

# Beyond Numbers

The Artistry of Math, Engineering,  
and Robotics

Kelsey Irizarry

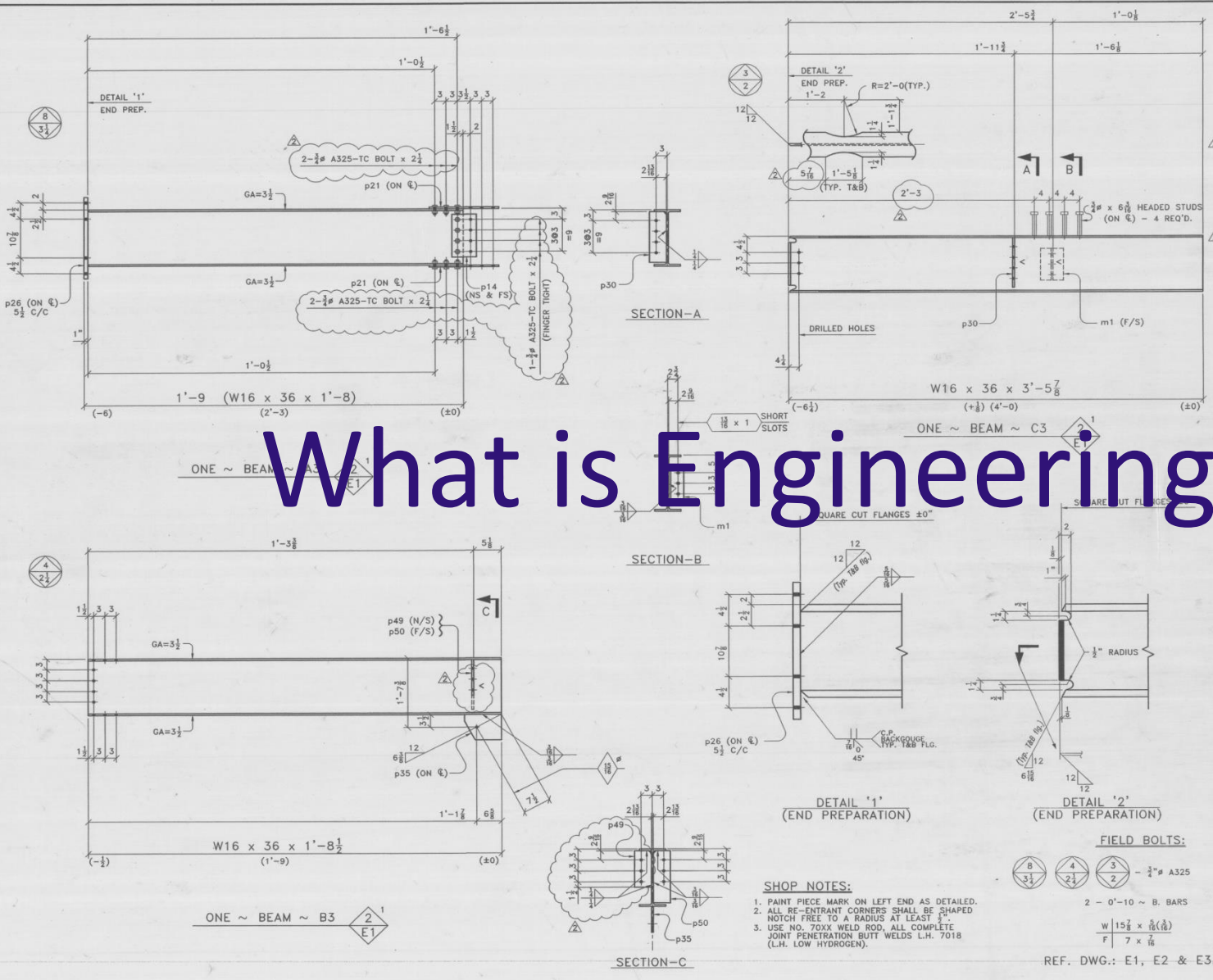


# Introductions



Kelsey Irizarry  
Center for  
Engineering Education Director  
[Kelsey.irizarry@stthomas.edu](mailto:Kelsey.irizarry@stthomas.edu)

