

Flexure Wrist for Surgical Devices

Summary

Vanderbilt researchers have designed a flexible wrist for use with manual or robotic surgical systems.

Addressed Need

Currently available bendable catheter tips suffer from both the lack of user control over the motion of the tip and inability to travel through a small radius of curvature.

Technology Description



The present miniature device is designed for deployment either at the tip of a catheter-like device or as a miniature wrist for tele-operated surgical robots. It is designed for variable axial stiffness and controlled curvature. The device is capable of achieving maximal curvature with minimal lateral deflection.

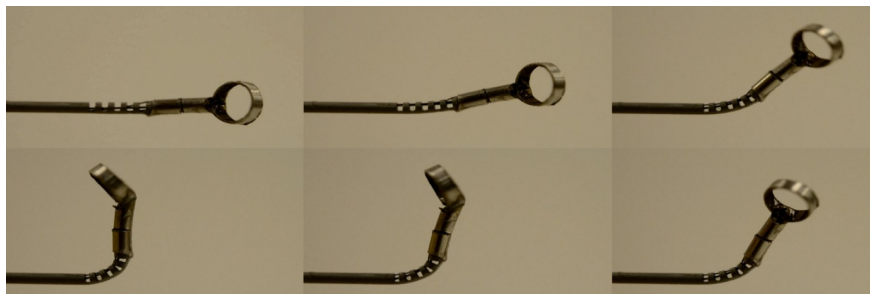
Unique Features

- Use for catheters, concentric tube robots, needle-size da Vinci-like manipulators, steerable needles
- Enables user to control the motion of the bendable tip
- Enhances dexterity
- Flexural elements confined at tip
- Variable curvature
- Customizable

Intellectual Property Status

- A patent application has been filed
- Additional information on the "Needle-sized Wrists" research program and publication : <http://research.vuse.vanderbilt.edu/MEDlab/research/needle-sized-wrists>
- Publication: <http://research.vuse.vanderbilt.edu/MEDlab/sites/default/files/YorkWristICRA15.pdf>
- Watch the Technology Demonstration Video at: <https://youtu.be/CEqUB5pVRmo>

1.16 mm diameter prototype wrist is shown below with metric scale and curette. A curette is a common surgical instrument used for tissue resection. This curette is attached to a nitinol wire running through the tube and can be axially rotated by rotating the wire. Wrist motion from 0 to 90 degree bending angle shown clockwise. Note that the ring curette is being rotated during the bending motion of the wrist.



CTTC CONTACT:

Ashok Choudhury, PhD
(615) 322-2503
Ashok.choudhury@vanderbilt.edu

INVENTORS:

Robert J. Webster, PhD
<http://research.vuse.vanderbilt.edu/MEDlab/research/needle-sized-wrists>

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