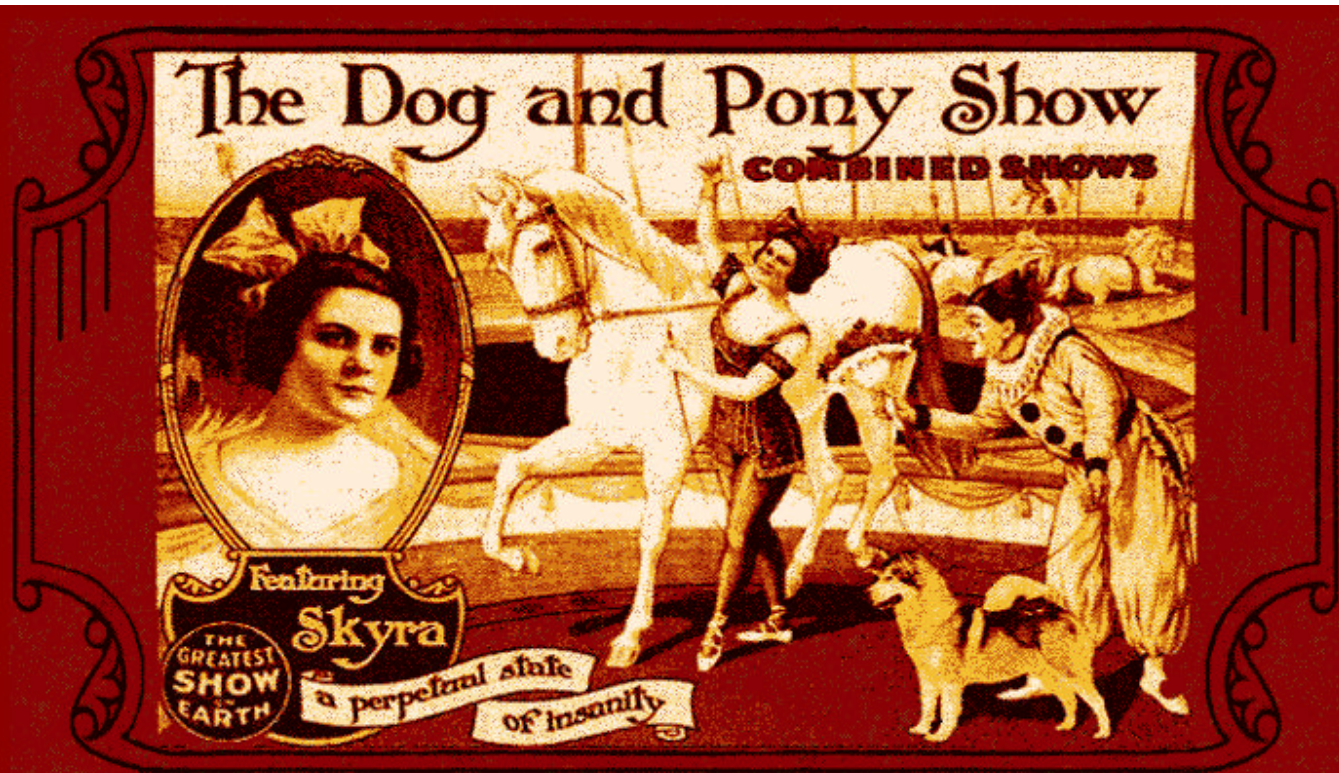


The College of Engineering Office of the VP for Research Colloquium



*One must still have chaos in oneself to be able to give birth to a dancing star
- Nietzsche*



Engineering_Research@iowa

- Overview of CoE research activities & capabilities
- Vision, challenges and plans
- Meet *some* of our key researchers
- Tour of the SC

engineering @iowa

Research Excellence Connected to Learning, Innovation, and Service to Society

High quality research and graduate education are central to the mission of the College of Engineering at The University of Iowa. The College is proud of its production of a substantial volume of externally funded research and of its role in preparing engineering leaders who are equipped with master's and doctoral degrees. National publications have consistently ranked the quality of graduate education in the College among the top 25% institutions nationally. The College seeks to focus its efforts and resources in those areas of unique strength where true distinction is attainable. These research areas are based on substantial faculty strengths in the College and are well positioned for addressing emerging national needs. In addition, the College is committed to using our research products for the benefit of the state and nation through aggressive technology transfer programs, active involvement in economic development programs, and publication in the open literature.

Click on the appropriate image
for more information.

