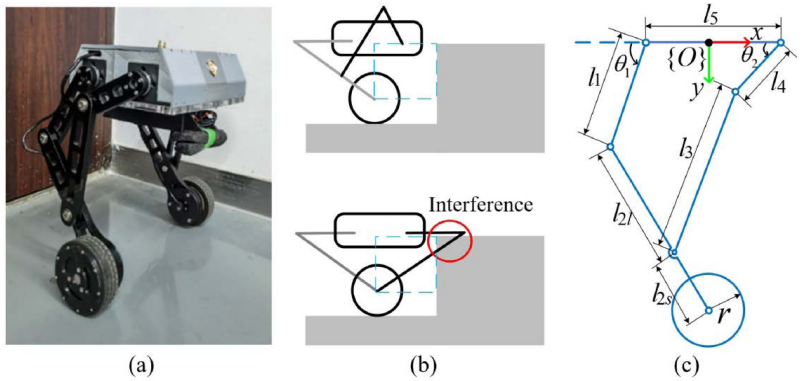
Research Article

## Whole-Body Hybrid Torque-Position Control for Balancing with a New Wheeled Bipedal Robot

Yi Xiong, Haojie Liu, Bingxing Chen, Yanjie Chen, Ligang Yao & Zongxing Lu

Abstract

The wheeled bipedal robots have great application potential in environments with a mixture of structured and unstructured terrain. However, wheeled bipedal robots have problems such as poor balance ability and low movement level on rough roads. In this paper, a novel and low-cost wheeled bipedal robot with an asymmetrical five-link mechanism is proposed, and the kinematics of the legs and the dynamics of the Wheeled Inverted Pendulum (WIP) are modeled. The primary balance controller of the wheeled bipedal robot is built based on the Linear Quadratic Regulator (LQR) and the compensation method of the virtual pitch angle adjusting the Center of Mass (CoM) position, then the whole-body hybrid torque-position control is established by combining attitude and leg controllers. The stability of the robot's attitude control and motion is verified with simulations and prototype experiments, which confirm the robot's ability to pass through complex terrain and resist external interference. The feasibility and reliability of the proposed control model are verified.




(a) (b) (c)

# Reconsideration on the maximum deformation of droplets impacting on solid surfaces

Droplet impact on solid surfaces is widely involved in diverse applications such as spray cooling, self-cleaning, and hydrovoltaic technology. Maximum solid-liquid contact area yielded by droplet spreading is one key parameter determining energy conversion between droplets and surfaces. However, for the maximum deformation of impact droplets, the contact length and droplet width are usually mixed indiscriminately, resulting in unignored prediction errors in the maximum contact area.

Recently, Zhifeng Hu et al. published an article "**Reconsideration on the maximum deformation of dropletsimpacting on solid surfaces**" in *Droplet* (https://onlinelibrary.wiley.com/doi/10.1002/dro2.163). They investigated and highlighted the difference between the maximum contact length and maximum droplet width. The results show the maximum droplet width is never smaller than the maximum contact length, and the difference appears once the contact angle exceeds 90° (which becomes more significant on superhydrophobic surfaces), regardless of impact velocities, liquid viscosities, and system scales (from macroscale to nanoscale). A theoretical model analyzing the structure of the spreading rim was proposed to demon-strate and quantitatively predict the above difference, agreeing well with experimental results. Based on molecular dynamics simulations, the theoretical analysis was further extended to the scenario of nanodroplets impacting on solid surfaces. Reconsideration on the maximum deformation of impact droplets underscores the often-overlooked yet significant difference between maximum values of contact length and droplet width, which is crucial for applications involving droplet-interface interactions.

