Welcome to CSE @ Michigan!
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- **Our Environment:**
  - Collaborative, collegial, and intellectually enriching

- **Our Research:**
  - Deep in addressing fundamental issues
  - Broad in interdisciplinary perspective

- **Our Alumni:**
  - Changing the World …
A Growing, Active, & Accomplished Faculty

- **74 Faculty:**
  - 11 ACM Fellows, 17 IEEE Fellows, 6 AAAI Fellows, 4 AAAS Fellows, 2 SIGCHI Academy, 1 CSS Fellow, 10 Sloan Fellows, 1 MacArthur Fellow
  - 37 National Science Foundation CAREER and PECASE Award winners
  - Numerous ACM, IEEE and USENIX national awards

- **17 Faculty with joint appointments in CSE:**
  - Electrical Engineering, School of Information, Medical School, Math…
Your Future Colleagues

- 337 graduate students, Fall 2016
- 79 MS and PhD degrees granted last year
An Abundance of Support for Research

Expenditures of $25+ millions in FY16.

**Government Sponsors:**
- National Science Foundation
- National Institute of Health
- Department of Homeland Security
- Department of Defense
  - AFOSR
  - ARO
  - DARPA
  - ONR
  - TARDEC
- Department of Energy
- Department of Interior
- NASA
- National Security Agency
- State of Michigan

**Industry Sponsors:**
- American Heart Association
- ARM, Boeing Company
- Cisco, Ford, General Electric
- General Motors
- Global Foundries, Google,
- Hewlett Packard, IBM, Intel
- Lockheed Martin, Micron
- Microsoft, NEC
- Northrop Grumman, Oracle
- Raytheon Samsung,
- SRC, Sloan Foundation,
- Soar Technologies,
- Texas Instruments,
- Toyota, VeriSign, Yahoo!
Breadth, Depth, and an Interdisciplinary Perspective

5 Laboratories:
- Artificial Intelligence
- Computer Architecture
- Interactive Systems
- Software Systems
- Theory of Computation

Areas of Research:
- Bioinformatics & medical
- Robust, low-power computing
- Pervasive and mobile computing
- Robotics
- Security and privacy
- Cognitive agents
- “Green” & cloud computing
- Self-healing systems
- Quantum computing
- Machine learning
- Human computer interfaces
- Socially relevant applications
- Technology in performance arts
- …
Computer Engineering Lab

Faculty:
Austin, Bertacco, Chen, Das, Dreslinski, Dutta, Fu, Hayes, Mahlke, Markov, Mars, Mazumder, Mudge, Narayanasamy, Papaefthymiou, Sakallah, Tang, Wenisch

CIRCUIT ENVELOPE
- logic-level testing and reconfiguration

ARCHITECTURAL ENVELOPE
- Check-pointing and epoch restore
Software Systems Lab

Faculty:
Cafarella, Chen, Chesney, Chowdhury, Compton, Dutta, Flinn, Fu, Halderman, Honeyman, Jagadish, Jamin, Koutra, Lasecki, Lee, Madhyastha, Mao, Mozafari, Narayanasamy, Noble, Prakash, Shin, Stout
Artificial Intelligence Lab

Faculty:
Abernethy, Baveja, Deng, Durfee, Jenkins, Koutra, Kieras, Kuipers, Laird, Lasecki, Lee, Mihalcea, Mower Provost, Olson, Radev, Syed, Wellman, Wiens
Interactive Systems Lab

Faculty:
Ackerman, Adar, Essl, Kieras, Lasecki, Mihalcea, Mower
Provost, Soloway, Wakefield
Theory of Computation Lab

Faculty:
Compton, Hayes, Miller, Markov, Peikert, Pettie, Schoenebeck, Shi, Stout, Strauss

\[ \|T\|_\diamond = \min \left\{ \left\| \sum \limits_t A_t^\dagger A_t \right\| \cdot \sqrt{\left\| \sum \limits_t B_t^\dagger B_t \right\|} : A_t, B_t \in \mathbb{L}(\mathcal{N}), T = \sum \limits_t A_t \cdot B_t^\dagger \right\} \]
CSE trends

- 20 new tenure-track faculty since 2011
- Fully-funded 5-year offers to all incoming graduate students
- Student enrollment and research continues to grow
Research Centers in Computer Engineering

- Center for Future Architectures Research
  - $28.5M, 5-year center funded by SRC with support from DARPA
  - Led by Todd Austin; investigators include Bertacco, Das, Mahlke, Narayanasamy
  - Goal: To create future generation scalable computing systems

Application Demands

Data-centric Architectures

Beyond Homogeneous Parallelism

Novel Architectures based on Emerging Technologies

Technology Drivers

Ultimate Goal: Sustained Scalability
Research Centers in Computer Engineering

- **ARM Research Center**
  - $10M relationship over 10 years funded by ARM - has been renewed for 2 more years
  - Led by Trevor Mudge; investigators include Das, Dreslinski, Mahlke, Sakallah, Sylvester, Wenisch
    - Goal: To research enabling technologies for ultra-low energy and sustainable computing
    - Application areas: cloud computing, wearable medical and lifestyle devices, energy-efficient trusted computing, and ubiquitous sensor networks
Where Do Our PhD Grads Go?

- Faculty - Academia

- Carnegie Mellon University
- Duke University
- University of Wisconsin
- Purdue University
- Georgia Tech
- University of Toronto
- University of Illinois
- UMass Amherst
- Stanford University
- Johns Hopkins University
- University of Maryland
- Princeton University
Where Do Our PhD Grads Go?

- *Industrial R&D Labs*

[Logos of various companies such as IBM, HP, Yahoo, AMD, Google, Intel, Apple, Microsoft, ARM, Texas Instruments, AT&T, Ford, and Cadence]
Where Do Our PhD Grads Go?

- Startups

  - SOARTECH
  - mobiata
  - SimpleScalar LLC
  - PANDORA internet radio
  - ZATTOO
  - ARBOR NETWORKS
  - twitter
  - facebook

Some of Our Alumni

- Larry Page – Co-Founder of Google
- Jennifer Rexford – Professor at Princeton University
- Kunle Olukotun – Professor at Stanford University
- Rob Malan – CTO at Arbor Networks
- Thomas Knoll – Inventor of Photoshop
- Dick Costolo – CEO of Twitter
- Bob Muglia – President of Server & Tools at Microsoft
- Usama Fayyad – VP at Barclays
- Greg Joswiak – VP of iPod & iPhone Marketing at Apple
- Kevin O’Conner – Founder of DoubleClick
- Tim Howes – LoudCloud, HP, and RockMelt
- Mark Abel – Director of Solutions Architecture at Intel
- Michael Stonebraker – Professor at MIT
- Sid Meier – Creator of Civilization / Co-Founder of Firaxis
- Tony Fadell – Inventor of iPod
- Bill Joy – Co-Founder of SUN