

SUNFEST



SUNFEST

Summer 2011



<http://www.facebook.com/pages/SUNFESTPenn/188385737859373>

UPENN

NSF REU

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Welcome to SUNFEST

Summer Undergraduate Fellowship in Sensor Technologies

You are among the few students selected
from over 200 applicants, nationwide.

Congratulations!!!



UPENN

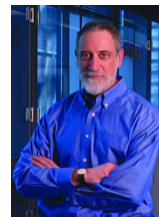
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Agenda



- ⌘ Introductions and Welcome
- ⌘ Background:
 - ☑ University of Pennsylvania
 - ☑ School of Engineering and Applied Science (SEAS)
- ⌘ Goals of SUNFEST
- ⌘ It is all about doing research
- ⌘ Student Activities, Responsibilities
- ⌘ Questions and answers
- ⌘ Lunch
- ⌘ Afternoon: get together with your advisor

Welcoming Remarks



Prof. Dan Koditschek
Chair, Electrical and Systems Eng.
School of Engineering and Applied

Welcoming Remarks



Prof. Joe Bordogna
Professor of ESE
Former Dean of Engineering
Former Deputy Director, NSF

25th Year of SUNFEST!



Started in 1986 with support of Ford
Motor Company

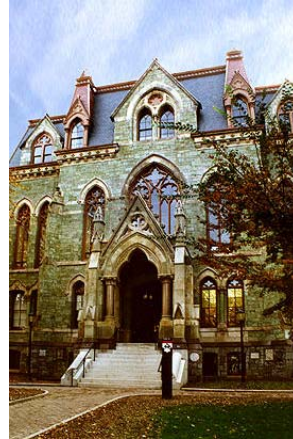
Since 1987 we got
continued support from NSF



To date, over 250 students have
participated.

Brief overview of PENN

- ⌘ University of Pennsylvania
- ⌘ School of Engineering and Applied Science



University of Pennsylvania

Founded by Benjamin Franklin
Penn is one of the oldest Universities:
Traces its origin to 1740
Ivy League School



Student Population – 24,107:

Full-time undergraduate student population – 10,275

Full-time graduate/professional student population – 9,853

Part-time students – 3,979

Faculty - 4,049 [17401740](#)

Standing Faculty – 2,524

Associated Faculty – 1,525

Student Faculty ratio: 6/1

University of Pennsylvania

4 Undergraduate Schools

- ☒ The College at Penn (School of Arts and Sciences), 6,404 students
- ☒ **School of Engineering and Applied Science, 1,534**
- ☒ School of Nursing, 488
- ☒ The Wharton School (Business), 1,866



UPENN

12 Graduate and Professional Schools

- ☒ Annenberg School for Communication, 88 students
- ☒ School of Arts and Sciences, 2,392
- ☒ School of Dental Medicine, 595
- ☒ Graduate School of Education, 1,433
- ☒ **School of Engineering and Applied Science, 1,134**
- ☒ School of Design, 589
- ☒ Law School, 895
- ☒ School of Medicine, 1,561
- ☒ School of Nursing, 474
- ☒ School of Social Policy, 367
- ☒ School of Veterinary Medicine, 489
- ☒ The Wharton School (Business), 2,239

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Penn Engineering



- ☒ Founded 1852
- ☒ Undergraduates = 1,669
- ☒ Graduate students = 1,134
- ☒ 107 Faculty
- ☒ Six Departments:
 - ☒ BE;
 - ☒ ChEBM,
 - ☒ CIS,
 - ☒ ESE,
 - ☒ MEAM,
 - ☒ MSE
- ☒ Research centers: 10



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Overview

- ⌘ Background: UPenn, School of Engineering and Applied Science (SEAS)
- ⌘ Goals of SUNFEST
- ⌘ Student Activities, Responsibilities

