ENGINEER CHANGE:
EXPANDING PURDUE’S
COLLEGE OF ENGINEERING

Leah H. Jamieson
The John A. Edwardson Dean of Engineering
President’s Forum November 7, 2013

https://engineering.purdue.edu/Engr/
AboutUs/StrategicGrowthInitiative
1. Drivers and contexts
2. Goals for impact
3. Components of expansion
4. Faculty hiring
   • Preeminent Teams
   • Introducing the 2013 Preeminent Teams
5. Opportunities for the future
INTERNAL DRIVERS

• Year after year growth in Purdue Engineering applications and enrollment
• Year after year increase in quality of the incoming class

FROM 2012-2016, GROW BY 1,500 STUDENTS: HALF UNDERGRAD, HALF GRADUATE
Central to innovation, economic development, and jobs creation

Central to addressing the 21st century Grand Challenges

National call to graduate 10,000 more engineers/year

BY 2016 PURDUE WILL GRADUATE OVER 5% OF THESE ENGINEERS
Contribute to increasing the national capacity for innovation and economic development

Purdue will graduate 1 out of 20 of the 10,000 more engineers/year
Amplify our impact

- 3rd largest College of Engineering: both # undergrads and # grad students
- More ground-breaking discoveries
- More inventions delivered to market
Enhance reputation of Engineering and Purdue
Enhance our students’ experience

Enhance the quality of interactions between faculty and students by improving the student-to-faculty ratio from 21.2 to 17.6
Increase our diversity

Faculty hiring and student growth at this scale is an opportunity to make dramatic gains in our diversity, which in turn transforms everything we do.
6 Expand our capacity for innovation in engineering education

Purdue can be THE leader in demonstrating how hands-on experiential learning can happen AT SCALE
Sharpen the focus on what Purdue Engineering is known for

Preeminent research teams that will position Purdue for recognized leadership
Expand engagement

Become the partner of choice for industry, the university of choice for entrepreneurs, and the national model for statewide economic development
WHAT THE GROWTH LOOKS LIKE
SUMMARY OF THE EXPANSION FROM 2011 TO 2016

10% growth
27% since 2006

28%
30%
28%

renovated leased new
WHAT THE GROWTH LOOKS LIKE
SUMMARY OF THE EXPANSION FROM 2011 TO 2016

<table>
<thead>
<tr>
<th>Category</th>
<th>2011</th>
<th>2016</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergrads</td>
<td>7,087</td>
<td>7,778</td>
<td>+691</td>
</tr>
<tr>
<td>Grad Students</td>
<td>2,738</td>
<td>3,500</td>
<td>+762</td>
</tr>
<tr>
<td>Faculty</td>
<td>358</td>
<td>465</td>
<td>+107</td>
</tr>
<tr>
<td>Staff</td>
<td>375</td>
<td>480</td>
<td>+105</td>
</tr>
<tr>
<td>Space</td>
<td></td>
<td>+220,000 ASF</td>
<td></td>
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</tbody>
</table>
FACULTY HIRING &
PREEMINENT TEAMS
FACULTY HIRING STRATEGIES

- 33 discipline-centered searches in 2013-14
- 11 searches to build preeminent research teams
- 9 cluster hires

Faculty

358 465

30%
FACULTY HIRING STRATEGIES
WHAT WOULD CATAPULT YOUR RESEARCH AREA TO INTERNATIONAL PREEMINENCE?

