

"PREPARING STUDENTS TO ONBOARD INTO STEM CAREERS"



TMCF Member Universities Professional Institute & Exhibition
New Orleans, March 15-18, 2009

OBJECTIVE OF THIS SESSION

ADDRESS THE FOLLOWING QUESTIONS

- *The 21st century student will be living and working in a rapidly changing world.*
- *What skills will the next generation of students need?*
- *What can you do now to ensure that you have the skills needed for future careers?*
- *What STEM careers, particularly in the natural and computer sciences are available and what are the specific skills required to be a contributing member of society and the workplace?*

PANEL MEMBERS

Microsoft Corporation

Mr. DeVaris Brown, Academic Developer Evangelist

Air Force Office of Scientific Research

Mr. Edward Lee, Program Manager

US Army Medical Research and Materiel Command

Col. Nancy L. Vause, Ph.D., Director, Strategic Communication & Partnerships

Prairie View A & M University

A. Anil Kumar, Ph.D., Moderator

Head, Department of Physics,

Professor, Electrical & Computer Engineering

WE HAVE THREE OF THE FOUR MAJOR SECTORS OF THE SOCIETY REPRESENTED HERE

- The Military (Government)
- The Industry
- The University
- Can you guess the fourth one?
- You belong to all of them!!!

I WANT TO ISSUE EACH OF US A CHALLENGE

YOU, the STEM Majors:

- Are you preparing yourself to be ready for the world as it will be when you graduate?
- Are you demanding that your professors teach you tougher and more rigorous topics and subjects?

The University:

- Are the professors updating their curriculum, modes of instruction and modes of assistance so as to provide you with the best possible learning environment?

The Industry and The Military?

- Are they providing adequate number of opportunities for training and employment?
- Are they providing funding opportunities for targeted training and education?

MY BASIC ADVICE

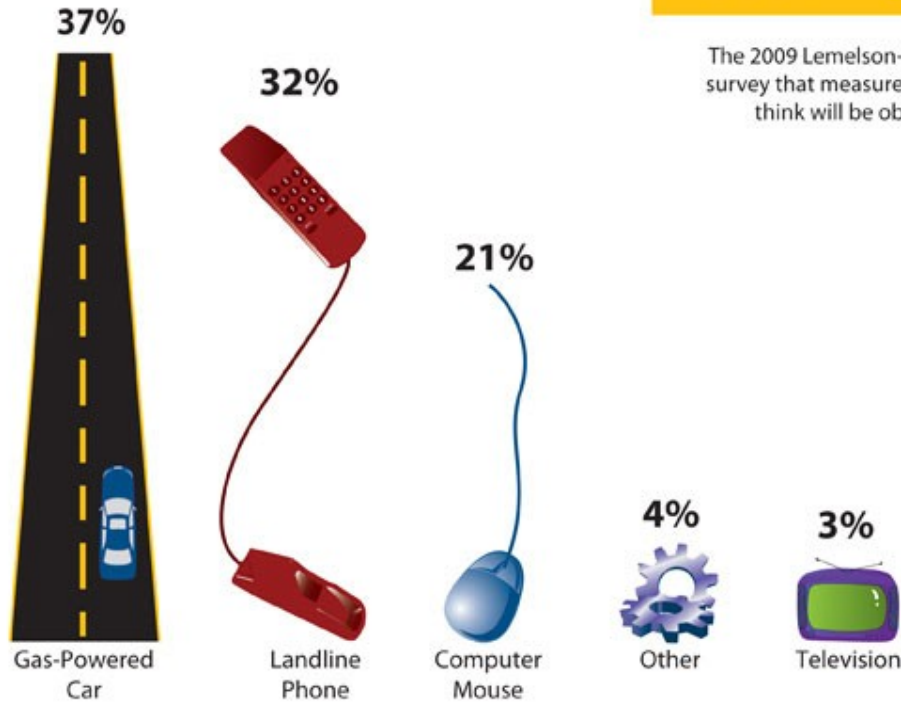
Don't be a solution looking for a problem.

Educate yourself to provide solutions to existing and potential problems.