Goals of SUNFEST



⌘ Provide a great research experience

- ☒ Inquiry-based learning
- ☒ Discovery through construction, testing, observation, simulations, etc.
- ☒ Learn to analyze and solve research problems
- ☒ Critical thinking, research planning and organization
- ☒ Collaborative learning, teamwork
- ☒ Learning to communicate effectively

Goals of SUNFEST

- ⌘ Give you a glimpse of what graduate work is all about
- ⌘ Provide awareness of ethical issues in Engineering
- ⌘ Motivate students for graduate school

Nature of Projects

- ⌘ Genuine research projects
- ⌘ At the appropriate educational level
- ⌘ Project stands by itself: student “owns” the project
- ⌘ Note: Research projects are not like well-designed laboratory exercises. The outcome is unknown and often leads to new and exciting discoveries. However, the path is not always straight and obvious!





What is research?



Is this Research or not?

- ⌘ You want to buy a new computer; you do some *research* about models, features and prizes.
- ⌘ A commercial on late night television says that years of *research* has resulted in a miracle cleaning product.
- ⌘ The teacher asks you to go to the library and do some *research* on "Climate Change".
- ⌘ For one of your English courses you are asked to write a research paper about one of Shakespeare's plays; you are asked to compare various scholars point of view about the play.

What Research is Not

- ⌘ Information gathering
- ⌘ Mere moving of facts from one location to another
- ⌘ Merely collecting information
- ⌘ A catchword used to get attention

What are the essential characteristics of a good research project?

Problem or question

**Data,
evidence**



**Hypothesis;
proposed
solution/answer**

**Interpretation,
conclusions**

Research defined

“Research is the systematic process of collecting, analyzing and interpreting data in order to answer a question that has never been answered before or to discover something that has never been discovered before.”¹

(1. Source: Practical Research: Planning and Design, by P. Leedy and J. Ormrod, Pearson Publ, 2010)

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Research Involves

⌘ **Critical knowledge acquisition** about the world:

- ☒ Critical thinking
- ☒ **Skepticism** (evidence, arguments, conclusions)
- ☒ Not claiming more than you know

⌘ **Objective knowledge acquisition:**

- ☒ Keep open mind
- ☒ Don't let pre-formed opinions (bias or prejudice) influence observation, analysis or conclusions.
- ☒ Let the data speak for itself; use standard procedures and criteria.
- ☒ Don't ignore data that does not support your hypothesis (solution, model, theory or law).
- ☒ **Honesty**

Science and Engineering

⌘ Science:

- ☒ Discovering how the world (natural or social) works by performing experiments, making hypotheses, building models (experimental data or theory) and testing the predictions.

⌘ Engineering:

- ☒ Engineering is the step after science: it uses scientific knowledge to build things (machine, process, structure, gadget) to improve life.
- ☒ *"Scientists study the world as it is; engineers create the world that has never been,"* [Theodore von Kármán](#)

Encyclopedia Britannica, <http://www.britannica.com/EBchecked/topic/187549/engineering>

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Key Aspects of Engineering Research

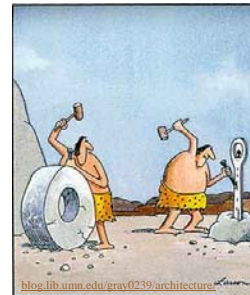
⌘ Creativity



⌘ Inventing

- ⌘ Solving problems and creating new things requires often complex solutions that are not obvious.

- ⌘ Requires good understanding of physics, mathematics, chemistry, biology, mechanics, systems... (i.e. engineering science).



blog.lib.umn.edu/engr0239/architecture/



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Doing Great Research

- ⌘ Misconception: great research results are achieved by luck.
- ⌘ Great research requires dedication, preparation and hard work:
 - ☒ Newton said it well: *"If others would think as hard as I did, then they would get similar results"*
 - ☒ Pasteur: *"Luck favors the prepared mind"*
 - ☒ Edison: *"Genius is 99% perspiration and 1% inspiration"*
 - ☒ Bode: *"Knowledge and Productivity is like compound interest"* (in other words by working a little harder everyday, over a lifetime you will be tremendously more productive)