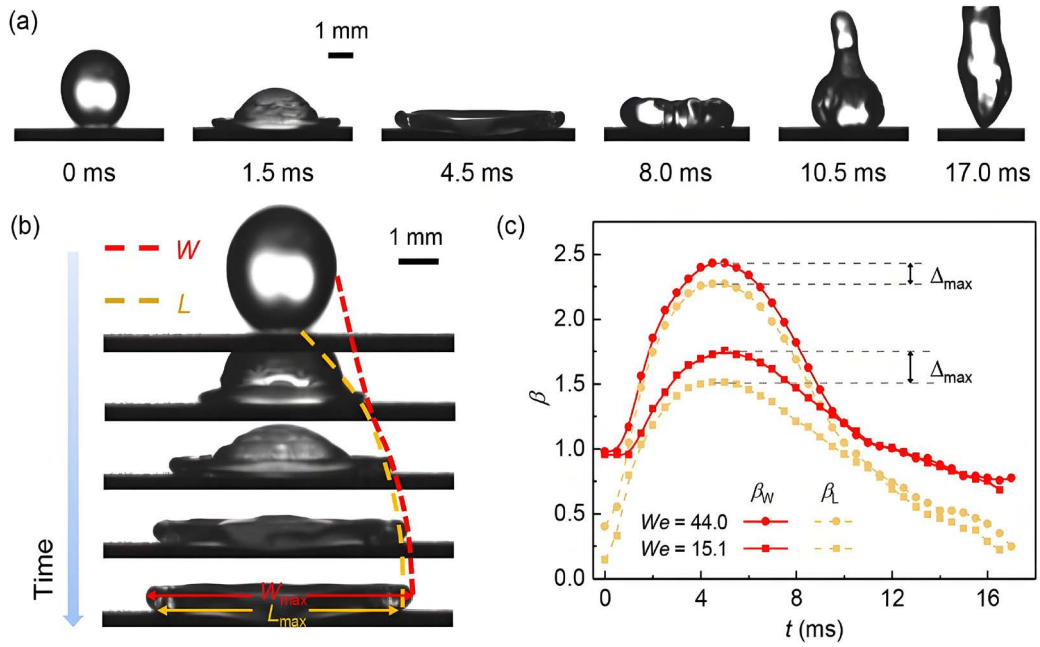



*Figure 1 Dynamic behaviors and maximum deformation of droplets impacting on the superhydrophobic surface (with the advancing contact angle $\theta_a$ = 162°). (a) Dynamic behaviors of impact droplets at We = 44.0. (b) Evolutions of the droplet width (W, red line) and contact length (L, orange line) during droplet spreading. (c) Time-varied droplet width coefficient $\beta_W$ and contact length coefficient $\beta_L$ at different We. $\Delta_{max}$ denotes the difference between $\beta_{W,max}$ and $\beta_{L,max}$.*

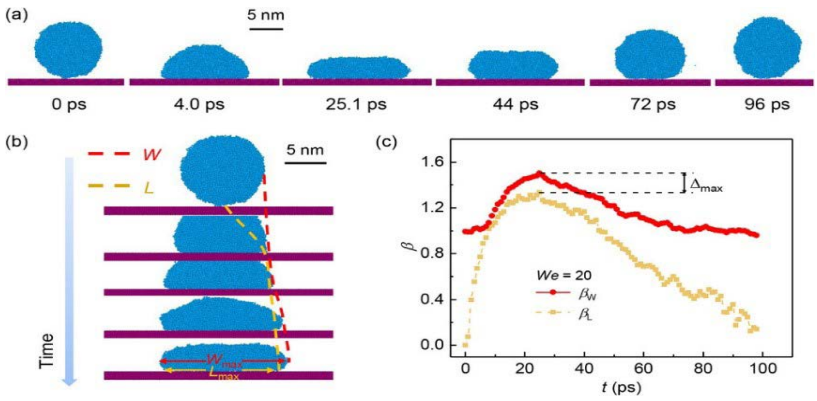



*Figure 2 Dynamic behaviors and maximum deformation of nanodroplets impacting on the superhydrophobic surface (with the static contact angle $\theta_s$ = 160°). (a) Dynamic behaviors of impact nanodroplets at We = 20. (b) Evolution of the droplet width (W, red line) and contact length (L, orange line) during droplet spreading. (c) Time-varied droplet width coefficient $\beta_W$ and contact length coefficient $\beta_L$ at We = 20. $\Delta_{max}$ denotes the difference between $\beta_{W,max}$ and $\beta_{L,max}$.*

## Call for Papers

A themed issue "Interfacial dynamics and phase behavior of complex droplets and bubbles" is calling for papers. The themed issue will focus on the new science and technology in droplet/bubble interface research related to a variety of fields ranging from new materials, new energy to human health.

Guest Editors:

Prof. Duyang Zang
Northwestern Polytechnical University, China

Prof. Fubing Bao
China Jiliang University, China

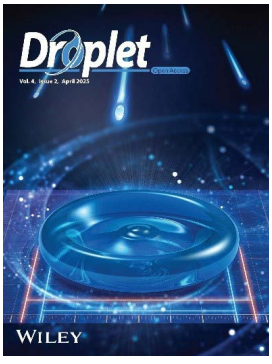
Prof. Bernard P. Binks
University of Hull, United Kingdom

Prof. Jianlin Liu
China University of Petroleum (UPC), China

Prof. Xuejin Li
Zhejiang University, China

Prof. Anniina Salonen
ESPCI, France

For more details: https://onlinelibrary.wiley.com/page/journal/27314375/call-for-papers/si-2025-000737




Droplet covers the design, synthesis, fabrication, characterization, manipulation, control, application and commercialization of structures, devices and systems that involve droplets and related objects from microscopic to macroscopic scales.

