

Embedded System Design

This is an introductory graduate-level embedded system course. It is about the basics of embedded systems, including both hardware and software. It will also review the latest trends of research in embedded system design.

Course Code: EE-6801

Credit Hours: 3

Pre-requisite: Computer Architecture, Computer Programming

Target Audience: MS/PhD students wishing to pursue research in the field of Embedded Systems, or research in any other field that may require embedded system based implementation.

Synopsis:

An embedded system is a small computer system that is designed to perform a specific task, often with real-time computing constraints. Embedded systems are embedded within a larger system, repeatedly carrying out a particular function, often going completely unrecognized by the end user. Today embedded systems control many devices in our daily lives including common electronic devices, home appliances, business equipment, medical testing systems, automobiles, telecommunication devices, military equipment, etc.

In contrast to embedded systems, a general purpose computer such as a personal computer (PC) is designed to be flexible and meet a wide range of end-user needs. Since an embedded system is dedicated to perform specific tasks, design engineers can optimize it to reduce cost and size of the product, and increase its reliability and performance. The need and the requirement to optimize an embedded system for a particular task, while reducing the cost, time-to-market, size, power-consumption and other metrics along with meeting real-time constraints makes embedded systems design different from general purpose system design.

This course will review the basic concepts of embedded systems including hardware architectures, software techniques, CAD-tool internal design, memory & interfacing, operating system, state-machines, hardware-software co-design and design-examples etc. It will also review the current and future trends of research in the vast domain of embedded system design.

Course Outline:

- Chapter 1 to 11 (Text Book)
- Latest trends in research (Research papers)
(Few text book chapters and research papers will be given as reading assignments)

Text Book:

- **Embedded System Design – A Unified Hardware/Software Introduction**, Frank Vahid, Tony Givargis, John Wiley & Sons, 2002

Reference Book:

- **High-Performance Embedded Computing, Architectures, Applications and Methodologies**, Wayne Wolf, Elsevier, 2007