

24th GENI Engineering Conference (March 8-9, 2016), Tempe AZ Welcome Address

Sandeep Gupta,
Professor and Chair Computer Science and Engg.

Welcome to ASU!

- **USA's Most Innovative University!** US News and World Report 2016
 - Based on survey of peers: College deans, provosts and admission dean each nominated 10 colleges and universities according to innovative improvements to curriculum, faculty, student life, technology and facilities.
- **New American University:**
 - Focus on real societal impact
- **Largest Public University**
 - Excellence at Scale!

Welcome to FSE!

- Engineering the Future!
- New Dean – Kyle Squires
- Six Schools:
 - Biological and Health Systems Engineering
 - Computing Informatics and Decision Systems Engineering
 - Electrical, Computer, Energy and Engineering
 - Engineering of Matter, Transport, and Energy
 - Sustainable Engineering and the Built Environment
 - Polytechnic School

Welcome to SCIDSE!



School of Computing, Informatics,
and Decision Systems Engineering

Centerpoint (1/2 blk West of Mill Ave & 6th Street)

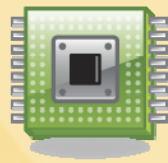
First Floor: CIDSE Tutoring Center and Engineering Career Center



School of Computing, Informatics,
and Decision Systems Engineering

Our Mission is

Defining and Creating the Information Driven Society
(Computing Data into Information for Decisions –
secure and affordable, anytime, anywhere)



Impact

Data → Information → Decisions → Action



Entrepreneurship/Innovation
Integrity
Scholarship
Good Citizenship

Commitment to Excellence!

computer science
program rankings

28th

U.S. News & World Report
Global Rankings

22nd

Academic Ranking of
World Universities
(United States)

33rd

Academic Ranking of
World Universities
(International)

31st

U.S. News & World Report

computer engineering
program ranking

industrial engineering
program ranking

19th

U.S. News & World Report



School of Computing, Informatics,
and Decision Systems Engineering

CIDSE Demographics

- Location:
 - Brickyard Building (Mill Ave. & 7th St., Tempe)
 - Peralta Hall (Polytechnic Campus)
- 84 Faculty Members
 - 26 Professors
 - 21 Associate Professors
 - 21 Assistant Professors
 - 16 Lecturers
- 3,800 Undergraduate Majors
- 1,300 Graduate Majors
- \$15M Research Annually
- Growing rapidly on all fronts



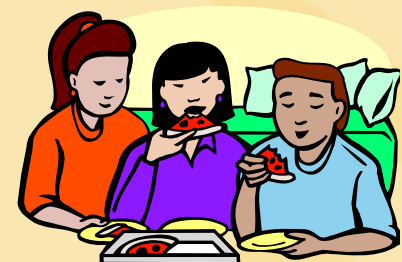
CIDSE Educational Programs

- BS in Computer Science (1,600 majors)
- BSE in Computer Systems Engineering (444 majors)
- BSE in Industrial Engineering (340 majors)
- BSE in Engineering Management (444 majors incl. 280 online)
- BS in Informatics (72 majors)
- BS in Software Engineering (872 majors incl. 590 online)

- MCS/MS in Computer Science (597 majors)
- MS in Industrial Engineering (174 majors)
- MS in Computer Engineering (152 majors)
- MS in Software Engineering (135 majors)

- PhD in Computer Science (150 majors)
- PhD in Industrial Engineering (59 majors)
- PhD in Computer Engineering (35 majors)

- Specializations/Certificates in
 - Gaming (Undergraduate)
 - Information Assurance (Undergraduate, Graduate)



Broad CIDSE Research Themes

- **Data Management and Information Assurance**
(Information Assurance/Security, Database Management, Information Retrieval, Multimedia)
- **Computational Intelligence and Algorithms**
(AI, Theory and Algorithms, Optimization, Data Mining and Machine Learning, Statistical Modeling, Imaging/Graphics/Visualization)
- **Network Science and Computing Systems**
(Cloud and Distributed Computing, Computer Design and Architecture, Cyber-Physical and Embedded Systems, Network Algorithms, Social Computing)
- **Software and Systems Engineering**
(Logistics, Software Engineering, Modeling and Simulation, Healthcare Delivery, Enterprise Information Systems, Personalized Learning/Educational Games)