**Indexing Information:**

* ESCI (Clarivate Analytics)
* Web of Science (Clarivate Analytics)
* EI COMPENDEX (Elsevier)
* SCOPUS (Elsevier)
* Directory of Open Access Journals (DOAJ)
* CAS: Chemical Abstracts Service (ACS)

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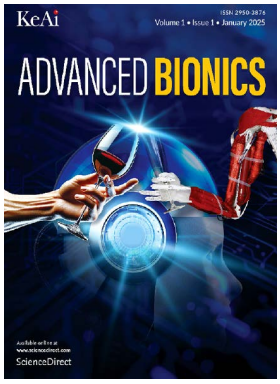
***Droplet*** has received its first Impact Factor of **9.1**, ranking 23rd out of 187 journals in the "PHYSICS, APPLIED" category (JCR **Q1**). There has never been a better time to submit your work to us, find out more: https://onlinelibrary.wiley.com/journal/27314375

# Newly Published Journal: Advanced Bionics




Advanced Bionics (ABS) is an international peer-reviewed, open access journal that publishes original research papers, reviews, letters, editorials, highlights, perspectives, comments and news.

ABS focuses on the study of novel principles and functions observed in biological systems, as well as the application of this knowledge to address real-world scientific challenges.

ABS aims to lead advancements in fundamental bionic research, pushing the boundaries of novel bionic investigations and fostering disruptive technologies within the field. Submissions to the journal are expected to provide fresh insights, possess scientific impact and a high level of quality, as well as contribute to shaping the future of bionic research.

As an interdisciplinary journal, ABS covers a wide array of topics, including but not limited to:

(1) Bionic Robotics, Electronics, and Intelligent Devices
(2) Bio-inspired Artificial Intelligence
(3) Biomechanics and Bionic Healthcare Engineering
(4) Bio-inspired Functional Surfaces/Interfaces
(5) Bio-inspired Functional Materials and Biosensors
(6) Bio-inspired Energy System
(7) Bio-manufacturing and Bionic Manufacturing
(8) Bio-inspired structures and design

Journal Homepage

*https://www.keaipublishing.com/en/journals/advanced-bionics/*

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# Exploring Biodiversity for Biomimetics in the North of Thailand

*Chayapol Hansanelak[1,2], Sanhanat Lertvittayavivat[1,3], Poramate Manoonpong[1], Stanislav N. Gorb[4]*

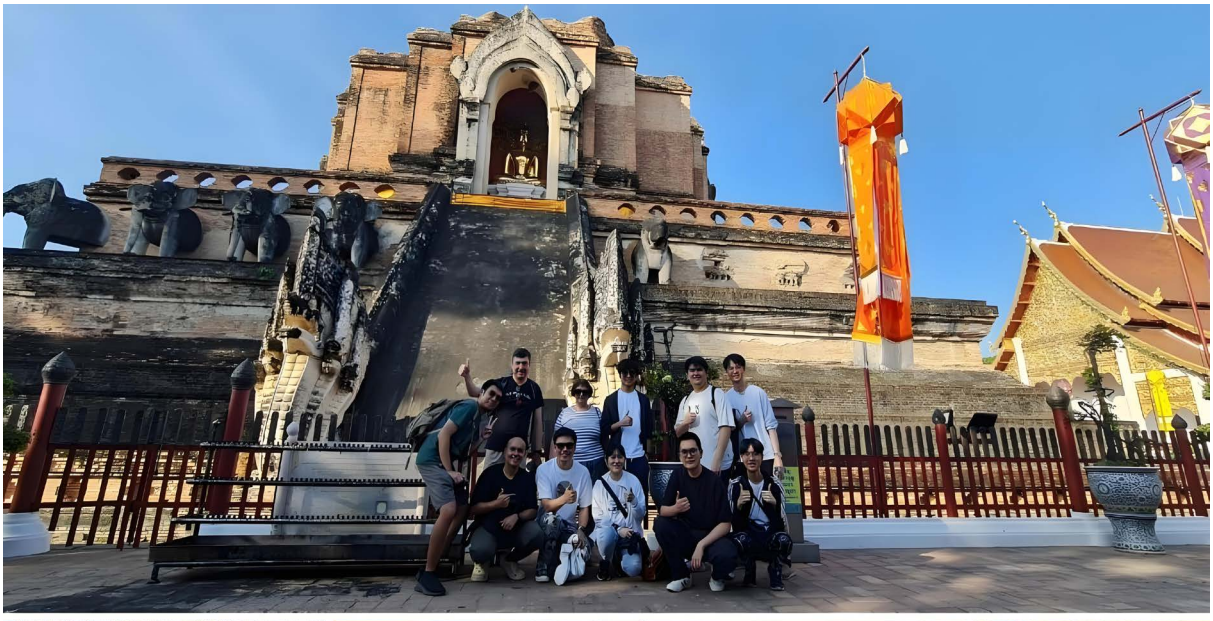
*[1]School of Information Science and Technology, Vidyasirimedhi Institute of Science and Technology, Rayong, Thailand*

*[2]Institute of Field Robotics, King Mongkut's University of Technology Thonburi, Bangkok, Thailand*

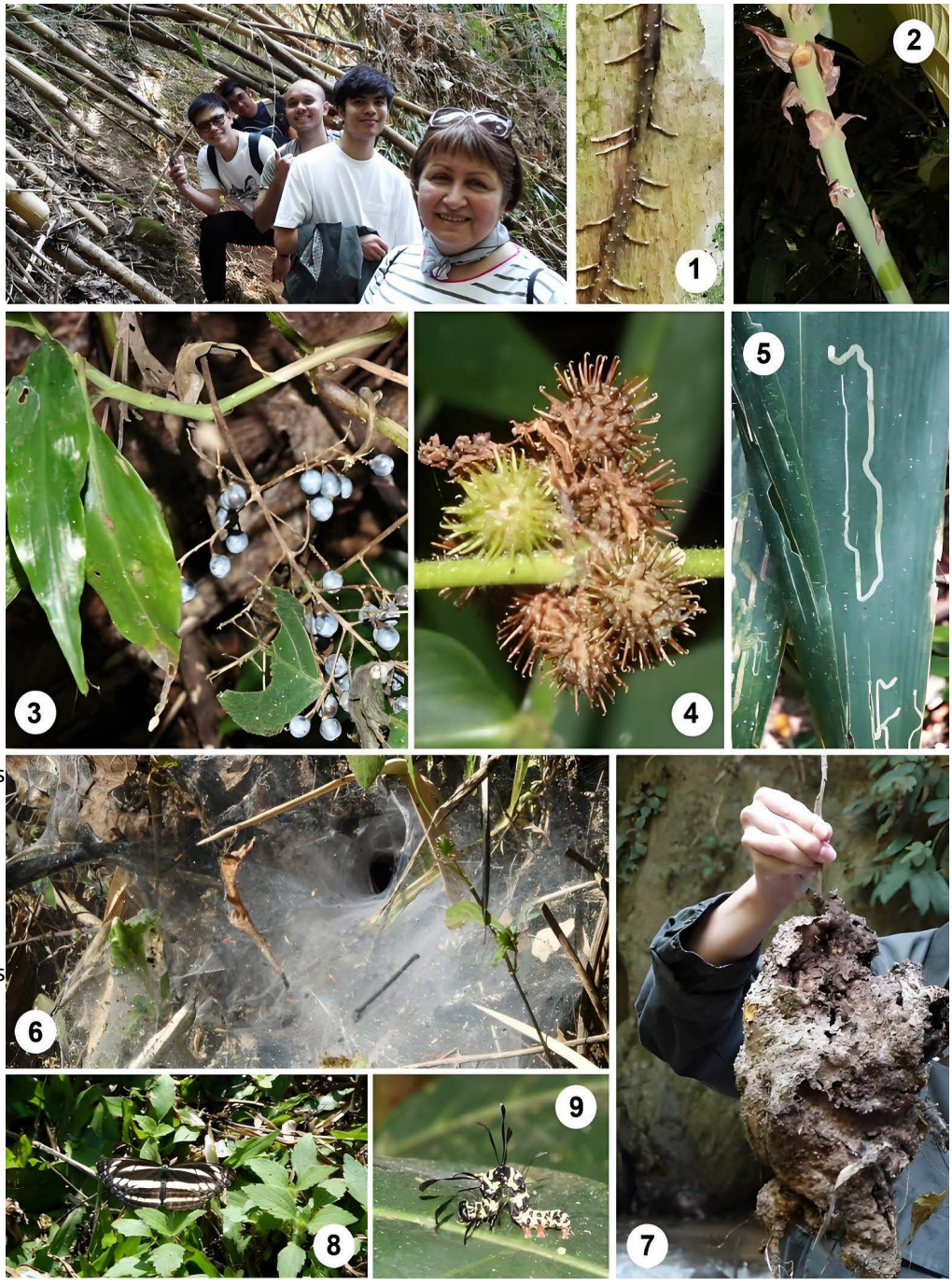
*[3]Prince of Songkla University, Songkla, Thailand*

*[4]Zoological Institute, Kiel University, Kiel, Germany*

In February 2025, ISBE members Professor Stanislav N. Gorb and Dr. Elena Gorb from Kiel University, Germany, together with Professor Poramate Manoonpong and his research team from the Vidyasirimedhi Institute of Science and Technology (VISTEC), Thailand, performed their field trip in Chiang Mai, a northern city in Thailand. The purpose of their trip was to explore biodiversity and collect biological samples for future studies in biology and biomimetics.



*[1]The team includes Dr. Harn Sison (Postdoc), Dr. Worasuchad Haomachai (Postdoc), Dr. Naris Asawalertsak (Postdoc), Mr. Rujikorn Charakorn (PhD student), Mr. Thirawat Chuthong (PhD student), Ms. Manatsanan Trakulruangroj (Research engineer), Mr. Chayapol Hansanelak (Internship student), and Mr. Sanhanat Lertvittayavivat (Internship student).*

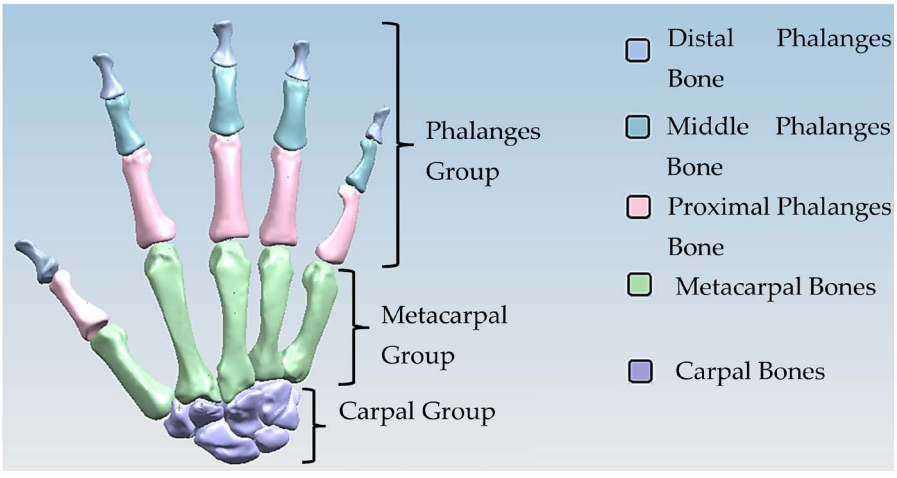



The trip started with an exploration of Chiang Mai's cultural heritage, followed by an immersion in its natural environment. The team conducted a field study at Doi Mae Mae, guided by Dr. Chanaporn Suttinun from Chiang Mai University. Their investigation focused on mayfly larvae in the river and their ecological role as bioindicators of water quality. Additionally, the team examined the distinctive morphological traits of these larvae, including their delicate wing pads and exceptionally strong mouthparts, as well as the locomotion and swarm behaviors of water striders. During their time in the rainforest of Doi Mae Mae, the international biomimetics team consisting of botanists, zoologists, materials scientists and engineers explored numerous biological phenomena related to plants, such as adhesive roots (1) and non-adhesive stems (2), fruits with structural coloration (3) and micro-hooks (4). Inspirations from the animals were even more diverse ranging from traces of mining insects in the plant leaves (5), butterflies with camouflaging coloration pattern (8), caterpillars with unusual attachment pads (9) to architectures of spider webs (6) and canopy-dwelling ant nests (7). Obtained inspiration from the amazing biodiversity in Thailand can potentially be a good start for numerous scientific projects strengthening future collaboration between Thai and German teams.

# Innovative Bionics Product Life-Cycle Management Methodology Framework with Built-In Reverse Biomimetics: From Inception to Clinical Validation

*Kazem Alemzadeh, University of Bristol, UK*

This study uses bionics as an enabling methodology to bridge the gap between biology and engineering for generating innovative designs for implementation into novel technology development. A product lifecycle management (PLM) methodology framework is proposed that uses bionics as a technical discipline. The manuscript presents a novel, reverse biomimetics as a shape abstraction methodology to investigate, analyse, and de-feature biological structures through functional morphology as the enabling methodology for studying the relationships between form and function. The novel reverse engineering (RE) format with eleven stages supports technical biology, addressing the abstraction issues which have been identified as the most difficult steps in Fayemi's eight-step framework. Inverse biomimetics and RE changes functional modelling (FM) from highly abstracted principles to low- or even reality-level abstraction, achieving nature design intents. The goal of the reverse biomimetic approach is to implement functional feature extraction, surface reconstruction, and solid modelling into five stages of a design process. The benefit of virtually mapping this in a pictorial fashion with high-end software fosters a simpler understanding and representation of knowledge transfer from biology to engineering, and can lead to innovative bio-inspired developments. The study aims to present the bionics PLM framework and its comprehensive processes of bionic design and biomimetic modelling, simulation, optimisation, and clinical validation techniques for two large-scale, human skeletal biological systems: a drug-releasing chewing robot and an anthropometric prosthetic hand suitable for introduction to engineering courses. Integration into undergraduate courses would be one route to bolster interest and encourage growth within the subject area in future.



# Emerging bioinspired hydrovoltaic electricity generators

*Guangtao Zan[a], Shengyou Li[a], Kaiying Zhao[a], HoYeon Kim[a], EunAe Shin[a,b], Kyuho Lee[a], Jihye Jang[a], Gwanho Kim[a], Yeonji Kim[a], Wei Jiang[a], Taebin Kim[a], Woojoong Kim[a], Cheolmin Park[a,c]*

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*[b] Korea Packaging Center, Korea Institute of Industrial Technology, Bucheon 14449, Republic of Korea*

*[c] Post-Silicon Semiconductor Institute, Korea Institute of Science and Technology, Seoul 02792, Republic of Korea*

Guangtao Zan (first author)

Prof. Cheolmin Park (corresponding aunthor)

Hydrovoltaic electricity generators (HEGs) are an emerging class of green energy harvesters, complementing photovoltaics, thermoelectrics, piezoelectrics, and triboelectrics. Distinguished by their ability to operate independently of time and location, HEGs harness the ubiquitous presence of water in its various forms—ranging from atmospheric moisture to liquid water, droplets, and waves—interacting directly with nanomaterials and nanostructures to convert ambient energy into electricity. To date, four primary types of HEGs have been developed based on their water sources and power generation mechanisms: moisture electricity generators (MEGs), evaporation electricity generators (EEGs), droplet electricity generators (DEGs), and reverse electrodialysis electricity generators (REGs). While HEGs remain in their infancy with relatively limited output performance, a diverse array of strategies is being pursued to boost their efficiency.

