香港大學 機械工程系
Department of Mechanical Engineering
THE UNIVERSITY OF HONG KONG

SEMINAR

Neural control of cuttlefish camouflage and octopus arms

Date: 27 November, 2026 (Friday)
Time: 11:00 a.m.
Venue: Room 7-35
Haking Wong Building
HKU



Speaker: Professor Xitong Liang
School of Life Sciences
Peking University
China

Abstract:

Cephalopods (e.g., octopuses, squid, and cuttlefish) have the most complex nervous systems among invertebrates. Their brains have evolved independently from our own for over 600 million years and use unique neural algorithms for color-change behavior and soft-body control. Both tasks require neural systems to generate extremely high-dimensional motor outputs. Cuttlefish coordinate changes in the size of millions of skin pigment cells to generate camouflage patterns within seconds, while octopuses can move their arms with nearly infinite degrees of freedom. By developing a large-scale imaging system to simultaneously track over 100,000 cells in freely moving cuttlefish, we uncovered an exploratory and iterative strategy that optimizes camouflage patterns, as well as distributed gain control of chromatophores through a light-sensing mechanism in the skin. Through 3D motion tracking of octopus arm movements, we further revealed the distributed neural control system underlying these complex motions. These findings promise to inspire new theories and applications in soft robotics and artificial intelligence.

Biography:

Dr. Xitong Liang is an Assistant Professor at the School of Life Sciences, Peking University, and an Investigator at the IDG/McGovern Institute for Brain Research and the Peking-Tsinghua Center for Life Sciences. He earned his B.S. in Biology from Peking University and his Ph.D. in Neuroscience from Washington University in St. Louis, USA. Dr. Liang conducted his postdoctoral research under Prof. Gilles Laurent at the Max Planck Institute for Brain Research in Germany. Using cephalopods (e.g., octopus, squid, and cuttlefish) as a novel model system, his research explores the diversity and evolution of animal behavior, the application of AI in neuroscience, and brain-inspired AI. His findings have been published in leading journals, including Nature, Science, Neuron, and PNAS.

ALL INTERESTED ARE WELCOME
For further information, please contact Prof. Peng Lu at 3910 2548.