Computer Science 465
Microcomputer Systems

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Class Motto

"Smaller is Better"

Goal of Class

• To learn modern Embedded System Design Techniques including Hardware and Software
• Learn to use State-of-the-art Development tools and test equipment
Class Information

- Ryan Phelps is TA/Lab Assistant
  - Treat him with great respect!

- Class Structure
  - 2 Hours Lecture/Week
  - 3 Hour MANDATORY Lab/Week

Class Information

- All lectures will be posted on-line before the lecture
- Quizzes will be given
- Attendance will be taken
- Sign up sheet for lab going around

Embedded Systems

- Where we are: $Cost Per MIP

[Graph showing cost per MIP for different years]
Embedded Systems are Everywhere!

- 11 BILLION sold in 1997!
- Compare to PCs (30 Million/year)
- PCs are less than 1% of the total!

Market Share by CPU Size

- 32 Bits
- 16 Bits
- 8 Bits
- 4 Bits

Cheaper to use a CPU

- Relay Logic
- Spider Relay Logic
- Tube based controls
- Discrete Transistor controls
- SSI controls
- Processor based controls
- FPGA based controls
Getting Products out Faster!

- Use Clever Technical Ideas
- Start Testing from Day 1!
- Manage Features to ship on time!
- Stamp out Bugs Aggressively
- Create an efficient development environment

What is a Real Time System?

- A system where timeliness is as important as the correctness of the outputs
- Real Time systems may not be “Fast” systems
- Real Time systems must satisfy explicit (bounded) response-time constraints or risk failure

Real Time Software

- Complexity of real time software is enormous
- Building “polling” software that can do everything is complicated and when it needs to be changed, it’s very difficult
More Definitions

- **Embedded System** - Software system completely encapsulated by the hardware it controls
- **Organic System** - Software system that is not highly dependent on the hardware and has a generalized user interface
- **Semi-detached system** - Software system that has attributes of both embedded and organic systems

What are we doing in the Lab?

- First Section - Building an mixed hardware/software embedded system
- Second Section - Interfacing to a complex piece of hardware or developing a web and network based internet appliance

Homework Assignment

- Read Chapter 1 and 2 in UCOSII
- Prepare yourself for the challenge of building embedded systems!