

# **Life Inside the Machine: A New Direction for Intelligence**

**Reinhold Scherer**

Head of Department

School of Computer Science and Electronic Engineering (CSEE)

University of Essex

[r.scherer@essex.ac.uk](mailto:r.scherer@essex.ac.uk)

## **Abstract**

Artificial intelligence has advanced rapidly, yet it still struggles with challenges that living neural systems solve naturally, such as continuous adaptation, learning from sparse signals, and maintaining robustness in unpredictable environments. Neuronal cultures and brain organoids, meanwhile, show rich self-organized activity and the ability to adapt and encode experience, but they are still treated mostly as passive models rather than active learners. This leaves a major opportunity: bringing biological and artificial learning systems into genuine closed-loop interaction.

In this talk, we explore how to build biohybrid intelligence, where living neurons and artificial agents co-adapt in real time. Biology offers plasticity, rich dynamics, and efficient learning, while the digital side provides precision, controllability, and rapid optimization. The key challenge is not only decoding neural activity, but designing interactions that allow both partners to co-adapt through continuous feedback. I will connect this vision to our recent work on synthetic biological intelligence, bioplausible AI, logic-oriented neural computation, and neurons on a chip. Together, these efforts aim toward learning systems where living and artificial intelligence do not merely interface, but develop together through co-adaptation.