

## Master Syllabus

### EGR 1144 - Sensors & Vision Systems

**Division:** Science, Mathematics and Engineering

**Department:** Automation and Control Technology

**Credit Hour Total:** 4.0

**Lecture Hrs:** 3.0 **Lab Hrs:** 3.0

**Prerequisite(s):** EET 1120 AND EGR 1128

**Date Revised:** October 2012

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### Course Description:

Introduction to basic sensors used in Computer Integrated Manufacturing (CIM) systems. Theory of operation, wiring, installation, testing and troubleshooting sensors and circuits. The analysis of various methods of utilizing vision systems in industrial applications using camera, lighting and software. Three classroom, three lab hours per week.

### General Education Outcomes:

- ▣ Critical Thinking/Problem Solving
- ▣ Information Literacy

### Course Outcomes:

#### Sensor identification

Recognize sensors by sight and be able to know what function they perform.

**Assessment Method:** Locally developed exams

**Performance Criteria:** Score greater than 70%

**Assessment Method:** Oral examination

**Performance Criteria:** Score "17.5" or higher on five by five rubric

#### Sensor wiring and testing

Safely wire sensors into a system and test a sensor to determine if it is working properly.

**Assessment Method:** Locally developed exams

**Performance Criteria:** Score greater than 70%

**Assessment Method:** Simulations

**Performance Criteria:** Score "17.5" or higher on five by five rubric

#### Perform sensor selection

Choose the right sensor for a described task, including considerations of cost, life cycle, environmental, and safety.

**Assessment Method:** Locally developed exams

**Performance Criteria:** Score greater than 70%

**Assessment Method:** Simulations

**Performance Criteria:** Score "17.5" or higher on five by five rubric

#### Machine vision hardware and software

Select machine vision system hardware and software that will be able to meet a particular application problem.

**Assessment Method:** Locally developed exams

**Performance Criteria:** Score greater than 70%

**Assessment Method:** Simulations

**Performance Criteria:** Score "17.5" or higher on five by five rubric

#### Machine vision system

Set up and program a machine vision system that will be able to identify various parts, locate randomly positioned parts, select a part from an area then re-orientate to new location, check part for dimensional accuracy and geometric integrity, and use vision hardware system for range finding.

**Assessment Method:** Locally developed exams

**Performance Criteria:** Score greater than 70%

**Assessment Method:** Simulations

**Performance Criteria:** Score "17.5" or higher on five by five rubric

#### Vision system component troubleshooting

Troubleshoot components of a vision system and make necessary repairs

**Assessment Method:** Locally developed exams

**Performance Criteria:** Score greater than 70%

**Assessment Method:** Simulations

**Performance Criteria:** Score "17.5" or higher on five by five rubric

### Outline:

Types of sensors

Theory of operation of various sensors

Wiring and troubleshooting sensors

Charge Coupled Device (CCD) and vidicon camera theory of operation

Image measurement covering grey scale, pixel, light intensity, and interpretation of this data

Two dimensional image analysis techniques and introduction of three dimensional image analysis

Utilization of various probability algorithms

Utilization of purchased software for vision systems

Introduction to infrared systems