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Editorial journal inauguration-*npj Robotics*

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Robotics is a quickly progressing field that has great potential both as a technology and as a means for a better understanding of nature. Robots are physical systems and endowing them with forms of autonomy requires innovations in both hardware and software and in their synergy, making robotics inherently interdisciplinary. As such, the technological progress in robotics benefits enormously from equally fast developments in other fields, such as materials, electronics, manufacturing, and artificial intelligence.

npj Robotics is an exciting new platform that aims to serve a diverse readership by publishing high-quality research papers representing major advances in the diverse disciplines that support the field, with the aim of fostering cross-fertilization among them. Inspired by natural intelligence, it has a particular focus on how all aspects of a robot, both its body and "mind" should be taken into account from the very onset of the design process. Biological inspiration forms a logical part of this focus, as animals' brains and bodies have co-evolved. This has led to efficient brains, smart sensory-motor coordination exploiting properties of the environment, and bodies that are highly adapted to the animals' ecological niche—allowing for safe, effective, and efficient interaction.

The inauguration of the journal is accompanied by a first batch of articles that present major innovations in all these areas. Zhao et al.[1] make an important step toward more efficient robotic AI by showing how brain-inspired computational primitives can be deployed on neuromorphic computing devices for solving real-world engineering tasks. Neuromorphic computing mimics the sparse and asynchronous processing of animal brains, promising similarly low-latency and low-energy processing. However, designing and training the spiking neural networks that are implemented on neuromorphic hardware is still much more challenging than for conventional neural networks. Moreover, if the hardware processor is partly analog, it is hard to obtain precision and robustness. Zhao et al. demonstrate how computational primitives such as triplet spike-timing dependent plasticity, basal ganglia-inspired disinhibition, and cooperative-competitive networks can achieve precise and robust motor control. In their experiments, an iCub humanoid robot uses motor babbling in a self-supervised learning scheme of a model of its two-joint robotic arm. After learning, the iCub performed a target-reaching task with 97.93% accuracy and 33.96 ms network latency, using 26.92 μW during inference for control. Although this motor control task is still limited in complexity, it sets a milestone for neuromorphic control, confirming its promise for the future.

Focusing more on sensory-motor coordination, Ding et al.[2] propose a highly efficient method for drones to avoid collisions and explore unknown environments. Specifically, their method exploits the aerodynamic interaction between the wake of the propellers and obstacles in the environment. It only requires a minimal sensing system, as it relies on the tiny accelerometer sensors in the drone's inertial measurement unit. Their drone successfully identified and followed wall contours to navigate along walls and even negotiate a staircase, showing the potential of this method to provide very small drones with collision avoidance capabilities.

Wang et al.'s[3] work focuses on a new robot design for physical interaction with the environment. Specifically, they design a biomimetic artificial whisker-based hardware system for medical use. The whiskers are tactile sensors that extract the structural and textural details inside intestines. The goal of this is to gather objective measurement data that can reduce the variability that currently exists between the diagnoses of different medical doctors. An ex vivo study was conducted with the device to detect common tissue structures, showing promising results with a test accuracy of up to 94.44%.

Finally, the first batch of papers also features an important advance in soft robots interacting with their environment. Guan et al.[4] present a novel design for soft actuators that is unique in achieving the desirable properties of a large workspace, high precision, and compliance for gentle interactions. In particular, they propose to judiciously combine trimmed helicoids into a meter-scale actuator that derives its physical properties from its geometric structure. The use of trimmed helicoids allows the designers to tune both axial and bending stiffness. The ratio between axial and bending stiffness can be determined by radial trimming and the absolute stiffness by the helicoid surface thickness. Combined with a tendon-driven actuation system, the novel, trimmed-helicoid actuator can compress, bend, and grip. In their experiments, Guan et al. demonstrate the desirable properties by having the actuator pick, place, and sort tomatoes, and help feed a human.

As editors of *npj Robotics*, we are very happy with the journal's inauguration, which illustrates the potential of this new cross-disciplinary initiative. We feel that it adds a welcome venue to the field of robotics, focusing on promising, cross-disciplinary and innovative developments, while upholding the highest values of scientific integrity historically defined by the Nature brand.

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COMPETING INTERESTS

The authors declare no competing interests.