Major Research Centers

- Cognitive, Ubiquitous Computing (Sethuraman “Panch” Panchanathan, Director)
- Embedded Systems (Sarma Vrudhula, Director)
- Information Assurance (Stephen Yau, Director)
- Engineering Logistics and Distribution (Rene Villalobos, Director)
- Spatial Modeling (PRISM) (Peter Wonka, Gerald Farin, co-Directors)
- Imaging Informatics and Analytics (Teresa Wu, Jing Li, co-Directors)
- Advanced Technology Innovation Center (ATIC) (Anshuman Razdan, Director)
- Innovative Learner and User Experience (iLUX) (Robert Atkinson, Director)
- Center for Assured & Scalable Data Engineering (CASCADE) (Selcuk Candan, Director)

Digital Identity and Privacy Management

PI: Gail-Joon Ahn

**Funding: National Science Foundation
and Bank of America**

Need: A new type of communication behavior is emerging amongst young Internet users as they explore their identities, experiment with behavioral norms, and build friendships. **As the use of personal information in virtual community, online-game or social networks seems manifold, so does the abuse or misuse of the information.**

Solution: We proposed a **user-centric identity management solution to manage users' personal attributes**, considering a notion of digital persona and associated risks in disclosing such private information over virtual communities. **The patent rights have been recently sold to a technology development company.**



What's Behind the Mask in Virtual Community?

Human Health: Brain Modeling & Alzheimer's Disease (AD)

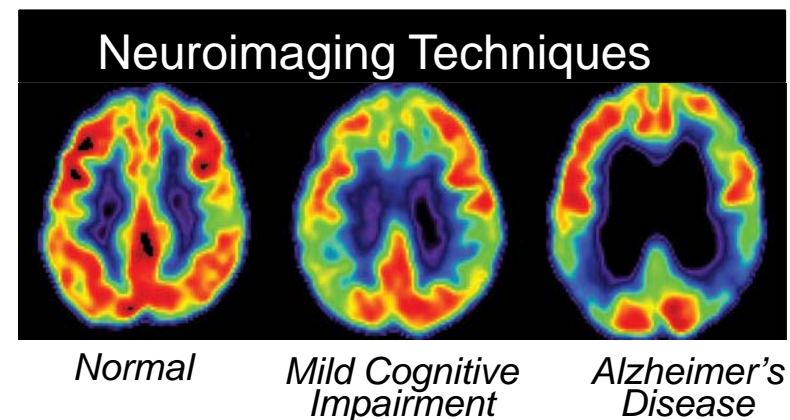
Jing Li

Need: Today, 4.5 million Americans suffer from AD, this number increases to 14 millions by 2050. The annual cost of AD care in the U.S. is more than \$100 billion. Better diagnosis and control of AD is an urgent national need.

Solution: We develop advanced statistical and machine learning methods for multi-modality neuroimaging data fusion, as well as for modeling of interaction between brain regions during cognition decline. These lead to new understanding of AD, and highly sensitive and reliable new markers for AD diagnosis and treatment evaluation.



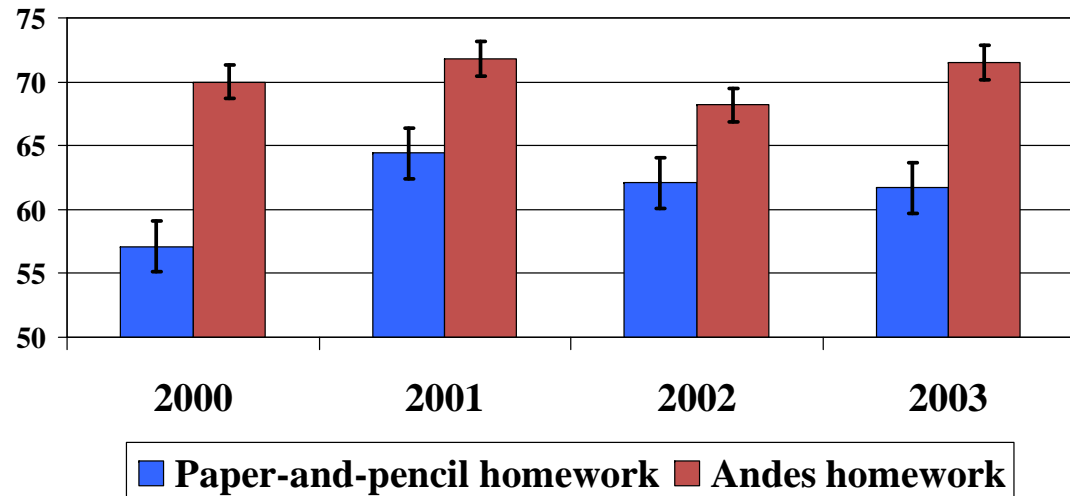
© www.harrycutting.com



Improving Personalized Learning

PI: Kurt VanLehn
Funding: ONR, NSF

Need: “Advance personalized learning” is one of the NAE grand challenges



Solution: We have developed an intelligent tutoring system, Andes, that provides personalized, individual help to university and high school physics students as they do their homework. A four-year multi-classroom evaluation showed that Andes increases exam scores by 0.61 standard deviations (about half a letter grade). A new web-based version of Andes is being integrated with a homework system used by more than 110,000 physics students.

