Some Other Efforts

Center for Science of Information

- Funded as a Science and Technology Center of the National Science Foundation, the Center aims to:
  - Define core theoretical principles governing extraction, storage, manipulation, and transfer of information in various forms
  - Develop metrics and methods for information
  - Apply principles of Science of Information to problems in physical science, social science, and engineering
  - Offer a venue for multi-disciplinary, long-term collaborations
  - Explore effective ways to educate students
  - Train the next generation of researchers in the Science of Information
  - Broaden participation of underrepresented groups
  - Transfer advances in research to education and industry

Center for
Science of Information
NSF Science and Technology Center

Center for Science of Information

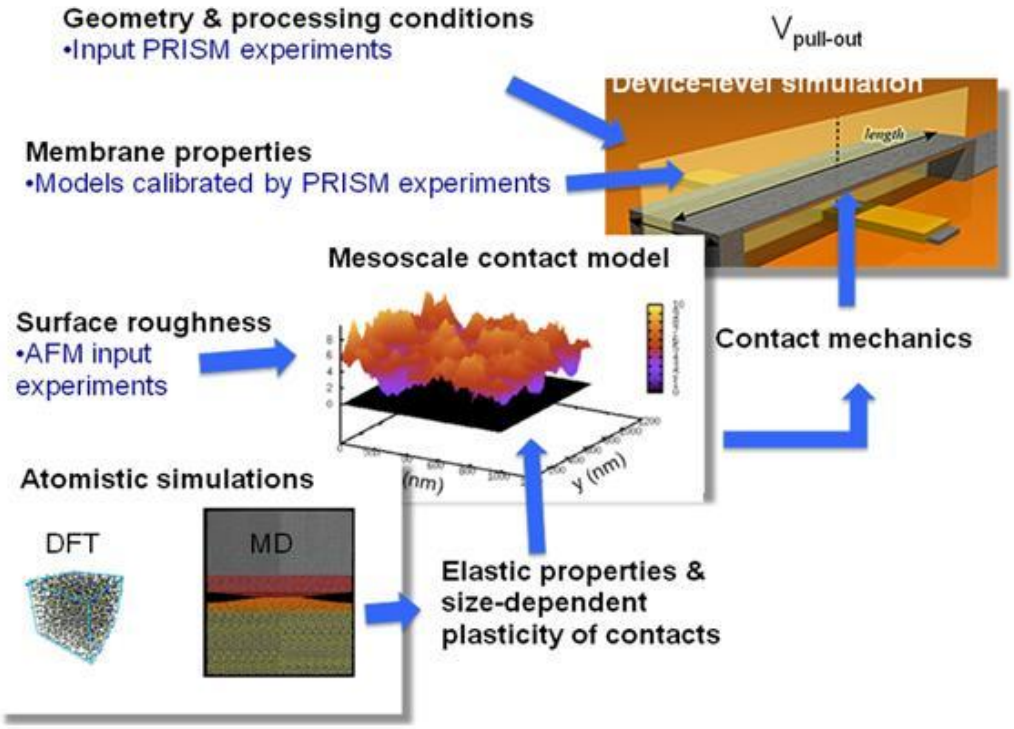
- Led by Purdue, the Center brings together researchers and educators from Bryn Mawr, Howard, MIT, Princeton, Stanford, UC-Berkeley, UC-San Diego, and UIUC.
- The Center includes over 40 faculty, 7 PostDocs, 60 Graduate Students, and a large number of Undergraduate Students.
- Please visit http://www.soihub.org for more information.

Center for Science of Information
NSF Science and Technology Center

Center for Prediction of Reliability, Integrity, and Survivability of MEMS (PRISM)

- Funded as a PSAAP Center of the Department of Energy, this Center aims to:
  - Significantly accelerate the integration of MEMS technologies through the use of predictive, validated science and petascale computing.
  - The Center seeks to understand, control, and improve the long-term reliability and survivability of MEMS by using multiscale multiphysics simulation, from atoms to micro-scale devices, to address fundamental failure mechanisms.
  - Focuses on a single class of contacting radio-frequency (RF) metal-dielectric capacitative MEMS switches.

