

**Docket #:** S14-387

# **Position/force control of a flexible robot under model-less control**

Stanford researchers in the Camarillo Lab have patented a model-less, robotic position-control technique that regulates force. The controller simultaneously controls position and applied forces of the manipulator as it moves through a workspace, without requiring a model. In addition, the robot traces paths along the environment while a specified amount of force is maintained and not exceeded. This model-less control technique is ideal for medical robotics where small, flexible devices navigate constrained and highly sensitive environments.

**Stage of development - Prototype**

## **Applications**

- **Flexible robotics**
- **Medical robotics**
  - Catheters
  - Endoscopes

## **Advantages**

- Accurate - especially in constrained spaces
- Constant - maintains safe levels of constant contact
- Adaptive - navigates irregular and unpredictable constrained spaces

## **Publications**

- Yip, Michael C., and David B. Camarillo. "[Position/force control of a flexible manipulator under model-less control](#)." U.S. Patent 10,434,644, issued October 8, 2019.
- Yip, Michael C., and David B. Camarillo. "[Model-less Feedback Control of Continuum Manipulators in Constrained Environments](#)." IEEE Transactions on Robotics. 30, no. 4 (2014): 880-889. DOI: 10.1109/TRO.2014.2309194

## Patents

- Published Application: [WO2016073367](#)
- Published Application: [20170312920](#)
- Issued: [10,434,644 \(USA\)](#)

## Innovators

- Michael Yip
- David Camarillo

## Licensing Contact

### Evan Elder

Senior Licensing Associate

[Email](#)