

Interactive Distributed Embedded Systems

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Today's goals

- Process of doing a literature survey.
- Expose you to embedded system implementation platforms appropriate for class projects.
- Narrow down project topics of interest.
- Give example of an appropriate project topic.

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Implementation platforms
Homework

Fractured market

- Specific market segments have their own sensing, actuation, speed, processing power, and interface requirements.
- This implies that no single platform is anywhere near optimal for the entire embedded system market.
- Result: Many platforms co-exist.
- How to manage class projects in this context?

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Implementation platforms
Homework

Platform selection

- You are free to choose whatever platform you prefer for your project.
- However, I can help you more if you work with a platform I have experience with.
- Your classmates will also be able to help you more if you are using a similar platform.
- We will still end up with multiple platforms because different students will pick different design projects.

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Common platform types

- Desktop-class: A general-purpose computer supporting real-time extensions may be appropriate for proof-of-concept work on some topics, e.g., robotics. Big, fast, substantial storage.
- Smartphone-class: ARM-class processors. Reasonable fast and energy-efficient. Decent human interface. Built-in sensors. Adding wired sensors results in clunky/fragile package. Good for communication applications. Good human interface nodes in larger-scale embedded systems.
- Custom sensing, processing, and actuation or gateway nodes: ATmega or TI MSP microcontroller based. Built-in ADCs. Platforms like Arduino and Maveric allow easy addition of voltage-based sensors.
- Ultra low-power leaf nodes: TI MSP or 8051 based nodes with limited sensing capabilities.

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Examples of appropriate project topics

- Explained system for simplifying the design of distributed embedded systems.
- Explained indoor air quality sensing system design.

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Determine topics of interest

- Due by 11:59 PM on 11 Jan.
- List three embedded systems topics you are interested in learning more about and working on.
- This is not a commitment to a particular topic.
 - That will come soon, though.

Begin study of topics of interest

- Due before class on 14 Jan.
- Use electronic resources, research papers, and questions posted to the mailing list to answer the following questions for each of the three topics of interest, using 3-5 sentences for each.
 - 1 Why will work on this topic be useful to its users in the next five years?
 - 2 Is this topic of special relevance to distributed interactive embedded systems?
 - 3 Identify a potential research project that is related to this topic and can be completed within the time-frame of this course.
- Your one-page report should back up your claims using research, technical, and business publications. It should contain roughly five references.

Reading assignment

- Due before class on 16 Jan.
- One-paragraph written summary.
- Fang-Jing Wu, Yu-Fen Kao, and Yu-Chee Tseng. From wireless sensor networks towards cyber physical systems. *Pervasive and Mobile Computing*, 7:398–409, July 2011.

Upcoming lectures

- Embedded applications.
- Embedded system design process.