UCLA Engineering
HENRY SAMUELI SCHOOL OF
ENGINEERING AND APPLIED SCIENCE

BIOENGINEERING

PRESENTS

MEMS EYE Implants

THURSDAY, Sept 27, 2018
12:00 – 1:00 PM
2101 ENGINEERING V

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Cal Tech

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Andrew and Peggy Cherng Leadership Chair
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ABSTRACT:

The field of Micro-Electro-Mechanical Systems (MEMS) has advanced tremendously for the last 20 years. Most noticeably, however, the field has mostly advanced in microsensors such as pressure sensors, accelerometers, gyros, microphones for cell phone and smart instrumentation applications. Looking forward though, in my opinion, one future direction of MEMS/NEMS is for micro biomedical devices. Among many possible biomedical applications, one challenging but promising branch is micro implants. Why micro implants? Body tissues (especially neurons), once severely damaged, do not repair or regenerate easily and often leave behind permanent debilitating deficits. Engineering implant technologies to interface intact tissues and/or to replace defective functions have continued to be the main solutions for many diseases. As our world is facing more severe aging population problems, significant growth in implant applications is foreseeable. As a matter of fact, there are already many existing commercially available implants such, as pacemakers and cochlear implants, but they all have a lot to improve. For examples, cardiovascular implants like defibrillator and pacemakers are still bulky, mechanically rigid, power hungry, and functionally limited. The future implants should be even smaller, flexible, power efficient and more versatile so that they can be used at places not possible before. This talk will review the research of implants done at the Caltech MEMS lab. More specifically, this talk will focus on bioMEMS implant devices to treat eye diseases. Examples of devices will cover the four major ophthalmic diseases, i.e., cataract, glaucoma, age-related macular disease and diabetic retinopathy that make of close to 80% of world blindness. It is believed that BioMEMS can also have many other opportunities for other organs in our body too.

BIOGRAPHY:

Dr. Yu-Chong Tai is the Anna L. Rosen Professor of Electrical Engineering and Medical Engineering. He is also the inaugural Executive Officer of the Department of Medical Engineering of California Institute of Technology (i.e., Caltech). Since joining Caltech, his research has been on micromechanical (MEMS) devices, including medical devices, for the last 20 years (mems.caltech.edu). Examples of devices developed in his lab include wearable ECG sensors, lab-on-a-chip diagnostics (e.g., complete blood count), retinal implants for blind people, oxygen-supplying devices for diabetic retinopathy, spinal cord implants, brain implants, micro drug delivery, etc. He is also interested in devices for chronic diseases such as atherosclerosis, diabetes, and cancer. He is the recipient of several awards such as the (Berkeley EECS) Best Thesis Award, Ross Tucker Award, Presidential Young Investigator (PYI) Award, Packard Award, ALA Achievement Award, (Popular Mechanics) Breakthrough Award, the inaugural IEEE Robert Bosch MEMS/NEMS Award, and National Acadamy Inventor Award. He has more than 700 articles and patents in the field of MEMS. He is an IEEE and AIMBE Fellow. He is also an academician of the Academia Sinica, Taiwan, ROC.