CSE 477 Digital System Design

Credits

5.0 (2 hrs lecture, 3 hrs lab, additional meetings times tbd)

Lead Instructor

Shwetak Patel

Textbook

None

Course Description

Capstone design experience. Prototype a substantial project mixing hardware, software, and communication components. Focuses on use of embedded processors and programmable logic in digital system design, case studies, and emerging components and platforms. Provides a complete experience in embedded system design and management.

Prerequisites

CSE 451; CSE 466; CSE 467.

CE Major Status

Selected Elective

Course Objectives

To serve as a capstone design course to tie together the computer engineering curriculum via the design of a complete embedded system involving multiple communicating components. To gain appreciation for the interaction between hardware and software in embedded system design. Familiarity with basic inter-component communication methods. To experience the development of a complete product from design to implementation and debugging. To present design goals and decisions as well as implementation results in both verbal presentation and written documentation. To work toward a common goal in a team environment. Students will prototype a substantial

project that mixes hardware, software, and communication components. Lectures will be limited and will be focused on topics relating to advance prototyping, emerging components and platforms, case studies, and other topics of interest to the class.

ABET Outcomes

(a) an ability to apply knowledge of mathematics, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multi-disciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Course Topics

- Introduction: Embedded Systems; Product design; Product development process
- Team-based Design: Project definition; Decomposition into hardware and software components;
- Evaluation of needs; Assessment of team members skills; Experimental design to resolve unknowns;
- Design reuse
- Project Evolution: Design for maintainability; Design for upgradability; Modularity in Design
- Research Directions: Architecture innovations; Operating systems; Networking; Application domains;
- User interfaces
- Case Studies: Past capstone design projects; Industry case studies; Research projects in department
- Advanced prototyping
- Product requirement documents