OBSOLETE INVENTIONS

Everyday Inventions Becoming Obsolete

The 2009 Lemelson-MIT Invention Index is a survey that measured what inventions teens think will be obsolete in five years.



*2009 Lemelson-MIT Invention Index includes a nationally representative survey sample size of 500 teens.

37 percent of teens surveyed believe that gas powered cars will most likely be obsolete in five years from now (versus the landline phone, computer mouse and television).

THE BATTLEFIELD EXTRACTION-ASSIST ROBOT (BEAR)

- Developed for military search-and-rescue missions
- Has hydraulic arms that can support injured soldiers weighing up to 400 lbs. (more than most troopers in full gear) and a system of wheels, tracks and joints that enable it to maneuver in all sorts of positions.
- It can balance on its back wheels to climb up a steep hill or roll over rough terrain while staying low to the ground.
- For now the BEAR needs a human to drive it via remote control, but a more autonomous version is in the works.

Inventor: Vecna Technologies
Availability: Field-ready by 2010
vecna.com/robotics

HOME INVENTIONS

Inventor: Southwest Power
Availability: Now; about
\$10,000, including installation
skystreamenergy.com

- Wind is a wonderfully renewable source of energy, but until now ordinary consumers who wanted to live off of--or contribute to--the electrical grid had no way to capture it.
- That's where the Skystream 3.7 comes in. It's a wind turbine designed especially for home use.
- Installed on a 35-ft. tower, it connects to standard utility hookups and starts turning in breezes as low as 8 m.p.h.
- It can provide up to 80% of the average household's electricity and shave \$600 or more off annual utility costs.

MEDICINE INVENTIONS: HOSPITAL HELPER

- Japan's Ri-Man has sensors that enable it to see, smell and hear its environment.
- It also has some 320 pressure points on its arms and chest that allow it to sense the exact position of whatever it's holding.
- The bot can lift 80 lbs. today
- Researchers hope to strengthen the motors in Ri-Man's arms without increasing their size, so they still resemble those of a man, not a monster.
- Inventor: Bio-mimetic Control Research Center at the Institute of Physical and Chemical Research

Availability: Not for sale
www.bmc.riken.jp/~RI-MAN/index_us.html

REALIVE, A ROBOTIC SUIT

- It uses the movement of the healthy limb to help rehabilitate stroke patients who have lost strength and sensation in one damaged arm.
- When a patient bends the unaffected arm, sensors detect the activity and send signals to rubber muscles wrapped around the other limb, which then mimics the healthy arm's motions.
- Inspired by studies showing that simply using damaged limbs can speed recovery by stimulating nerve cells, the device can also help motivate stroke victims to stay on track with physical therapy.

Inventor: Panasonic
Availability: By 2011

HOME INVENTIONS: AIR MATTRESS

- A bed, it is floating unsupported--though lightly tethered at its four corners--16 in. above the floor.
- Inspired by the monolith in the movie 2001: A Space Odyssey.
- Its secret is a matching set of repelling magnets, built into the bed and the floor below, that's powerful enough to support almost 2,000 lbs.

Inventor: Janjaap Ruijssenaars
Availability: Now, \$1.5 million
universearchitecture.com

MEALS INVENTIONS: SAUVIGNON BOT

Inventor: NEC System
Technologies
and Mie University
Availability: Prototype only
necst.co.jp

- This robot with a swiveling head can "taste" wine using infrared light sensors and a spectrometer in its left arm.
- When training its beam directly onto a bottle of, say, Sauvignon Blanc, the bot can analyze the chemical composition of the liquid inside to determine type, brand and flavor and then suggest a complementary cheese (it relays the info by speaking in a high-pitched voice).
- NEC's mechanical sommelier is the latest robot with an "optical tongue" to emerge from the company's research lab in Tokyo; the first, PaPeRo, unveiled last year, identifies

CLOTHING INVENTIONS

Inventor: CuteCircuit
Availability: Not yet for
sale

- Amazing Embrace
- Hug Shirt, a high-tech garment that simulates the experience of being embraced by a loved one.
- When a friend sends you a virtual hug, your cell phone notifies the shirt wirelessly, via Bluetooth.
- The shirt then re-creates that person's distinctive cuddle, replicating his or her warmth, pressure, duration and even heartbeat.
- And, yes, the Hug Shirt is fully washable.

