Flexible Instrument with Pre-curved Elements

VANDERBILT UNIVERSITY
CTTC Center for Technology Transfer & Commercialization

Summary

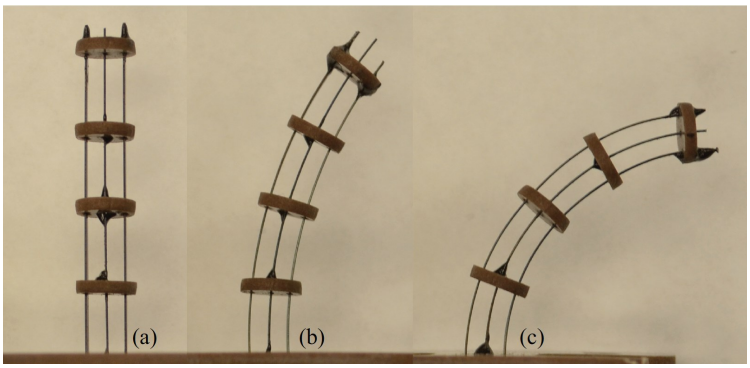
Vanderbilt researchers have developed a novel system for allowing surgical instruments to navigate around tighter corners and access difficult-to-reach areas in the body. This system uses pre-curved elastic elements added on to the existing instrument. Current surgical instruments are manufactured in a straight-line configuration, which means they must bend in order to reach around obstructions in surgery. By adding pre-curved sections, some of the bending is already accomplished, allowing the instrument to bend around tighter corners.

Addressed Need

- Current surgical instruments cannot access all anatomical regions, resulting in inoperable locations or more invasive surgery techniques
- Some minimally invasive surgeries are limited by the degrees of freedom of the surgical instruments
- Improvement of robotic surgical instruments is a key step in the advancement of minimally invasive surgery techniques

Technology Description

The pre-curved elements extend the capabilities of these devices in many ways. The additions can: enable them to reach around "tighter corners" than is possible in traditional straight-element devices, achieve larger workspaces than are possible with traditional straight–element devices, and achieve novel motions. Pre-curving the structure allows the surgical instrument or robot to navigate through winding lumens or cavities. Adding a pre-curved element to the actuation area of the instrument provides additional degrees of freedom of movement and more control over the instrument's behavior. The idea can be applied to standard endoscopes, robotic endoscopes, multi-backbone continuum robots, and more.



Unique Features

- Pre-curvature in structural or actuation elements of the device
- Additional degrees of freedom associated with axial rotation of curved elements
- Can be used in conjunction with traditional tendons

Intellectual Property Status

- Published US patent application US20160016319A1.
- Additional information on the "Bio-Inspired Robots" research program and technology videos: http://research.vuse.vanderbilt.edu/MEDlab/research/bio-inspired-robots
- Related Technology: http://cttc.co/technologies/tentacle-robots-access-tight-spaces-manufacturing-and-medical-applications

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