



One Girl's Journey in Engineering

PAVE YOUR OWN PATH!

Ozlem Kilic

Associate Dean, Academic and Student Affairs

Tickle College of Engineering

University of Tennessee, Knoxville

One Story...

Story begins many years ago when there were

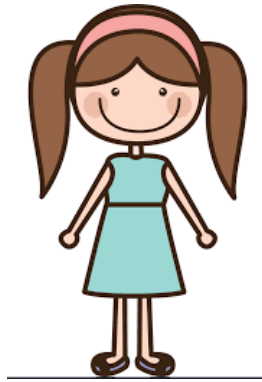
- No internet!
- No cell phones!
- No social media, texting, snapchat,...



A typical(?) girl

Loved to:

- o play with baby dolls
- o play with mom's makeup
- o do ballet
- o play hopscotch



- o Wanted to be a mom when I grew up (like many women in TV shows)

Atypical(?) girl

Loved to:

- o solve riddles and puzzles
- o wondered how and why
- o run fast(er than boys)
- o jump high(er than boys)
- o write stories



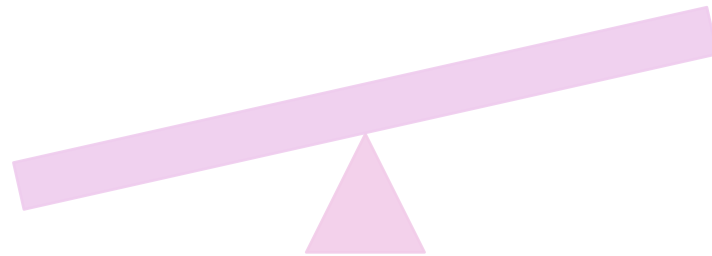
- o Had male figures in my life who had no gender specific expectations from me

Mentors make a difference

I was shy

I didn't have
confidence

CAN I??? 😞



I CAN! 😊

Mentors make a difference

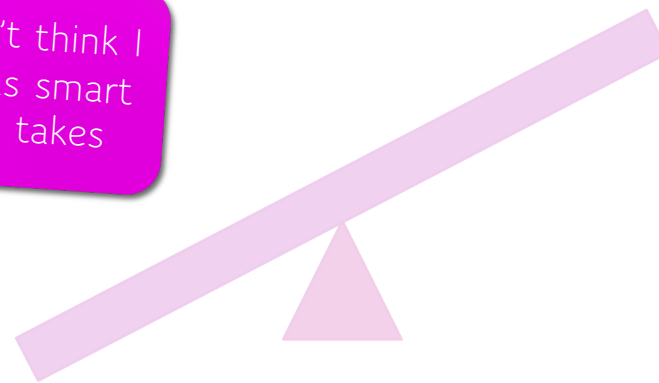
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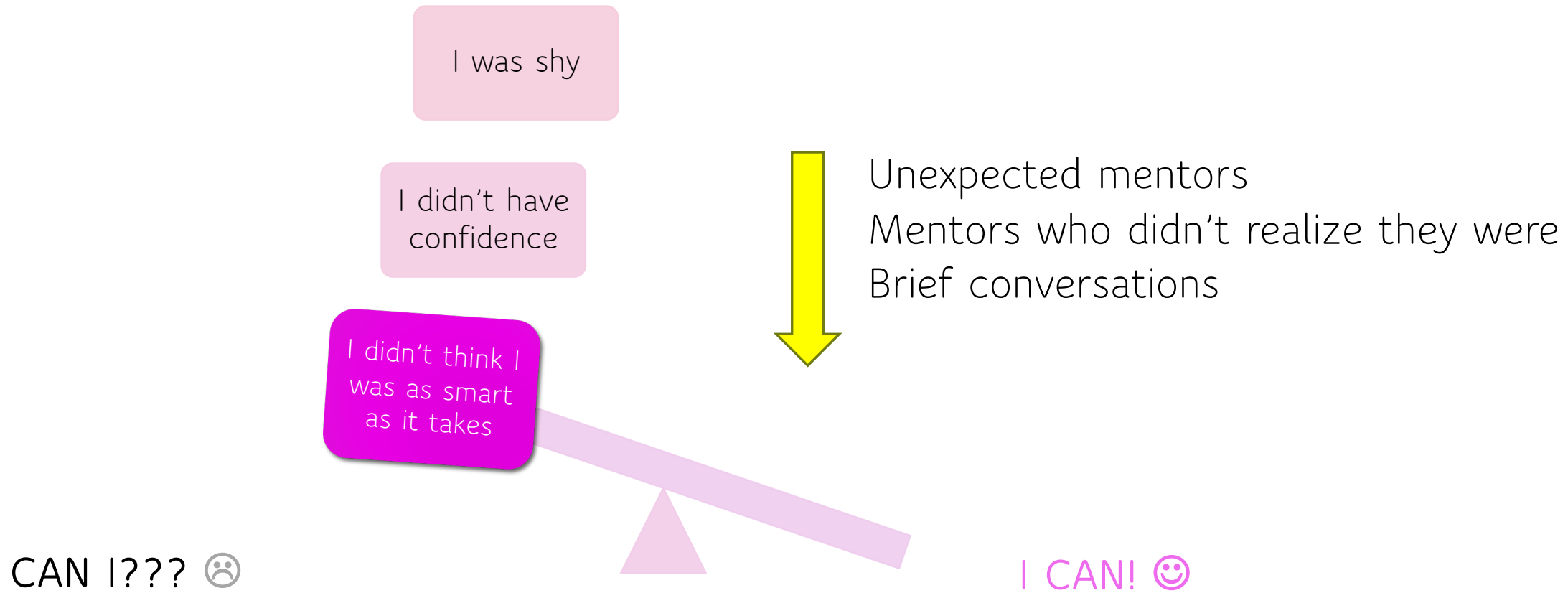
I didn't think I
was as smart
as it takes

CAN I??? ☹️

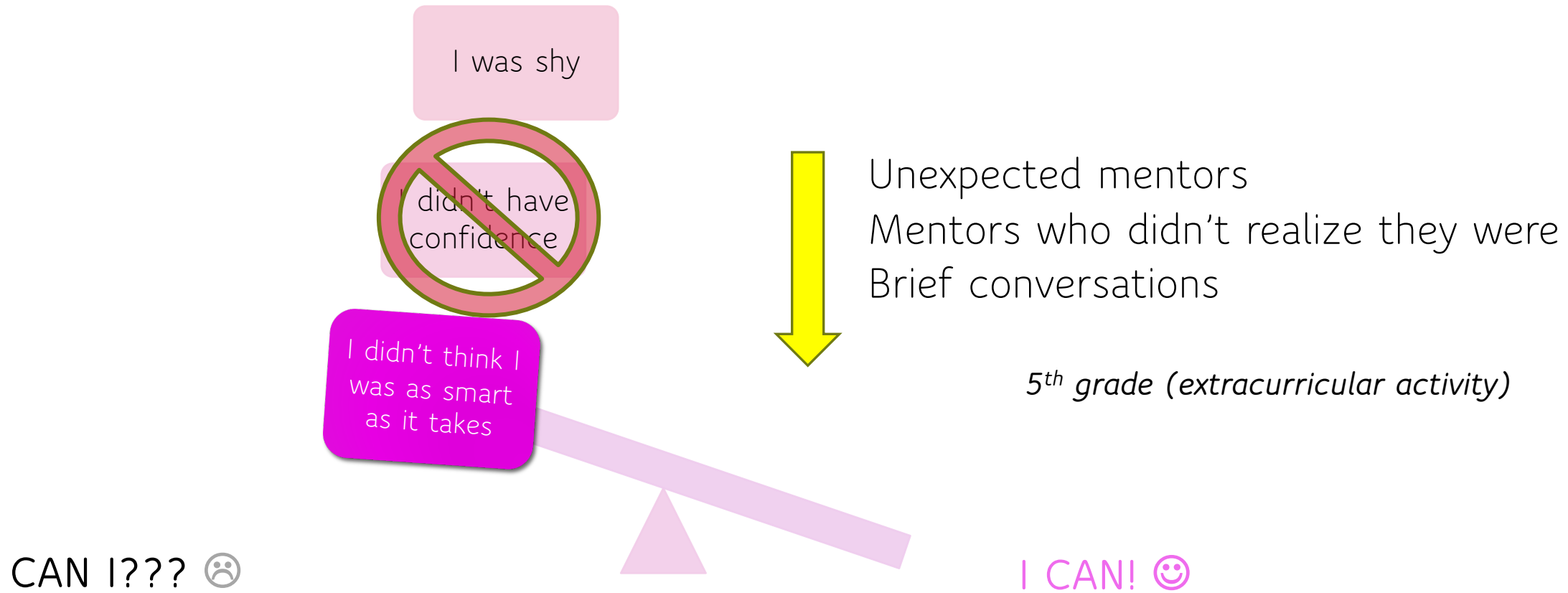
I CAN! 😊



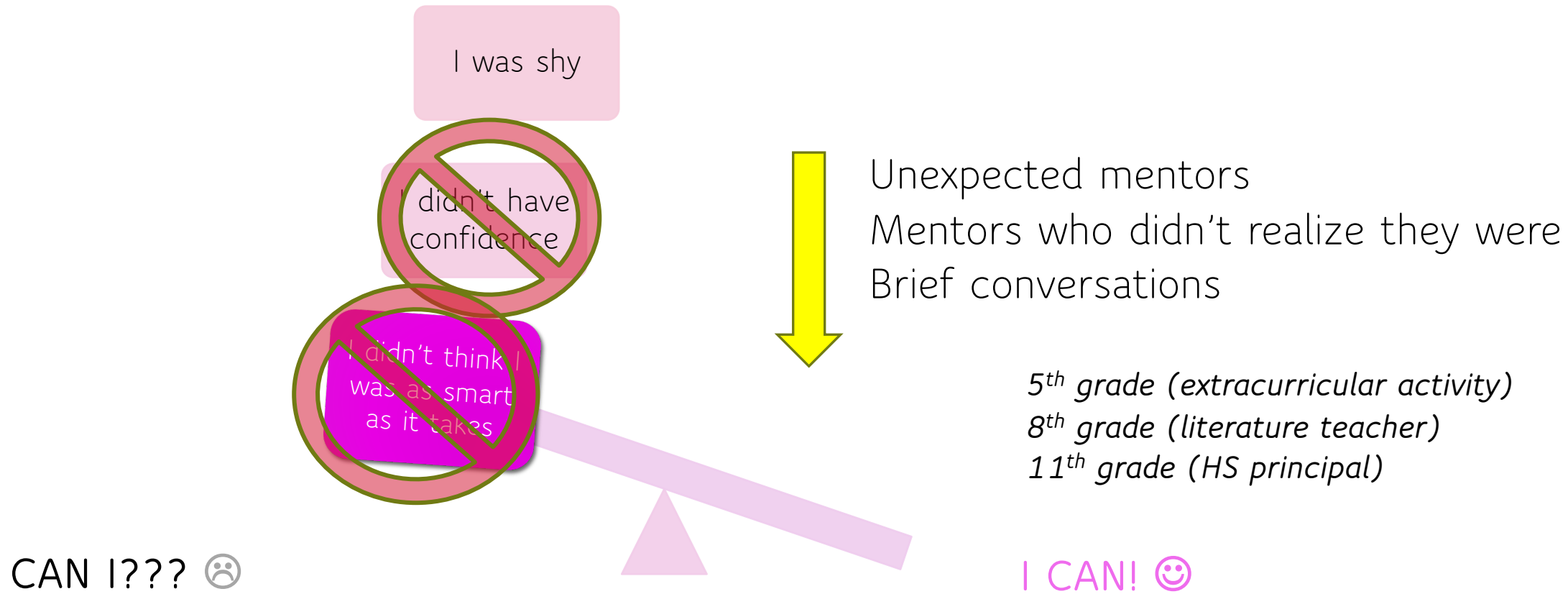
Mentors make a difference



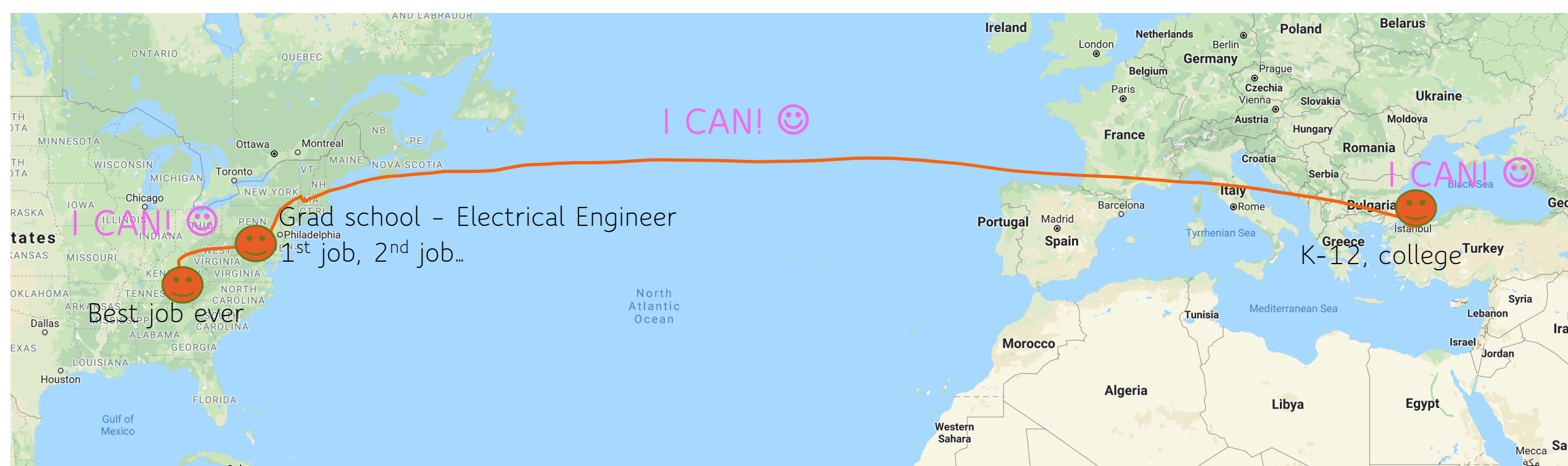
Mentors make a difference



Mentors make a difference



My journey (of "I CAN"s)



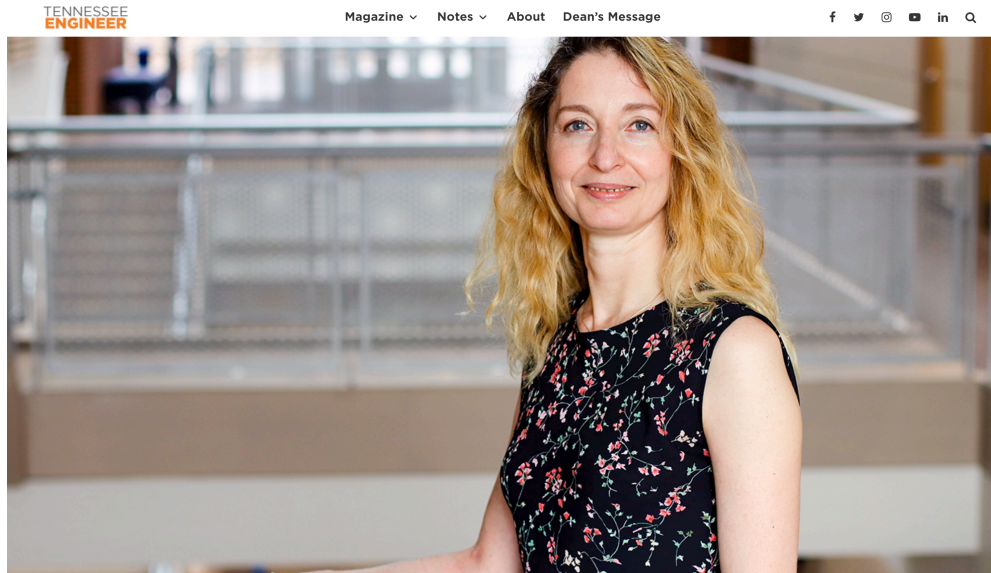
What I do as an engineer

- ✓ Think
- ✓ Innovate
- ✓ Design
- ✓ Lead
- ✓ Manage \$\$s
- ✓ Educate
- ✓ Advocate
- ✓ Write
- ✓ Test
- ✓ Measure
- ✓ Program computers
- ✓ Work alone / work in a team
- ✓ Work in a lab / work from home / work on a computer



Engineers can wear many hats, it's all about where your passion is

What I do as an engineer – University of Tennessee



Keeping up with Kilic

Spring 2020

Associate Dean Ozlem Kilic has surely gotten to know UT in her first several months on the job. A full schedule keeps her in motion from her HQ in the TCE Office of Academic and Student Affairs, across campus, and back.



Kilic delivers an overview on climate change to [Chancellor's Honors](#) students at the [Howard Baker Center](#). She shared with them the dangers facing the world, but also more hopeful developments and how we can be a powerful force to impact change.