CLOTHING INVENTIONS

The fish-scale pattern on the back of Nike's Sphere Macro React tennis dress

Maria Sharapova's attire of choice at the 2006 U.S. Open

As you perspire, the flaps of fabric swing open to release heat and moisture, so you stay cool and dry.

A light and stretchy mesh lining keeps the polyester-spandex material from sticking to your skin.

Inventor: Nike

Price: \$60 and up

THE SPEEDO LZR RACER

- 94% - Percentage of Olympic swimming races won in Beijing by athletes wearing the LZR, a second-skin suit that's the first to be made with ultrasonically bonded seams.
- The LZR, which was co-designed by NASA experts, comes with a built-in corset to improve buoyancy and is constructed with compression fabric that keeps muscles from vibrating in the water.
- Michael Phelps made history eight times — including a 0.01-sec. win in the 100-m butterfly.
- Phelps, however, was wearing only the bottom half of the suit (to keep his shoulders from being constricted), while the silver medalist had donned the full-body version. Which makes you wonder just how much faster he might have gone ...

BODY-SCANNING KIOSK - INTELLIFIT

The future of the apparel industry is a 50-square-foot booth called Intellifit.

It is a chamber that holds a body scanner, a first-of-its kind cylindrical holographic imaging technology capable of performing a 360-degree body scan in less than 10 seconds.

Intellifit, uses radio waves to scan the body.

The radio waves bounce off water just under the person's skin, much like Dopplar radar that detects atmospheric moisture.

IDENTIFYING DRUNK DRIVERS

- A new infrared alcohol test-- developed by an Albuquerque, N.M., start-up--is launched next year.
- Using the fact that body tissue with alcohol in it absorbs more light than normal tissue, the device detects alcohol levels by shining infrared light on the subject's skin and analyzing tissue based on how it reflects that light.
- The test (which doesn't have an official name yet) takes 60 sec. to produce results vs. 20 min. for a Breathalyzer test and days for a standard blood test.

Inventor: TruTouch Technologies
Availability: January 2007
trutouchtechnologies.com

BIOMECHANICAL ENERGY HARVESTER

- Max Donelan, a kinesiologist at Simon Fraser University invented a device that harnesses the energy of walking.
- The 3.5-lb. device wraps around the wearer's knee and generates power using the same principle that allows hybrid cars to recycle energy created by braking.
- A walker wearing harvesters on both knees could generate about five watts of power — enough to charge 10 cell phones — without hampering his or her stride.

SMOG-EATING CEMENT

- Ordinary cement mixed in an agent called a photo-catalyzer (titanium dioxide), speeds up the natural process that breaks down smog into its component parts.
- The smog-eating cement is called TX Active, and the Italian firm Italcementi spent 10 years developing it.
- Now there's a busy street in Segrate that's covered with it, and Italcementi claims it has reduced nitric oxides in the area by as much as 60%.
- Bonus: buildings made with TX Active stay cleaner too.

THE PERAVES MONOTRACER

- Combines the lithe maneuverability of a motorcycle with the not-getting-rained-on-ability of a conventional automobile.
- MonoTracer furnishes its driver (and one passenger) with such luxuries as air-conditioning and windshield wipers, plus the safety of a cockpit made from Kevlar and carbon fiber and reinforced with an aluminum roll cage.
- The MonoTracer is also energy-efficient: its BMW engine, which goes from zero to 62 m.p.h. in 4.8 sec. (100 km/h), gets about 65 m.p.g. (28 km/L).

YOU HAVE MULTIPLE ROLES TO PLAY

- Pursue a career yourself.
- Educate others.
- Act as mentors and role models.
- Be ambassadors to parents, community citizens and community leaders.

HOW WILL YOU DO THAT?

HERE ARE SOME SUGGESTIONS.

