Non-confidential Description. Feb 4, 2018

Project Title: Universal Millirobot.

Abstract: This project is to build and test a larger size prototype of a tiny medical robotic actuator or millirobot that has great flexibility and functionality, thus opening up a range of capabilities that are currently unavailable in medical or engineering areas. These millirobots will be a new paradigm for medical applications because they are larger than nanoparticle vehicles, which are too small to perform medical procedures, and smaller than the da Vinci Robot, which has centimeter-sized tools and arms that are too large to access many sites. Long catheters are also available, but lack the combination of being small, steerable through tissue, and functional at their tips. Millirobots will move in tissues, and will be functional at the tip driven via hydraulic and electrical power. The robot will move through tissue minimally invasively.

Unique Aspects: Medical and engineering teams worldwide have sought to design miniaturized devices that can be directed to specific remote and otherwise inaccessible sites and then perform a series of tasks. Just as laparoscopic and catheter-based interventions have revolutionized medicine, millirobots would lay the groundwork for another revolution in precision medicine. One application is for cancer diagnosis and therapy. Some tumors are considered unresectable (inoperable, cannot be removed completely through surgery) if they're located for example in critical areas of the brain, where surgical removal would be too dangerous or cause too much damage to healthy brain tissue. The millirobot may be used in these cases, Fig-1. The location of the tumor is one reason it may be inoperable. A tumor may be intertwined with blood vessels and other vital structures in the body making safe removal impossible. The millirobot may provide greater precision in surgery in these cases.

Work Location: This research will be performed in the CEAS Nanoworld Laboratory in Rhodes Hall. Mark Schulz will be the mentor. Other faculty members may help guide the project. One or two students may work on this project. The project will be in an engineering lab, there will not be any medical work. Please contact Mark for a more detailed description of the project.

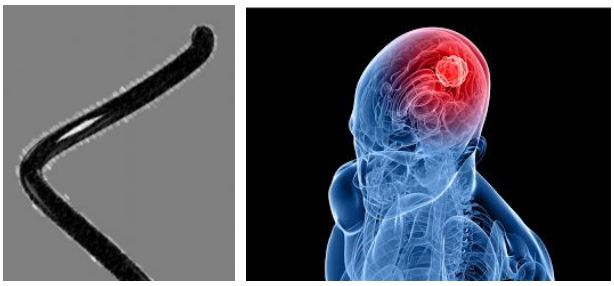

FIGURE 1. CONCEPT OF A SNAKE-LIKE MILLIROBOT (LEFT) THAT CAN MOVE THRIOUGH TISSUE TO A TUMOR SITE (RIGHT) AND DELIVER MEDICATION OR PERFORM SURGERY. HTTP://BRAIN-TUMOR-345.BLOGSPOT.COM/

MENTOR.
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