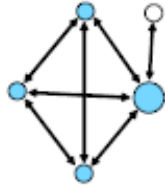Final Study Guide:

April 23:
1. In what embedded systems field of specialization is Zigbee most related to?
2. What is the name of this wireless network topology? List an advantage by using this type of topology.

3. Most current energy modeling tools for sensor networks use transmitted packets and/or CPU cycles to gauge the energy consumption of sensor nodes. AEON, a tool presented in class, uses a different approach to predicting energy consumption. Briefly list this approach and its purported benefit.
4. AEON, a tool presented in class, allows the energy profiling of sensor nodes in sensor networks. What benefits does energy profiling provide to software engineers in particular?

April 21:
5. What is the main issue that will limit future use of MOSFET-based memory technology? What problems are arising?
6. How does FeRAM store a bit?
7. How does PCRAM store a bit?

April 18:
8. You are designing a low-power wireless 3G device with a fixed bit error rate (BER) requirement. This device receives strong signals 40% of the time, average signals 40% of the time, and weak signals 20% of the time. Using an ASOVA turbo decoder, you can implement 3 configurations: "A" decodes strong signals and consumes 150mW. "B" decodes strong or average signals, and consumes 250mW. "C" decodes all signals and consumes 400mW. Only configuration C meets the BER requirement. But you can also use a "dynamic" mode which switches between configurations depending on the signal. The circuitry to switch between B and C consumes 50mW. The circuitry to switch between all modes consumes an additional 50mW. Which mode is the most power efficient? C only, switching between B and C, or switching between all configurations?
9. Give two examples of how using a logarithmic numbering system simplifies a normally complex instruction (operation) in a processor.
10. When creating turbo codes, a lookup table is used inside SRAM which consumes a lot of power. The values in this lookup table are added to the max of two inputs (A or B, which ever is larger) and used for determining bit values in the turbo code.

A) What hardware can be added to this system in order to reduce the power consumption?
B) Under what conditions does this new hardware perform its function?

April 16:
11. Why is the Cell processor be described as a heterogeneous processor and how does this help?
12. List any three methods for optimizing power in the SPE of the cell processor
13. Why is the cell a commodity processor and how does this help the scientific computing area?
14. How is a single clock used for the 2 clock domain in an SPE and how is this helpful (list 1 or 2 points)?

April 14:
15. What is window-based image processing?
16. What advantage do overlapping windows present in image processing?
17. What is SAD correlation and how is it used in image processing.
18. What are two advantages of using FPGA devices for image processing.

April 4:
19. How is scratchpad memory different from Cache?
20. Briefly explain the dynamic memory allocation approach in dynamic scratch pad memory.

April 2:
21. What is single pass cache simulation and give one advantage while using this method of cache exploration?

March 28:
22. What are 3 different forms of energy that can be harvested and
which one is the most prevalent?
23. Briefly explain 2 challenges for low power, light weight embedded systems?

ARM:
24. ARM only sells soft-core processors. What is a soft-core processor?
25. Why doesn't the ARM company know how many ARM processors are in a particular device?
26. Briefly explain what the THUMB mode is and how give one benefit for operating in that mode.