



Krishna Ramachandran and Dawn Tilbury
“Prediction of Impending Desaturation:
Using Signal Analysis for Building Novel Phenotype State
Concepts”



Monday November 17, 2014, 4:30-6:30PM in 1123 LBME

We present a new approach for evaluating predictions of oxygen saturation levels in blood (SpO₂). A performance metric based on a threshold is proposed to evaluate SpO₂ predictions based on whether or not they are able to capture critical desaturations in the SpO₂ time series of patients. We use linear auto-regressive models built using historical SpO₂ data to predict critical desaturation events with the proposed metric. The overall classification capabilities for the developed predictive models were also investigated. We show no improvement in the percentage of the predicted critical desaturations if pulse rate dynamics are incorporated into the SpO₂ predictive models. Our results indicate oxygen in blood is an effective input to the pulse rate rather than vice versa. We demonstrate that the combination of predictive models with frequent pulse oximetry measurements can be used as a warning of critical oxygen desaturations that may have adverse effects on the health of patients.

Dr. Ramachandran's target condition of interest is obstructive sleep apnea. Through retrospective and prospective study methods, his research focuses on the effect of anesthesia on state changes in patients' physiology. He has also developed screening tools for sleep apnea and postoperative respiratory complications. His work with Dr. Tilbury involves studies into changes in respiratory physiology occurring during sleep and anesthesia.

Dawn M. Tilbury is currently the Associate Dean for Research in the College of Engineering, University of Michigan. She received the B.S. degree in Electrical Engineering, summa cum laude, from the University of Minnesota in 1989, and the M.S. and Ph.D. degrees in Electrical Engineering and Computer Sciences from the University of California, Berkeley, in 1992 and 1994, respectively. In 1995, she joined the Mechanical Engineering Department at the University of Michigan, Ann Arbor, where she is currently Professor, with a joint appointment as Professor of EECS. Her research interests include distributed control of mechanical systems with network communication, logic control of manufacturing systems, reliability of ground robotics, and dynamic systems modeling of physiological systems. She was elected Fellow of the IEEE in 2008 and Fellow of the ASME in 2012, and is a Life Member of SWE.

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