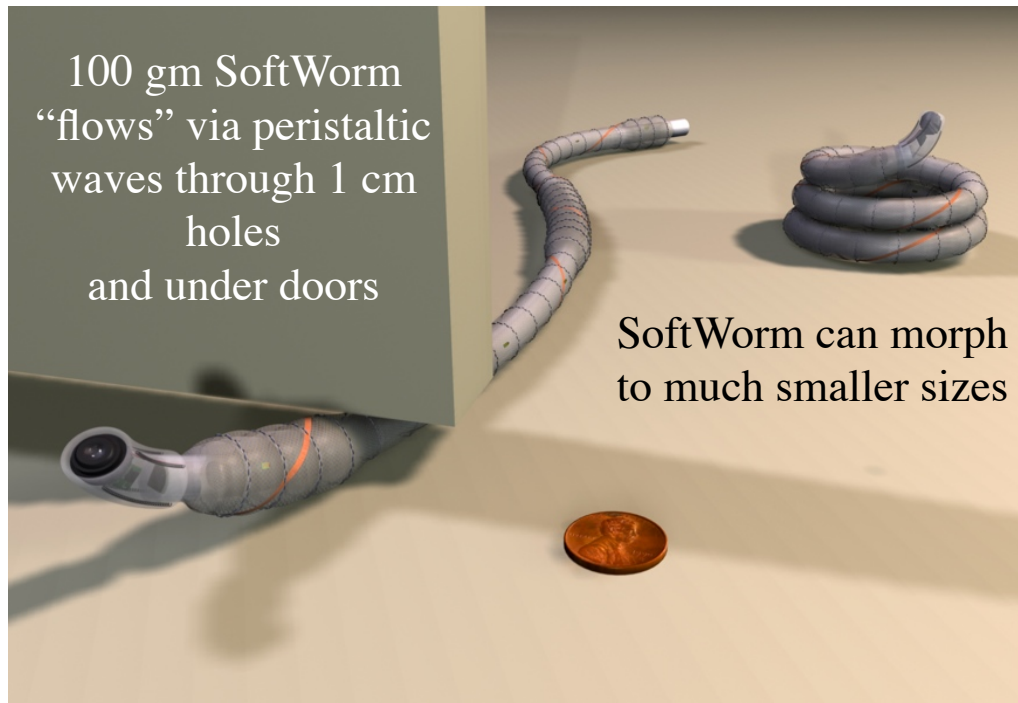


## Proposal Title: **SoftWorm - A Soft Biologically Inspired Worm-Like Robot**



### Operational Capability

#### Performance:

1. **Hole traversal:** 1 cm in diameter; 6 cm deep in 15 sec
2. **Velocity:** 0.25 m/minute; **Range:** 5 meters
3. **Morphing:** 10 fold change in longest dimension
4. **Energy efficiency:** 230 J/m; **Power:** 950 mW

#### Applications:

1. Search and rescue
2. Surveillance
3. Maintenance
4. Payload delivery
5. Offensive battlefield actions

**Environments:** Can function in environments useful to Army, Navy or Air Force

### Proposed Technical Approach

1. Two hydraulic waves induced by contraction of SMA springs
2. Body made of novel mesh-reinforced polymer materials
3. Fine adhesive hairs for low friction environments
4. All components soft: polymer body, fluid, central lumen
5. Lithium battery for autonomous operation
6. Morphing and steering induced by SMA springs
7. Hollow central silicone lumen for central payload bay
8. Camera in front for surveillance
9. Wireless command and control

### Cost and Schedule

1. 3 months - First prototype, non-autonomous
2. 9 months - Second prototype, autonomous
3. 15 months - Third prototype with morphing capability
4. 18 months - Final Phase I milestone Robot

Total cost: **\$2,761,815**

### Deliverables

1. SoftWorm Robot
2. Modeling Platform for Soft Robots

### Performer

Case Western Reserve University  
(216) 368 - 3846  
[hjc@case.edu](mailto:hjc@case.edu)