

Introduction to Engineering

Melody Morris and Janice Mathew

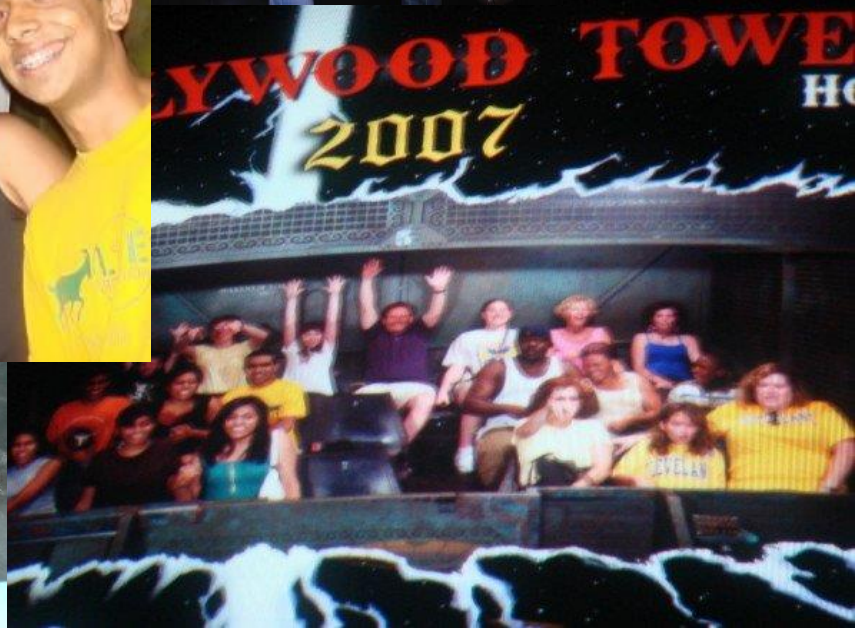
Melody Morris



Massachusetts
Institute of
Technology

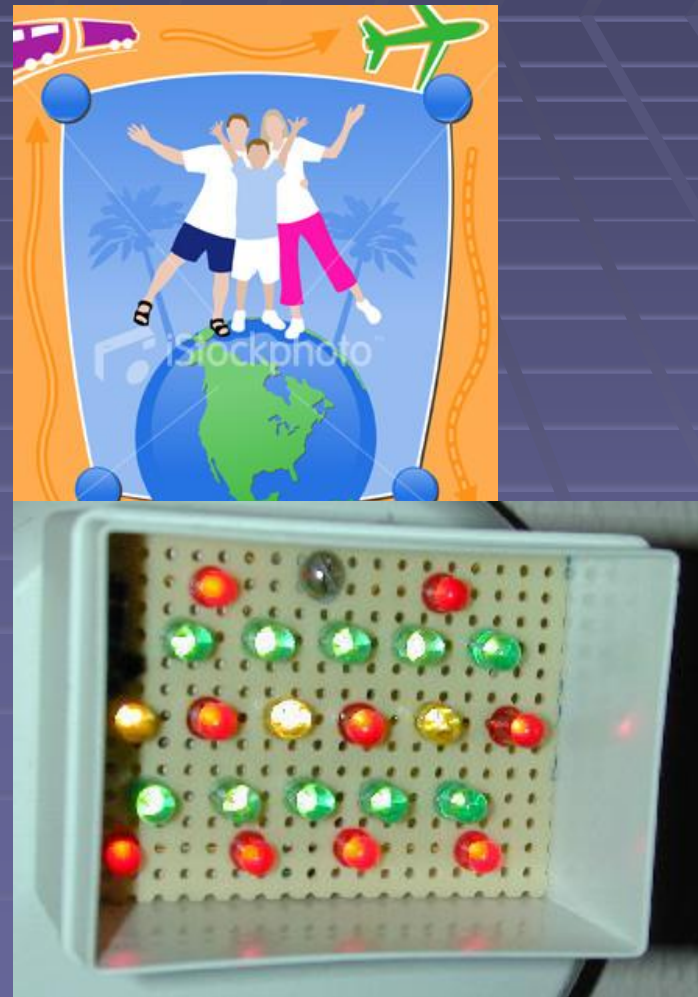


JANICE!!!

