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### USE OF HYPERSPECTRAL IMAGING TO IMPROVE THE SAFETY OF FOOD

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**ABSTRACT** Concerns regarding food safety are growing worldwide, and the recent increase in the prevalence of outbreaks of food borne illness and the pathogenicity of microorganisms responsible for these outbreaks has only heightened these concerns. In this regard, our laboratory has developed a number of imaging devices that can be used to inspect food and food processing surfaces. The underlying technology used to develop these devices is reflectance and fluorescence VIS/NIR hyperspectral imaging. Generally, acquired 3-D hyperspectral image cubes are used to identify multispectral wavebands that can be used to detect attributes of concern in a commercial environment. Examples of devices (all patent-pending) near the end of their development cycle include a hand-held fluorescence imaging device to detect contaminants such as feces in processing plants, a system to detect wholesome poultry carcasses, and a system that allows simultaneous acquisition of fluorescence (400-720 nm) and reflectance (800-950 nm) images using a single camera. This last device has been used to simultaneously detect fecal contamination and quality problems of apples at commercial processing speeds. Devices under development include a hand-held hyperspectral imaging system for surveying production facilities and a portable time-resolved laser-induced fluorescence line-scan hyperspectral imaging system for detection of feces in produce fields. One application of the hand-held system might be to identify biofilms on processing surfaces. The presentation will outline the practicalities of hyperspectral imaging, and will discuss the benefits and limitations of imaging-based food safety detection systems.

**Keywords:** food safety, machine vision, hyperspectral imaging, image processing.