What I do as an engineer

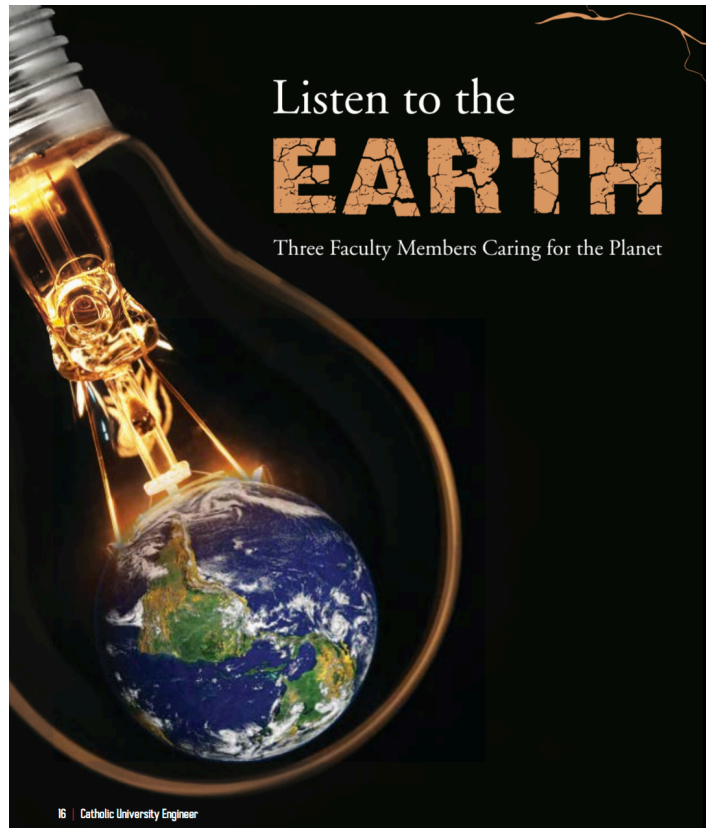


Kilic helped present awards during the [17th Annual Tennessee Louis Stokes Alliance for Minority Participation \(TLSAMP\) Research Conference](#) in February 2020. TLSAMP brings together underrepresented students for presentations, discussions, and poster competitions related to engineering, math, science, and agriculture. Kilic serves as a co-PI on this multi-institution program funded by NSF. One of her top priorities is to serve the underserved and underrepresented as she leads TCE's student and academic affairs. She has been submitting proposals and is eager to collaborate across the campus in seeking grants to address diversity and workforce development.



Kilic catches up with the progress of her research team that's working on developing detection devices for a variety of applications ranging from vital signature detection, drone based remote sensing systems, large scale electromagnetic modeling on hardware accelerated platforms, and 5G applications of antenna and RF systems.

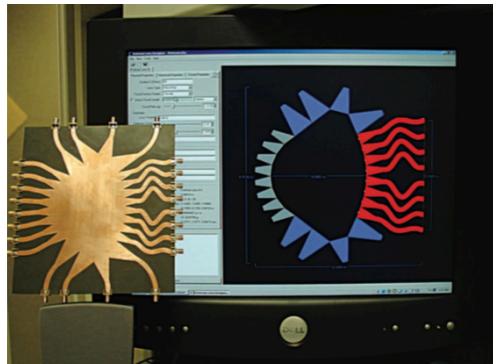
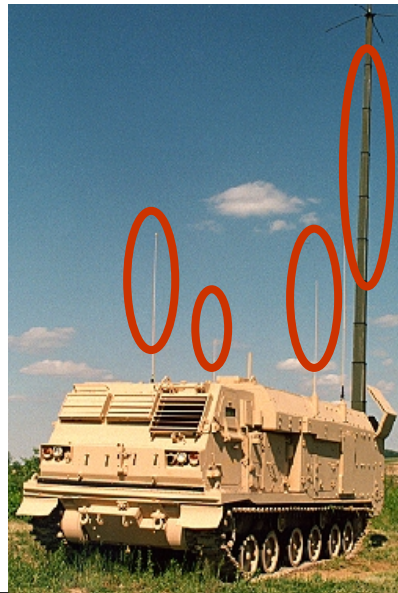
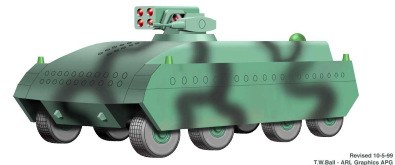
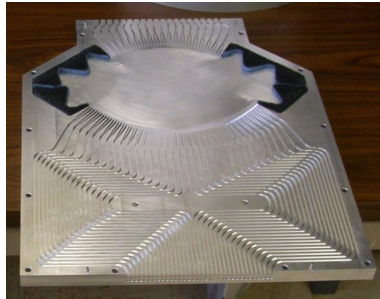
What I do as an engineer – University



Engineer: research, caring for earth

What I do as an engineer – government and industry jobs

Army Research Labs & Naval Surface Warfare Center



Lockheed Martin

INTEL-2258 IMPROVED ANTENNA MEASUREMENT TECHNIQUES

Kickoff Meeting
September 22, 1999

The computations for the VSAT tool development will be based on a single feed, offset-fed reflector antenna geometry as shown in x-z plane in Figure 1. The surface is assumed to be rotationally symmetric. Both elliptical and diamond surfaces require the user to input two lengths corresponding to the diameters in x and y directions; D_x and D_y . All units are normalized with respect to the wavelength, so there is no input required for the frequency in the user interface.