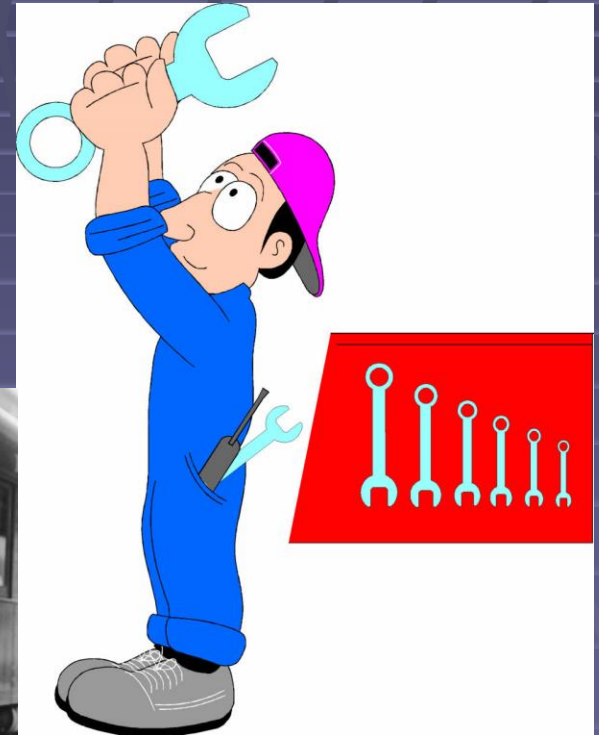
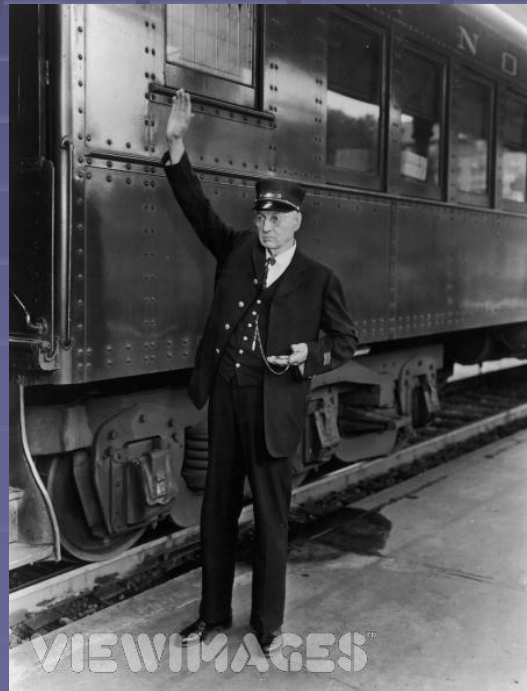


Why I want to be an engineer?

- I love making stuff that will help people
- I enjoy solving problems
- I enjoy traveling
- I enjoy meeting and socializing with people
- A secure future



What is an Engineer?



What is an Engineer?

- Someone who uses Engineering Problem Solving techniques to Develop and Improve...
 - Consumer Products
 - Drugs (the good kind)
 - Factory Processes
 - Buildings and Bridges
 - Computer programs
 - Electronics

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Who is an Engineer?



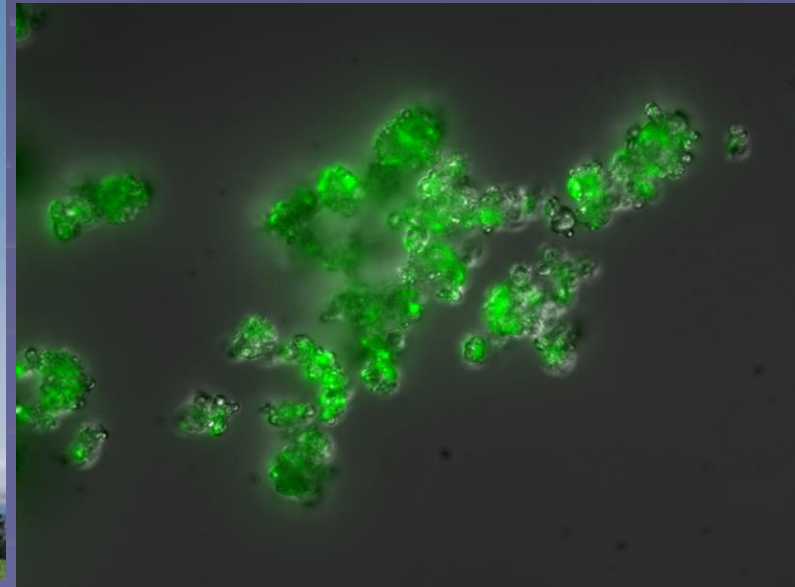
Types of Engineers

- Aerospace
- Agricultural
- Architectural
- Automotive
- Biological
- Ceramic
- Chemical
- Civil
- Computer Science
- Electrical
- Environmental
- Geological
- Marine
- Mechanical
- Materials
- Mining
- Nuclear
- Ocean
- Petroleum
- Systems
- Textile
- Transportation

Biological Engineering

Understanding Biological Systems
Designing Medical Devices

<http://techtv.mit.edu/file/336>



Chemical Engineering

Design Products and Processes



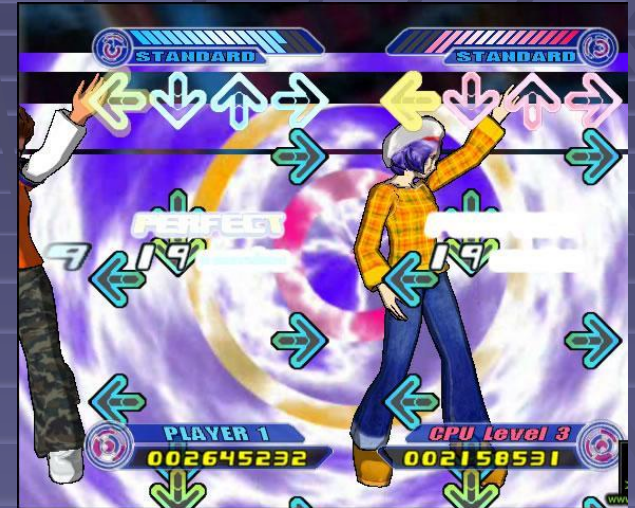
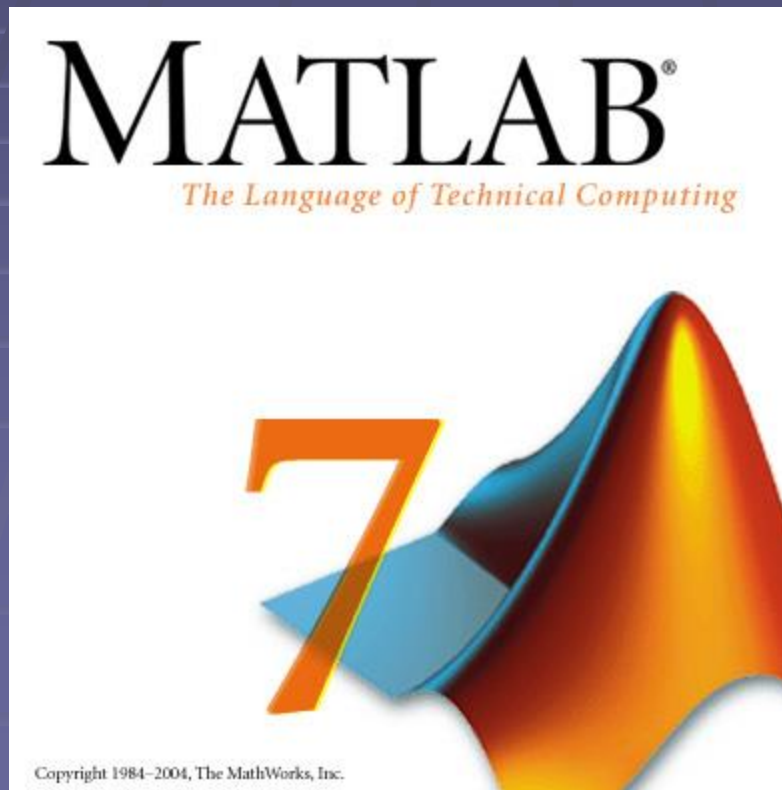
Civil Engineering



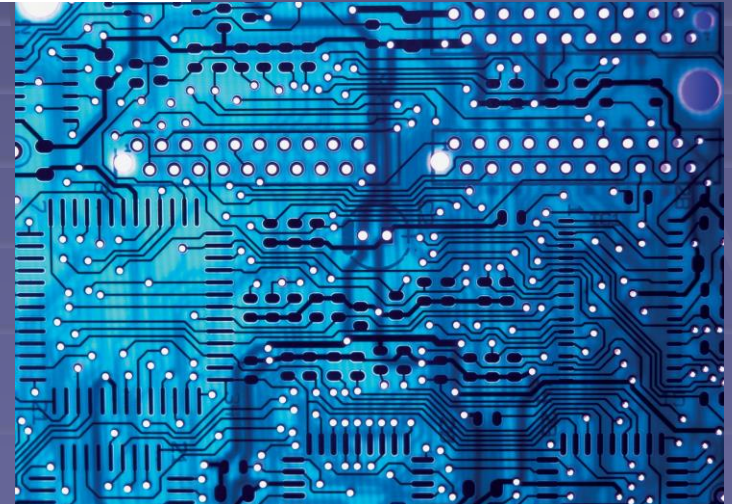
Design Buildings, Bridges, Roads,
and other kinds of Infrastructure

Computer Science Engineering

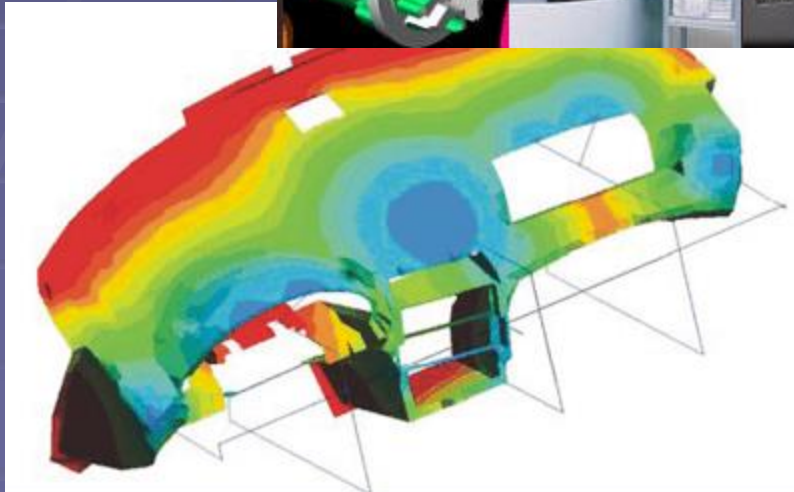
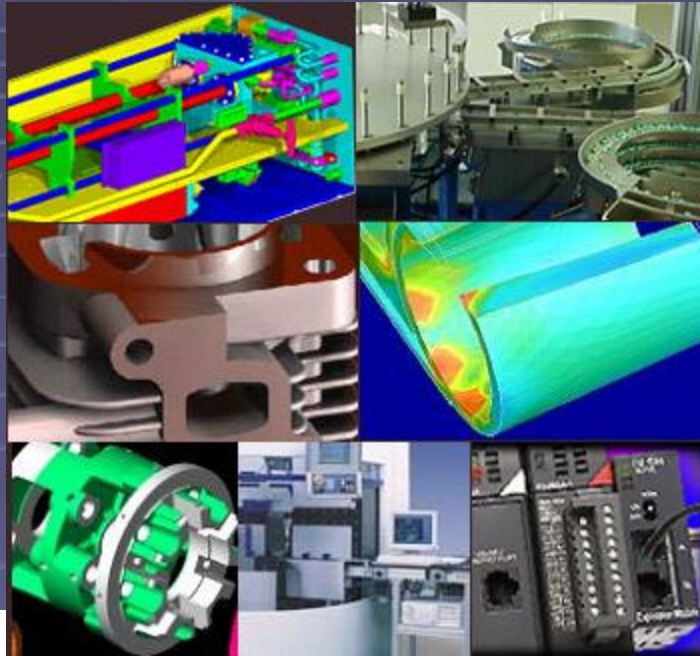
Software and Computer Programs



Electrical Engineering



Mechanical Engineering



Benefits of Engineering

- Challenging (You Don't Get Bored)
- Flexible Job Opportunities
- Good Pay and Benefits
- Lasting and Tangible Products
- Help to humankind

