Beyond Numbers

The Artistry of Math, Engineering, and Robotics

Kelsey Irizarry

Introductions

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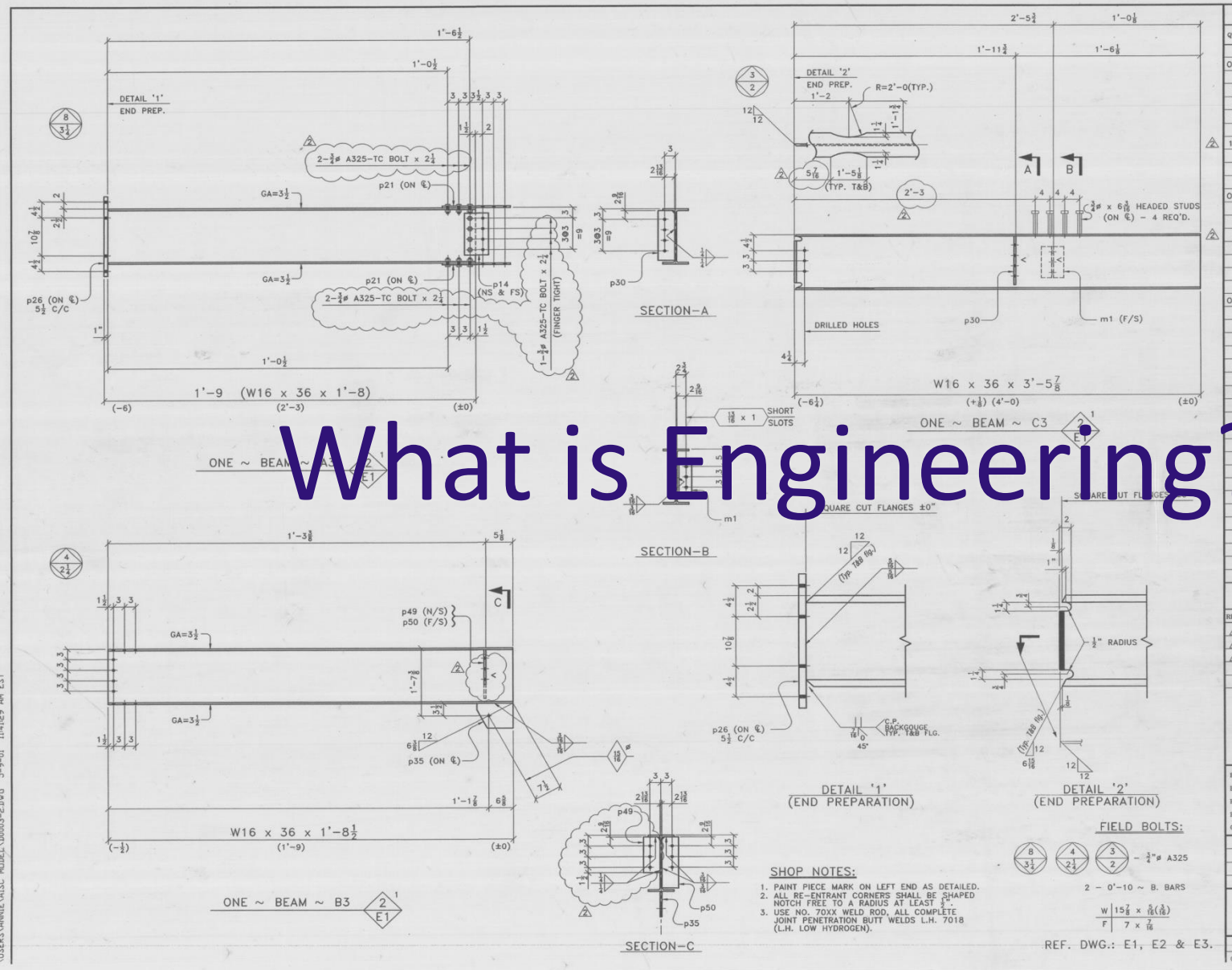


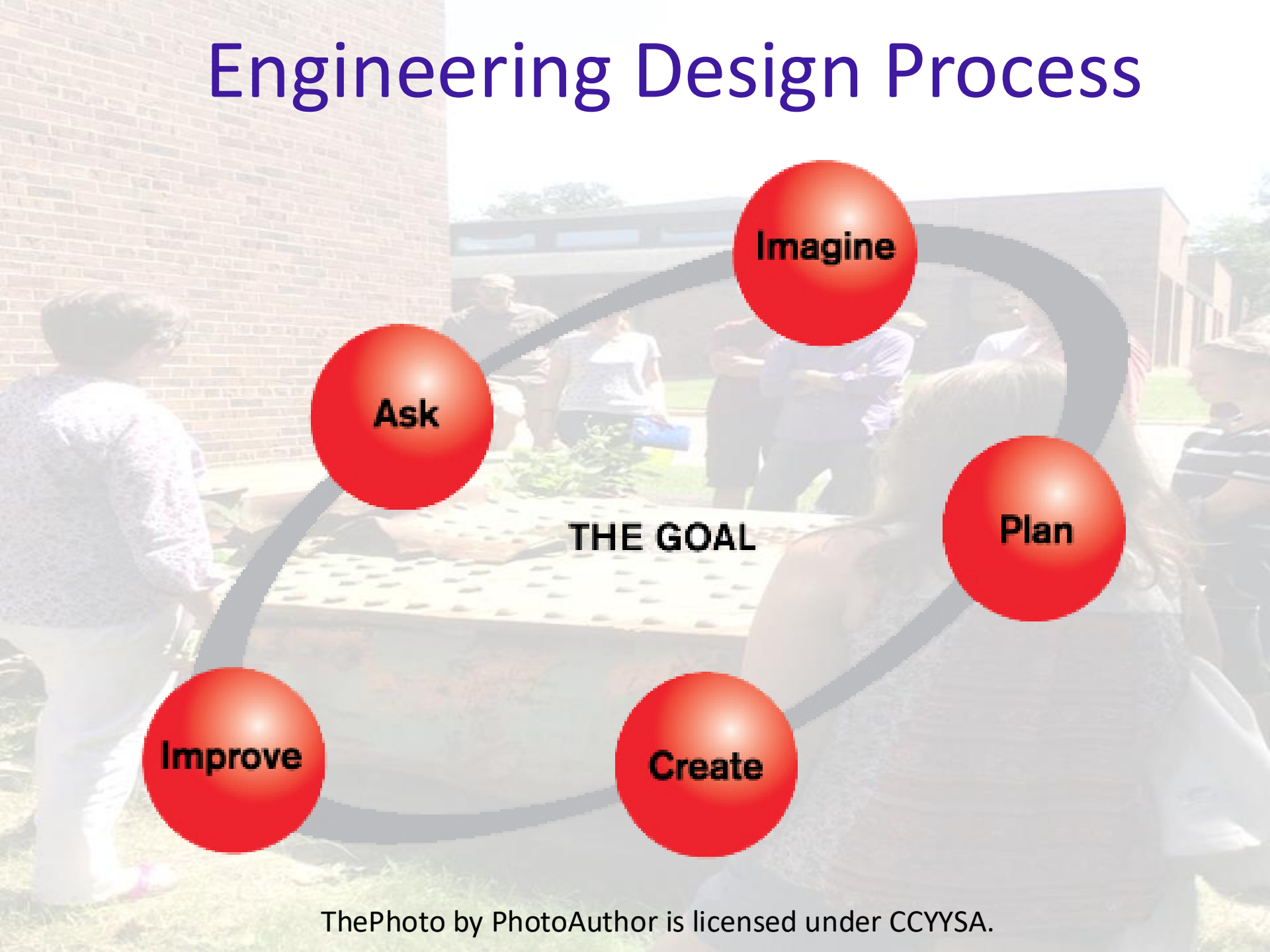
What is Engineering?

