MICROWAVE THEORY AND TECHNIQUES SOCIETY

Measuring the Fundamental Physical Properties of Cells and Organisms Using Resonating Mass Sensors

By William Grover, Ph.D., A. Professor, Bioengineering, UC Riverside

Oct 20, 2015 at 6:30 pm

California Lutheran University in Thousand Oaks, room to be announced

Meetings are free and open to the public (6:30 pm pizza, 7 pm talk)

All objects have fundamental physical properties like mass and density, and for millennia mankind has developed techniques for measuring these properties with increasing accuracy. However, living objects like cells and microorganisms have proven to be difficult to measure accurately, primarily because they live in a fluid environment that is incompatible with conventional measurement tools. In this talk I will share our progress in developing and using sensors that can be used to accurately measure the physical properties of living cells and organisms in fluid. These sensors are akin to tuning forks with fluidic channels embedded inside them. The sensor vibrates at a certain resonance frequency, and when an object like a cell, embryo, particle, etc. passes through the sensor, its resonance frequency changes by an amount proportional to the buoyant mass of the object. Using micro-fabricated mass sensors developed at MIT, we can measure the mass, volume, and density of ingle living cells; and using the larger-scale mass sensors we are developing at UC Riverside, we can monitor whole multicellular microorganisms as they grow and react to stimuli. We have found that the physical properties of a cell or organism can provide unique and valuable information about the biological state of the cell or organism, answering questions like “what kind of cell is this? Is the cell alive? Is it growing? Is this cancer cell responding to this drug? And is this organism reacting to this toxic substance?” Ultimately these techniques have applications in point-of-care diagnostics, drug screening, toxicity assessment, and several other fields.

William H. Grover is an Assistant Professor in the Department of Bioengineering at the University of California, Riverside. Prior to joining UCR, Dr. Grover received his postdoctoral training in the Biological Engineering Division at Massachusetts Institute of Technology. In Prof. Scott Manalis' group at MIT, Dr. Grover used the group's microfluidic mass sensors to make the first precision measurements of the density of single living cells. Dr. Grover obtained his Ph.D. in Chemistry at the University of California, Berkeley. In Prof. Richard Mathies' group at UC Berkeley, Dr. Grover developed microfluidic "processors" that bridged the chemical, biological, and computational sciences. A native of Tennessee, Dr. Grover received his B.S. in Chemistry at the University of Tennessee, Knoxville.

Location: California Lutheran University
Building and room to be announced
60 West Olson Road, Thousand Oaks
(see map on next page)
Pizza/networking starts at 6:30 pm
Talk starts at 7:00 pm

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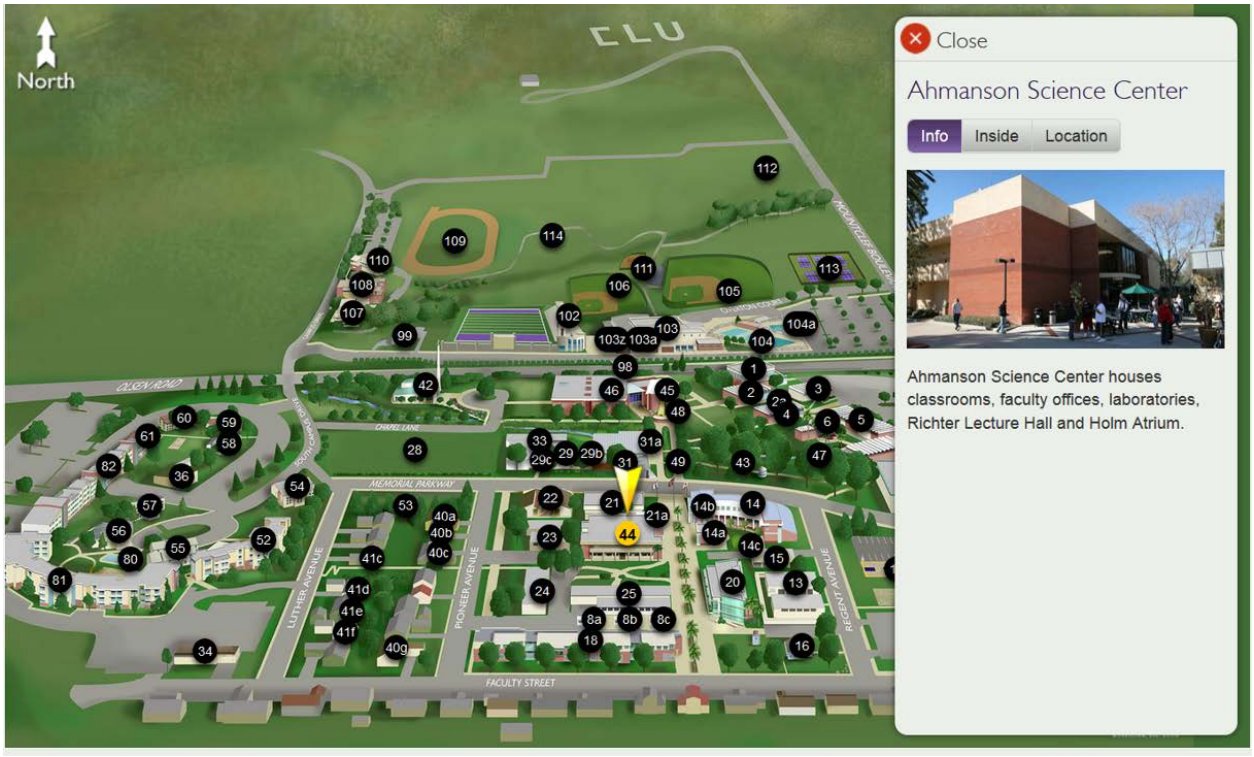

Directions from Ventura:
Take the Ventura Freeway 101 South.
Take Lynn Road Exit, turn left, drive 2.9 miles.
Lynn Road turns into Olsen Road, drive .9 miles.
Turn right onto Mountclef Boulevard - the University is on the right
Turn Right onto Memorial Parkway
Park on Memorial Parkway or adjacent streets.

Directions from Los Angeles:
Take the Ventura Freeway 101 North.
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