Transforming Engineering: Industry’s Role in Improving the Landscape

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Engineer of 2020 Attributes

- Ingenuity of ......................Lillian Gilbreth
- Problem Solving of ........Gordon Moore
- Scientific Insight of ........Albert Einstein
- Creativity of ....................Pablo Picasso
- Determination of ...............Wright Brothers
- Leadership of .....................Bill Gates
- Conscience of .................Eleanor Roosevelt
- Vision of ........................Martin Luther King, Jr.
- Curiosity & Wonder of .....Our Grandchildren
Engineering Achievements

- Electrification
- Automobile
- Airplane
- Water Supply
- Television
- Air Conditioning
- Agricultural Mechanization
- Telephone
- Refrigeration
- Household Appliances
- Internet
- Highways
- Spacecraft
- Gasoline
- Computers
- Healthcare Technologies
# Shape of Future Engineers

<table>
<thead>
<tr>
<th>&quot;I&quot; shape</th>
<th>&quot;T&quot; shape</th>
<th>&quot;M&quot; shape</th>
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</thead>
<tbody>
<tr>
<td><strong>Vertical line:</strong> functional disciplinary skill</td>
<td><strong>Horizontal line:</strong> ability to apply knowledge across situations</td>
<td><strong>Multiskill profile with ability to apply knowledge across situations/domains</strong></td>
</tr>
<tr>
<td><strong>Poor</strong></td>
<td><strong>Good</strong></td>
<td><strong>Best</strong></td>
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</table>

**Examples**
- Microsoft CRM expert
- Paid search expert
- Mobile analytics
- Social manager
- Content marketer
- Product designer + coder
- Big data + electronics
- Musician + animator

*Source: Upcity website*
The World Without Engineers
Challenges Facing Engineering

- Advance health informatics
- Advance personalized learning
- Develop carbon sequestration methods
- Engineer better medicines
- Engineer the tools of scientific discovery
- Enhance virtual reality
- Make solar energy economical
- Manage the nitrogen cycle
- Prevent nuclear terror
- Provide access to clean water
- Provide energy from fusion
- Restore and improve urban infrastructure
- Reverse-engineer the brain
- Secure cyberspace

NAE Grand Challenges
Challenges Facing Engineering Education

• Engineering educational approaches are **stale** and need updating.
  
  \[\text{David B. Spencer and George Mohler, 2013}\]

• Curriculum still stresses analytical skills to solve well-defined problems rather than engineering design, **innovation**, and systems integration.

• Need to broaden education to include topics such as **innovation**, **entrepreneurial skills**, globalization, and knowledge integration.

  \[\text{James J. Duderstadt, Former Engineering Dean & President University of Michigan}\]
“Most of our universities are attempting to produce 21st century engineers with a 20th century curriculum in 19th century intuitions.”

James J. Duderstadt, Former Engineering Dean & President University of Michigan
We cannot solve our problems with the same thinking we used when we created them.

Albert Einstein - www.quoteikon.com
• 4 UTDesign Programs
  – EPICS
  – Capstone
  – Makerspace
  – Start-Up
• Corporate Engagement
  – Innovation Lab
    • Texas Instruments
  – Campus Development Teams
    • State Farm
    • Walmart
# Sampling of the Corporate Sponsored Senior Design Projects

<table>
<thead>
<tr>
<th>Title</th>
<th>Sponsor</th>
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</thead>
<tbody>
<tr>
<td>Beaconless Auto Telematics</td>
<td>State Farm</td>
</tr>
<tr>
<td>Glue Dispenser</td>
<td>Corning</td>
</tr>
<tr>
<td>Vending Route Optimization</td>
<td>Dr Pepper/Snapple Group</td>
</tr>
<tr>
<td>Internal Hip Distraction/Offloading Device</td>
<td>Texas Scottish Rite Hospital</td>
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<tr>
<td>Low Profile Long Rang HF Antenna</td>
<td>Rockwell Collins</td>
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<tr>
<td>Trimless/low trim cost solutions for accurate voltage/current references - achieve voltage reference after trim of 2ppm/degree C over -40 to 125°C operating range</td>
<td>Texas Instruments</td>
</tr>
<tr>
<td>Applying Machine Learning on Analyzation of Logs and Auto Healing</td>
<td>Capital One</td>
</tr>
<tr>
<td>Gap Alignment Tool</td>
<td>FritoLay</td>
</tr>
</tbody>
</table>

**Sponsorships**

- **CS** – one semester
  - $8,000 (+ $2,000)
- **Engineering** – 2 semesters
  - $13,000 (+ $2,000)

**Size of Corporate Sponsors**

- Large (41%)
- Start-Ups (35%)
- Mid Size (23%)
UTDesign - Capstone

- Required course for all ECS students
- Teams work with a sponsor to define, design, build and test a solution
- Goal is to provide 80% of the students with corporate sponsored projects, filling in the rest with student and faculty projects
- CS - 1 semester class; Engineering - 2 semester class
- All results are owned by the sponsor
Benefits to Students

• Get exposure to real engineering problems.
• Gain industry experience.
• Learn new technology used in the workplace.
• Get guidance from two experts in the area – corporate mentor and faculty advisor.
• Have opportunities for internships or employment recruitment by company sponsors.
“Changing a university is like moving a graveyard, you cannot expect help from the people inside.”
You Play a Key Role

- Partner with us on activities like UT Design
- Forge Long Term Research Collaborations
  - Decreasing research budgets make us desirable partners
- Create Faculty Internships
- Be more than an Advisor via our Councils & Boards
  - Co-design curriculum with us, continue to hold us accountable
  - Invest in our success
“We may not be able to prepare the future for our children, but we can at least prepare our children for the future.”

President Franklin D. Roosevelt
Feel free to pick my brain ...