

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

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