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Presentation 47: Smart Fingertip Tactile Sensors for Agrorobotics Applications

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With a growing world population, food supply demand is sure to continue to grow as well. Therefore, more than ever, autonomous food harvesting techniques have become a necessity to match these ever-growing demands. Existing solutions relying on optical inspection face limitations, particularly in image quality dependence on factors such as lighting conditions. Tactile sensing-based classification is a very possible alternative, although with its own challenges. This thesis aims to develop a prototype device that is able to autonomously classify harvested food (such as fruits and vegetables) by their ripeness, hopefully contributing to a faster production process. The tactile sensing device would be built upon magnetoresistive-based magnetic field sensors with a biomimetic approach, utilizing a magnetorheological elastomer as soft skin. This architecture provides a large sensing area with a significant space resolution, while still being thin and flexible. In a subsequent stage, a machine learning classifier algorithm will be implemented to facilitate the differentiation of food products based on their ripeness. The combination of soft skin tactile sensing and machine learning holds promise for overcoming the limitations of current food harvesting techniques, ultimately aiding the food industry in meeting the escalating demands of a growing global population.

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