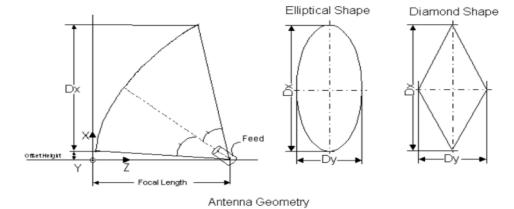


Figure 1 Antenna Geometry for the Elliptical and Diamond Shaped Surfaces
INTEL-2258, INTERIM REPORT FOR TASK 3

2. G/T Measurement Using the Sun and Moon

The antenna system G/T using a radio star as a hot source can be expressed as, [1]

$$\frac{G}{T} = \frac{8\pi k (Y-1)}{\lambda^2 S_{star} N_{atm} N_{star}} \quad 2.1$$

where k is Boltzman's constant, Y is the ratio of the power measured with the star in the antenna main beam to the power measured with the antenna pointed at the cold sky, λ is the measurement wavelength, S is the star flux density incident on earth, and N_{atm} and N_{star} are the atmospheric transmission and star shape correction factors, respectively.

In order to measure G/T of an antenna precisely, an accurate knowledge of the y-factor,



Leadership on Sustainability

Director, Engineering Center for Care of Earth



Vatican visit, Feb. 25, 2019
Pope Francis



Istanbul visit, March 5, 2019
Patriarch Bartholomew



James Baker, former Undersecretary of Commerce



International team of climate experts

Engineer – advocacy with a passion

Doors engineering opened for me

Teacher

Mentor

Leader

Researcher

Serve military, NASA, industry

Have fun and get paid for it!



Why am I here today

Perhaps I can offer that short, unexpected conversation

Be that unexpected mentor

Whether you are a girl or boy

Whether you want to be an engineer or not

My unexpected mentors and education led me to engineering

Engineering changed my life

- Little shy girl to someone who gives talks across the globe
- Girl in Istanbul to PhD in Washington, DC

You can too – if you want to!

One lesson
learned...

Everything
changes!

1. "There is nothing permanent except change." -*Heraclitus*
2. "To improve is to change; to be perfect is to change often." -*Winston Churchill*

Change is good.

Change makes us adapt and thrive

We can't avoid it

We must embrace it

Change is triggered by someone
thinking/acting differently than others

That *IS* a GOOD thing!

DON'T BE AFRAID TO BE DIFFERENT

PAVE YOUR OWN PATH!

