Georgia Tech College of Engineering
Daniel Guggenheim School of Aerospace Engineering

Scaling Down Robotics: Mobility, Mechanisms, and Motors for Microrobots

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Abstract:
Research on mobile microrobots has been ongoing for the last 20 years, but the few robots that have walked have done so at slow speeds on smooth silicon wafers. However, ants can move at speeds over 40 body lengths/second on surfaces from picnic tables to front lawns. What challenges do we still need to tackle for microrobots to achieve this incredible mobility? This talk will discuss some of the mechanisms and motors we have designed and fabricated to enable robot mobility at the insect size scale. Mechanisms utilize new microfabrication processes to incorporate materials with widely varying moduli and functionality for more complexity in smaller packages. Actuators are designed to provide significant improvements in force density, efficiency and robustness over previous microactuators. Results include a 4mm jumping mechanism that can be launched approximately 35 cm straight up as well as a 300mg robot that jumps 8 cm with on-board power, sensing, actuation and control.

Bio:
Sarah Bergbreiter joined the University of Maryland, College Park in 2008 as an Assistant Professor of Mechanical Engineering, with a joint appointment in the Institute for Systems Research. She received her B.S.E. degree in electrical engineering from Princeton University in 1999. After a short introduction to the challenges of sensor networks at a small startup company, she received the M.S. and Ph.D. degrees from the University of California, Berkeley in 2004 and 2007 with a focus on microrobotics. She received the DARPA Young Faculty Award in 2008 and the NSF CAREER Award in 2011 for her research on engineering robotic systems down to sub-millimeter size scales. She has also received the Best Conference Paper Award at IEEE ICRA 2010 on her work incorporating new materials into microrobotics and the NTF Award at IEEE IROS 2011 for early demonstrations of jumping microrobots.