Engineering Problem Solving

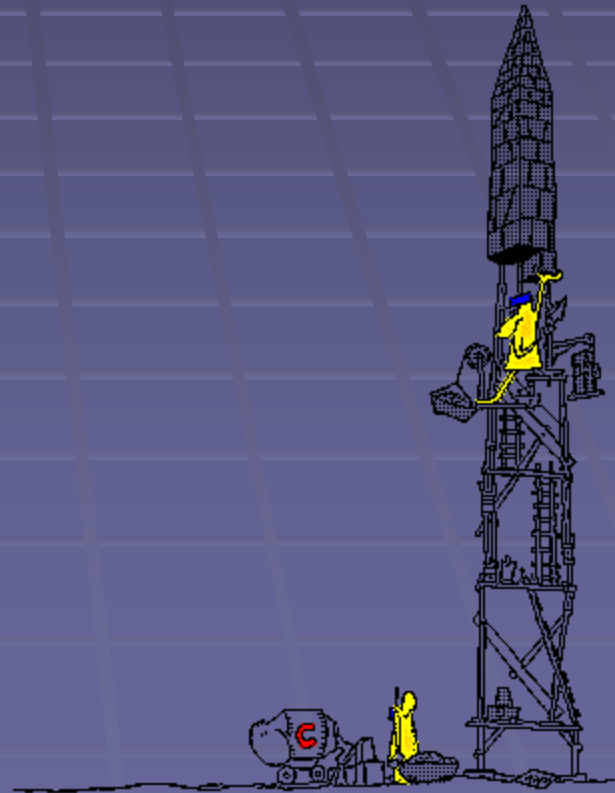
- How to Engineers approach a problem?
- Problem Type: What is the underlying mechanism/theory?
- Use: Scientific Method
 - Define the Problem
 - Research what's been done before
 - Lots of thinking
 - Form a hypothesis (testable prediction)
 - Test Hypothesis (actual experiment)
 - Analyze Data (could be more involved that you would expect)
 - Form Conclusions
 - Take appropriate actions based on conclusions

Engineering Problem Solving

- How to Engineers approach a problem?
- Problem Type: I want to build something amazing!
- Use: Design Process
 - Define the Problem
 - Research what's been done before
 - Lots of thinking
 - Create Criteria
 - May be known
 - May use scientific method to determine
 - Design Product
 - Computer simulations
 - Optimization
 - Improve it!
 - Build a prototype
 - Lets customers know what they are getting

Activity

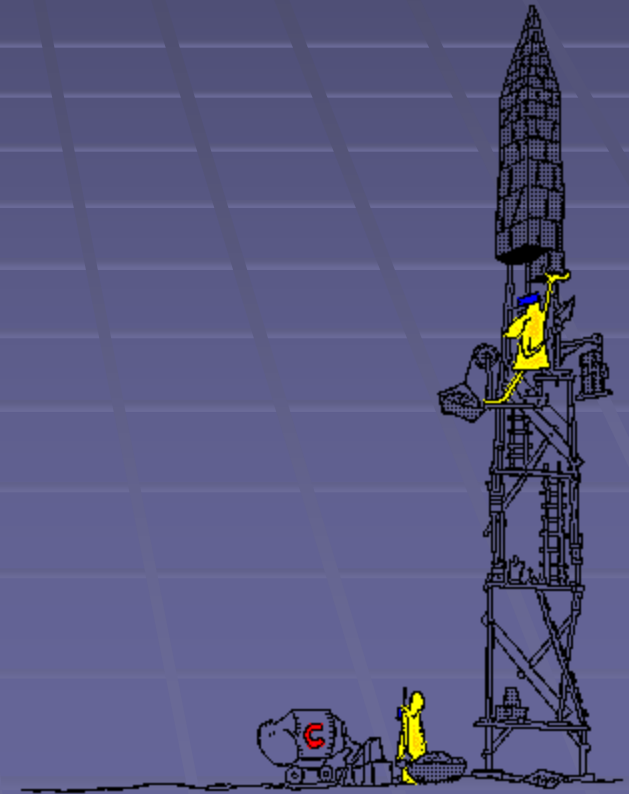
- Build the tallest free-standing tower
- Use only the provided newspaper and tape



