Subject Code: EE4011A  
Subject Title: Industrial Computer Applications  
Credit Value: 3  
Level: 4  
Pre-requisite/ Co-requisite/ Exclusion: Pre-requisite: EE3005A & EE3007A

Objectives:
1. To introduce the applications of computing techniques in solving industrial problems and the following topics are included: Computer process control; Industrial instrumentation and systems; Image processing; Multimedia concepts.

Intended Learning Outcomes:
Upon completion of the subject, students will be able to:
a. Design and develop digital controllers.  
b. Write ladder logic for simple PLC applications.  
c. Understand the use of industrial networks.  
d. Apply image processing techniques in industrial automation.

Subject Synopsis/ Indicative Syllabus:
1. Computer process control: Modelling of the computer process control system, practical approaches to digital control implementation, PLC and microcomputer-based control systems.  
2. Intelligent instrumentation and systems: Embedded microcontrollers, industrial process controllers, applications of distributed digital control algorithms, industrial networks and SCADA system.  
3. Image processing: Digital image fundamentals, image representation, image enhancement, image segmentation, application of image processing in industrial automation.  
4. Multimedia concepts and applications: Multimedia fundamentals, image compression, video compression, hardware peripherals and software tools.

Laboratory Experiment:
PC based digital controller for temperature control  
Power failure monitoring using embedded controller  
Sequential control using PLC  
Automatic meter reading using computer vision

Teaching/Learning Methodology:
Lectures and tutorials are the primary means of conveying the basic concepts and theories. Experiences on design and practical applications are given through mini-projects, in which the students are expected to solve design problems with real-life constraints and to attain pragmatic solutions with critical and analytical thinking.

Teaching/Learning Methodology | Outcomes | a | b | c | d  
--- | --- | --- | --- | --- | ---  
Lectures | ✔ | ✔ | ✔ | ✔  
Tutorials | ✔ | ✔ | ✔ | ✔  
Experiment | ✔ | ✔  

Assessment Methods in Alignment with Intended Learning Outcomes:

| Assessment methods/tasks | Specific assessment methods/tasks | % weighting | Intended subject learning outcomes to be assessed | a | b | c | d  
--- | --- | --- | --- | --- | --- | --- | ---  
1. Examination | 60% | ✔ | ✔ | ✔ | ✔  
2. In-class Test (x2) | 20% | ✔ | ✔ | ✔ | ✔  
3. Mini-project Report | 10% | ✔ | ✔ | ✔ | ✔  
4. Mini-project Demo/Presentation | 10% | ✔ | ✔  
Total | 100% | | | | | | |  

One end-of-semester written examination; one mid-semester-test; one end-of-semester test; a mini-project on a small micro-processor based application; and a report/demonstration/presentation to accompany the mini-project.

Student Study Effort Expected:
Class contact:
- Lecture/Tutorial: 36 Hrs.  
- Laboratory (mini-project): 12 Hrs.  

Other student study effort:
- Mini-project report and preparation: 12 Hrs.  
- Self-study: 45 Hrs.  

Total student study effort: 105 Hrs.

Reading List and References:

Reference books: