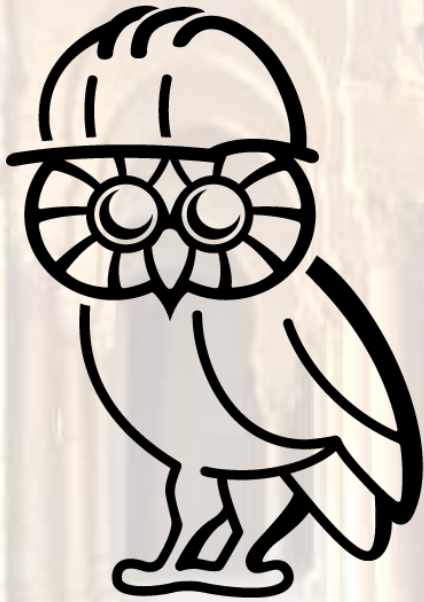


# George R. Brown School of Engineering



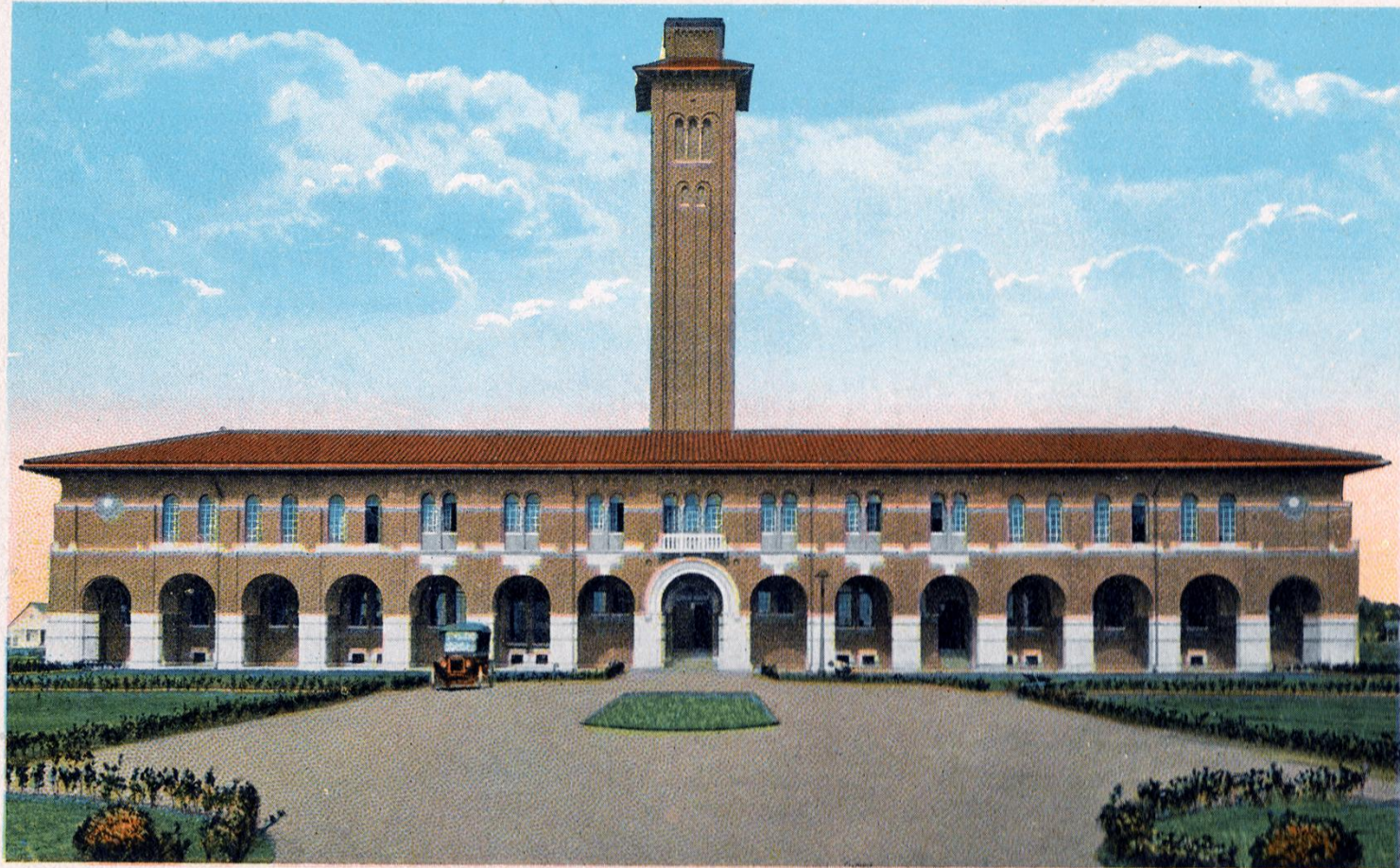
Wade Adams, Senior Faculty Fellow, MEMS, September 17, 2013

# Rice Centennial 1912-2012





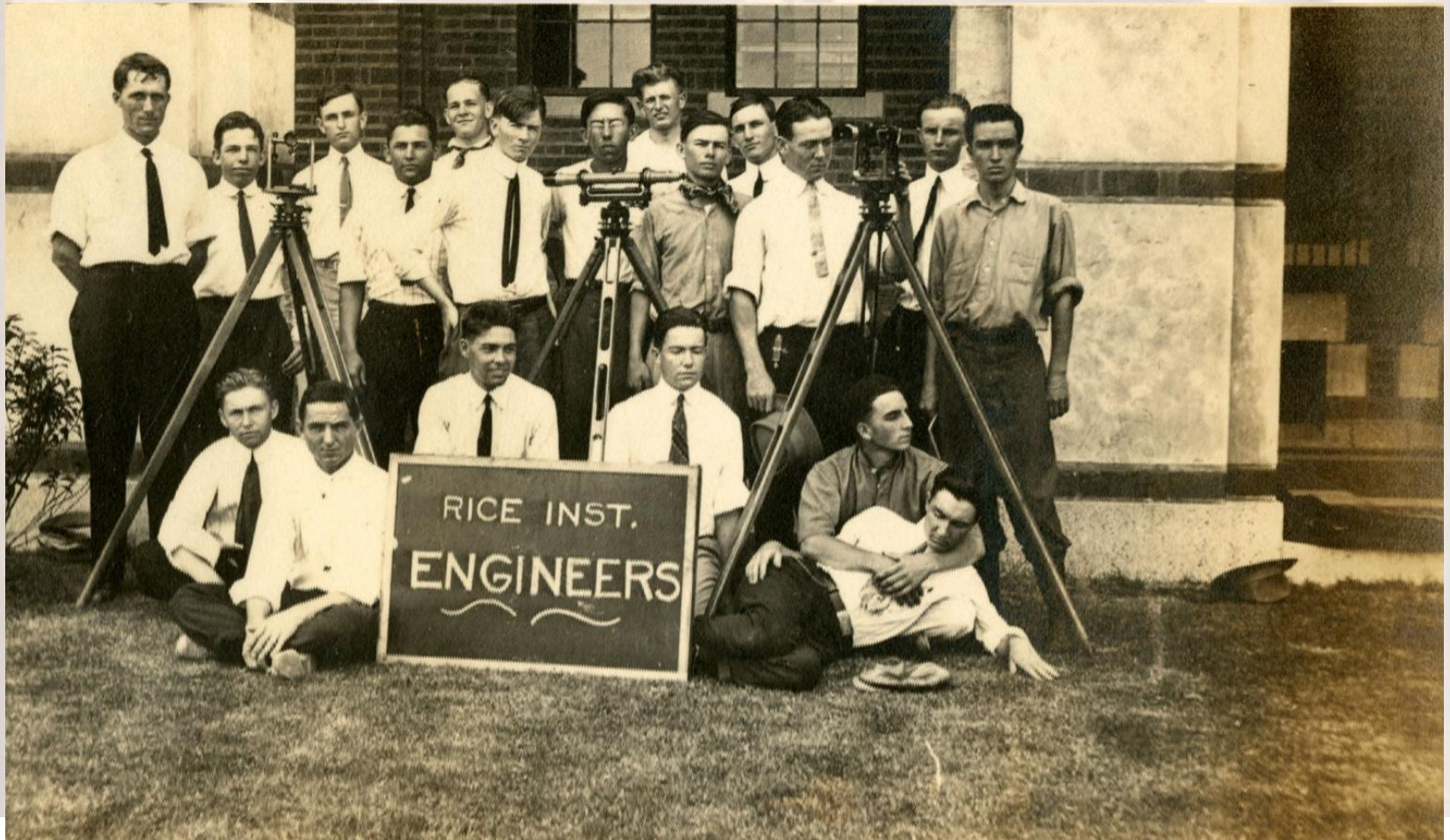
# Mechanical Engineering Laboratory, 1912



MECHANICAL LABORATORY, RICE INSTITUTE, HOUSTON, TEXAS.