# What is Engineering?



BILL OF MATERIAL				JOB NO.	2410
QTY.	DESCRIPTION	LENGTH FT. IN.	MARK	SHEET NO.	
				REMARKS	D3
				M.O.	WT.
ONE	W16 x 36	1 8	A3	● SC1E, A992	60
2	$1\frac{1}{2}$ x 6	1 0	p14		17
2	$1\frac{1}{2}$ x 6	1 6	p21		31
1	$1\frac{1}{2}$ x 8	1 10	p26		52
16	# A325-T.C BOLTS	0 2		C/W 1-HFW	11
					171
ONE	W16 x 36	1 8	B3	● A992	62
1	$1\frac{1}{2}$ x 7	0 10	p35		7
1	$1\frac{1}{2}$ x 4	0 10	p49		7
1	$1\frac{1}{2}$ x 4	1 2	p50		5
					81
ONE	W16 x 36	3 5	C3	● SC1E, A992	125
1	$1\frac{1}{2}$ x 4	1 2	p30		7
1	Pc OF W6x25	0 9	m1		19
4	$\frac{1}{2}$ " HEADED STUD	0 6		TYPE S3L	3
					154
					406

ALL MAT'L. = A36 U/N

REV#	DATE	DESCRIPTION	BY	CHKD
01/06/01		C3: END PREP & STUD LOC'N REV'D; DETAIL '2' REV'D PER APPL. COMMENTS	RP	G1
01/25/01		DETAIL '1' BATHHOLES DELETED; DETAIL '2' DIM. REV'D PER APPL. COMMENTS	RP	JW
3/26/01		REV C3 TO MAKE DIMS SYMMETRICAL & REV. #4 TO CLEAR BY 1/8" ON SHOP END AT CORNER TO T.C. BOLTS	JME/AMP	DML

EDGE DISTANCE, AS NOTED

BOLTS:  $\frac{1}{2}$ " U/N (DEBURR)

PAINT: NONE

CONTRACTOR:

