4D Printing: 3D Printing of Shape Morphing Materials for Soft Robotics

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3D printing is well-known for its ability to place a wide variety of materials at precise locations in 3D space with very few limitations on geometrical complexity. Recent advances in active, shape morphing polymers have enabled the design of structures which can change their shape in response to external stimuli such as temperature, light, or water. By combining shape morphing soft materials and 3D printing, a new paradigm of 4D printing can be realized where printed objects can perform actuations directly after printing. The complex shape design offered by 3D printing can be leveraged to generate soft actuators with previously unseen complexity. This talk will focus on how 4D printing of actuators can be used to realize novel soft robotics applications from crawlers to drug delivery systems.

Devin is an Assistant Professor in the Mechanical, Industrial, and Manufacturing Department at Oregon State University (OSU). Prior to his time at OSU, he was a Senior Member of the Technical Staff at Sandia National Laboratories leading a research group focusing on applied machine learning methods for real-time monitoring and autonomous optimization of additive manufacturing systems. He received his PhD from Georgia Institute of Technology under the direction of Prof. H Jerry Qi.

His research interest lie at the cross-section of additive manufacturing, materials, and structural design. He is particularly interested in how artificial intelligence can be applied to improve and even automate additive manufacturing processes to eliminate user error. Additionally, he is interested in the development and manufacturing of smart/active materials such as shape memory polymers (SMP) and liquid crystal elastomers (LCE) for applications in biomedical devices, soft robotics, and energy harvesting devices.

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