Final Exam Review

CSE 132

Logistics and Style

- Date and Time
  - May 10, Lab Sciences 300
  - 10:30am to 12:30pm, starting right at 10:30!
- Questions
  - Question 1 will be a collection of short answer things (e.g., true/false, fill in the blank, quick definition)
  - Questions 2 through N will be longer (going more in depth on a particular subject)
- One-page "cheat sheet" is allowed
  - 8.5 x 11 sheet, front and back, whatever you want to include (content-wise)

Coverage

- Cumulative
  - All material on midterm exam is still fair game
  - Emphasis on material since then or not asked then
    - C bit manipulations
    - Assembly language
    - Etc.
- Likely longer than midterm
  - There will be no attempt to make it harder

Between Now and Then

- Please complete student evaluations
  - I really do value your opinions
  - I especially value specific comments on how to improve the course, e.g.:
    - Individual studios or assignments that could be clearer
    - Order, "If A were ahead of B, B would make more sense"
    - Some more background explanation of a topic
- Doug Shook is recruiting for the summer
  - Working on course improvements, on-line lectures
  - See email on that topic and email Doug if interested

Between Now and Then (cont.)

- Quiz 5 assigned today and due Wed. late
- Will have one more recitation session
- No required studio today – open lab time
  - Practice problems available for final
  - TAs can checkout assignments
- Wed. lab time is last opportunity for checkouts
  - Both on-time and late assignments

Practicalities

- How to use development environment(s)
- Commonly used library functionality
  - Controlling pins (in and out)
  - Printing to attached PC
  - Timing
- Details of Arduino C language
  - Standard data types
  - Similarities and differences relative to Java
  - Bit-level and logical manipulation

Command Line

- Directories and their notation
- Navigation
  - ls
  - cd
  - mkdir
- Source control
  - Function of a repository
  - Checkout, update, commit

Programming When Time Matters

- Simple delays
  - Advantages and disadvantages
  - How to program
- Delta time
  - When it really matters
  - Advantages and disadvantages
  - How to program

Input and Output

- Analog Input
  - Linear calibration, scaling, units, ranges
- Analog Output
  - Pulse width modulation operation
  - Scaling, units, ranges
- Digital Input
  - Pushbutton wiring, debouncing
- Digital Output
  - Meaning, polarity
  - Multiplexing

Information Representation

- Number systems
  - Binary, two's complement, hex – conversions
  - Other negative representations
  - Fixed point – Q notation
  - Floating point – definitions
- Text representations
  - ASCII (if you need ASCII table, I will provide it)
  - UTF (-8, -16, -32)

Communication Protocols

- Java Streams
  - InputStream, DataInputStream, OutputStream, DataOutputStream
  - Wrapping Streams
- Information representation
  - In Java vs. in Arduino C vs. in protocol
  - Integers, characters, strings
- Protocol design
  - Magic numbers, error recovery, keys

Networking

- IP addressing
- DNS – Domain name service
  - URL → IP address
- Network protocols
  - UDP vs. TCP
- What is a:
  - Port
  - Socket

Peripheral Devices

- Example device use
  - LCD display
  - Accelerometer
- I2C interface
  - Principles of operation
  - Addressing mechanism
- Pixel displays and multiplexing
- Color displays

Raw Data to Information

- Filtering
  - Windowed filter
  - FIR and IIR filters
    - Execution, not coefficient design
- Peak detection
  - Combined with zero-crossing

Basic Machine

- Fetch-decode-execute cycle
- Instruction set architecture of AVR
  - Registers, instructions, memory
- AVR assembly language (I will provide docs)
  - Basic operations, addressing modes
  - Conditional branching
  - Array indexing
- Relationship between C and assembly
  - Register usage
  - Passing parameters and return values