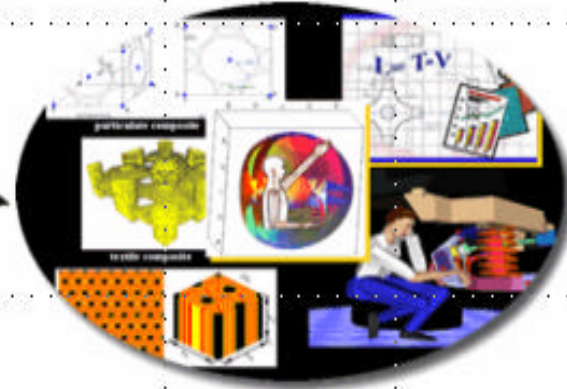


People

Facilities



Ideas



First Class Faculty

- *# of NAE and fellows*
- *13 named faculty*
- *# of NSF PECASE and CAREER awards*
- *Faculty providing interdisciplinary leadership*
- *Editorships*
- *Over 160 new awards (>2 new awards per faculty) totaling >\$26M*
- *Expenditures of >\$27M, triple value in last decade, \$330K/faculty*





Graduate Fellowships

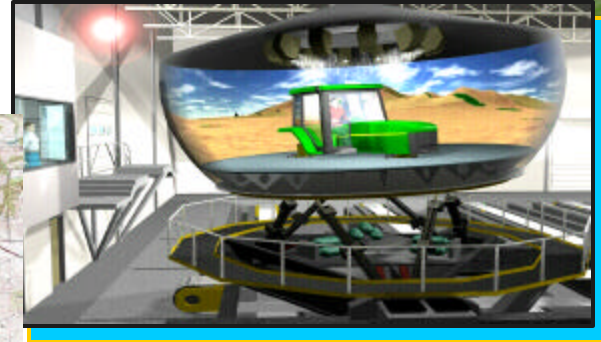
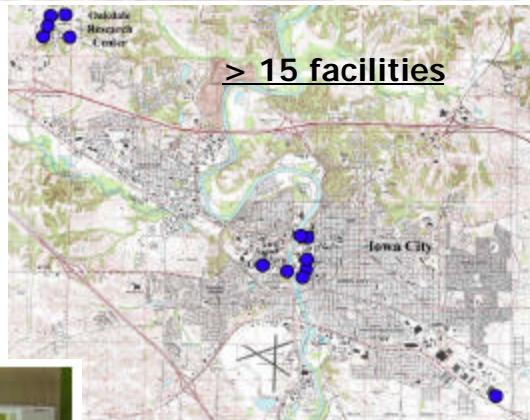
- **Nine** UI Students Engineering Students Won NSF Graduate Fellowships
- Active in NIH and USDA Trainingship programs through CBCB
-other info ...



Undergraduate Research

- Include also enterprenuerial efforts

First Class Facilities





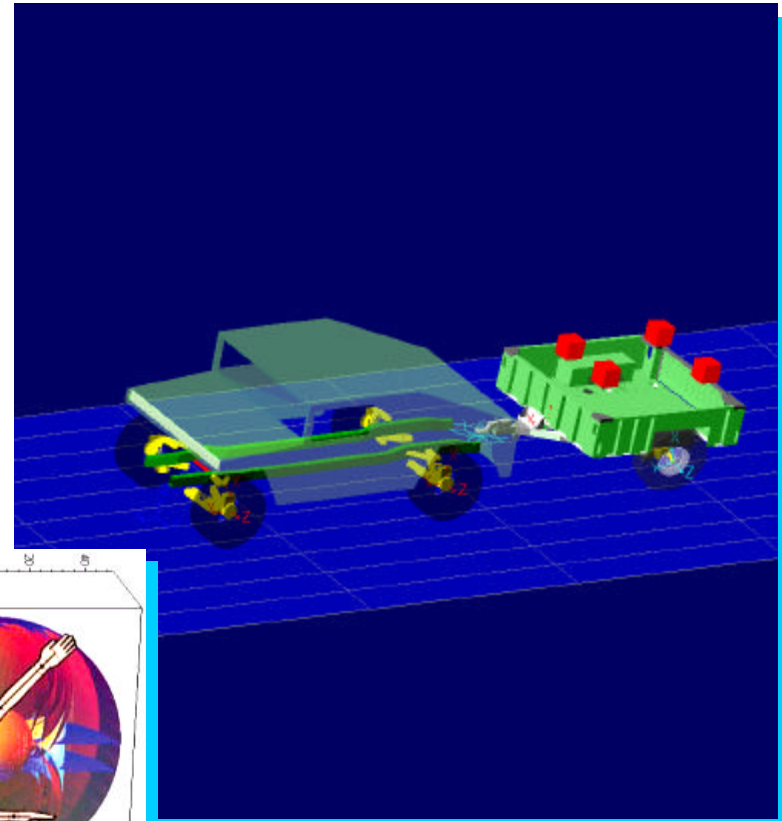
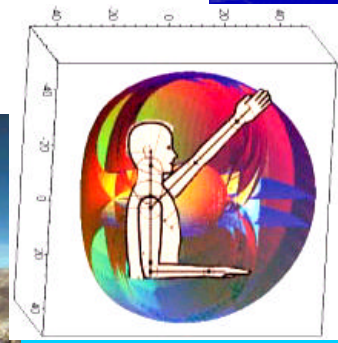
Selected Areas of Research Excellence

- Computer-aided design and simulation
- Human factors
- Environmental health and sustainability solutions
- Biotechnology
- Medical informatics and imaging
- Hydraulics and water/air resources
- Photo-polymerization

Center for Computer Aided Design

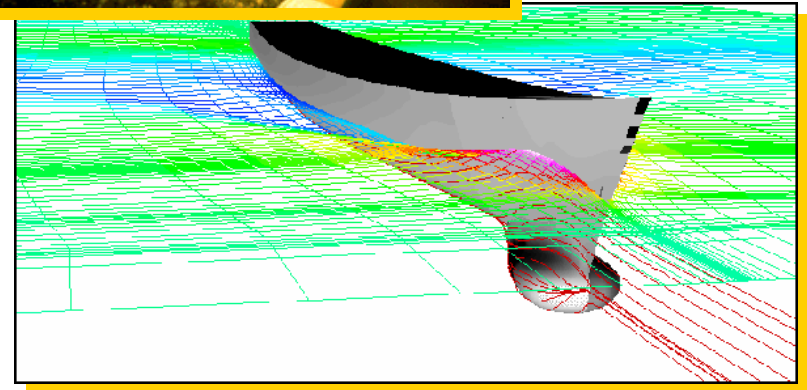
Human-system interactions

- Design sensitivity analysis and optimization
- Digital human simulation
- Robotics and kinematics
- Computational solid mechanics



IHR--Hydroscience & Engineering

- One of the world's premier fluids research laboratories with focus areas in:
 - Fluid dynamics
 - Environmental hydraulics
 - Water and air resources
- Major Hydraulic Laboratory renovation recently completed
- New Lucille A. Carver Mississippi Riverside Environmental Research Station—Fairport, Iowa



IHR--Hydroscience & Engineering

Lucille A. Carver Mississippi Riverside Environmental Research Station

- Study of the river's response to **all** natural and man-made influences
- Only one of its kind, operated by a university
- Multi-disciplinary research and educational opportunities





CoE Provides Interdisciplinary Research Expertise & Leadership

- **Biotechnology Byproducts Consortium**
- **Center for Biocatalysis and Bioprocessing**
- **Center for Global and Regional Environmental Research**
- **Center for Health Effects of Environmental Contamination**
- **NIEHS - Environmental Health Sciences Research Center**
- **Institute for Rural and Environmental Health**
- **Iowa Injury Prevention Research Center**
- **National Advanced Driving Simulator**
- **Optical Science and Technology Center**
- **Public Policy Center**
- **Orthopaedic Biomechanics Laboratory**
- **Center for Environmentally Beneficial Catalysis**
- 14% of faculty hold secondary and tertiary appointments in other Engineering departments and UI colleges, including Liberal Arts and Sciences, Medicine, Nursing, Public Health, and Urban and Regional Planning
- 50% of engineering faculty have affiliations with major University research centers and institutes

Human Factors & Simulation @iowa



Cognitive Systems Laboratory

John D. Lee, director

Examines how people adapt to technological innovation. To extend human capabilities, the lab develops innovative design concepts, broadens the understanding of human performance, and builds computational models. By understanding how technology can mediate attention to the system being controlled, the lab hopes to create display and control systems that enable people to work effectively with technological innovations.



Dentistry Simulation Clinic

Yvonne Chalkley, director

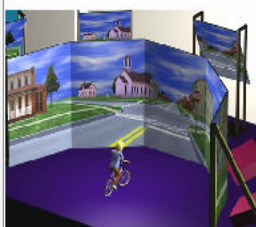
Helps first- and second-year students make a smoother transition from the preclinical to clinical setting. It allows seniors to refine their skills for clinical board/licensure exams and it provides a more realistic environment for practitioners taking continuing education courses. Eighty operatories are clustered in modules that can accommodate right- and left-handed students. Each operatory has a mannequin with a realistic tooth model and jaws that function very much like a human's.



Digital Humans Laboratory

Karim Abdel-Malek, director

Performs basic and applied research dealing with digital humans, modeling, simulation, animation, design, ergonomics, and optimization. The work and fundamental expertise in the lab are a result of 10 years of research in the robotics field. The vision of the lab is to advance the state of the art in digital human technology; to enable digital humans to perform and test scenarios without endangering human subjects; to perform design and evaluation during the conceptual design process thus saving significant cost and shortening lead times.



Hank Driving Simulator

James Cremer, co-leader

Joseph Kearney, co-leader

Designed to run on a wide-range of platforms, from modest workstations to high-end multi-processor computers with state-of-the-art image generators. Special emphasis is placed on the development of technology supporting applications that use interactive simulation to study human driving behavior. Hank contains a powerful and flexible mechanism for programming scenarios and the behaviors of vehicles, pedestrians, and other entities through Hierarchical Concurrent State Machines (HCSM).



National Advanced Driving Simulator

L.D. Chen, director

World's most sophisticated simulator for conducting research to achieve fundamental improvements in highway safety and transportation efficiency, and to enhance equipment product development effectiveness without the need to construct expensive prototypes. Experts collaborate on vehicle dynamics and simulation, simulator technology and virtual reality environment, and human factors.



Operator Performance Laboratory

Thomas Schnell, director

Conducts research in a number of areas of surface and air transportation. Aviation research includes synthetic vision, flight simulation, pilot eye movements, pilot and crew performance and workload, situational awareness and display optimization research.



Patient Simulator

Frank Scamman, MD, interim program director

An anatomically accurate, adult size mannequin similar in appearance to the Resusci-Annie mannequins used to teach in support of patient care and treatment. The simulator will respond to medications and procedures performed at critical moments just as a human would, and it is the responsibility of the attendant to monitor the "patient's" condition and administer the appropriate treatments.



Simulator for Interdisciplinary Research in Ergonomics and Neuroscience (SIREN)

Matthew Rizzo, director

An immersive real-time virtual environment for assessing at-risk drivers in a medical setting. Subjects drive on a simulated rural 2-lane highway with interactive traffic, resembling a drive on the roads surrounding Iowa. SIREN studies driving performance safety errors of motorists with medical disorders that can impair cognitive abilities that are crucial to the driving task.

The Ever-Changing Face of Engineering Research: Multiscale (from nano to terra), Increasing Complexity, Holistic Views, Sensing the World, Critical Infrastructure, Environmentally Beneficial Engineering, Health-Centric



Vision for the Future

“Think beyond...”

Faculty of national distinction

- Attracting and developing “star” faculty

Students of national distinction

- Recruiting top undergraduate and graduate students

Programs of national distinction

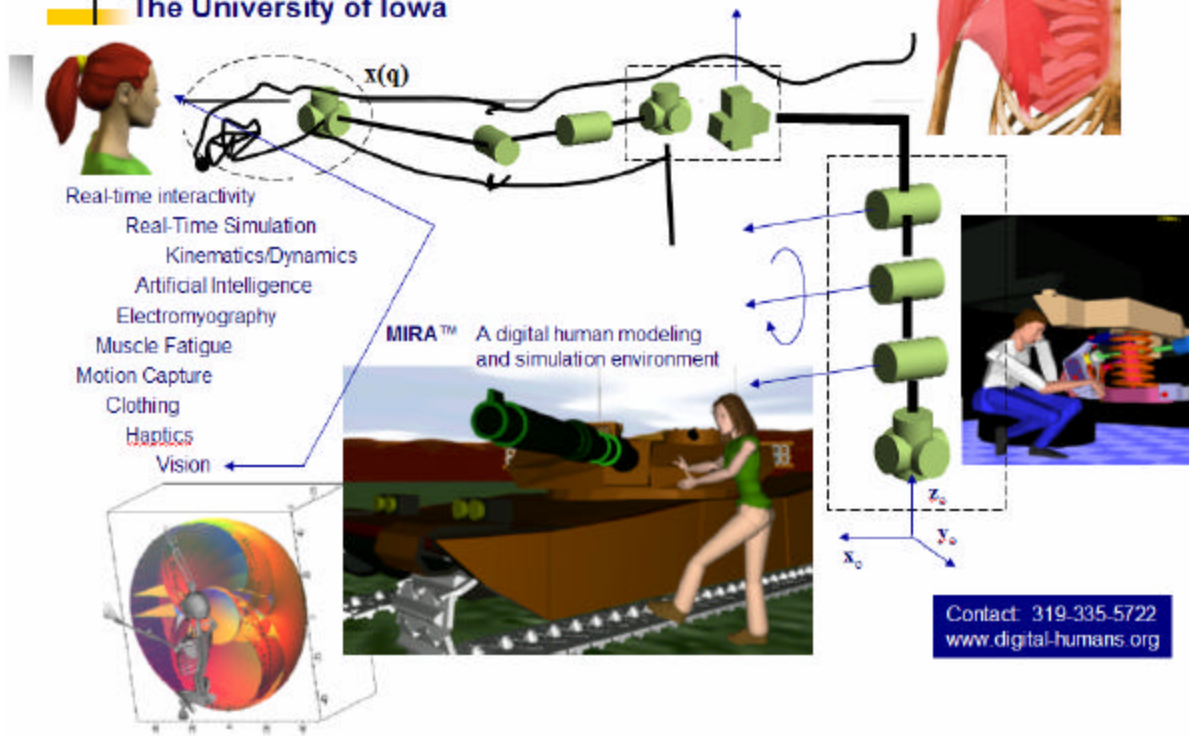
- Technological Entrepreneurship Certificate
- Program for Enhanced Design Experience
- Center for Technical Communication
- Internationalizing the curriculum
- Enhancing Undergraduate research opportunities
- Growth in research excellence



New Initiative: Digital Humans and Virtual Reality for Future Combat Systems



Digital Humans and Virtual Reality for
Future Combat Systems
Center for Computer Aided Design
The University of Iowa



New Initiative in Reliability – Opportunity associated with the newly established SAE G-11 Probabilistic Methods Committee / Mission of “Ground Vehicle Subcommittee”



TACOM
Lethality, Survivability, Mobility and
Sustainment for America's Army

Tank-automotive & Armaments Command

**Improving the Reliability, Maintainability,
and Sustainability (RMS) of Army Systems
through the Use of Probabilistic Methods**

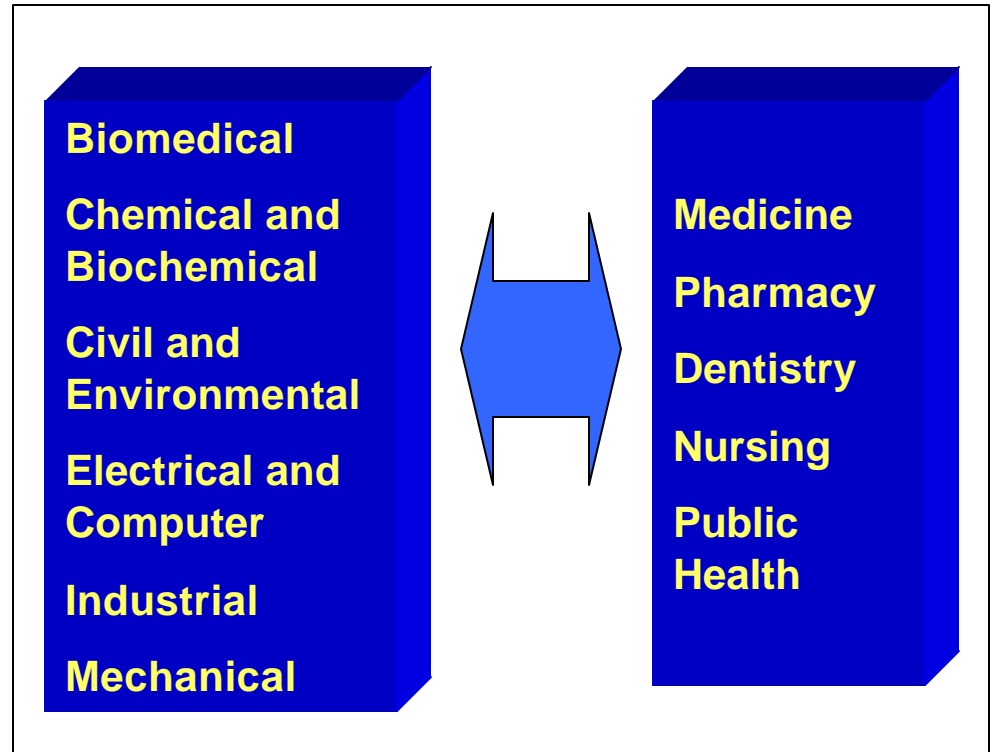
MG N. Ross Thompson III
Commanding General

Committed to Excellence

Priority: Building Even Closer Ties with Health Sciences

Uniquely Iowa

- **All six** disciplines have close teaching and research ties with **all five** Health Sciences colleges on one campus