MOMENT BEAMS (FITTED) W16x36

TIER 2

AMERICAN INSTITUTE OF STEEL CONSTRUCTION  
STRUCTURAL STEEL TEACHING SCULPTURE

**PDM STROHM INC.**  
2324 NAVY DRIVE • STOCKTON, CA. 95206  
Phone (209) 248-4600

MADE BY: NBL 06/09/00 JOB NO. 2410  
CHECKED BY: G1 07/19/00 SHEET NO. D3

# Engineering is...

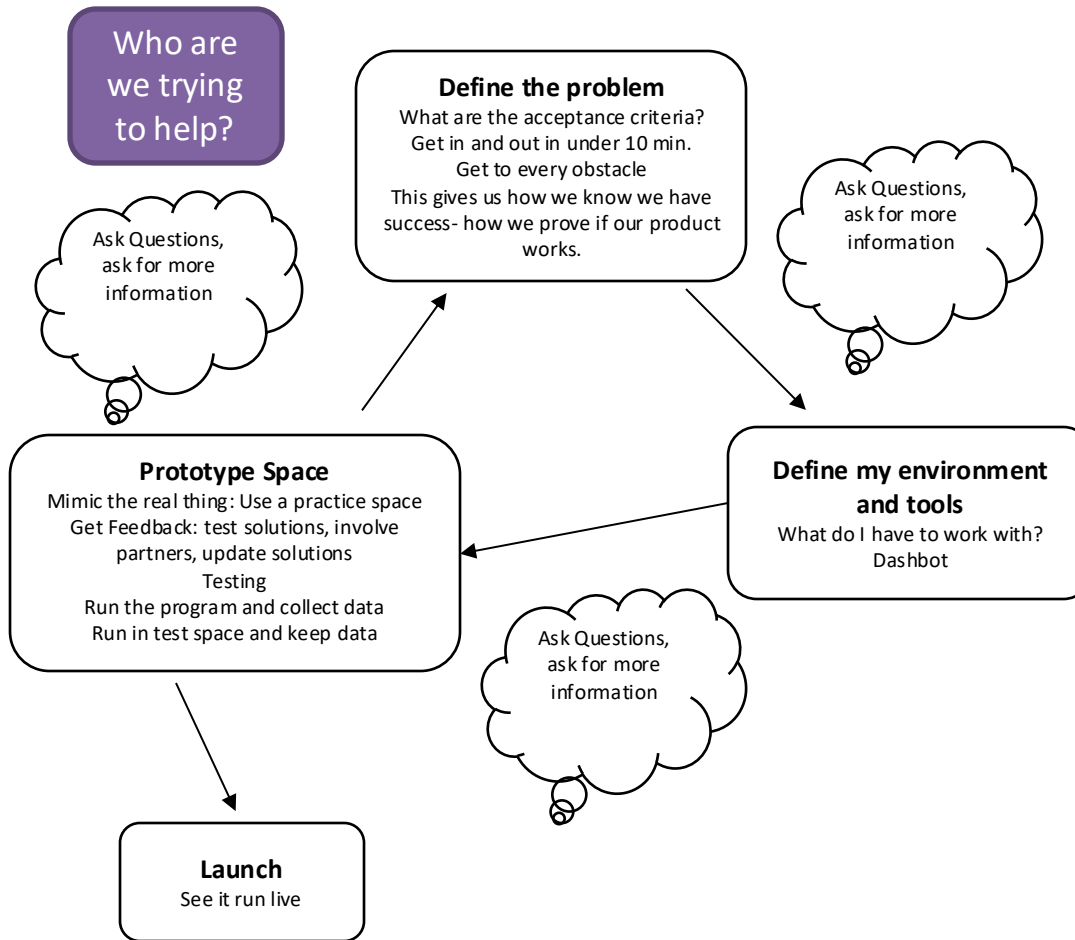
A major difference between science and engineering is that scientists deal with the world that is, while engineers envision the world that could be.



