Surgical Manipulator with Finer Motion Control and Capability

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WARF: P130344US01

Inventors: Michael Zinn

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a new manipulator device that combines flexible and rigid components.

Overview

Minimally invasive surgeries – including robotic procedures – utilize manipulators, which are inserted into patients to help maneuver tissue or tools. Manipulators can be classified either as rigid-link or flexible continuum devices. Flexible manipulators (such as catheters) often are desirable because they are softer and less likely to damage tissue. For this reason they are popular when safety is paramount, such as intracardiac and vascular interventions.

On the other hand, flexibility has drawbacks. Soft compliant structures, in combination with internal friction, can be difficult to position and operate.

The Invention

A UW–Madison researcher has developed a new device, called an interleaved continuum-rigid manipulator, that combines safety and high performance. The device is made of flexible segments interleaved with small, rigid-link joints. The segments elastically flex upon insertion into tissue, and are designed for tendon-driven articulation and telescoping motion. The rigid joints serve as limited stroke actuators to move and control the flexible segments.

Applications

- Minimally invasive surgical procedures, such as valve replacement, stem cell injection, ablation and atrial fibrillation

Key Benefits

- Enhances motion capability and control
- Larger-scale flexibility
- Actively corrects motion errors
- Enables accurate tool positioning and dexterity

Stage of Development

The new manipulator was evaluated experimentally using a one degree of freedom validation test bed, and evaluated via simulation using a two degree of freedom planar manipulation setup.

Additional Information

For More Information About the Inventors

- Michael Zinn

Publications

- Conrad et al. 2013. Interleaved Continuum-Rigid Manipulation: An Augmented Approach for Robotic Minimally-Invasive Flexible Catheter-Based Procedures. IEEE International Conference on Robotics and Automation (ICRA), 718-724.

Tech Fields

- Medical Devices : Medical tools

For current licensing status, please contact Jeanine Burmania at jeanine@warf.org or 608-960-9846