Reading: "[Prepared to be Lucky](http://www.nsf.gov/news/speeches/bordogna/jb021221umo_commenc.htm)", by J. Bordogna, Commencement Speech at Univ. Missouri-Rolla
(http://www.nsf.gov/news/speeches/bordogna/jb021221umo_commenc.htm)

(based on talk by Richard Hamming, "[You and Your Research](http://www.cs.virginia.edu/~robins/YouAndYourResearch.html)," talk at Bell Labs, 1986:
<http://www.cs.virginia.edu/~robins/YouAndYourResearch.html>)

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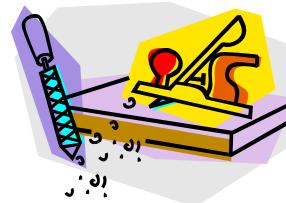
Enhancement Activities

Enhancement Activities

- ❖ Help students develop skills to
 - ☒ Conduct research
 - ☒ Communicate their results: oral and written form
- ⌘ Help students relate the work in the larger context of society
- ⌘ Social and cultural activities
- ⌘ See also: [Sunfest website](#)

Workshops & Seminars

- ⌘ Safety workshop
- ⌘ Library workshop
- ⌘ How to do research
- ⌘ Going to graduate school
- ⌘ Writing technical reports
- ⌘ Giving presentations
- ⌘ Ethics in engineering
- ⌘ Lunch clubs: presentations by faculty, grad students (almost every Friday at 12pm): check the sunfest calendar.



- ⌘ These are mandatory

2011 Lunch Club Program

Levine 512

Fridays 12:00 PM – 1:00 PM

June 3, 2011	Professor Vijay Kumar, "Autonomous Micro UAV's"
June 10, 2011	Professor Rahul Mangharam, "Embedded Everywhere: A Whirlwind Tour Embedded Systems Around You"
June 17, 2011	Professor CJ Taylor, "The Microsoft Kinect Sensor: How it works and what you can do with it"
June 24, 2011	Professor Gianluca Piazza, "Chemical and Biological Sensing with Micro/Nano Mechanical Resonators"
July 8, 2011	Professor Dawn Elliot, ""What's Next? Exploring Different Grad School, Working Professional School Options"
July 15, 2011	Professor Nader Engheta, "Circuits with Light at the Nanoscale"
July, 22 2011	Professor Robert Mauck, Lab Grown Tissues for Load Bearing Applications: Biomaterials, Cells and Culture Systems



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Ethics in Engineering

- ⌘ Introduce students to a broader range of thinking about complexities and social impact of technology
- ⌘ Increase awareness of how ethical issues arise in research
- ⌘ Three 1h sessions - Discussion/case studies
- ⌘ Discussion leader: Professor Ken Foster

Importance of writing

- ⌘ In order to get credit for your work, you must communicate it. Often we don't like to do a selling job but it is essential in research. Research is a *cumulative* process whose results depend heavily on previous work. So you have to learn to write clearly or give good talks so that people will read it or listen to your talk.

Workshops on Writing & Information Searching

- ⌘ Oral and written communication is key!
- ⌘ Three integrated workshops:
 - ☒ Workshop 1:
 - ☒ Basics of writing technical report
 - ☒ Writing background/introduction of your report
 - ☒ Citing published literature
 - ☒ In preparation: **submit a 1-2 page proposal** outlining your report (email to Mary Westervelt: mwesterv@seas.upenn.edu).
 - ☒ Workshop 2: Information searching and evaluation of sources
 - ☒ Hands-on workshop
 - ☒ Bring a citation with you of a scholarly article on your topic (ask your advisor)
 - ☒ Workshop 3: Writing and Info search refining
 - ☒ Writing your final report and use of sources
 - ☒ **Finalizing the abstract** of your paper.