Some examples of great changes



This is the “magic” of electrical engineers and computer scientists

Magnetic ladle to satellite-based GPS



Model of a Han Dynasty (206 BC-220 AD)
south-indicating ladle

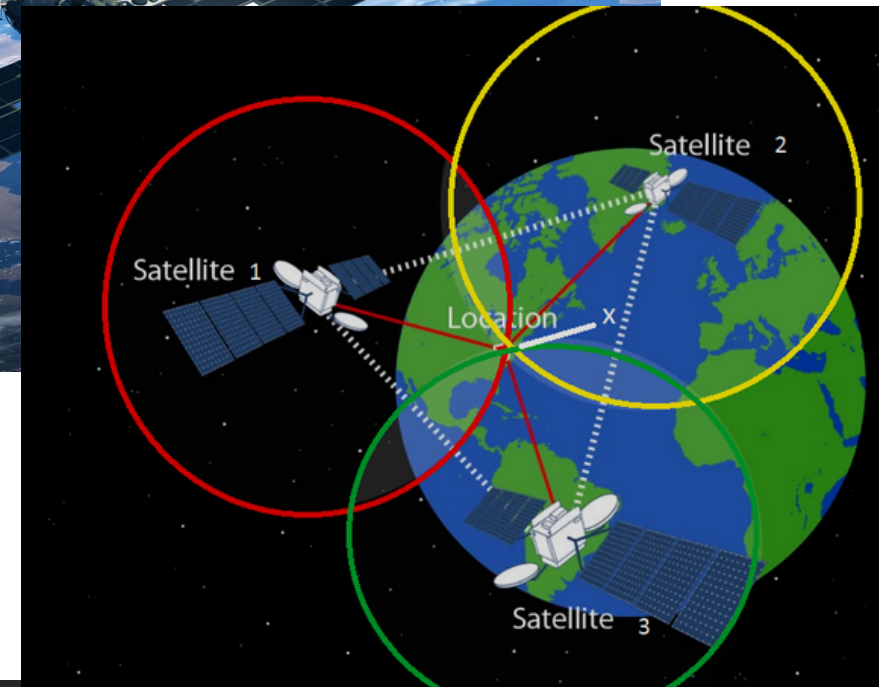
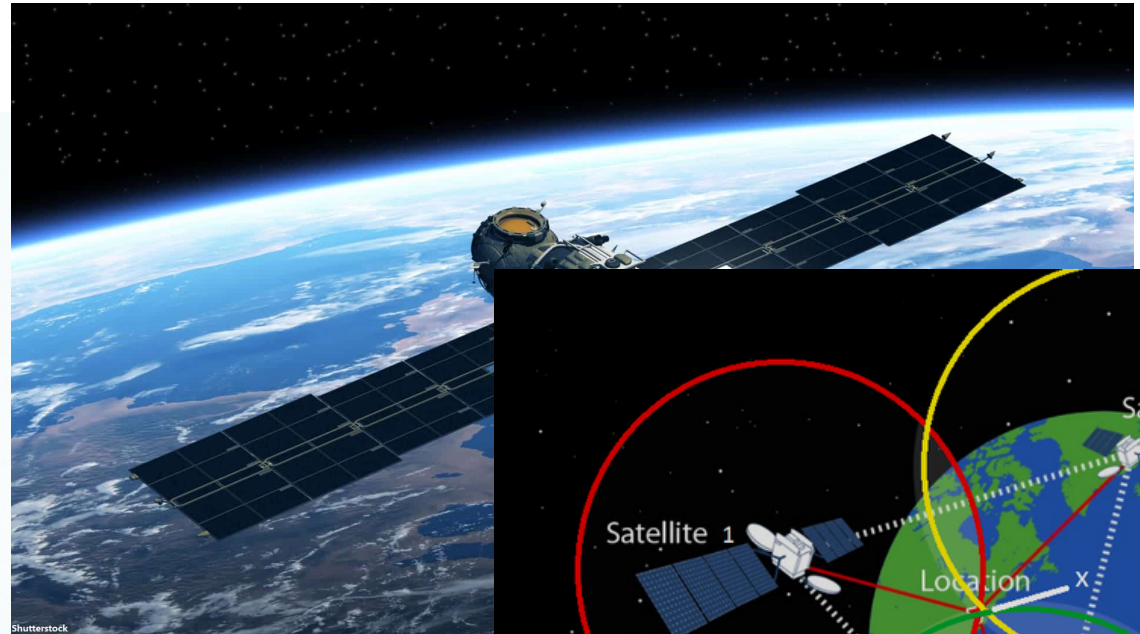


Earth observing satellite

Magnetic ladle to satellite based GPS



Model of a Han Dynasty (206 BC-220 AD)
