Dr. Skubic will describe ongoing interdisciplinary research in the Center for Eldercare and Rehabilitation Technology at the University of Missouri. Longitudinal research studies with in-home sensing systems have shown that the sensors offer new vital signs for detecting early signs of illness and functional decline. The system provides a new paradigm for proactively managing chronic health conditions. A variety of sensors have been tested, including passive infrared motion sensors, a bed sensor that captures quantitative pulse, respiration, and restlessness while positioned under the mattress, as well as fall detection and gait analysis systems using vision, radar, acoustic arrays, and depth images. Variations of the system have been installed in 15 senior housing sites in Missouri and Iowa as well as private homes in Kansas City. The Center is also investigating a new paradigm for rehabilitation by studying preventative screening tools to identify athletes prone to ACL injuries and piano students prone to hand injuries. The talk will focus on research challenges for three systems: (1) the bed sensor system developed at the University of Missouri, (2) methods used for capturing falls and gait parameters from depth images and tracking fall risk, and (3) the screening tool for piano students which also uses depth images.

Marjorie Skubic received her Ph.D. in Computer Science from Texas A&M University, where she specialized in distributed telerobotics and robot programming by demonstration. She is currently a Professor in the Electrical and Computer Engineering Department at the University of Missouri with a joint appointment in Computer Science. In addition to her academic experience, she has spent 14 years working in industry on real-time applications such as data acquisition and automation. Her current research interests include sensory perception, spatial referencing interfaces, human-robot interaction, sensor networks for eldercare, and preventative screening tools. In 2006, Dr. Skubic established the Center for Eldercare and Rehabilitation Technology at the University of Missouri and serves as the Center Director for this interdisciplinary team. The center’s work supports proactive models of healthcare such as monitoring systems that noninvasively track the physical and cognitive health of elderly residents in their homes and generate alerts that flag health changes. Recent work has also investigated automated screening of athletes and pianists to flag injury risks, with support for preventative exercises to reduce the risk.