# Engineering Students, 1913

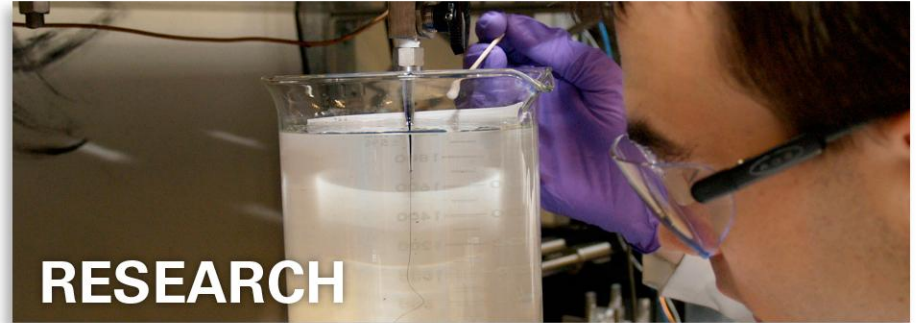


# GRB Vision Statement - 2013

- **Make a difference.** Develop leading research and educational programs in areas where Rice is well-positioned to make a difference: *energy, water, nanomaterials, health and information technology and big data.*
- **Enhance our strengths** in *materials science, computational engineering, robotics, and neuroengineering.*
- **Develop leaders.** Be pre-eminent in *engineering education* and the education and development of tomorrow's *leaders and entrepreneurs. “L & E – ship”*
- **Be open/take risk.** *Build on and exploit our unique strengths to increase our opportunities and impact in the USA and beyond.*



# Rice Engineering





# ENGINEERING DEPARTMENTS

BIOENGINEERING

CHEMICAL AND BIOMOLECULAR ENGINEERING

CIVIL AND ENVIRONMENTAL ENGINEERING

COMPUTATIONAL AND APPLIED MATHEMATICS

COMPUTER SCIENCE

ELECTRICAL AND COMPUTER ENGINEERING

MECHANICAL ENGINEERING **AND MATERIALS SCIENCE**

STATISTICS





# Engineering Graduate Student Growth: 2006-2012

- PhD students: 20% growth (572)
- Professional Masters students: 495% growth (125)
- Total GS enrollment: 40% growth (727)
- Grad degrees awarded: 47% growth (193)

34% (65) of all graduate degrees awarded in 2012 were to women, compared with 30% (39) in 2006.



# Engineering Undergraduate Student Growth 2006-2013

Undergraduate students: 41% growth (1335)