Theodore von Kármán

# Engineering Design Process







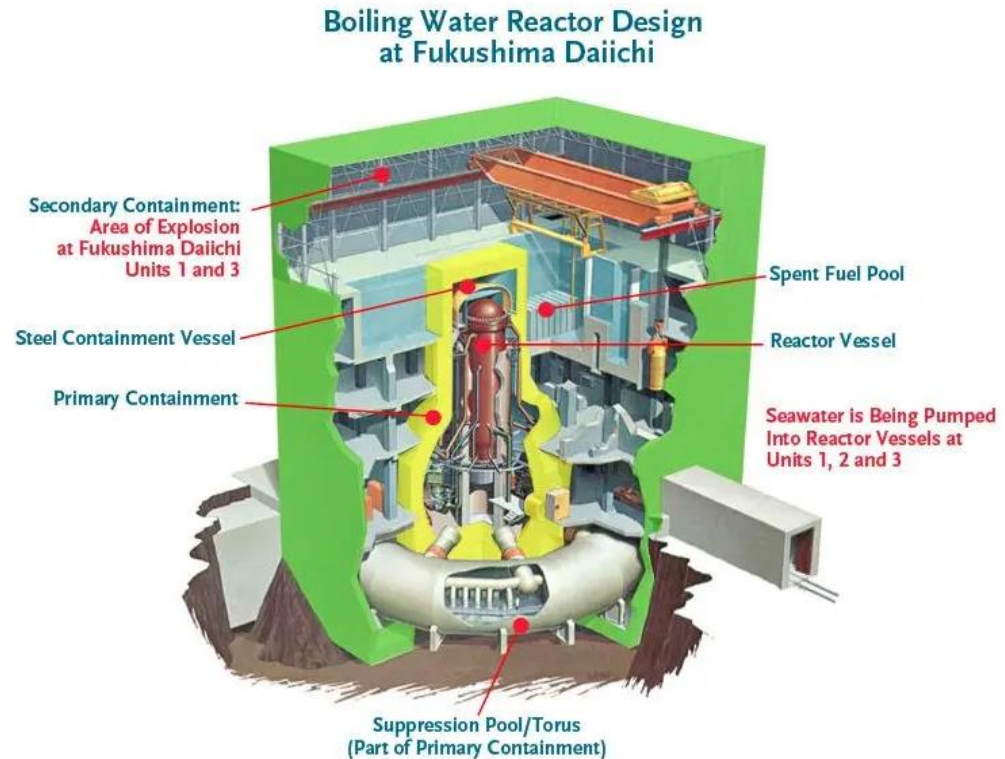
# Fukushima Nuclear Disaster

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?



ThePhoto by PhotoAuthor is licensed under CCYISA.



ThePhoto by PhotoAuthor is licensed under CCYISA.



ThePhoto by PhotoAuthor is licensed under CCYISA.



ThePhoto by PhotoAuthor is licensed under CCYISA.

# 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.

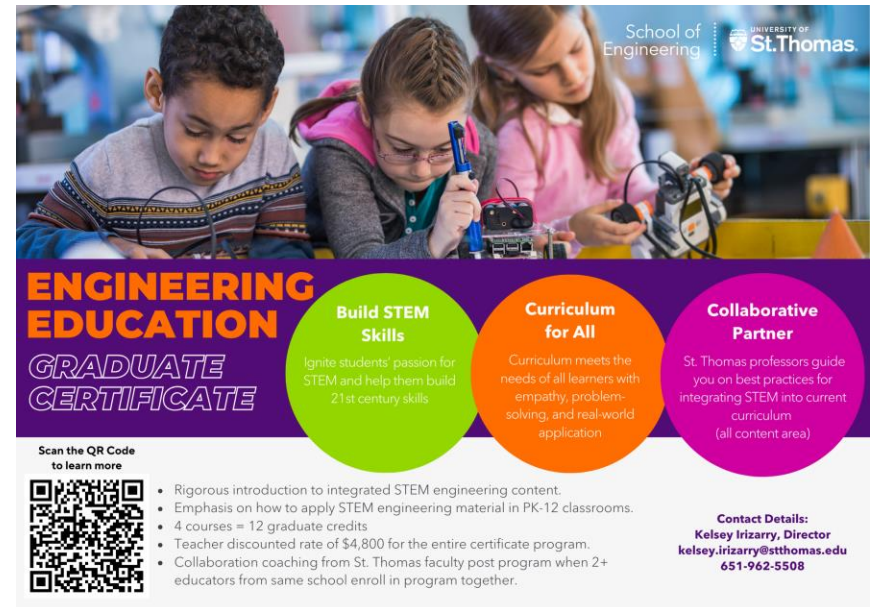
# Reflect

- 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



School of Engineering UNIVERSITY OF St. Thomas

**ENGINEERING EDUCATION**  
**GRADUATE CERTIFICATE**

**Build STEM Skills**  
Ignite students' passion for STEM and help them build 21st century skills

**Curriculum for All**  
Curriculum meets the needs of all learners with empathy, problem-solving, and real-world application

**Collaborative Partner**  
St. Thomas professors guide you on best practices for integrating STEM into current curriculum (all content area)

Scan the QR Code to learn more

- Rigorous introduction to integrated STEM engineering content.
- Emphasis on how to apply STEM engineering material in PK-12 classrooms.
- 4 courses = 12 graduate credits
- Teacher discounted rate of \$4,800 for the entire certificate program.
- Collaboration coaching from St. Thomas faculty post program when 2+ educators from same school enroll in program together.

Contact Details:  
Kelsey Irizarry, Director  
kelsey.irizarry@stthomas.edu  
651-962-5508

[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



Kelsey Irizarry  
kelsey.irizarry@stthomas.edu