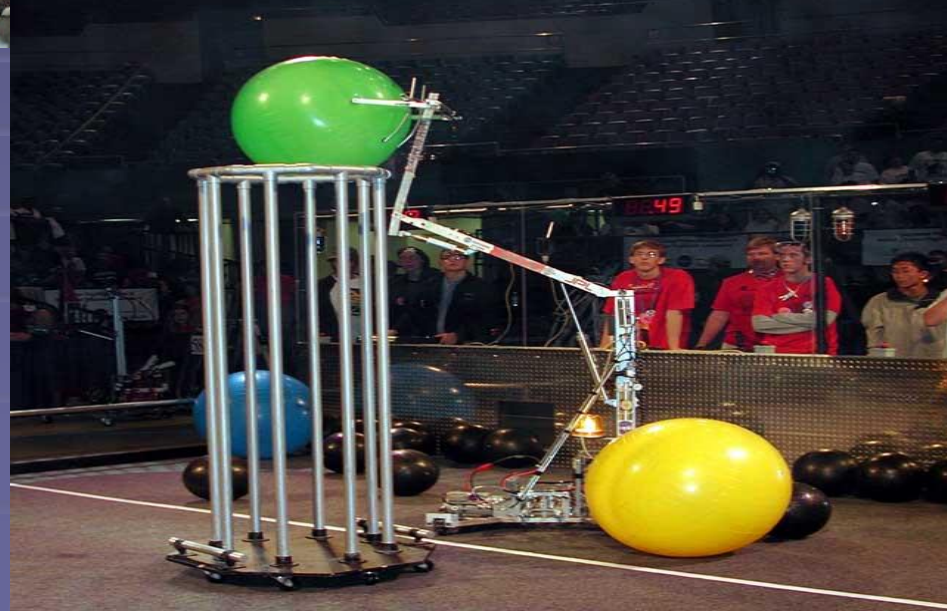
Engineering Problem Solving

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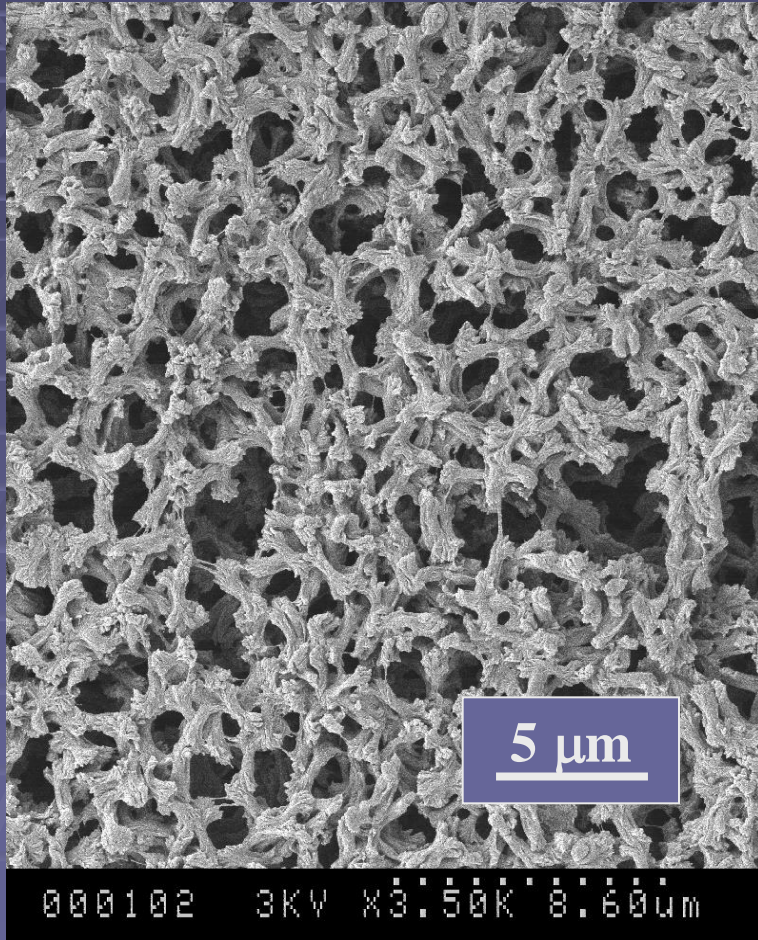
Activity