Finding Allies for the War of Words

Co-PI: Davulcu (SCIDSE)

Funding: US Department of Defense (DOD)

Need: Uproot Religious Violence.

Identify and map social networks of radical and counter-radical discourse – their methods, locations, ideologies, leaders, institutions, and media channels.



Solution: Real-Time Contextual Mapping (disclosed RTCM™ technology)

New computational methods and models of political and social events for tracking shifts in opinions and influence. Trans-disciplinary project among ASU SCIDSE, CSRC, Sciences Po (France), and Northwestern University focusing on three critical regions: Southeast Asia, West Africa, and Western Europe.

Bluetool for Green and Sustainable Data Centers

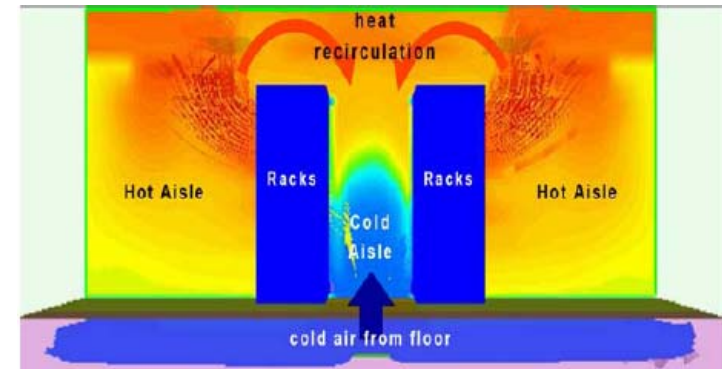
PI: Sandeep K. S. Gupta

Funding: National Science Foundation
Raytheon



Raytheon

Need: Energy consumption for data centers (a.k.a. hosting centers, server farms, clusters etc.) is fast becoming a significant portion of the nation's annual energy budget. The principal contributor to this energy bill is the cooling energy required to counter inefficient thermal conditions.



<http://impact.asu.edu/>

Thermal distribution in a typical data center using a cold aisle – hot aisle configuration.

Solution: We are developing a **cyber-physical** oriented software-controlled resource management approach for dynamically reducing the cooling demands in datacenters. Additionally, we are developing a research and evaluation infrastructure called **Bluetool** to test and develop new methodologies to address the inefficiencies of data centers.

Travel Advisories and Congestion Pricing

PI: Pitu Mirchandani

Funding: Various Transportation Agencies

Need: Current transportation networks are highly congested resulting in air pollution, excessive energy consumption, and lower quality of life. Also, mass evacuation, if needed, is not possible in this situation.



Solution: Using state-of-the-art streaming data gathering and data-mining approaches, and modern communication/computer systems, we have developed algorithms and systems that (a) re-configure networks, (b) actuate real-time strategies, to (c) provide traffic controls and route advisories to minimize the above adverse affects, as well as (d) impose real-time congestion pricing schemes.

Social Interaction Assistant

PI: Sethuraman Panchanathan
Funding: National Science Foundation

Need: Technology aid for people who are blind or visually impaired for their everyday social needs. Nearly 65% of human interpersonal communication happens through non-verbal cues such as head nod, eye gaze, hand movement etc, which are primarily visual cues. People who are blind or visually impaired do not have access to these cues. In a broad sense, human interpersonal communication is still an unexplored area and development of technologies that can intercept human-human interaction signals can substantially increase our understanding of human behavioral and communication psychology.

Solution:

The solution, termed as Social Interaction Assistant, uses a wearable visual sensor on the user's body which captures and interprets "social signals". Any deductions are then transmitted to the user through audio and touch interfaces.



We are actively hiring!

- FSE goal 25 faculty per year for next 5 years!
- SCIDSE currently hiring in
 - Cybersecurity
 - Robotics
 - Human centered computing
 - Software Engineering
- Additionally ASU is aggressively hiring world-renowned leaders aligned with it's mission.



Thank You!

<http://cidse.engineering.asu.edu>