COLLEGE OF ENGINEERING
MECHANICAL ENGINEERING
UNIVERSITY OF MICHIGAN

# Mechanical Engineering Seminar Series

## Integrating Microfluidics and Computer Vision for High-content Analysis of Aging


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Tuesday, December 7, 2021

Room 3150 DOW

4:00 p.m.

This seminar will also be streamed live at the following link

ME Seminar Zoom link (QR Code below)

Password 413824


**Abstract**

The fraction of older adults in the global population is projected to increase substantially in coming decades and aging is the main risk factor for a large number of diseases. Revealing the molecular underpinnings of aging and longevity, and its functional and morphological impacts on an organism, are thus critical questions. In our work, we use the nematode *C. elegans* to better understand aging. We develop and apply key technologies that enable quantitative, high-content analysis of the effects of aging on cells, neuronal connections, protein stability, and gene activity. Aging induces high levels of heterogeneity, and complex morphological changes in cellular and subcellular structures. Thus, their analysis requires large sample numbers and quantitative approaches to describe them. The model system *C. elegans* has been fundamental to our current understanding of aging. This nematode provides multiple advantages that have made it a widely used model organism, such as transparency and capability to express fluorescent tags, thus allowing *in vivo* analysis of biological processes at multiple scales. However, aging phenotypes are highly variable and complex. In this talk, I will present several approaches that rely on microfluidic tools, high-content phenotyping aided by machine and deep learning, and CRISPR/Cas9 genetic engineering to study aging in *C. elegans* at the molecular, cellular, and organismal level. This work has enabled quantitative analysis of key aging molecular components and phenotypes that enable lifespan prediction, identification of aging-relevant genes, and the identification of aging-specific degenerative changes in neurons.


**Bio:**
Adriana San Miguel is an Assistant Professor in the Department of Chemical & Biomolecular Engineering at NC State University. She is also part of the University's Synthetic and Systems Biology Cluster. Her work combines engineering and biology, and focuses on developing tools to perform high-throughput automated experiments with the model organism *C. elegans.* These tools are used to better understand aging, stress, and neurodegeneration.
She received a BS in Chemical Engineering at the Monterrey Institute of Technology and obtained a PhD in Chemical Engineering from Georgia Tech. She trained as a Postdoctoral Fellow with Hang Lu at Georgia Tech and with Marc Vidal at the Dana-Farber Cancer Institute. She has received several awards, which include the NIA K99/R00 Pathway to Independence Award, DOD New Investigator Award, and the Interstellar Initiative on Healthy Longevity.


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