Nature, as a master of water manipulation, offers a rich reservoir of inspiration. From the efficient water transport in plants to the adaptive wetting of insect wings, biological systems demonstrate extraordinary capabilities in managing water for complex life processes and functions. Drawing from these mechanisms, researchers are infusing HEG devices with bioinspired designs. This review systematically explores the biological structures, functions, and processes that can inspire next-generation HEGs, categorizing bioinspiration into three hierarchical levels: (1) elementary bioinspired materials, (2) smart bioinspired structures, and (3) living bioinspired devices. By offering a comprehensive and forward-looking synthesis, this review aims to illuminate the path for future breakthroughs in the dynamic field of hydrovoltaic energy generation.

Full Paper: *https://doi.org/10.1039/D4EE03356F*

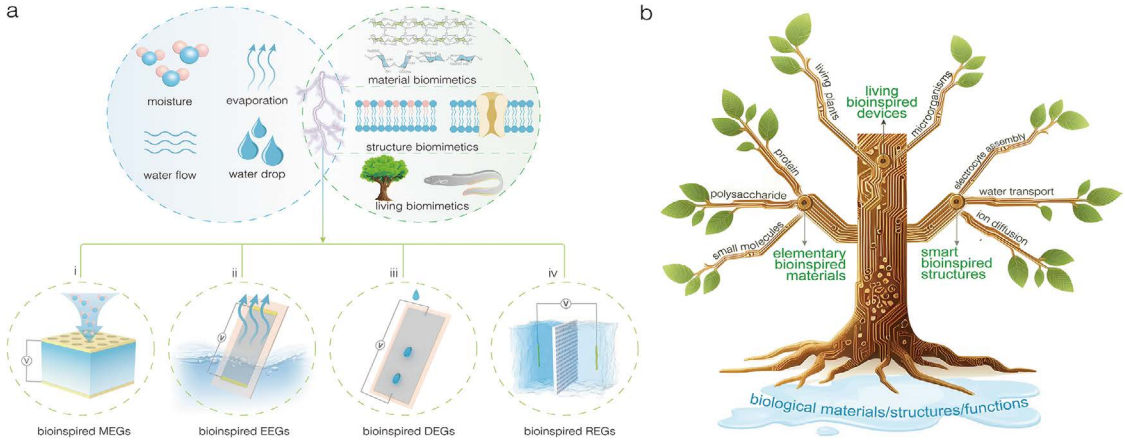


*Fig.1 Different types of hydrovoltaic devices involved in the fusion of hydrovoltaic technology and bioinspired concepts*

# Additive manufacturing of bionic interfaces: From conceptual understanding to renewable energy applications

*Xuliang Chen[a,b,d,e,f,1], Annan Chen[a,b,1], Lei Zhang[a,b,c,1], Hanyang Yu[a,b], Zhengyi Mao[a,b],Yuhan Chen[a,b], Jialun Gu[b], Chunze Yan[c], Jian Lu[a,b,d,e,f,*]*

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*[b] Department of Mechanical Engineering, City University of Hong Kong, Hong Kong, China*

*[c] State Key Laboratory of Materials Processing and Die & Mould Technology, Huazhong University of Science and Technology, Wuhan, China*

*[d] City University of Hong Kong Shenzhen Research Institute, Greater Bay Joint Division, Shenyang National Laboratory for Materials Science, Shenzhen, China*

*[e] Hong Kong Branch of National Precious Metals Material Engineering Research Center, City University of Hong Kong, China*

*[f] Guangdong-Hong Kong Joint Laboratory of Modern Surface Engineering Technology, City University of Hong Kong, China*

Bionic interfaces exhibit multiscale features with various functions that reduce energy consumption and produce renewable resources to support life, triggering them an emerging area of technological revolution in many disciplines. To improve the design and fabrication flexibility, additive manufacturing (AM) technology has been attempted to achieve multiscale structures and reconstruct biological functions at interfaces. Emerging AM of bionic interfaces has led to substantial advancements in renewable energy applications in recent years, but some challenges remain to be overcome. This review first presents a basic understanding of bionic mechanisms and typical manufacturing techniques especially AM. Subsequently, it emphasizes the latest progress of the bionic interfaces and AM on various renewable energy applications, such as those for wetting-controlled surfaces, energy harvesting, water treatment, batteries, and catalysts. Finally, it discusses some challenges and provides insights on how bionic interfaces and AM provide innovative solutions for next-generation renewable energy applications.