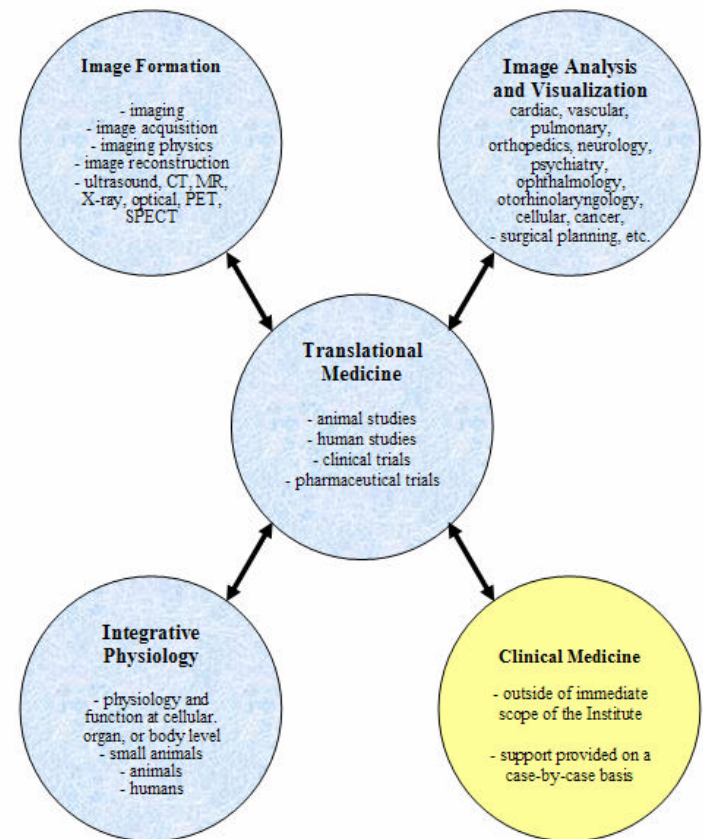
Center for Bioinformatics and Computational Biology

- High performance computational and informational resource, with interdisciplinary research in:
 - Basic life sciences
 - Applied medicine
- Administered by Engineering and Medicine
- Researchers from Engineering, Medicine, Liberal Arts and Sciences, Public Health, Business, Pharmacy, Dentistry, Nursing and Graduate Colleges
- Helps medical researchers study autism, hypertension, cystic fibrosis, cancer, and vision-related diseases
- New NIH Cancer Computing Research Node
- Joint faculty recruitment activities



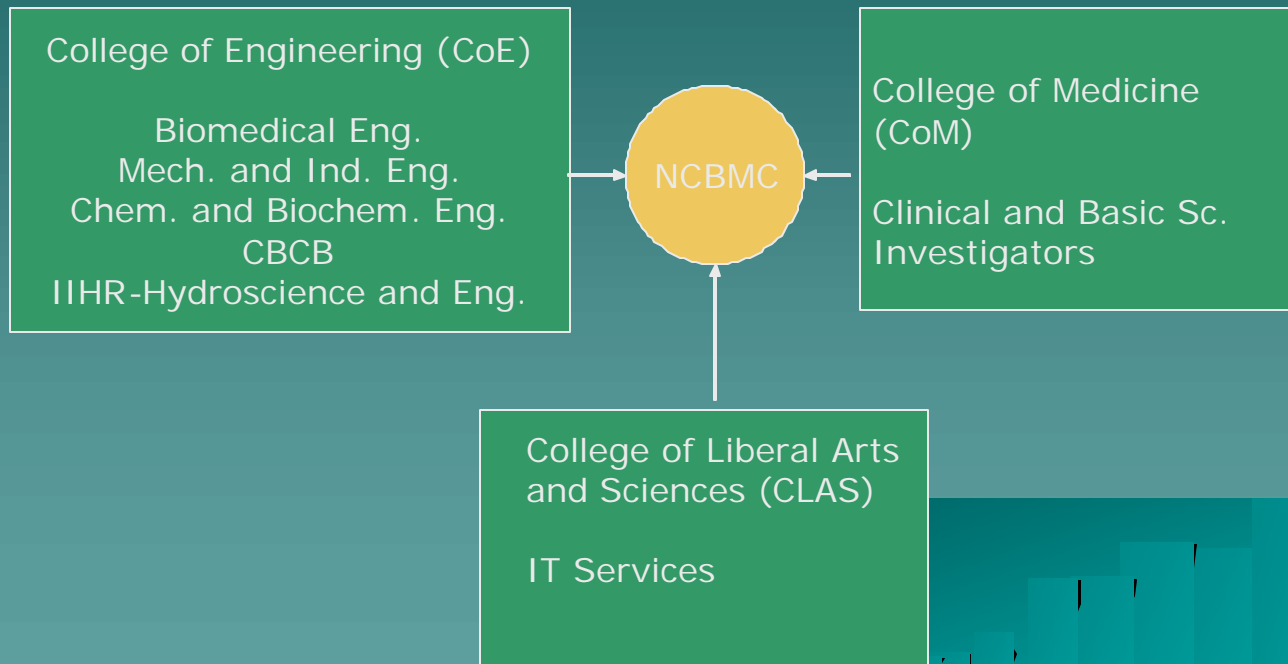
Initiative on Enhancing Interdisciplinary Biomedical Imaging and Image Analysis Research

