Critical Research Areas Driven by Industry Transformations
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Critical Research Areas Driven by Industry Transformations - Questions

- What are (should be) key/emerging industry drivers of research?
  - Products (applications)
  - Features
  - Functionality
  - Technology
- Where is the path forward most challenging/obscure?
- Which research breakthroughs have the most promise of high impact?
- Where may industry have unrealistic expectations?
- Which popular research is of less relevance in industry?
What are (should be) key/emerging industry drivers of research? **Applications**

- **Autonomous, Artificial Subjects**
  - Robots
  - Drones
  - Cars
  - Airplanes
  - Spacecrafts
  - Vacuum cleaners
  - Lawn mowers

- **Distributed Sensing, Processing and Control**
  - Surveillance systems
  - Smart buildings
  - Smart energy grids
  - Environmental monitoring
  - Health monitoring
  - Traffic monitoring and control
  - Internet monitoring and control

Navigating the physical space

Navigating the information space
What are (should be) key/emerging industry drivers of research? **Technology**

- 3D Stacking
- 3D Transistors
- Phase Change RAM
- Spin Torque Transfer RAM
- Memristors
- Hybrid Memory Architectures
- Carbon Nano
- Graphene
- Organic Electronics
- Functional Materials

**Era of Heterogeneity**
Which research breakthroughs have the most promise of high impact?

- Future Breakthroughs are unknown
- Composability of Subsystems (Functions, Performance, Correctness, Cost)
- Efficient on-line Learning and Adaptivity
Where is the path forward most challenging / obscure?

- Pure top-down design (Specification -> Synthesis -> Product) is elusive
- Dynamic learning and adaptivity
- Interaction with users / integration with humans
- Where certification and legal issues dominate
- What do users expect and accept
- Interplay and integration of different domains and ecosystems
Where may industry have unrealistic expectations?

- Where it cannot formulate the problem

- Methodologies and design flows will not be revolutionized by academic research
Which popular research is of less relevance in industry?

Problems which are easy to formulate, can be attacked by small groups, but lack practical relevance.
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