Final report



⌘ Draft is due Monday July 28th:

- ☑ Mail to Mary Westervelt
- ☑ Have it checked by your advisor (a few days earlier)

⌘ **Final version is due: August 5**

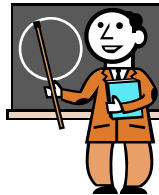
- ☑ Must be edited by Mary Westervelt and commented on by your advisor
- ☑ Mail to sunfest@seas.upenn.edu

Final presentations



⌘ Sunfest symposium: Thursday August 4th

⌘ Each student gives a 12 minutes presentation summarizing the results of the research done.



Assessing the program

- ⌘ We need your feedback on how well we do.
- ⌘ HOW?
 - ☒ Three informal meetings with assessment person, April Yee (see calendar for dates)
 - ☒ Complete the entry and exit questionnaires
 - ☒ Alumni: yearly follow up

Student Activities, Responsibilities

- ⌘ Entry questionnaire by the end of the week
- ⌘ Final report
- ⌘ Fill out an exit questionnaire.
- ⌘ Attend enhancement activities/workshops (these are mandatory); arrive on time!
- ⌘ Keep a good notebook
- ⌘ Participate in the **program evaluation** and assessment (with April Yee).

This week's activities

- ⌘ Today at 4pm: Safety workshop (LRSM Aud) –33rd and Walnut streets



- ⌘ Friday June 3: 12pm – lunch club with Prof. V. Kumar

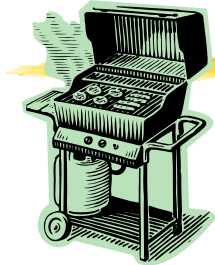
Kings Court / English College House



Publications

- ⌘ Each student is encouraged to submit their work of a publication or conference presentation
- ⌘ Check with your advisors for appropriate journal or conferences.
- ⌘ Penn's undergraduate journal, *PennScience*: good place to get started

Fun Activities



Social activities



- ⌘ BBQ
- ⌘ Nature outing: canoeing, tubing on the Brandywine river (with Prof. J. Santiago) or trip to the NJ Shore
- ⌘ BBQ later in the summer
- ⌘ If interested: trip to the NJ beach
- ⌘ During weekend students are on their own: many activities and attractions in Philadelphia



Housing



- ⌘ Effort has been made to place all students together in the middle of campus.
- ⌘ Follow the house rules:
 - ☑ Lock door
 - ☑ Keep all areas clean (Kitchen!)
 - ☑ Keep room clean (never let food lay around; put in a plastic container unless you like to have cockroaches and mice)!
 - ☑ Don't let anybody in you don't know
- ⌘ Common areas will be cleaned every Wednesday (not your room)

Note: Health Care

- ⌘ In case you need medical assistance, you need to go to the Hospital of Pennsylvania's emergency room and not to Student Health, unless you are a Penn student

Gym access

Pottruck Health and Fitness Center, David



3701 Walnut St, Philadelphia, PA

⌘ Penn has a great facilities

⌘ Cost is \$60/month

⌘ If interested go to the Pottruck office to get your membership. You can pay by credit card, check or money order; bring your Penn ID with you.

Miscellaneous

⌘ Who to contact for questions:

✉ Necole Rasul (rasuln@seas.upenn.edu)

✉ Delores Magobet (magobet@seas.upenn.edu; 898-9241 in 203M)

✉ Jan Van der Spiegel (jan@seas.upenn.edu; 898-7116 in 203M)

⌘ Housing: William Mulhearn

⌘ Office: provided by supervisor

⌘ Email: each will get a Univ. of Penn email account (go to the CETS office, 1st Fl. GRW)



⌘ Join Sunfest on Facebook:

<http://www.facebook.com/pages/SUNFESTPenn/188385737859373>

Points to pay attention to

- ⌘ Time management!
- ⌘ Get off to a good start - each day counts
- ⌘ Do not let the project drift
- ⌘ See your advisor at least twice a week;
update him/her on your progress

⌘ Have fun!

Have a Great SUNFEST !

