



# From soft robot control to soft manipulation: a model-based view

Lecture by *Cosimo Della Santina (TU Delft)*



## Abstract

In the past decade, substantial progress has been made in developing a low-level artificial brain for soft robotic systems that can make them execute precise motions and eventually exploit the intelligence embedded in their complex mechanical structures.

In this talk, I will briefly introduce this grand challenge within the soft robotic field and then present the model-based view of its solution. I will show how simplified models can be combined with nonlinear control theory and machine learning, leading to precise and dynamic task execution. I will conclude by presenting recent activities within my group concerning transferring this body of knowledge toward the manipulation of soft objects.

## Biography

**Cosimo Della Santina** is an Assistant Professor at **TU Delft** and a Guest Scientist at the **German Aerospace Institute (DLR)**. He earned his Ph.D. in robotics (cum laude, 2019) from the University of Pisa. He was a visiting Ph.D. student and a postdoc (2017 to 2019) at MIT's Computer Science and Artificial Intelligence Laboratory. Subsequently, he held a senior postdoc position (2020) and served as a guest lecturer (2021) at the Department of Informatics at the Technical University of Munich (TUM). Cosimo has been awarded the euRobotics Georges Girault Ph.D. Award (2020), the "Fabrizio Flacco" Young Author Award from

I-RAS (2019), and was a finalist for the European Embedded Control Institute Ph.D. award (2020). In 2023, he received the IEEE RAS Early Academic Career Award in Robotics and Automation. He is Principal Investigator for European and Dutch projects, such as H2020 Natural Intelligence, EH EMERGE, and Agrifood Nxtgen Hightech. He is an NWO VENI laureate and codirects the Delft AI lab SELF. Cosimo leads the Phi-Lab at TU Delft, focusing on the study of embodied and disembodied intelligence in physical systems, with an emphasis on elastic and soft robots.

*The seminar is managed by Brair Lab, coordinated by dr. Egidio Falotico*

**DATE**  
*09 November, 2023*  
**HOUR**  
*3 p.m.*  
**WHERE**  
*Room 1, The BioRobotics Institute*

