

## Title: **Biologically Inspired MEMS Sensors for Medical Applications**

Professor Chang Liu, Northwestern University

### Abstract:

Today's engineering systems, such as machines, vehicles, robots, medical devices, home appliances and entertainment devices, are often sensor deficient. Biological systems, on the other hand, exhibit great sensory intelligence. Evolved over millions of years, biological systems offer many exquisite examples of sensing and intelligence. For example, biological haircells are used in many animal species for a wide variety of sensing needs, including hearing, touch, flow sensing, balance sensing, and more. With the advancement in micro fabrication and MEMS, it is now possible to mimic the structures and functions of many biological sensors at their native scales. At the MedX lab of Northwestern University, we seek paths for radical advancement of sensor technology through the bioinspired approach – seeking inspiration about performance, materials, and design from nature, building engineering mimetic devices using silicon or polymers, and demonstrate new capabilities and quantum leaps of performances.

I will illustrate a few examples of sensors inspired by nature, including biomimetic artificial haircells, artificial lateral line for flow sensing, and multimodal tactile sensing skin. These devices can be used to sense vibration, touch, flow, pressure, heat, and contact. The sensor development is targeted for applications in medicine and health care. Modern medicine demand highly functional sensors for patient monitoring, smart surgical tools, non-invasive surgery, and home health care. I will discuss our work on developing miniature flow and touch sensors.

### Short Bio:

Chang Liu is a professor of the McCormick School of Engineering at Northwestern University, Evanston, IL. He received his M.S. and Ph.D. degrees from the California Institute of Technology in 1991 and 1995, respectively. He served as assistant and tenured associate professor at the University of Illinois at Urbana-Champaign between 1996-2007. He joined Northwestern University in 2007, and established the MedX Laboratory to conduct interdisciplinary research focusing on advanced engineering research for medical applications. He authored over 90 journal articles. Prof. Liu is a fellow of the IEEE. He is the author of a textbook titled "Foundations of MEMS".

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