south-indicating ladle



Magnetic ladle to satellite based GPS



Model of a Han Dynasty (206 BC-220 AD)
south-indicating ladle



This is the collective magic of electrical, mechanical, aerospace engineers, rocket scientists, computer scientists

Our earliest greatest invention.. **Fire**

Energy

Light and visibility

Weapon

Food

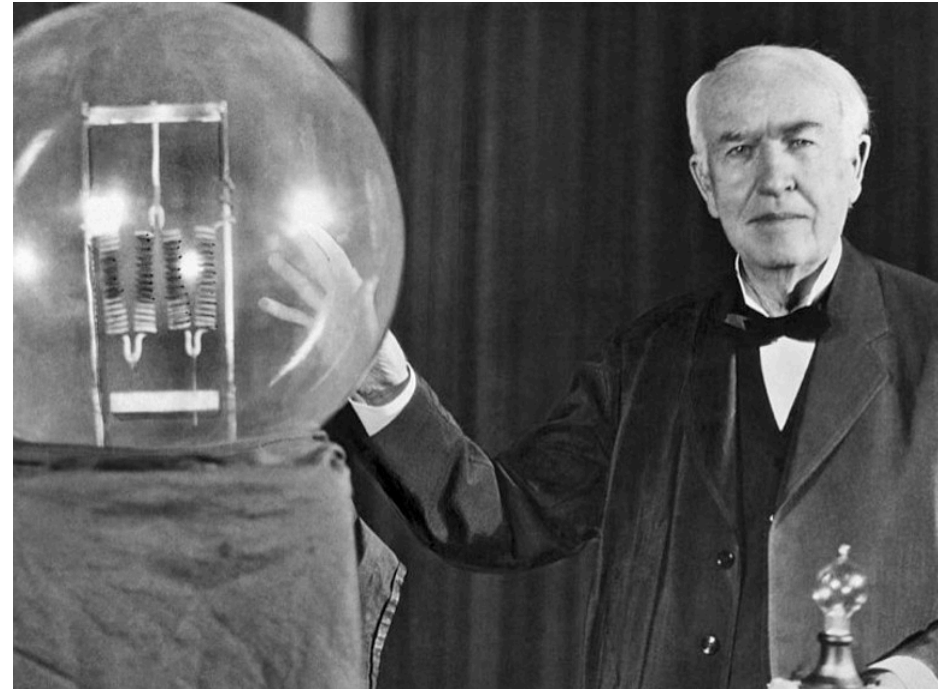
We didn't start the fire...