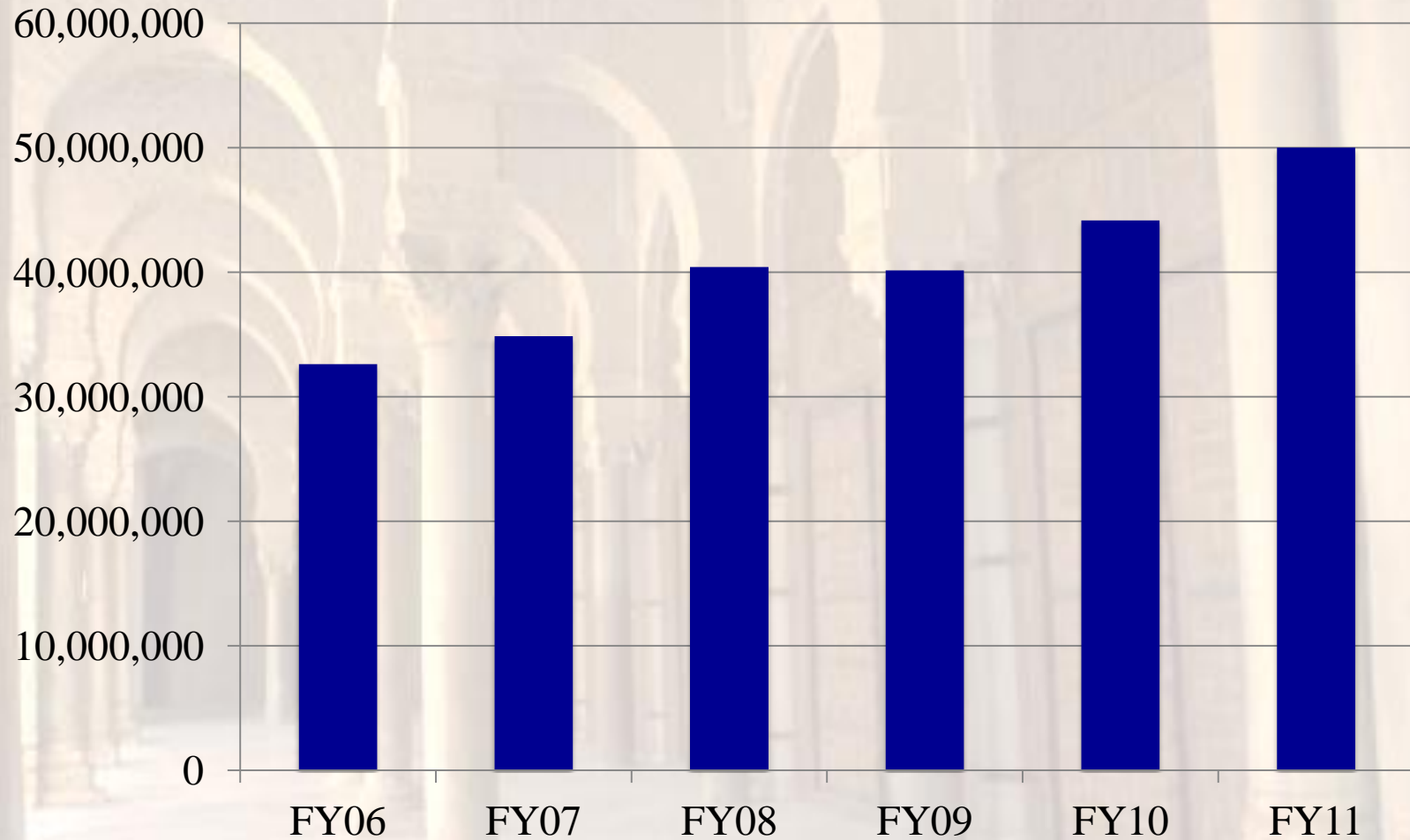
Undergrad degrees awarded: 37% growth (287)

34.6% women (20% nationally)

22.7% underrepresented minorities (16.5% nationally)

33% of Rice undergraduates are Engineers!

# SoE Research Expenditures





## **e2i: Energy & Environment Initiative**

**Mission:** To build a world recognized energy and environmental center for excellence to meet global demands for energy security and affordability in an environmentally sustainable manner.

**Transformative Needs:**

- 1) Science & Engineering Solutions
- 2) New Business Models
- 3) New Public Policies & Legislation
- 4) Social Sustainability > Right to Operate in Communities

# CIVIC ENGAGEMENT

**School of Engineering  
supports activities in our  
Houston neighborhood and  
way beyond!**



**Engineers Without Borders in Nicaragua**



**DREAM Project**



**Washington, DC, Interns**

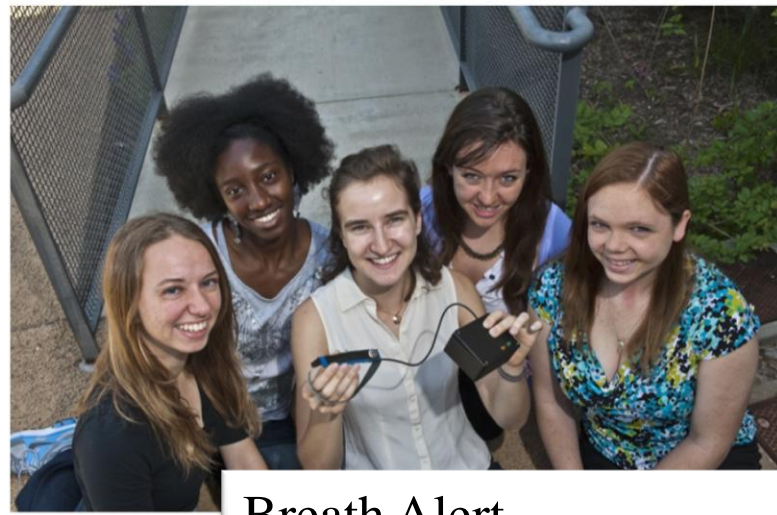




## CivSAFE

ASME iShow Semi-Finalists

(Will compete with 9 other teams in Montreal in June)



