立命館大学　ロボティクス研究センター　セミナー

Electro-active Polymer Hydrogels for chemo-mechanical memory

Speaker:　**Dr. Yoshikatsu Hayashi**
　　　　　　University of Reading, UK

**Date:**　　　April 24th, 2025
Time:　　　15:00-16:00
Venue:　　Seminar room 1, 4F, East-Wing, BKC Campus,
　　　　　　Ritsumeikan Univ., Noji-Higashi 1-1-1, Kusatsu

Abstract:

The goal of artificial neural networks is to utilize the functions of biological brains to develop computational algorithms. However, these purely artificial implementations cannot achieve the adaptive behavior found in biological neural networks (BNNs) via their inherent memory. Alternative computing mediums that integrate biological neurons with computer hardware have shown similar emergent behavior via memory, as found in BNNs. By applying current theories in BNNs, can emergent memory functions be achieved with alternative mediums? Electro-active polymer (EAP) hydrogels were embedded in the simulated game-world of Pong via custom multi-electrode arrays and feedback between motor commands and stimulation. Through performance analysis within the game environment, emergent memory acquisition was demonstrated, driven by ion migration through the hydrogels.

In addition, I will talk about how the self-organisaition in living systems coupled with sensory-motor loops can lead to control the microtumour environment for cancer cells, emergent approach in generative medicine.
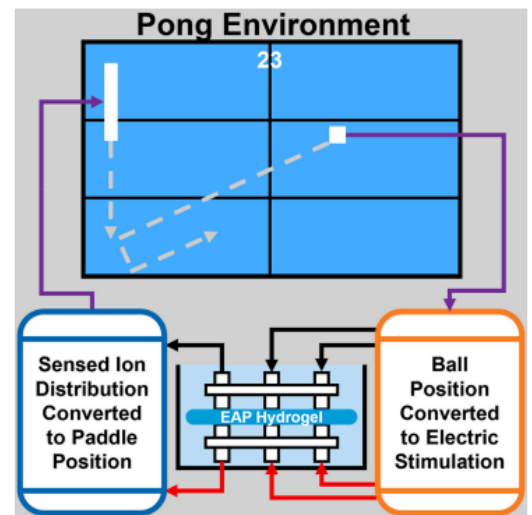
Biography:

Dr. Yoshikatsu Hayashi earned his BSc in Cell Biology from the University of Tokyo and a PhD in Statistical Physics of Soft Matter from Lund University. He is now an Associate Professor in Biomedical Engineering at the University of Reading. His core focus is on cybernetic control bridging over complex and living systems, expanding his research interests in behavioural brain science, intelligent materials, soft robotics, and generative medicine.

Website: https://www.sites.google.com/site/complexlivingmachineslab/