IRIM Seminar Series

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Direct Fabrication and Tailoring of Soft Robot Bodies

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Link: https://tinyurl.com/IRIMVSSspring1

Abstract: Material properties and composite structures play key roles in tailoring the performance of soft robots. Unfortunately, current design and fabrication approaches limit the achievable complexity and functionality in these two categories and as a result hinder soft robot performance. This talk will discuss approaches that allow the design and direct fabrication of novel soft robot composite structures. The processes combine computational topology optimization, to determine required three-dimensional multi-material composite structures, and direct fabrication using an all-in-one fabrication workflow with resilient hybrid polymers, enabling precise tailoring of mechanical and functional properties. The library of polymer mixtures synthesized for compatibility with the processes spans five orders of magnitude in elastic modulus. Application examples in bio-inspired soft robots and sensors, as well as soft grippers will be described. The results demonstrate the potential of having an all-in-one fabrication workflow capable of producing tailored complex soft robot composite bodies.

Bio: Pablo Valdivia y Alvarado is an Assistant Professor in the Engineering Product Development Pillar at the Singapore University of Technology and Design (SUTD), and a Research Affiliate in the Mechanical Engineering Department at MIT. At SUTD, he is the director of the Bio-Inspired Robotics and Design Laboratory and the deputy director of the Digital Manufacturing and Design (DManD) Centre. He received his Ph.D., M.Sc., and B.Sc. degrees in Mechanical Engineering from the Massachusetts Institute of Technology. His research interests include: soft robotics, bio-inspired design, and advanced additive manufacturing processes. He was recognized with an MIT's Technology Review 2012 TR35 Young Innovator Award for South East Asia, Australia and New Zealand for his contributions to novel vehicles for long-term exploration of harsh environments.

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