

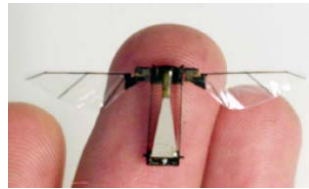


Goals

- Develop a process for integrating a soft elastomer into an SOI fabrication
- Design mechanical devices for:
 - storing and rapidly releasing energy
 - improving friction along surfaces of electrostatic inchworm motors
 - improving robustness of microrobot components

Applications

- High force density motors
- Medical devices such as microjets to inject medicines
- Mobile sensor networks with many robots
- Sensors for stealthy surveillance
- Devices to manipulate micro scale particles and structures

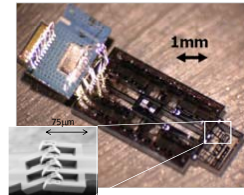


Harvard flying robot

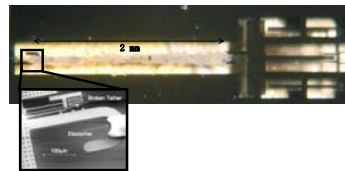


KTH thermally actuated robot

State of the Art

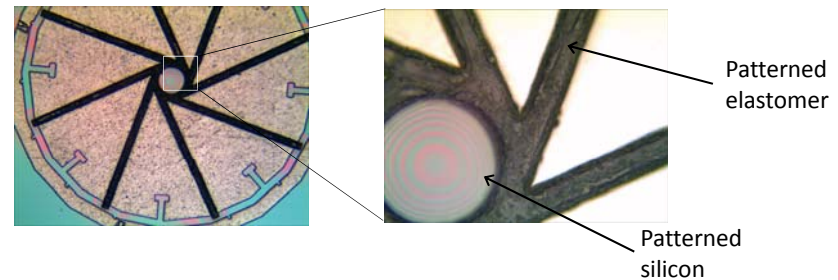
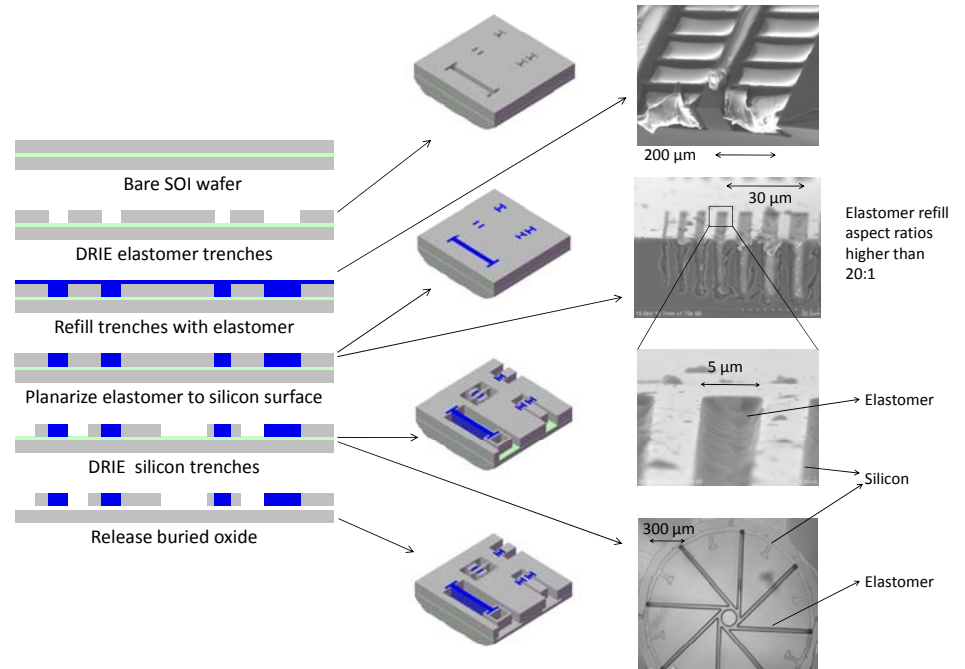


Berkeley 10mg robot capable of only 10µm high steps

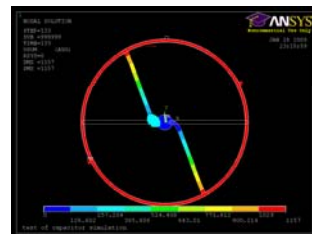
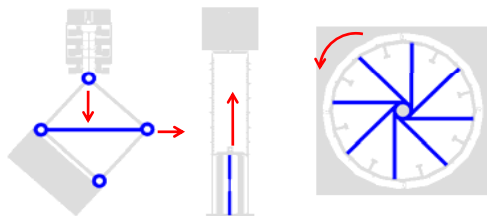


Silicon components and 2mm springs separately fabricated and assembled

Silicon and Elastomer Fabrication Process



Energy Rapid Release Designs



Future Work

- Demonstrate repeatable SOI and soft elastomer fabrication process
- Fabricate mechanisms capable of storing and rapidly releasing energy
- Design new high-force, low-power motors with integrated elastomer
- Develop new generation of robust, mobile microrobots

Model of jumping microrobot that stores energy in an elastomer spring that is released upon actuation. Releasing 20mJ of energy would allow for a 20cm high jump

Millimeter-scale, low-power, and mobile microrobots have not yet been successfully demonstrated.