

# ESWeek – the Future

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# What killer apps would you like to add now?

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- Large-scale wireless control systems
  - ❑ 1000s of wireless sensors/actuators in an oil field
  - ❑ Intelligently control heat distribution in a city
  - ❑ Civil infrastructure control that can sustain earthquakes
  
- Complex real-time systems (e.g., autonomous cars)
  - ❑ Complex real-time workloads that we have not seen before.
    - Motion planning, vision, learning, active safety control, wireless...
  - ❑ Need to expand the horizons of real-time systems research.

## How will the scope of "ESWeek" change?

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- **Fundamental** research on Internet of Things
  - ❑ Design, optimize and manage numerous interconnected things.
  - ❑ Concerns: energy, latency, reliability, security, privacy, fidelity...
  - ❑ Enable average programmers to develop good IoT applications.
  
- Cyber-physical co-design for wireless control
  - ❑ From case studies to unified theory and methodology
  
- New theory and systems for real-time systems
  - ❑ Virtualization, parallel computing, real-time clouds.

## How is the speed at which industry evolve?

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- In exploring new applications, industry moves faster than academia, but **not** in systematic approaches.
  
- Internet of Things
  - ❑ Today's products: streaming data to some cloud service.
  - ❑ Does **not** work for: energy, latency, reliability,, security, privacy...
  - ❑ **The Internet will be littered by malfunctioning things?!**
  - ❑ Need new methodology, algorithms and tools to design such systems!
  
- Industry has built autonomous cars, but at what cost?
  - ❑ Need research on ways to build them in a trustworthy and cost-effective manner.

# At the 20th anniversary ESWeek, what will be regarded as greatest challenges?

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- New hardware trends for IoT
  - ❑ Millimeter microprocessors
  - ❑ Energy-neutral computing
  
- How will they change the computing paradigms of IoT?
  - ❑ How do you design, optimize and manage them?
  - ❑ Design concerns: what do we need to worry and not to worry?
  
- What new applications will emerge?
  - ❑ Example: ingestible dusts that can predict health problems.

# How about future engineers education?

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- New courses
  - ❑ Design of Internet of Things.
  - ❑ Cyber-Physical Co-design, or **Control-Computing Interfaces**.
  
- Students need to learn basics in new domains
  - ❑ Control Systems I, or **Control for CS majors**.
  - ❑ New system technologies for real-time computing.
    - Virtualization, multicore, parallel...
  - ❑ Wireless – will be prevalent for embedded systems.