UNIVERSITY of HOUSTON | ENGINEERING

Department of Biomedical Engineering

Seminar

Driver Performance Under Cognitive, Emotional, Sensorimotor, and Mixed Stressors

Friday, October 28, 2016

SEC 204: 12-1PM

Speaker: Dr. Ioannis Pavlidis

Ioannis Thomas Pavlidis, PhD
Eckhard-Pfeiffer Professor
Director, Computational Physiology Lab
Department of Computer Science

Abstract: In a simulation experiment we studied the effects of cognitive, emotional, sensorimotor, and mixed stressors on driver arousal and performance with respect to (wrt) baseline. In a sample of *n*=59 drivers, balanced in terms of age and gender, we found that all stressors incurred significant increases in mean sympathetic arousal accompanied by significant increases in mean absolute steering. The latter, translated to significantly larger range of lane departures only in the case of sensorimotor and mixed stressors, indicating more dangerous driving wrt baseline. In the case of cognitive or emotional stressors, a significantly smaller range of lane departures was observed, indicating safer driving wrt baseline. This paradox is likely due to the activation of the anterior cingulate cortex (ACC) that appears to compensate erroneous reactions precipitated by cognitive or emotional conflict. ACC's compensatory grip slips, however, when the feedback loop is

intermittently severed by sensorimotor distractions. Interestingly, mixed stressors did not affect crash rates in startling events, suggesting that ACC's compensation time scale is above the range of neurophysiological latency.

Bio: Dr. Pavlidis is the Eckhard-Pfeiffer Professor of Computer Science and Director of the Computational Physiology Laboratory at the University of Houston. His research is funded by multiple agencies including the National Science Foundation, transportation organizations, and medical institutions. He has published numerous papers and books on the topics of human-computer interaction, computational physiology, and the physiological basis of human behavior. He is well known for his work on stress quantification, which appeared in a series of articles in *Nature* and *Lancet*.