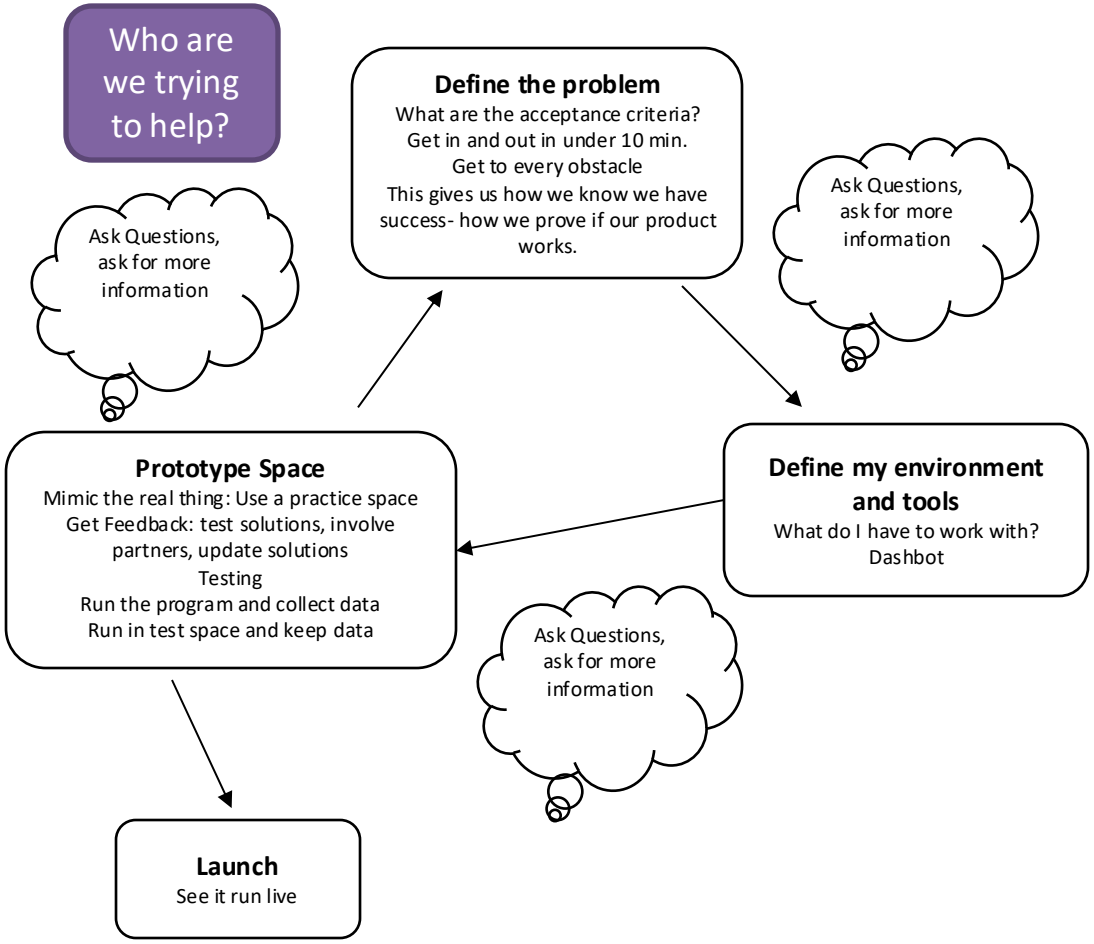
Engineering is...

A major difference between science and engineering is that scientists deal with the world that is, while engineers envision the world that could be.

