



***Bio-inspired Intelligence*: bridging biological principles and intelligent systems**

Wei He

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The rapid development of artificial intelligence, robotics, neuroscience, cognitive science, computational science, biomechanics, and advanced materials is reshaping the landscape of intelligent systems. Despite remarkable progress in algorithms and computational power, biological organisms continue to demonstrate extraordinary capabilities in perception, learning, locomotion, adaptation, decision-making, coordination, and interaction. These capabilities have evolved through highly integrated relationships among structure, sensing, computation, actuation, behavior, and the environment, offering a rich source of principles for the development of next-generation intelligence.

It is within this context that *Bio-inspired Intelligence* is established as an international, peer-reviewed, open-access journal dedicated to advancing the science and technology of intelligence inspired by biology. The journal aims to provide a multidisciplinary platform connecting foundational sciences - including biology, neuroscience, cognitive science, biomechanics, and materials science - with artificial intelligence, robotics, control, and computational engineering.

The emergence of bio-inspired intelligence reflects a broader shift in how intelligence is understood. Intelligence is no longer viewed solely as the outcome of increasingly powerful computation. Biological systems demonstrate that intelligent behavior can emerge from the interaction of neural processes, body morphology, physical materials, sensory mechanisms, behavioral strategies, and environmental dynamics. At the same time, biological principles can be abstracted into computational models and algorithms without necessarily requiring direct physical imitation. This creates a broad spectrum of research, ranging from brain-inspired computation and evolutionary algorithms to embodied intelligent robots and biohybrid systems.

Bio-inspired Intelligence seeks to bring these research directions together under a common scientific framework. The journal focuses on understanding, modeling, abstracting, and engineering the principles through which biological systems perceive, learn, reason, move, adapt, coordinate, and interact. We are particularly



College of Automation and Institute of Artificial Intelligence, Beijing Information Science and Technology University, Beijing 102206, China.

Correspondence to: Prof. Wei He, College of Automation and Institute of Artificial Intelligence, Beijing Information Science and Technology University, Beijing 102206, China. E-mail: weihe@ieee.org

interested in research that establishes a meaningful connection between biological inspiration and new forms of intelligence, rather than merely adopting biological terminology or superficial morphological analogies.

Biological inspiration can enter the research process at different levels. At the computational level, neural architectures, synaptic plasticity, evolutionary processes, collective behavior, and biological learning strategies can inspire new computational paradigms, learning algorithms, optimization methods, and decision-making frameworks. At the perceptual level, biological sensory systems can inspire new approaches to vision, tactile sensing, multimodal perception, active sensing, and sensorimotor intelligence. At the physical level, biological morphology, compliant structures, materials, and locomotion mechanisms can inspire new robots, actuators, intelligent materials, and embodied systems. These different levels are complementary rather than mutually exclusive.

A central objective of the journal is therefore to connect biological principles, intelligent computation, physical embodiment, and engineering realization. We welcome both theoretical and experimental research, from fundamental models of biological intelligence to computational algorithms, intelligent materials, robotic systems, and real-world applications. This broad scope allows the journal to accommodate research across different levels of abstraction while maintaining a common emphasis on biological inspiration and intelligent behavior.

Embodiment represents an important dimension of this vision. In many biological systems, intelligence is closely coupled with the body and the physical environment. Morphology can simplify control, materials can provide passive adaptation, and movement can actively shape perception. Such interactions have motivated the emerging concepts of embodied intelligence and physical intelligence. *Bio-inspired Intelligence* welcomes research investigating these relationships and encourages experimental validation on physical platforms when embodiment is central to the scientific question.

At the same time, the journal recognizes that not all forms of bio-inspired intelligence require physical embodiment. Brain-inspired computation, neuromorphic intelligence, evolutionary computation, swarm intelligence, and biologically inspired learning can generate important advances at the computational or theoretical level. The journal therefore welcomes rigorous theoretical, computational, and simulation-based contributions when they provide substantive biological grounding and advance the understanding or engineering of intelligence.

The journal covers a broad range of interconnected research areas, including bio-inspired intelligence and biological mechanisms of intelligent behavior; brain-inspired intelligence, neural computation, and neuromorphic systems; bio-inspired computation, learning, optimization, and evolutionary intelligence; embodied and physical intelligence; bio-inspired perception, cognition, navigation, and sensorimotor coordination; bio-inspired control, decision-making, and adaptation; bio-inspired robotics and autonomous systems; soft robotics, intelligent materials, morphing structures, and biomechanics; swarm and collective intelligence; and human–machine, organism–machine, and biohybrid systems.

An important goal of the journal is to promote interaction between communities that have traditionally developed along separate disciplinary paths. Researchers in neuroscience may investigate the mechanisms of biological information processing, computer scientists may abstract these mechanisms into computational models, control researchers may develop adaptive strategies, roboticists may implement them in physical systems, and materials scientists may create structures capable of sensing and responding to their environments. Bringing these perspectives together can reveal scientific principles that would remain difficult to identify within individual disciplines.

The journal also places strong emphasis on scientific rigor and meaningful validation. The appropriate form of validation depends on the nature of the contribution. Theoretical studies should provide rigorous analysis and clearly defined assumptions; computational studies should use appropriate benchmarks and comparisons; biological studies should provide quantitative evidence; and embodied systems should be evaluated through reproducible physical experiments where appropriate. By recognizing different forms of scientific evidence, the journal seeks to encourage both fundamental discoveries and practical technological advances.

Engineering translation is another important dimension of *Bio-inspired Intelligence*. Biological inspiration can contribute to healthcare, robotics, autonomous systems, environmental monitoring, agriculture, industrial inspection, disaster response, exploration, and human augmentation. We particularly welcome studies that demonstrate how biological principles can lead to improved adaptability, efficiency, robustness, autonomy, or interaction with complex environments.

The development of bio-inspired intelligent systems also raises important questions concerning safety, reliability, ethics, sustainability, privacy, animal welfare, and human oversight. As intelligent technologies become increasingly integrated with biological organisms, human users, and natural environments, responsible innovation must become an integral part of research and engineering practice. The journal encourages constructive discussion of these issues alongside technological development.

Our vision for *Bio-inspired Intelligence* is to establish a global forum that connects biological discovery with computational intelligence, physical embodiment, and engineering innovation. Rather than defining the field by a particular biological species, computational method, robot morphology, or application, the journal defines its identity through a common question: What can the principles of biological intelligence teach us about understanding, designing, and building new forms of intelligence?

By bringing together researchers across biology, neuroscience, artificial intelligence, computation, robotics, control, biomechanics, materials science, and related disciplines, *Bio-inspired Intelligence* aims to accelerate the discovery and translation of biological principles into intelligent technologies. We invite the global research community to contribute original discoveries, innovative methodologies, critical reviews, and forward-looking perspectives, and to help shape the scientific foundations and technological future of bio-inspired intelligence.

DECLARATIONS

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