

**Title: Touchless Monitoring of Breath Function**

**Authors:** Ramya Murthy, Ioannis Pavlidis, and Panagiotis Tsiamyrtzis

**Department of Computer Science, Infrared Imaging Group**

**Abstract:** We have developed a novel method for non-contact measurement of breathing function. The method is based on statistical modeling of dynamic thermal data captured through an infrared imaging system. The expired air has higher temperature than the typical background of indoor environments (e.g., walls). Therefore, the particles of the expired air emit at a higher power than the background, a phenomenon which is captured as a distinct thermal signature in the infrared imagery. There is significant technical difficulty in computing this signature, however, because the phenomenon is of very low intensity and transient nature. We use an advanced statistical algorithm based on the method of moments and the Jeffrey's divergence measure to address the problem. So far, we were able to compute correctly the breathing waveforms for ten (10) subjects at distances ranging from 6-8 feet. The results were checked against concomitant ground-truth data collected with a traditional contact sensor. The technology is expected to find applications in the next generation of touchless polygraphy and in preventive health care.