



## TECHNOLOGY

# Magnetostrictive Wire Based Flow Sensors

## OVERVIEW

### Background:

Numerous examples of cilia and whisker-based flow sensors can be found in nature. A mammal's whisker bends in response to touch or to wind, creating a sensory response which is then interpreted by the animal's brain. Similarly, fish have a sensory organ known as a lateral line running the length of the body that can detect changes in flow and vibrations in the surrounding water. In both cases, these flow sensors alert the animal to changes in the surrounding environment.

### Innovative Research:

Researchers at the University of Maryland have developed an improved flow sensor mimicking those found in nature that is fabricated from a thin wire made of a structural magnetostrictive material. As flow past the wire causes it to bend, local compressive stresses produce changes in the permeability and magnetic state of the wire that can be detected at the wire's base using conventional magnetic field sensors. The surface of the wire may be treated to increased pressure and viscous drag forces produced as flows move past the sensor (e.g. to make the wires resemble feathers or paddles). This technology allows accurate in-situ sensing of diffusion rates and dwell (reaction) time for the first time, and will allow for real time feedback and control of flow rates.

### Advantages

- Extremely small magnetostrictive flow sensors ('whiskers') are the same diameter as those found in nature
- Whiskers are variable in length up to 7 inches
- Permanent magnet provides bias field
- Magnetization change detected with a GMR sensor

### Applications

- Personal, implantable, and/or wearable medical devices
- Portable and inexpensive medical diagnostic tools
- Pharmaceutical testing
- Hazardous chemical/biological warning systems (military, industrial, environmental)
- Underwater robotics (mimicking fish scales/ skin)

## CONTACT INFO

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## **Additional Information**

### **INSTITUTION**

University of Maryland, College Park

### **PATENT STATUS**

Patent(s) pending

### **LICENSE STATUS**

Available for exclusive or non-exclusive license

### **CATEGORIES**

- Aerospace
- Sensors/Monitors
- Materials
- Engineering

### **EXTERNAL RESOURCES**

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