- Build a 4-lane highway between Medicine and Engineering
- Increase national and worldwide visibility of the University, CoM, and CoE as the primary center of medical imaging
- Built a basis for entrepreneurial ventures in medical imaging with economic advantage to the State of Iowa
- Support research transition into daily clinical applications
- Attract highest-quality faculty, graduate students, and post-docs
- Capitalize on the opportunities presented by the newly established National Institute of Biomedical Imaging and Bioengineering of the NIH



Emerging Initiative in Biofluids

Proposed National Center for Biofluid Mechanical Computing (NCBMC)



Nanotechnology – An Emerging Initiative



The screenshot shows a Mozilla browser window displaying the website for Nanoscale Technology at The University of Iowa. The browser's address bar shows the URL <http://nanotech.uiowa.edu/>. The website features a blue header with the text "NANOSCALE TECHNOLOGY - Mozilla" and a navigation menu with links for Home, Faculty, Resources, Applications, Education, Grants, and Meetings. A search bar is located below the navigation menu. The main content area is divided into several sections: a "Welcome" section with a paragraph about nanotechnology's potential, a "Definition" section with a paragraph about research and technology development, a "Want to join?" section with a link to a listserv, and a "New Grant Opportunities" section with a link to NSF funding. On the left side, there are three news items: "Radiant MEMS News" about IBC's Annual Drug Discovery Technology World Congress, "Fourth Annual BioMEMS and Nanotech World 2003", and "Nanotech 2004: The Nanotechnology Conference and Trade Show". On the right side, there is a "Links" section with a list of external resources. The footer contains links for "Bookmark This Page" and "Print This Page", and a page modification date of August 18, 2003.

NANOSCALE TECHNOLOGY - Mozilla

File Edit View Go Bookmarks Tools Window Help

<http://nanotech.uiowa.edu/>

Home Bookmarks The Mozilla Orga... Latest Builds iShip Track It - T...

Nanoscale Technology
for the future...

Home Faculty Resources Applications Education Grants Meetings

Search the internet for: Search

Welcome

Nanotechnology has the potential to affect every aspect of daily life, from changes in medical treatment and environmental pollution, to the clothing we wear and the batteries in our laptops and cellular phones. This web page was designed to provide information for academic and corporate research, technology entrepreneurs, business development professionals, and investors.

Definition

Research and technology development at the atomic, molecular or macromolecular levels, in the length scale of approximately 1 - 100 nanometer range, to provide a fundamental understanding of phenomena and materials at the nanoscale and to create and use structures, devices and systems that have novel properties and functions because of their small and/or intermediate size.

Want to join?

We now have a listserv for sharing resources, collaboration, etc. Just click [here](#) and fill out the form.

New Grant Opportunities

Check out new applications for funding from NSF for Undergrad and other [here](#)

Links

- [nano.gov](#)
- [NanoHub](#)
- [NBTC](#)
- [NNUN](#)
- [Smalltimes](#)
- [The Nano Index](#)
- [LISTSERV](#)
- [Bulletin Board](#)

Radiant MEMS News

IBC's Annual Drug Discovery Technology World Congress.

Fourth Annual BioMEMS and Nanotech World 2003.

Nanotech 2004: The Nanotechnology Conference and Trade Show.

Smalltimes: The magazine.

A journal that surveys and informs the reader on new and upcoming technologies. It is free!!! You can subscribe [here](#)

Bookmark This Page Print This Page

Page last modified on: August 18, 2003

Contact Webmaster



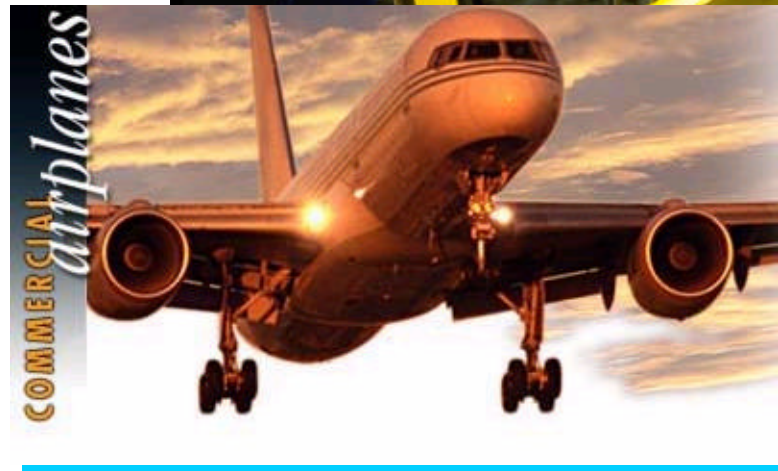
Priority: Further Fostering Industrial Interactions & Economic Development

