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Mobile Systems

Revision Problems

COMP28512

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Question 15

- Describe the roles of anti-aliasing, sampling and quantization in accepting an analogue signal into a digital system.
- What is the Nyquist frequency?
- Estimate the data capacity of a CD that can hold 1 hour of uncompressed stereo music sampled at 44kHz with 16-bit resolution.
- Estimate the data capacity of a voicemail flash memory that can hold 20 minutes of telephone quality (300Hz to 3.4kHz) speech.
- What is meant by "frequency domain"?

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Question 16

- What is the distinction between "hard" and "soft" real-time systems?
- Describe and compare the merits of handling external events through the use of polling, interrupts and DMA.
- Sketch the arrangement of an IO system that is double-buffered in main memory.
- What is a watchdog timer?
- What is an event-driven system?

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Question 18

- Describe the operation of a real-time streaming media system, in particular sketching the buffer arrangements at the receiver and the role of the buffer's low- and high-water marks.
- How are packet errors handled in real-time streaming media communications, and how may their effects be ameliorated?
- Describe how feedback might be used to optimise the performance of a radio communications channel.

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Question 19

- The Manchester Baby computer used 3.5kW of electrical power while executing 700 instructions per second. A recent mobile phone processor might use 20mW while executing 200 MIPS. How much more energy-efficient than Baby is the modern processor?
- Why is CMOS a good technology for mobile applications?
- CMOS power is given by $P = \frac{1}{2} \times C_{\text{total}} \times f_{\text{clock}} \times V_{\text{DD}}^2 \times \alpha$. Why does reducing the clock frequency not directly improve energy-efficiency? What other measure can exploit a reduced clock frequency to deliver improved energy-efficiency?
- For each of the variables in the above CMOS power equation describe a design approach that improves energy-efficiency by reducing that variable.
- What is CMOS leakage power and why is it a growing problem?

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