Intelligent Sensing and Multi-Sensor Fusion for Various Engineering Systems

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Extended Abstract

Real-time sensing and multi-sensor fusion are fundamentally important issues for information processing, monitoring and control of various engineering systems. Intelligent real-time data acquisition, effective multi-sensor fusion, and efficient information processing would achieve reliable and accurate information for the engineering systems, and result in high performance and efficient operation of the engineering systems. In this talk, I will start with a very brief introduction of the various intelligent approaches. Then I will present our recent research on several innovative applications of advanced intelligent systems to agricultural, biomedical, robotic and other engineering systems, such as an electronic nose system for real-time livestock odor monitoring and control, which is based on novel e-noses and wireless sensor networks; a real-time intelligent system for ginseng drying, which is based on a computer vision system and an embedded intelligent controller; a real-time intelligent system for flue-curing barns, which is based on the image features of tobacco leaves from cameras, smells from an electronic-nose system, and a neuro-fuzzy control system; and a real-time intelligent monitoring and control system for meat drying process with efficient energy consumption, where an improved psychrometer is developed for accuracy relative humidity measurement and a neuro-fuzzy system is developed for decoupled temperature and humidity control. Finally, I will talk about intelligent sensing and signal processing of intelligent harvesting robotic systems for agricultural products, and intelligent navigation of behavior-based mobile robots in unstructured field environments.