- Faculty # of patents
- Significant number of business grants (~25% of CoE research expenditures from businesses)
- Web summary.. Fred..
- NSF University/Industry Cooperative Research Centers
 - Photo-polymerization
 - Center for Virtual Proving Ground Simulation

Program for Enhanced Design Experience

- Exposing students in a team-based setting to solve real-world industrial problems

Deere-Dubuque
Alcoa
General Electric
HON Industries
Maytag
Monsanto
Pella
Rockwell Collins





Iowa *Values* Vision

- We need a broader vision of value fund
- Value added of course!
- But build upon – “value based”
- Sustainable
- Healthy (human and environmental perspectives) and just



CoE Vision



The sustainability challenge

Innovative engineering to address issues such as water, environment, transportation, sustainable use of resources, development and management of infrastructure, efficient, competitive manufacturing....

The global economy

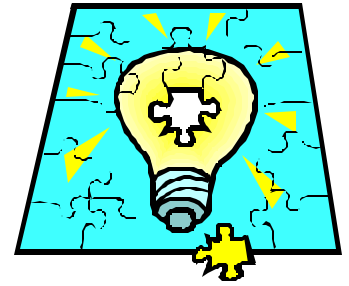


Center for Environmentally Beneficial Catalysis





CoE Idea Incubator




Goal: to facilitate focused, strategic, and forward-looking discussions of future research directions and opportunities.

The possibilities are left up to your imagination!

Long Term Aspiration: Create an Advanced Studies Institute

Emerging Opportunity: Consortium of Universities for Advancement of Hydrologic Science, Inc. – NSF Supported

- Leadership - Witold F. Krajewski CEE/IIHR
- Chance to bring a national facility to UI
- *Design of Blueprint Observational Network for a Hydrologic Observatory funded*
- Physical facility needed – discussions begun



CUAHSI


Consortium of Universities for the Advancement of Hydrologic Science, Inc.

- Background
- Objectives
- Governance
- Membership
- Committees
- News
- Home

Mission

To foster advancements in the hydrologic sciences, in the broadest sense of that term, by:

- Developing, prioritizing and disseminating a broad-based research and education agenda for the hydrologic sciences derived from a continuous process that engages both research and applications professionals;
- Identifying the resources needed to advance this agenda and facilitating the acquisition of these resources for use by the hydrologic sciences community; and
- Enhancing the visibility, appreciation, understanding, and utility of hydrologic science through programs of education, outreach, and technology transfer



Announcements

- [Cyberseminars](#) are starting in October! This educational speaker exchange is free, courtesy of the internet.
- There will be a town meeting and a [special session](#) on CUAHSI at the [Fall AGU meeting](#) in San Francisco. Check back for dates.
- Find out about the core funding proposal and Washington office in the [newsletter](#).
- How to [join CUAHSI](#).

How to contact CUAHSI

Webmaster: Laura Toran, ltoran@temple.edu

Other info: membership@cuahsi.org or questions@cuahsi.org



Challenges

- Space
- Resources (start-up funds, ...)
- Rewards
- Alligning and enhancing our graduate programs to reflect interdisciplinary nature of our research



College of Engineering



Resources for...

- ▶ **Current Students**
- ▶ **Future Students**
- ▶ **Faculty and Staff**
- ▶ **Alumni and Friends**
- ▶ **Employers**
- ▶ **Economic Partners**

Connect to...

- ▶ **Welcome**
♦ WELCOME FROM THE DEAN, COE PROFILE, FORMING PARTNERSHIPS, TAKE A TOUR
- ▶ **Research**
- ▶ **Centers and Institutes**
- ▶ **College Services**
- ▶ **Computing and Libraries**
- ▶ **Supporting the College**

Google

◊ Search Engineering ◊ Search UIowa ◊ Search WWW

Centers & Institutes

- Biomedical
- Chemical & Biochemical
- Civil & Environmental
- Electrical & Computer
- Industrial
- Mechanical

News | E/WEEK | Calendar

DRIVING ASSESSMENT 2003

July 21-24 Symposium Focuses on Human Factors in Driving
[\(click here\)](#)

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[top](#)

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