Theodore von Kármán

Engineering Design Process



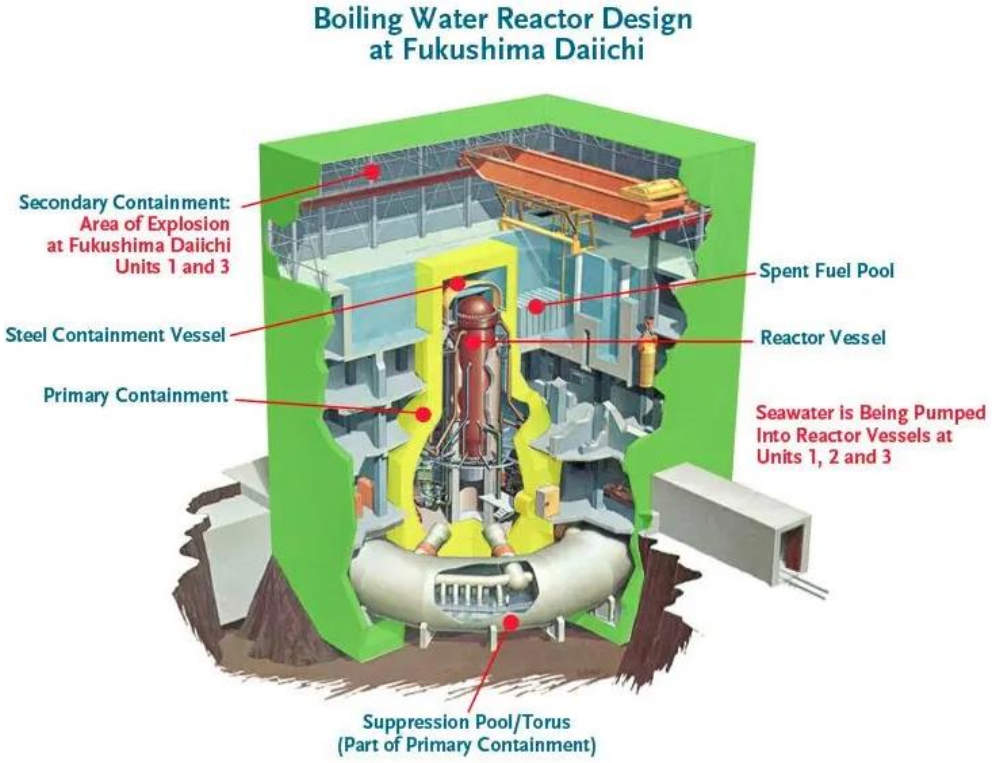

Who are we trying to help?
Define the problem
What are the acceptance criteria?
Get in and out in under 10 min.
Get to every obstacle
This gives us how we know we have success- how we prove if our product works.
Ask Questions, ask for more information
Ask Questions, ask for more information
Define my environment and tools
What do I have to work with?
Dashbot
Prototype Space
Mimic the real thing: Use a practice space
Get Feedback: test solutions, involve partners, update solutions
Testing
Run the program and collect data
Run in test space and keep data
Ask Questions, ask for more information
Launch
See it run live

Fukushima Nuclear Disaster

What do you know about the Fukushima Nuclear Disaster in Japan?

Context: Fukushima Daiichi Nuclear Power Plant

- One of 15 largest nuclear power stations in the world
- March 11, 2011 - 9.0 earthquake and tsunami
- Permanent damage to several reactors, disabled reactor cooling systems
- Released radioactivity in 30 km evacuation zone
- April 2013 - Units were decommissioned



http://www.decodedscience.org/fukushima-radioactive-ocean-plume-dangerous/39425

http://disc.sci.gsfc.nasa.gov/gesNews/nasa-data-and-fukushima-daiichi

Fukushima Daiichi Nuclear Power Plant

https://www.youtube.com/watch?v=-JfUO50dR90

Discussion

- Why might it be beneficial to use robots?
- What kind of robot might help in this situation?

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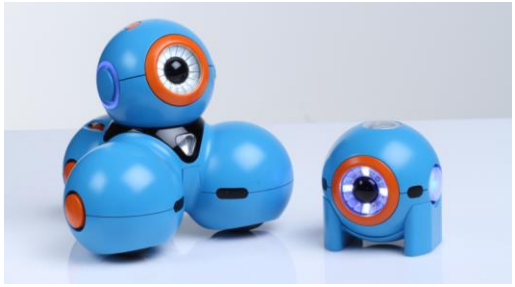

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Fukushima Simulation Activity

Challenge: Use a Dash Bot to enter a radioactive area, avoid obstacles, and circle the nuclear core.

Constraints:

- You must not hit any of the obstacles or the core.
- You need to take a picture of at least two objects in the area.

Rules of Engagement

1. Take some time to get to know the Blockly. We will use the Blockly for Dash and Dot app by Wonder (you can get this from the Appstore or Google Play). Spend some time with the app, practicing how to code and get the Bot to do what you want it to do.

2. Make sure you know how to make it move, turn, turn on the lights, make sounds, etc.

Your Challenge

- *5 minutes*: teams collect ideas, brainstorm as a team, select best concept, and finalize sketch of their best concept.
- *20 minutes:* code your final concept.
- *Try out your code!*

The Nuclear Plant

- You may enter the plant one time to measure but then should not reenter.
- You may choose to create a scale picture of the plant.
- You must get to the nuclear core, circle the core, and avoid other obstacles.
- Complete all these requirements:
  - Drive up to each hazard, stop and look.
  - Drive around the nuclear core.
  - Make a noise to warn others away.
  - Make the bot do something of your choosing along the way.

Connecting to the Mathematics

- Use the matching cards to explore how graphing and the robots connect.

Reflect

- What did you learn from this challenge?
- What connections can you make to other content/concepts/challenges?

Want to Learn More?

Graduate Certificate in Engineering Education

- 4 courses (12 credits)
- Offered at a discounted price
- Funding available
- Blended model with option to Zoom
- Fall registration open

Learn more about the program here

MA in Educational Studies

- 4 core courses (Assessment, Curriculum, Equity, Technology)

Concentrations:

- Engineering
- Learning Technology
- Mathematics
- K-12 Reading
- Hispanic Culture and Language
- Special Education
- Teaching College English
- Mental Health

SCHOOL OF EDUCATION

Learn more about this program here

K-12 STEM Projects Built for Your Classroom

Freshman undergraduate St. Thomas engineering students need to make hands on projects for their ENGR 100 class. We are looking for teachers to be the stakeholders and provide them with design constraints.

What do you need for your classroom?

Scan the QR code to share your interest and someone from the School of Engineering will be in contact.

Thank You!

Questions?
Please contact me

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