# 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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## Outline

1. Implementation platforms

2. Homework

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## 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?

## 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.

## 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.

# Examples of appropriate project topics

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

# Outline

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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.

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# 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.