1. Strong leadership
2. Promise of preeminence
3. Promise of transformative impact
4. Potential for collaboration
5. Potential for diverse sources of research funding
6. Contribution to educational enterprise
7. Contribution to innovation and entrepreneurship
8. Leveraging existing strengths and infrastructure
PITCHING PREEMINENT TEAMS

Round 1:
32 teams competed
5 minute pitch
5 minute Q&A
panel of distinguished faculty

12 teams advanced

Round 2:
10 minute pitch
10 minute Q&A
external + internal panelists

4 teams selected for 2013-14
2013-14 PREEMINENT TEAMS

• Implantable Networks of Wireless Nanoelectronic Nodes for Medical Treatment
  Pedro Irazoqui, Ashraf Alam, Bill Chappell, Mark Lundstrom

• Energetic Materials: Science, Engineering, Sensing, and Detection for Defense & Security Applications
  Steve Beaudoin, Bryan Boudouris, Charlie Bouman, Wayne Chen, Jeff Rhoads, Steve Son

• Flexible and Efficient Spectrum Usage
  David Love, Bill Chappell, Ed Delp, Jim Krogmeier

• Quantum Photonics
  Vlad Shalaev, Andy Weiner, Chris Green
IMPLANTABLE NETWORKS OF WIRELESS NANOELECTRONIC DEVICES

Pedro Irazoqui
Associate Professor, BME & ECE
Director, Center for Implantable Devices
engineering.purdue.edu/CID

Mark Lundstrom
Scifres Distinguished Professor of ECE
Director, NCN NEEDS nanohub.org/groups/needs

William Chappell
Professor, ECE
PM, Microsystems Technology Office, DARPA
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Ashraf Alam
Professor, ECE
Biosensors
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SYSTEMS
NANOELECTRONICS
WIRELESS
BIOSENSORS
19.5% of GDP by 2017*  
*DHHS
Enable multi-pathology treatment through physically distributed networks of nanoscale wireless sensors and actuators
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A Paradigm Shift in Medical Treatment
The microchips shown were designed and assembled at Purdue.
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Glaucoma monitoring

Seizure detection

Heart failure warning

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NEED:

- Network of implantable wireless devices
- Nano-biosensors
  - CMOS compatible
- Packaging
- Energy Harvesting
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Ashraf Alam
Professor
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Mark Lundstrom
Scifres Distinguished Professor
NEEDS: Nano Engineered Electronic Device Simulation
Lead institution: Purdue
Partners: MIT, UC Berkeley, and Stanford

CMOS 180 nm tapeout – Irazoqui group

FET-based bio-sensor
Alam group

needs.nanohub.org
NEEDS: Nano Engineered Electronic Device Simulation
Lead institution: Purdue
Partners: MIT, UC Berkeley, and Stanford

Vision: A new era of electronics enabled by the new capabilities of emerging nano-devices.

Mission: Connect nano-material and device research to new applications with physics-based circuit simulation models.

FET-based bio-sensor
Alam group

needs.nanohub.org
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• Nano-biosensors
  • CMOS compatible

• Packaging

• Energy Harvesting

William Chappell
Professor
PACKAGING:
MINIATURIZATION
MINIATURIZATION
MINIATURIZATION
FURTHER MINIATURIZATION
MAGNETICALLY DRIVEN INSERTION
WHY

• Our idea?
• Now at Purdue?
• This team?
• What resources

• Combine Purdue:
  • Implantable devices
  • Nanotechnology
  • Clinical partnerships

• Fill key gaps in
  • Faculty
  • Facilities
  • Preeminence
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**WHY**

- Our idea?
- Now at Purdue?
- This team?
- What resources

- 3 new faculty:
  - Nano-biosensor fab
  - Packaging
  - Energy harvesting

- Facilities
  - RF anechoic chamber
What the Growth Looks Like

Summary of the Expansion from 2011 to 2016
• Reputation
• Pioneer new approaches to faculty hiring
• Explore high quality, efficient, energy efficient, flexible, and collaborative space
• One of the anchors of STEM education
• Leadership in experiential education at scale
• Preeminence through research collaborations
• Grounded in innovation and impact
Reputation
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ENGINEERING EXPANSION
AN OPPORTUNITY FOR PURDUE

- Reputation
- Pioneer new approaches to faculty hiring
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EXTRAORDINARY
PEOPLE GROWTH IMPACT