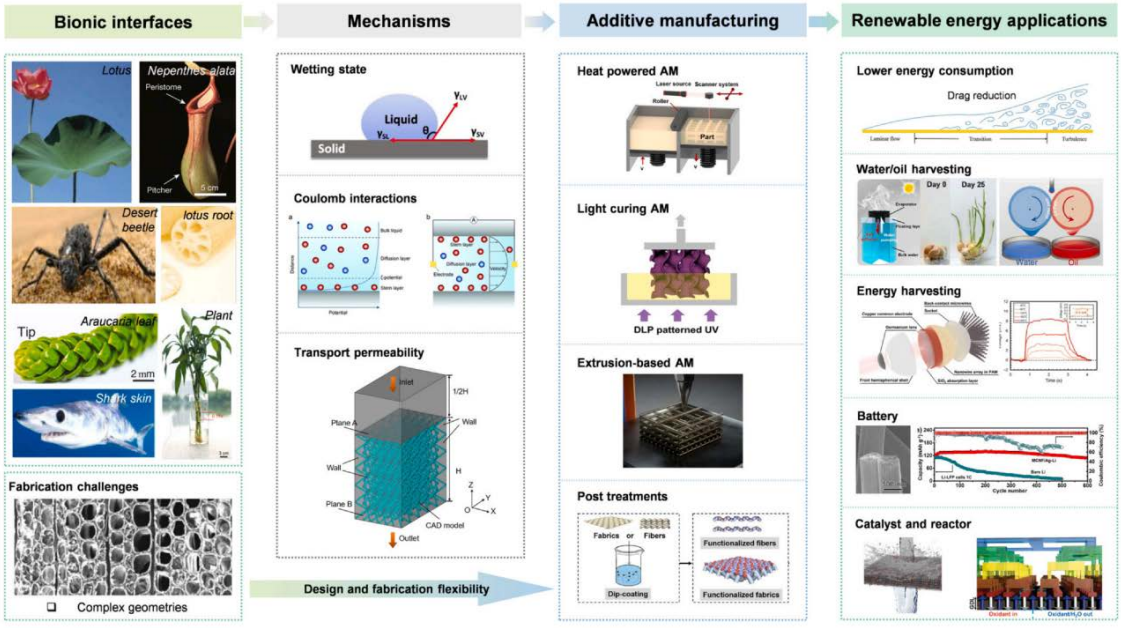


*Fig. 1. Outline of this review. Representative biological interfaces include those of the lotus, Nepenthes alata, the desert beetle, lotus root, Araucaria leaf, shark skin, and plant, all of which have complex geometries with an example of porous structures. The discovered bionic mechanisms are mainly based on wetting state, Coulomb interactions, and transport permeability. The several major categories of AM methods include heat-powered AM, light-curing AM, extrusion-based AM, and their post treatments. The renewable energy applications of bionic interfaces include drag reduction, water/oil harvesting, energy harvesting, batteries, catalyst and reactor.*

# International Workshop on Bionic Engineering (IWBE 2025)

# The 15th Plenary Meeting of ISO/TC 266 Biomimetics

## September 23-27, 2025, Vienna, Austria

**Host**: International Society of Bionic Engineering (ISBE)

ISO/TC 266 Biomimetics

**Organizers:**

TU Wien

Jilin University

Beijing Research Institute of Automation for Machinery Industry Co., Ltd.

By mimicking nature's designs and processes, bionics offers innovative solutions to complex challenges, improving human life and pushing the limits of what is possible. The ISBE organizes the International Workshop on Bionic Engineering (IWBE) in different countries since 2017 aiming to provide excellent academic exchange platform for all of the bionics researchers around the world. As with the previous workshop series, IWBE 2025 will be jointly organized with the 15th Plenary Meeting of ISO/TC 266 Biomimetics on September 23-27 in Vienna, Austria. This joint event will focuses on technology innovation and standardization.

Vienna, the capital city of Austria, is a beautiful and historic city that is filled with culture and charm. Vienna is located in the northeast of Austria, with the Danube River flowing through it. The city is famous for being the City of Music. Vienna is also known for its stunning architecture such as the Imperial Palace, Schoenbrunn Palace, Stephansdom, etc. Vienna is constantly updating itself to suit its hard-earned title as one of Europe's prettiest and most liveable cities.

IWBE 2025 website: https://isbe-online.com/?ui=english&mod=info&act=view&id=5277

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## Topics

Biological systems and biodiversity
Bioinspired surfaces and interfaces
Bioinspired structures and materials
Biomimetics and Arts
Environmental perception and bionic sensing
Motion bionics and bionic intelligence
Biomechanics and bionic healthcare engineering
Biofabrication and bionic manufacturing
Application and standardization of bionics

## Important Dates

June 15, 2025: Abstract submission deadline
June 30, 2025: Early bird registration deadline
September 23, 2025: Registration
September 24-26, 2025: Workshop & Meeting
September 27, 2025: Technical visiting

## Abstract Submission:

Submission page: http://iwbe2025.huicekeji.com//EnUserCentral/Index/Login

The workshop invites scholars to submit proposals for presentations before April 30, 2024. The abstract should be one or two A4 pages in length, may include figures, tables and references.

