FACULTY RESEARCH TALKS

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Zoom talk | Friday, April 15, 2022 | Noon to 1 p.m.

PRESENTER 1:

LUIGI PEROTTI

Assistant Professor, Mechanical and Aerospace Engineering, Biionix Cluster

Using Computational Biomechanics to Develop Biomarkers of Cardiac Health and Bio-inspired Deployable Structures

Computational models can reveal key mechanisms governing biological systems from the macro to the nano scale. In this presentation, Dr. Perotti will introduce two applications across scales. First, new biomarkers of cardiac function are discussed. These biomarkers are based on subject-specific kinematics and microstructural measures that can be obtained non-invasively through MRI. Second, a new modeling framework inspired by the maturation and structure of viral shells is presented to design deployable structures.

Dr. Perotti's research focuses on computational mechanics. Two main areas of his research are developing new biomarkers of cardiac function and studying deployable structures inspired by the maturation of viral capsids. Dr. Perotti received his Ph.D. in mechanical engineering from Caltech in 2011. He was a postdoctoral scholar at UCLA in MAE (2011-2014) and radiological sciences (2014-2016) after receiving an AHA postdoctoral fellowship, and a project scientist (2016-2018) when he received an NIH K25 award and conducted pre-clinical studies. Dr. Perotti joined the MAE department at UCF in 2019.

PRESENTER 2:

TUHIN DAS

Associate Professor, Mechanical and Aerospace Engineering

Acausal Modeling and Simulation of Floating Offshore Wind Turbines

Floating Offshore Wind Turbines (FOWTs) are multi-physics renewable energy systems. Their characteristics are governed by aerodynamics, hydrodynamics, rigid-body dynamics and vibration phenomena. Dr. Das and his team model FOWTs on an acausal environment, which facilitates modeling of multi-domain power transfer, helps build modular, hierarchical models and preserves natural inter-component interactions. A hybrid path is taken in the modeling effort, combining discretized and lumped-parameter methodologies. Model validation and control co-design questions are discussed. Some preliminary results comparing traditional and nonlinear controllers are presented and the idea of individual pitch control is discussed with examples.

Dr. Das' research interests are in modeling, simulations, dynamics and control. His has conducted research in the theory of dynamics and control as well as their applications in fuel cells, wind turbines, power plants, grids, structures, UAVs and robots. He received his Ph.D. and M.S. degrees from Michigan State University in 2002 and 2000, and B.Tech. from Indian Institute of Technology Kharagpur in 1997, all in mechanical engineering. Before joining UCF in 2011, he worked in the industry for four years and was an assistant professor at Rochester Institute of Technology. Dr. Das' research has been funded by several agencies such as NSF, ONR, ARPA-e, Siemens and FHTC.

PRESENTER 3:

MARY JEAN AMON

Assistant Professor, School of Modeling, Simulation and Training

Human State Estimation in Complex Dynamic Environments via Multimodal and Nonlinear Methods

Understanding effective coordination between people within socio-technical systems is increasingly necessary in our contemporary interconnected workforce. Dr. Amon will discuss how sensor technologies can be used in conjunction with concepts from nonlinear dynamical systems theory to describe the time-evolving, multimodal and complex nature of many goal-directed tasks. Her findings demonstrate how large amounts of data, from multiple people and modalities, can be synthesized into meaningful measures of higher-order activities for enhanced detection, prediction and intervention.

Dr. Amon holds an M.A. and Ph.D. in experimental psychology from the University of Cincinnati, and an M.A. in psychology in education from Teacher's College, Columbia University. Before joining UCF, she was a postdoctoral researcher at Indiana University Bloomington and a research associate at the University of Colorado Boulder. Her research is informed by the cognitive, computer and data sciences and centers on optimizing user decision-making and performance in the context of complex socio-technological systems.

ZOOM LINK: https://bit.ly/3ILqC1l | PREVIOUS TALKS: www.cecs.ucf.edu/faculty-research-talks