UNIVERSITY of ROCHESTER

BME Colloquium

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"Encoding and perceiving the texture of sounds: neural and perceptual strategies for recognizing auditory texture and for listening in natural background noise."

OCTOBER 21

Dr. Monty A. Escabí is Professor of Electrical and Computer Engineering and Biomedical Engineering at the University of Connecticut (UConn). He holds joint appointments in Psychological Sciences Department and the Connecticut Institute for Brain and Cognitive Sciences. He received a Ph.D. from University of California San Francisco and Berkeley Bioengineering, M.S. and B.S. in Electrical in Computer Engineering from Columbia University and Florida International University, respectively. His research explores how the central auditory system represents natural sounds ultimately contributing to perceptual abilities. His experimental approach spans single neuron and neural populations recordings in auditory midbrain, thalamus, and cortex and is coupled with human perceptual studies, acoustic modeling, and computational modeling of the auditory system. He is broadly interested in understanding how single neuron and network-level computations contribute to natural sound perception and recognition capabilities, both for normal and impaired hearing.

Seminar Abstract: Natural soundscapes such as from a forest or a busy restaurant are composed of mixtures of individual sounds that the brain can interpret independently or collectively. In certain instances, sounds such as from moving cars, sirens, and people talking, are perceived in unison and are recognized collectively as single sound (e.g., city noise). Yet, in other instances, such as for the cocktail party problem, multiple sounds compete for attention so that the competing background (e.g., sirens and cars) interferes with the perception of a target sound (e.g., a talker).

I will describe results from my lab on the perception and neural representation of auditory textures and how these influence speech recognition in noise. Using neural recordings from the auditory midbrain of unanesthetized rabbits and complementary perceptual studies on human listeners, I will first show how neural activity can be decoded to account for human texture perception. Next, I will demonstrate how summary statistics from natural background sounds distort the neural representation of speech, ultimately contributing to difficulties for recognizing speech in noise. Finally, by adapting a model of the auditory midbrain I will demonstrate how summary statistics from natural backgrounds sounds compete with foreground speech. The auditory model accurately predicts human speech recognition capabilities in arbitrary natural noise accounting for 90% of the perceptual variance across background conditions and SNRs.

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Zoom Webinar ID: 957 4592 2834 Passcode: BME@UR

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