Abstract: Radiation therapy is a cancer treatment method that employs high-energy radiation beams to destroy cancer cells by damaging the ability of these cells to reproduce. Thoracic and abdominal tumors may change their positions during respiration by as much as three centimeters during radiation treatment. Because of the finite time delay between the acquisition of target position and responding to real-time measurement, prediction of respiratory motion—its technical limitations and the physiological phenomena in radiotherapy systems—is a very critical issue to overcome. In this talk, we will present customized prediction of respiratory motion with clustering from multiple patient interactions. The proposed method contributes to the improvement of treatment accuracy. Meanwhile, breathing pattern can impact the dose calculation for patient treatments in radiotherapy systems. Real-time tumor-tracking, where the prediction of irregularities becomes relevant, has yet to be clinically established. We will also discuss the statistically quantitative modeling for irregular breathing classification, in which commercial respiration traces are retrospectively categorized into several classes based on breathing pattern. The proposed statistical classification may provide clinical contributions to optimize the safety margin to guide the radiation beam during external beam radiotherapy.

Presenters: Suk Jin Lee is a Ph.D. candidate in the Department of Electrical and Computer Engineering (ECE) at VCU. Mr. Lee received a B.Eng. degree in electronic engineering from Pukyong National University (PKNU), Korea, in 2003, and an M.Eng. degree in telematics engineering from PKNU, Korea, in 2005. In 2007, he worked as a visiting research scientist at Center for Networks Research, George Washington University. His research interests include target tracking, machine learning, pattern classification, neural networks, and network protocols.

Dr. Yuichi Motai is currently an assistant professor of ECE at VCU. Dr. Motai received a B.Eng. degree in instrumentation engineering from Keio University, Tokyo, Japan, in 1991; an M.Eng. degree in applied systems science from Kyoto University, Kyoto, Japan, in 1993; and a Ph.D. degree in ECE from Purdue University, West Lafayette, IN, USA, in 2002. His research interests include the broad area of sensory intelligence, particularly medical imaging, pattern recognition, computer vision, and sensory-based robotics.

When: 12 noon, Wednesday, March 28, 2012
Where: E1232, School of Engineering, Monroe Campus