PhD program in **Design, Modeling, and Simulation in Engineering**

Piola Lecture Award

6 October 2025

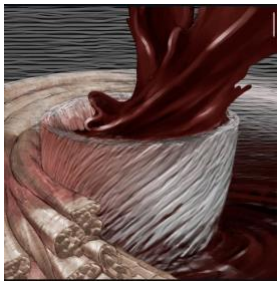
h 15:00, Aula Foscolo (Università di Pavia)

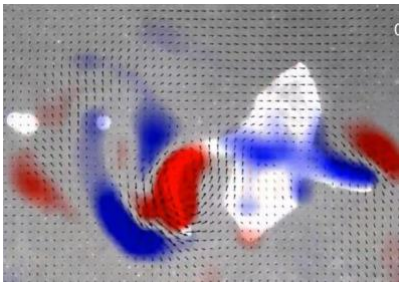
Biohybrid Robotics:
Adventures in Building with Materials that are Alive

Prof. Kevin Kit Parker

School of Engineering and Applied Sciences, Harvard University

More than a decade ago, our team initiated an effort to understand the laws of muscular pumps. We look at the similarities between the heart and marine life forms that pump to swim and see similar design schemes. Using cardiac myocytes, we have built tissue engineered biohybrid robotics to replicate marine life forms such as jellyfish, rays, and fish. Along the way, our efforts have evolved from biomimicry after extensive studies of the anatomy and physiology of these swimmers to the use of machine learning to replicate the evolution of these lifeforms. These efforts have revealed common design features between creatures of the sea and the human heart, suggesting the potential for a new form of robotics where living materials, cells, are coupled to abiotic materials in such a manner as to exploit the unique sensing and actuation strategies of cells and tissues for novel machines.





Kit Parker is the Tarr Family Professor of Bioengineering and Applied Physics at Harvard, Co-Director of the Center for Accelerating Therapeutic Development, and Senior Scientist at Boston Children's Hospital. Founder of the Disease Biophysics Group and a core faculty member of the Wyss Institute, he has advanced regenerative heart therapeutics and taught across multiple Harvard schools. He is also a Colonel in the U.S. Army Reserve, faculty at West Point, and co-founder of the food companies Desora and Tender Foods.

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