FIRST ROBOTICS

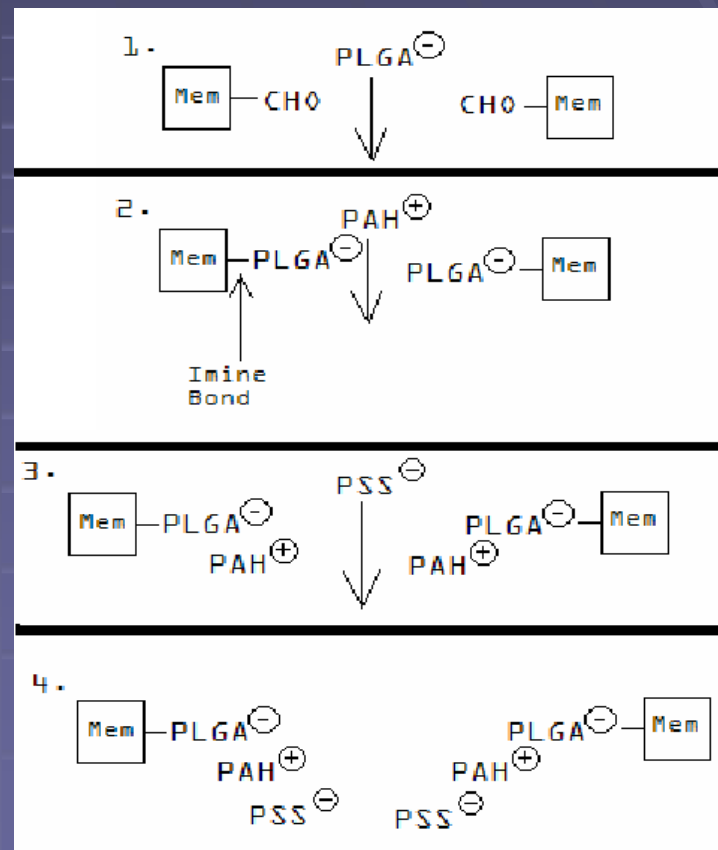


Melody's Stuff



Scanning Electron Images of Functionalized Nylon Membrane Used

Layer-by-Layer Assembly of functionalized Nylon membrane



Melody's Stuff



Influence of Food Polymers
on Chip and Dough
Properties

How Does Making a
Specified Change in the
Process of making Pringles
Change the Final Product?

Should I become an Engineer?

- Do you enjoy science and math?
- Do you have perseverance?
- Are you creative?
- Are you curious?
- Do you wonder why things are the way they are?
- Do you like to think of ways to improve things?

How Do I Prepare to Be an Engineer?

- Take classes such as
 - Math: Geometry, Pre-Calculus, Calculus
 - Science: Biology, Physics, Chemistry
 - A Foreign Language, other humanities
- Look into summer programs
- Read about scientific discoveries
- Gain experience in a variety of activities

Interesting Links

- www.engineeringedu.com/petimes.htm Pre-Engineering Times Newsletter: a free pre-engineering newsletter filled with resources to catapult engineering education success.
- www.jets.org JETS is a national non-profit education organization that has served the pre-college engineering community for more than 50 years.
- www.AmericanEngineeringCampaign.org/informationkit.html The National Society of Professional Engineers has an easy reading site for students and teachers.
- www.asee.org/precollege American Society of Engineering Education is a guide for high school students and others interested in engineering and engineering technology careers.
- www.swe.org Society of Women Engineers provides a wealth of information for females interested in technology.
- www.usfirst.org FIRST or "For Inspiration and Recognition of Science and Technology" is a non-profit organization whose mission is to generate an interest in science and engineering among today's youth through annual robot competitions.
- www.discoverengineering.org What does an engineer do? How much does s/he make? What are different types of engineering?
- www.nsf.gov/funding/ National Science Foundation: funds summer programs around the country for all ages
- tbp.mit.edu/highschool Guide to HS Programs in Sci+Engr: awesome resource!

Local Programs

- http://wise.mst.edu/precollege_summer/precollege.html
- Precollege and Summer Programsn for Girls
- **EXPANDING YOUR HORIZONS (EYH) In Math, Science, and Technology! (7-8th Grade)**
- EYH is a one-day conference held annually for approximately 500 7-8th grade girls from all over Missouri. Students meet and enjoy a personal testimony from an expert -- such as an astronaut, participate in hands-on activities, and interact with current Missouri S&T students, faculty, staff, and practicing engineers and scientists
- **"IT'S A GIRL THING" (7th & 8th Grade Girls Camp)**
- This three-day middle-school program is designed to provide a fun and introductory engineering and science experience to girls entering 7th and 8th grades.
- **SUMMER "SOLUTIONS" CAMP (9-10th Grade)**
- This live-in week long camp is designed to give girls who will be in the 9th or 10th grade the experience of college life while learning more about career options in science, engineering, and math.
- **WISE/SWE HIGH SCHOOL GIRLS LOCK-IN CONFERENCE (11-12th Grade)**
This conference will allow students to visit the campus, learn about the admission and financial assistance process, participate in team projects, meet other girls who are prospective or current students, stay the night in a dorm, and have fun! For more information, visit the ["Lock-In"](#).

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Advancing the Science of Light



Questions?

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