- Do not just look at your preparation in terms of passing an examination or meeting some pre-set standard or getting a grade.
- Prepare yourself with a futuristic view.
- Don't be a solution looking for a problem.
- Be a solution to a specific problem – either current or one that might arise in the future that your potential employer is not aware of.

If you are a Biology Major,

There is an opportunity to revolutionize how biologists who are in individual labs interface with those who build large data sets can interface with research scientists, clinicians and maybe even patients to access petabyte [10^{15} bytes] and maybe even exabyte [10^{18} bytes] scales of data.

People who have intense knowledge of disease biology at a protein–protein, biochemical level, are not able to interface with those who are building the more genomics-oriented data sets.

A researcher in Seattle looking at how all 35,000 genes in breast cancer patients are dialed on or off at a certain stage of illness might be able to make critical comparisons by stacking results up against a deeper and broader data pool that integrates clinical, genetic, and other molecular data from peers in, say, San Francisco, New Haven, CT, or anywhere else.

So as scientists query their data sets against this platform, they are actively contributing that data to the platform to make it even better.

You can think of it as a Wikipedia type of thing where you have this active-contributor network-based approach that just makes the information more and more informative.

If you are a Computer Science Major,

<http://www.youtube.com/watch?v=VFkyV7d5t8o>

This is a futuristic clip from the movie Disclosure.

If you are a Civil Engineering major, learn your mechanics of materials, construction engineering with a view to build the strongest and the tallest tower.

The Dynamic Tower

80 floors in the world's first moving skyscraper with offices and a hotel, topped by apartments

Each floor will rotate 360 degrees, all at different speeds.

Designed by Italian architect David Fisher and located in Dubai (another is planned for Moscow), the prefab, wind-powered tower will cost an estimated \$700 million.

The residences will sell for \$3.7 million to \$36 million. The building should be completed in 2010.

If you are an Electrical Engineering Major,

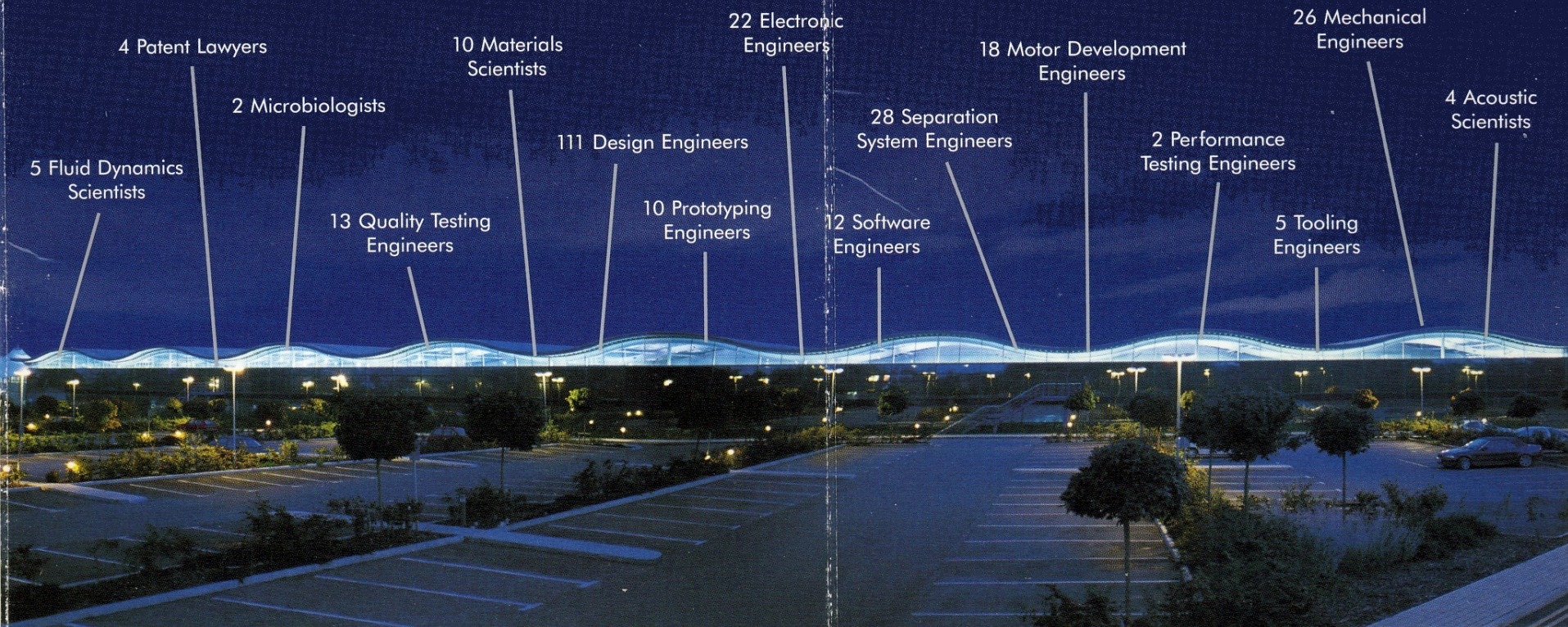
Biocontact lenses!!!

