

LIVING MACHINES

Online Satellite Event – July 28, 2020

“Growing structures: bioinspired innovation insights for architecture and robotics”

During the last decades, the fields of architecture, materials, and robotics have been increasingly enriched by the use of biomimetics and bio-inspired design. The fundamental paradigm is that key features of a large variety of organisms, such as hierarchical structure, growth and adaptation, can be exploited for inspiring the design of innovative sustainable materials, structures and robots. In the era of digitalization, artificial intelligence and automation, robotics, biomimetic design, and architecture are getting closer. In robotics for example, plants and animals have inspired the design of soft, multi-functional, adaptable, self-growing robotic structures, and the coordination of collective robots for autonomous building or repair. At the same time, architects are more and more interested in integrating robotic fabrication methods, additive manufacturing technologies, dynamic energy-efficient mechanisms, and robotically-augmented architecture, where constructions can adapt and evolve with the surrounding environment, and last but not least can be built in an energy and material efficient way.

At the interface of biomimetics, biorobotics, and architecture, this satellite event will bring together material scientists, biologists, bioroboticists, and architects to present the latest innovations and trends for future sustainable building construction and maintenance.

Cross-disciplinary talks will show current initiatives and major perspectives on: the form-structure-function-relationship on various hierarchical levels of biological materials and structural systems; growing and building strategies in plants and animals; plant-inspired technologies for adaptable and growing robots; as well as biomimetic and biorobotics architectural installations and buildings.

Organisers



Barbara Mazzolai

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9:15 – 9:20	Welcome and overview of the event: Barbara Mazzolai, Thomas Speck, Mirko Kovac
	<i>Animals and plants: a face-to-face of growing structures from biology to robotics</i>
9:20 – 9:40	Fritz Vollrath , Oxford Silk Group, Department of Zoology, Oxford University Topic: Spider web engineering and behavior URL: https://www.zoo.ox.ac.uk/oxford-silk-group
9:40 – 10:00	Mirko Kovac , Aerial Robotics Lab, Imperial College London Topic: Tensile web construction and perching with aerial vehicles URL: http://www.imperial.ac.uk/infrastructure-robotics
10:00 – 10:20	Justin Werfel , Wyss Institute for Biologically Inspired Engineering, Harvard Topic: Collective construction in insects' colonies URL: https://projects.iq.harvard.edu/del
10:20 – 10:40	Nicholas Rowe , Botany and Modelling of Plant Architecture and Vegetation, CNRS Topic: Architecture, functioning and evolution of plants URL: http://amap.cirad.fr/en/index.php
10:40 – 11:00	Barbara Mazzolai , Center for Micro-BioRobotics, Istituto Italiano di Tecnologia Topic: Plant-inspired growing artefacts URL: https://www.iit.it/it/people/barbara-mazzolai
	<i>Biomimetic materials and technologies for architecture, robots and cultural heritage</i>
11:00 – 11:20	Andreas Lendlein , Institute of Biomaterial Science, Helmholtz-Zentrum Geesthacht at Teltow Topic: Active biomaterials for growing robots URL: https://www.hzg.de/institutes_platforms/biomaterial_science/director/index.php.en
11:20 – 11:40	Thomas Speck , Plant Biomechanics Group, University of Freiburg Topic: Biomimetic architecture materials and structures inspired by plants URL: https://www.botanischer-garten.uni-freiburg.de/mitarbeiter/pbg
11:40 – 12:00	Achim Menges , Institute for Computational Design and Construction, University of Stuttgart Topic: Bioinspired architecture URL: https://www.icd.uni-stuttgart.de/team/Menges-00002/
12:00 – 12:20	Barbara Imhof , Liquifer Systems Group and University of Applied Design, Vienna Topic: Space architecture URL: http://spacearchitect.org/
12:20 – 12:40	Robert Stuart Smith , Computer Science Autonomous Manufacturing Lab, Univ. College London Topic: Design, robotics and computation URL: https://www.aml-ucl.co.uk/team