PRISM: Modeling and Design



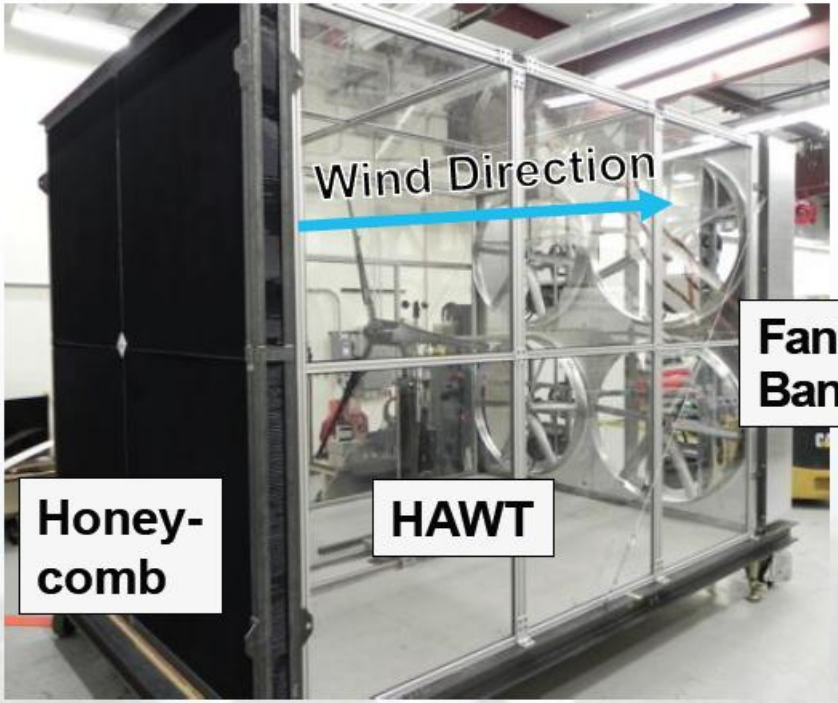
Led by Purdue, the Center includes researchers from University of Illinois, University of New Mexico, and Vanderbilt. For more information, please visit http://www.purdue.edu/discoverypark/prism/people/Faculty.php

Cyber-physical Systems: Robust Distributed Control of Wind Farms

- Wind Turbines are expensive, ~$3 million dollars for a 1.5MW Wind turbine
- Life span of a turbine is about 20 to 30 years. The payback time is between 4 to 23 years depending on the size of the frame
- It is important to make wind turbines more efficient. It is also important to protect the investment by detecting possible problems in the wind turbine before the problems become irreparable.

Cyber-physical Systems: Robust Distributed Control of Wind Farms

Wind Turbine Dynamics and Control Test Bed



- Southwest Windpower® - Whisper 100™ (2.1m diameter)
- ¼" honeycomb core
- 4 - 48" diameter axial fans
- Polycarbonate Enclosure

Data acquisition hardware

- National Instruments® cDAQ
  - 4 - NI 9234 Input Modules
  - 1 - NI 9215 Input Module
- DC Power Supplies
  - Optical Tachometer
  - DC Accel Power
- Wind Transducer Digital Readout

Cyber-physical Systems: Robust Distributed Control of Wind Farms

- The ENSEMBLES Sensor Software System
  - mPL:
    - The macroprogramming layer, inspired by CosmOS
    - Language that lets users specify coordinated behavior, as well as to set optimization
    - The behavior of the entire farm, as well as individual turbines, can be programmed declaratively.
  - mOS:
    - A safety-critical real-time runtime
    - Node-level behavior can be coded at a high level of abstraction
    - mOS is a customizable node operating system running on native hardware on small devices, as well as on top of a real-time operating systems.

Thank you!

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