

ABC Robotics Monthly Seminar

Speaker: Dr. Aslan Miriyev

Date: February 22, 2021

Time: 16:10-17:00

Location: via zoom <https://zoom.us/j/5647021747>

Title: Fusing Digital and Physical AI into Lifelike Robots

Abstract:

My talk will focus on the path to creating lifelike robots, which will live and work alongside humans in symbiotic ecosystems. The intelligent behavior of such cooperative robots will result from a close interaction between their 'brains', 'bodies', and the environment. The digital artificial intelligence (AI) of robots' brains has strongly advanced in the past decades, while the development of materials and structures for robots' 'bodies' has dramatically lagged. I recently coined the term "Physical Artificial Intelligence" (PAI) [1]- the physical counterpart of digital AI, responsible for body intelligence. PAI refers to the theory and practice of synthesizing robotic systems capable of performing tasks typically associated with intelligent organisms. PAI can synergistically complement digital AI or substitute it by guiding a robot's behavior on the body intelligence level. Creating PAI may be achieved by co-evolving the actuation, sensing, control, and morphology while inherently considering the aspects of materials, design, and manufacturing. On the example of soft material-actuators, I will show how new materials, designs, and manufacturing methods may shift the paradigm of 'a robot as an assembly of hard devices' towards PAI. Subsequently, I will discuss how fusing PAI with digital AI may redefine robotics and human-robot interaction by enabling symbiotic human-robot ecosystems. While being a core component of Industry 5.0, PAI robots may also assist humans outside the industrial environment, potentially revolutionizing healthcare, elderly care, public safety, education, and facilitating our daily routine.

[1] Aslan Miriyev, Mirko Kovac, [Skills for Physical Artificial Intelligence](#), *Nature Machine Intelligence*, 2020.

Short bio:

Dr. Aslan Miriyev is a Scientist at the [Materials and Technology Center of Robotics](#) at Empa, Switzerland, and a Visiting Researcher at the [Aerial Robotics Lab](#) in the Department of Aeronautics at Imperial College London, UK, led by Prof. Mirko Kovac. In these capacities, Dr. Miriyev works at the nexus of materials and robotics to develop soft and bio-hybrid intelligent robots of the future. Dr. Miriyev is particularly interested in synthesizing robots via the interdisciplinary effort of creating physical artificial intelligence. Before joining Empa and Imperial College London, Dr. Miriyev spent three years at Columbia University in the City of New York as a postdoctoral researcher in the [Creative Machine's Lab](#), directed by Prof. Hod Lipson. In this role, Dr. Miriyev has developed a new type of [self-contained soft material-actuators](#). Dr. Miriyev obtained his Ph.D. degree in Materials Engineering from Ben-Gurion University of the Negev in Israel.



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