## Breath Alert

Dell Social Innovation Challenge  
Semi-Finalist



## VaxNation

1st Prize National Academy of  
Engineering Institute of Medicine  
Go Viral to Improve Health  
Collegiate Challenge

# COMPETITION WINNERS

Design/Build  
**OEDK**

So how did *industry* like Rice Engineers?

## PRIOR FEEDBACK FROM INDUSTRY LEADERS

- > Big Brains...smart, really smart, energetic...BUT BUT, BUT ...
- > **Success** not so much determined by technical abilities as *what you do with them*
- > **Effectiveness** depends on character, motivation, determination, communication, teamwork, strategizing, taking responsibility, commitment to “make it happen no matter what”



# RICE ENGINEERING EXPERIENCE

## PREPARES YOU FOR YOUR FUTURE

- ✓ Learn how to learn—quickly!
- ✓ Design systems and devices to solve real-world problems
  - ✓ Create new knowledge through research
- ✓ Take fundamental discoveries out of the lab into the World
  - ✓ Understand engineering in global/social context
  - ✓ Develop leadership and teamwork abilities



2013 Rice Global E&C Forum XVI



# Towards 2112

## American Education:

### *The T Shaped Individual*

- Subject Matter Expertise
  - Communicate
- Coordinate/Teams
  - Advocate
  - Anticipate
  - Get stuff done



# ENGINEERING LEADERSHIP

- Real-world engineering
- Potential for interdisciplinary projects—get *undergrad and grad* students (even from different departments) to work together !
- *Encourage* clubs
- Explore business opportunities of design challenges.
- Encourage entrepreneurship
- *Win the Rice Business Alliance !*



# ENGINEERING LEADERSHIP –

## some stuff you can't teach/learn in the classroom...

Show initiative, make decisions in face of uncertainty

Possess urgency and will to deliver

Take responsibility

Be resourceful and flexible

Show integrity and make ethical decisions

Build trust and loyalty

Know the relevant context

Relate well to others

Create purposeful and compelling visions of future

Deliver on the vision (*make it happen no matter what*)



*New Offices in Abercrombie*



# HOW DO YOU ACQUIRE LEADERSHIP QUALITIES?

*Not* just in the classroom !  
Learn by doing !

Seek mentored practice and get  
feedback (coaching) !

Internships and projects —  
very helpful — **WE NEED MORE**

Competitions and Clubs



*Being effective is not a  
spectator sport!*





# RCEL / OEDK COLLABORATION

## ENGI 120: Introduction to Engineering Design

- Teach Rice engineering students to be creative designers, *starting freshman year*.
- Semester-long *team* engineering design experiences for freshmen.
- Projects are motivated by *real clients* on campus and in the community, *who advise the teams*.
- Teams build prototypes in the OEDK, learn to use OEDK resources in future clubs, classes
- Teams are *coached* by older engineering students in RCEL's Apprentice Leader Program.



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# RCEL / OEDK COLLABORATION

## ENGI 120: Introduction to Engineering Design

Program has become *very* popular

- Spring 2011 pilot: 20 students
- 2011–2012 academic year: 81 students
- 2013–introducing second section: 160 students/academic year

### Summer Design Internship in OEDK

- Standout ENGI 120 students serve as leadership/design interns in OEDK the following summer.
- Further develop ENGI 120 prototypes to address client needs, industrial design, intellectual property.
- Mentored leadership/project management practicum.
- Great experience – in need of sustainable funding.



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# Oshman Engineering Design Kitchen II Basement Expansion

# Smart Car Ad in South Africa



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# Roadblocks

- Vision without funding is hallucination.
  - Da Hsuan Feng – UT Dallas
- Vision without hardware is delusion.
  - Lockheed engineer
- Money buys progress.
  - John Przybysz – Northrup Grumman



# Questions?

Internships and design projects – let me know:

[elt@rice.edu](mailto:elt@rice.edu)

Thank you !

