In contrast to conventional electronics, which are composed of rigid and inextensible materials, “soft-matter” electronics are composed entirely of soft polymers, gels, and fluids. Examples include micropatterned traces of conductive elastomer or microfluidic channels of liquid-phase metal alloy embedded in an insulating rubber film. Depending on the elastic rigidity of the sealing elastomer, these circuits can be softer than natural skin and remain electrically functional when stretched. In the case of elastomer-sealed liquid metal, circuits can remain functional when stretched to several times their natural length. In this talk, I will primarily focus on stretchable circuit wiring and elastic deformation sensing using elastomers embedded with microfluidic channels or microdroplets of liquid phase Gallium-Indium alloys. In particular, I will emphasize the central role of solid mechanics in sensor functionality and show how classical solutions can be used to predict electromechanical coupling. I will also discuss the role of conductive elastomers and liquid-phase electronics in the broader context of wearable computing and soft robotics. This will include highlights from a recent user study with tactile electronic skin, results with a novel rigidity-tuning composite, and preliminary work with electrostatic actuation.

**Bio:** Carmel Majidi is an Assistant Professor of Mechanical Engineering at Carnegie Mellon University, where he leads the Soft Machines Lab. Prior to arriving at CMU, Prof. Majidi was a postdoctoral fellow in the School of Engineering and Applied Sciences at Harvard University (December 2009 – August 2011) where he worked with Profs. Robert Wood and George Whitesides to explore new paradigms in soft robotics and soft-matter electronics. From December 2007 to November 2009, he was a postdoctoral fellow in the Princeton Institute for the Science and Technology of Materials (PRISM) and worked with Profs. David Srolovitz (currently at UPenn) and Mikko Haataja (Mechanical & Aerospace Engineering) to examine the physics and morphological stability of piezoelectric nanostructures. Prof. Majidi received his doctoral training at UC Berkeley, where he worked with Profs. Ronald Fearing and Bob Full to examine natural gecko adhesion and develop a gecko-inspired shear-activated adhesive. Prof. Majidi is a recent recipient of Young Investigator awards from DARPA, ONR, AFOSR, and NASA all for work related to soft-matter robotics and engineering.