University at Buffalo
Department of Mechanical and Aerospace Engineering
School of Engineering and Applied Sciences

# Dr. Silvia Ferrari

## Sensing and Searching for Information Under Pressure

*Professor; Sibley School of Mechanical and Aerospace Engineering; Cornell University, Ithaca, NY*


### Abstract

Unmanned ground, aerial, and underwater vehicles or robots equipped with on-board wireless sensors are becoming crucial to both civilian and military applications because of their ability to replace or assist humans in carrying out dangerous yet vital missions. In many cases, these robots are deployed for the primary purpose of gathering information from unstructured and uncertain environments and, therefore, must decide future actions intelligently based on the sensor measurements and environmental information. Recent work on information-driven sensor path planning has shown that the performance of these sensors can be significantly improved by planning their paths based on probabilistic sensor models, and on the geometric characteristics of the workspace and of the sensor field-of-view or visibility region. This talk discusses recent collaborative studies on satisficing decision making in human and primate subjects aimed at uncovering how these decisions can be made under pressure. High-fidelity simulations and virtual reality (VR) environments are used to present the same treasure hunt problems to human and non-human subjects, as well as robots. The goal is to develop a general framework by which feature selection and heuristics can be combined with traditional information-driven methods for path planning and control laws in active sensing and information gathering. Studies show that an adaptive approach, known as adaptive evidence accumulation, by which only the most informative cues are used to make decisions under pressure can be applied to autonomous sensors. As a result, future sensors will be able to conduct challenging missions under external pressures, such as sensory deprivation, time constraints, energy limitations, and insufficient data.


### Bio Sketch

Silvia Ferrari is Professor of Mechanical and Aerospace Engineering at Cornell University, where she also directs the Laboratory for Intelligent Systems and Controls (LISC). Prior to joining the Cornell faculty, she was Professor of Engineering and Computer Science at Duke University, where she was also the Founder and Director of the NSF Integrative Graduate Education and Research Traineeship (IGERT) program on Wireless Intelligent Sensor Networks (WISeNet), and a Faculty Member of the Duke Institute for Brain Sciences (DIBS). Her principal research interests include robust adaptive control, learning and approximate dynamic programming, and information-driven planning and control for mobile and active sensor networks. She received the B.S. degree from Embry-Riddle Aeronautical University and the M.A. and Ph.D. degrees from Princeton University. She is a senior member of the IEEE, and a member of ASME, SPIE, and AIAA. She is the recipient of the ONR young investigator award (2004), the NSF CAREER award (2005), and the Presidential Early Career Award for Scientists and Engineers (PECASE) award (2006).

If you would like to meet Dr. Ferrari, please contact Dr. John Crassidis at johnc@buffalo.edu

**Thursday, November 30**
**O'Brian 112**
**3:30-4:30 pm**