## Contact Information

IWBE 2025: secretariat@isbe-online.org
ISO/TC 266 Plenary Meeting: isotc266@riamb.ac.cn
Invitation letter: ille.gebeshuber@mac.com
graves@iap.tuwien.ac.at


The 11th International Conference on Bioengineering and Biotechnology (ICBB 2025) will be delivered in-person in Paris, France and virtually, providing the opportunity of online presentation for the people who can not travel for any reason. Attendees will be able to connect with researchers from across the globe and network in-person or virtually. The registration fee for virtual participation is reduced.

ICBB 2025 is a part of the NewTech congress and conference papers will be published in the NewTech Congress proceedings.

ICBB is an acronym for International Conference on Bioengineering and Biotechnology.

**Topics for ICBB 2025 include, but are not limited, to the following:**

* Biochemistry and Biochemical Engineering
* Biofuels
* Biomaterials
* Biomedical Engineering
* Biotechnology-based Products
* Genetic Engineering

Poster Board Dimensions:

Authors presenting via poster boards are to be informed that poster boards are 90 cm height and 70 cm width.

**The important dates and deadlines for the 11th International Conference on Bioengineering and Biotechnology (ICBB 2025) are as follows:**

| | | |
|---|---|---|
| CONFERENCE DATES | August 21-23, 2025 | |
| SUBMISSION DEADLINES | Extended Paper Submission Deadline | April 10, 2025 |
| | Extended Notification to Authors | May 1, 2025 |
| | Extended Final Version of Accepted Submissions | May 15, 2025 |
| REGISTRATION DEADLINES | Extended Early-Bird Registration | May 15, 2025 |
| | Extended Regular Registration | June 19, 2025 |
| | Late Registration | After June 19, 2025 |

More information about the conference: https://bbseries.org/

Scopus Google Scholar PORTICO Crossref Semantic Scholar

# IEID 2025

September 19-21, 2025
Hangzhou, China

## 2025 International Conference on Intelligent Equipment and Industrial Design

Official Website: www.icleid.org

## Organization

Host: East China Jiaotong University
Organizer: School of Mechatronics and Vehicle Engineering, East China Jiaotong University
Supporters: Leuphana Universität Lüneburg
Robotics and Automation Research Lab.
Technical Support: IEEE
IEEE Industrial Electronics Society

## Publication

IEEE

All papers will be reviewed by two or three expert reviewers from the conference committees. After a careful reviewing process, all accepted papers will be published in IEEE, which will be submitted for indexing by IEEE Xplore, EI Compendex, Scopus and Inspec.


IEID 2025 has been approved by IEEE and being online on IEEE conference search

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## Call For Papers

### Intelligent Equipment

- Intelligent Control Systems
- Intelligent Industrial Robotics
- Machine Learning and Artificial Intelligence in Manufacturing
- Smart Sensors and Actuators
- Human-Machine Interaction and Collaboration
- Smart Manufacturing
- Industry 4.0 and Smart Factory
- Digital Manufacturing of Intelligent Equipment
- Automation and Robotics Frontiers
- Intelligent Maintenance and Diagnostics
- Intelligent Transportation and Logistics Equipment
- Intelligent Agricultural Equipment
- Mechatronics and System Integration
- Automated Inspection and Measurement Technology
- Intelligent Power and Electronic Equipment

### Industrial Design

- Digital Service Design
- Virtual Design & Computer Simulation
- Application of Big Data and AI in Design
- Applications of Virtual and Augmented Reality in Industrial Design
- 3D Modeling & Animation
- Energy Management & Smart Grid Design
- Human-Machine Inclusion and Intelligent Human-Machine Interface
- Control System Design for Intelligent Equipment
- IoT Integration in Control System Design
- Wireless Communication System Design for Control
- High-Performance Motion Control Systems Design
- Signal Processing System Design for Control
- Design Techniques for Fault-Tolerant Control Systems
- Smart Grid Control System Design
- Design of Networked Control Systems

## Program

| | | |
|---|---|---|
| September 19, 2025 | 14:00-17:00 | Registration |
| September 20, 2025 | 09:00-12:00 | Keynote Speeches |
| | 12:00-14:00 | Lunch |
| | 14:00-17:30 | Oral Presentations |
| | 18:00-19:30 | Banquet |
| September 21, 2025 | 09:00-18:00 | Investigation (TBD) |

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# Newsletter

**ISBE Newsletter**



Published by the International Society of Bionic Engineering (ISBE)

ISBE Newsletter

Volume 14, Issue 2, 2025

# ISBE NEWSLETTER

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