

Graduate Module Outline

Title: Computer Vision and Image Analysis

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Timing: July 2015

Course Description:

The development of computer-vision technologies has created an opportunity to use them in precision agriculture, automated navigation, food imaging, etc. This course provides an overview of computer vision technologies, including image acquisition, processing, interpretation and decision-making.

This module is suitable for graduate students, who are involved in research of macro- and microstructure of biological systems, bioinstrumentation and image analysis. The module will start with a background introduction to computer-vision; digital cameras and optical devices, spectral sensitivity and resolution, image acquisition, image processing, image analysis, image recognition, feature analysis, imaging software, applications in food engineering and precision agriculture. Students who register for the module must have a strong background in mathematics and physics.

Format:

Four lecture sessions will be given; each will be around 1 hour. Students will spend most of the time on the development of their practical applications, from the development of imaging system (for macroscopic or microscopic research) to meaningful image analysis.

Method of Evaluation:

60% for the completion of the assigned literature review and lab exercises
40% for presentation on the assigned topic

Prerequisites

Undergraduate courses in Mathematics (1001 or/and 2000) and Physics (1002).

Course Outline:

- I. Computer-vision
 - 1. Computer vision industry
 - 2. Real-time imaging
 - 3. Multi-spectral and hyper-spectral imaging
- II. Image analysis
 - 1. Digital image attributes
 - 2. Image pre-processing, segmentation, filtering techniques
 - 3. Correlation of image and sensor attributes
 - 4. Real-time image analysis.
- III. Practical applications
 - 1. Precision agriculture
 - 2. Weed identification
 - 3. Picking/packing technologies
 - 4. Food inspection and classification

Format: