Smart Connectors for Cut-and-Seam Manufacturing of Soft Electronics

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Abstract (in 12 Pt Arial Font)

Interfaces between inorganic and biological systems need to be mechanically compatible with soft surfaces that grow, stretch, and distort over time. This requirement has driven the development of soft photonic and electronic circuits. However, the evolving shape of these circuits poses a problem when connecting circuits together: how can we match up distorted contacts that may be impossible to align? The problem comes up not only when repairing, modifying, or temporarily connecting to a stretchable circuit that's already attached to a biological system, but also when connecting circuit pieces into custom 3D structures to cover one-of-a-kind biological shapes. The usual solution to the distortion problem is to create a stiffened connector region that prevents the circuit from deforming, which is good for alignment but doesn't conform to biological surfaces as closely as a soft region does. The goal of this research is to connect signals across thin seams between soft materials without precise alignment at the connections. Our method relies on mm- and smaller scale electrical components inserted into thin adhesive tapes, producing materials with anisotropic electrical conductivity. In this work, we investigate the alignment tolerances in circuits made from thin films and fibers, focusing on sensors that will function after being encapsulated by parylene, silicone, and other conformal biocompatible coatings.

Biography of Presenter (in 12 Pt Ariel Font)

Samantha Musante is a current undergraduate student at Trinity College majoring in Engineering and German Studies. During her time, she has earned the Junior Engineering Book Prize Award and the Phi Gamma Delta Prize in Mathematics. She is currently an undergraduate researcher for the IMPACT-ING REU program at the University of Louisville.