<http://www.youtube.com/watch?v=qdILVMGXSQk>

DYSON VACUUM CLEANER

Who makes a Dyson?

A third of the people at Dyson are engineers working in Research, Design and Development (RDD). We don't have product stylists – our machines look the way they do because they're functional – *technology can be beautiful.*



A NEW WAY OF LEARNING

<http://www.youtube.com/watch?v=xHAHpvFmgQk>

This is an interesting video clip on teaching science in
“Second Life”

A NEW WAY OF LEARNING SCIENCE

[http://www.youtube.com/watch?
v=4R1SrZua5ww&feature=PlayList&p=ED0A1237F37AE2
4C&playnext=1&playnext_from=PL&index=7](http://www.youtube.com/watch?v=4R1SrZua5ww&feature=PlayList&p=ED0A1237F37AE24C&playnext=1&playnext_from=PL&index=7)

This is another interesting video clip on teaching science
in “Second Life”

WHAT IS THE ENVIRONMENT LIKE?

How many students will graduate this year?

The National Center for Education Statistics projects that there will be 1,523,000 graduates from the class of 2007-08.

WHAT IS THE ENVIRONMENT LIKE?

- In 1967, the production of material goods (such as cars and equipment) and the delivery of material services (such as transportation and construction) accounted for nearly 54 percent of the country's economic output.
- However, by 1997, the development of information products (such as computers) and the delivery of information services (such as financial and broadcast services) accounted for 63 percent of the country's output.
- Abroad, developed and competing nations have focused on imparting a different set of skills--21st-century skills--to their graduates, because these skills increasingly power the wealth of nations.
- Furthermore, businesses now require workers who can handle more responsibility and contribute more to productivity and innovation.
- In fact, from 1995 to 2005, the United States lost three million manufacturing jobs, but, during that same time, 17 million service-sector jobs were created. It is critical that the United States graduate students capable of filling those jobs and keeping pace with the change in skill demands.

Hiring Flat for 2009 college graduates

Date: 12/4/08



TOP JOBS FOR 2007-08 GRADS

Job Function	Average Salary Offer
Teaching	\$36,755
Sales	\$41,179
Registered Nurse	\$50,083
Management Trainee	\$41,807
Consulting	\$55,452
Financial/Treasury Analysis	\$50,977
Project Engineering	\$56,152
Accounting (Private)	\$47,287
Design/Construction Engr	\$54,499
Accounting (Public)	\$47,392

Source: Fall 2008 Salary Survey, National Association of Colleges and Employers. All data are for bachelor's degree candidates. Ranking is based on number of offers reported.

THE TOP 5 PERSONAL QUALITIES/SKILLS EMPLOYERS SEEK

- Communication skills (verbal and written)
- Strong work ethic
- Teamwork skills (works well with others)
- Initiative
- Analytical skills

THE SIXTH SENSE

<http://www.youtube.com/watch?v=mUdDhWfpqyg>

TED sixth sense technology

THANK YOU.

ANY QUESTIONS?