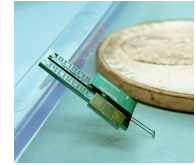




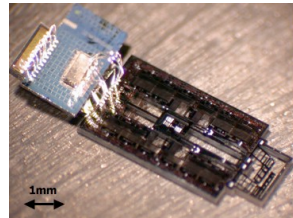
# Micro Robotics Laboratory

Prof. Sarah Bergbreiter



## Goals

- Engineer a new class of networked millimeter and centimeter-sized autonomous mobile robots
- Adapt these technologies for use in sensor networks, science, medicine, and consumer products



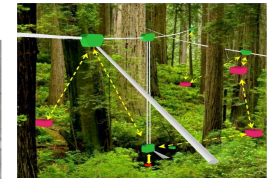
## Applications

- Search and Surveillance
- Mobile Sensor Networks
- High Force Density Motors
- Medical Devices
- Micro-manipulation

### Robots and Sensor Networks



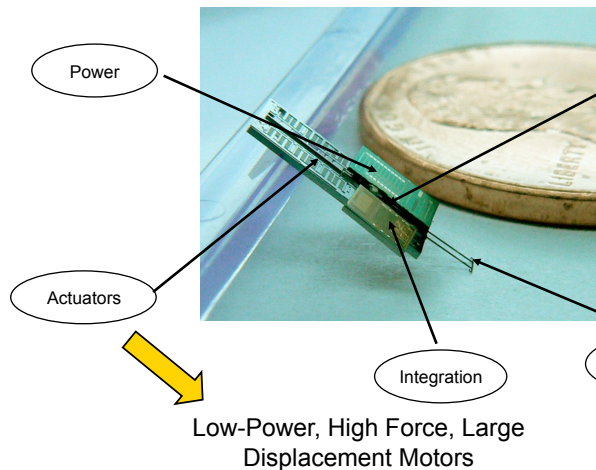
Stealthy Mobile Sensor Networks for Security (Sastry 2007)



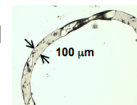
Low-Impact Mobile Sensor Networks for Science (Estrin 2007)

## Autonomous Mobile Microrobots

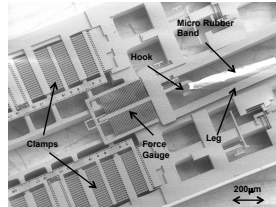
### Challenges



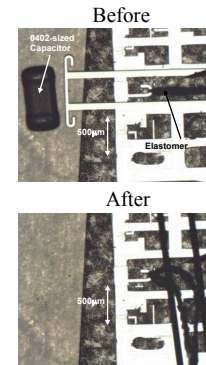
### Elastomer-Based Micromechanical Energy Storage



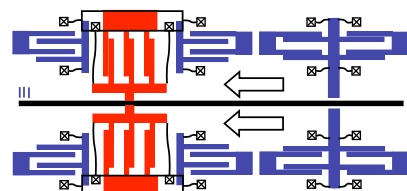
### Quick Release of Energy



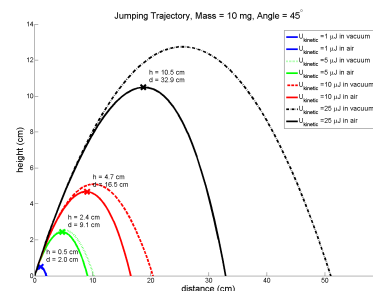
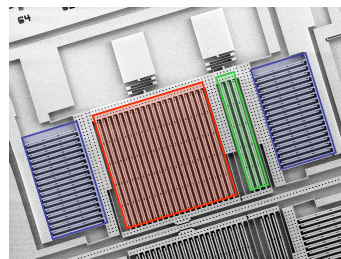
20 μJ stored = 20 cm jump straight up!



### Efficient and Effective Locomotion



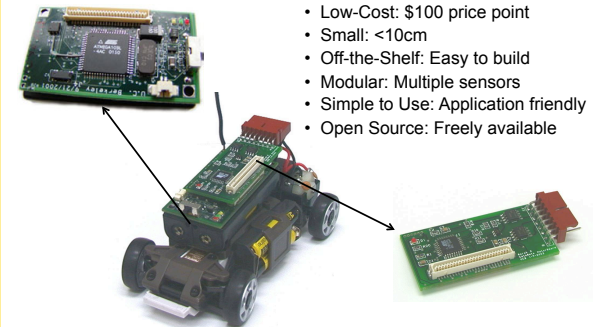
$$F = \frac{1}{2} \epsilon_0 V^2 \frac{A}{g_0^2}$$



## Mini Robots and Sensor Nets

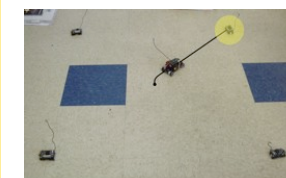
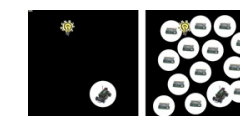
### Challenges

- Low-Cost: \$100 price point
- Small: <10cm
- Off-the-Shelf: Easy to build
- Modular: Multiple sensors
- Simple to Use: Application friendly
- Open Source: Freely available



### Demonstrations

#### Robot in Sensor Network



#### Multi-Robot Network

