14 - Final Review

CEG 4330/6330 - Microprocessor-Based Embedded Systems

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Midterm Format

- 12 Problems:
  - 2 Design Problems
    - 50% total
    - 25% each
    - 8.75 points each
  - 10 Concept Problems
    - 50% total
    - 5% each
    - 1.75 points each

Key Sections

- I/O Port Synchronization
  - Serial vs Parallel
  - Synchronous vs Asynchronous
  - Baud Rate
  - Strobing and Handshaking
  - Flow Control
  - Communication Interfaces
    - USB
    - SCI
    - SPI
    - I2C
  - Manchester Coding
  - Software Serial vs Hardware Serial

Note: these topics are only recommended for studying for the midterm, any material discussed in lecture or in slides may or may not appear on the midterm

Key Sections (cont.)

- Microprocessor-Based Systems
  - Microprocessor vs Microcontroller
  - System On Chip
  - Raspberry Pi
  - GPIO
  - Operating System
  - Low Power
  - Applications and Alternatives to Raspberry Pi

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Key Sections (cont.)

- Low Power Design
  - Reducing Power Methodologies
  - CMOS and Transistors
    - Direct-Path Current
    - Power Saving in CMOS
  - ATmega328p Power Saving
  - Raspberry Pi Power Saving
  - Governors
  - Hibernation

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Key Sections (cont.)

- Noise Considerations
  - Power Conditioning
  - AVCC vs VCC
    - Power Pins
    - Disabling Digital Circuitry
  - Unused Pins
  - Schmitt Trigger and SR Latch
    - Thresholds
    - Debouncing
  - Successive Input Noise Cancellation
  - WiFi, Bluetooth, and Other Wireless Communication

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Key Sections (cont.)

- Real Time Operating System
  - Operating Systems
    - Task, Memory, and Storage Management
  - RTOS
  - Multitasking
  - Task Scheduling
  - Rate Monotonic Scheduling and CPU Utilization
  - Concurrency
    - Critical Section, Semaphore, Priority Inversion/Inheritance
  - Reentrancy
  - Multitasking without RTOS

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Key Sections (cont.)

- Sensors
  - IR Emitter and Detector
  - Hall Effect Sensor
  - DC Motors
  - Other Types of Sensors

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Key Sections (cont.)

- Memory
  - PC Architecture, Northbridge, Southbridge
  - Memory Hierarchy
  - Caches
  - SRAM vs DRAM
  - Addressing, RAS, and CAS Timing and Pins
    - Address Multiplexing
  - DRAM Controller
  - Bus Arbitration
  - SDRAM and DDR
  - Dual Channel RAM

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