but we kept it going:

- where we wanted,
- when we wanted, and
- how we wanted



Candlelight to light bulbs



Candlelight to light bulbs



This is the "magic" of electrical engineers

Our (*one of the*) most important invention...

Ingenious wheel-and-axle concept

Required excellent carpentry

Invented in far east (3500 BC),
spread like wildfire to Eurasia



A depiction of an onager-drawn cart on the Sumerian battle standard of Ur.

Photo: Wikimedia Commons



A recreation of the earliest carriage, which was a two-wheeled basin that held two people and was pulled by one or two horses.

Photo: Flickr/Bigja



A horse drawn tram of the London Tramways Company on the route between Tooting and Blackfriars Bridge, circa 1890.

Photo: Wikimedia Commons



Tarantass, a type of Russian carriage, in Siberia, circa 1885-1886.

Photo: Wikimedia



Profile view of a Rauch and Lang Brougham Coach, circa 1890.

Photo: Wikimedia



Photograph of a Hansom cab from "Street Life in London" 1877 by John Thompson and Adolphe Smith. This agile vehicle seated two passengers with the driver outside at the back of the vehicle. It was fast and easy to maneuver.

Photo: Wikimedia

Evolution of wheel



From carriage to luxury electric vehicles



2 horsepower



500 horsepower

This is the “magic” of physicists, mechanical engineers, electrical engineers,

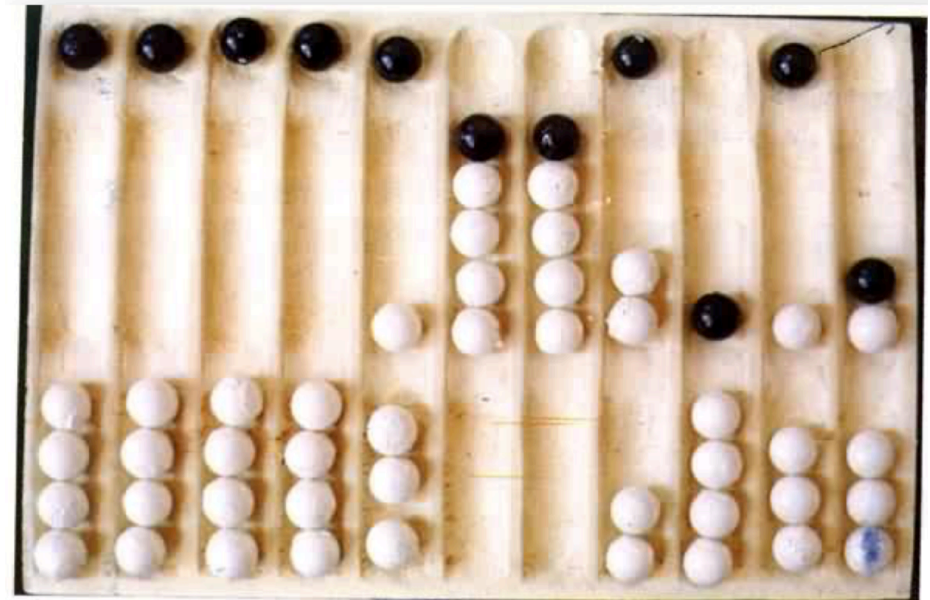
Counting to computing

Tally sticks



1, 2, ...

Abacus (invented in Babylon, 2400 BC)



5, 10, 15, ...

Computing is inherent to humans

We are naturals when it comes to math

Math is the universal language

Counting, more vs. less, tall vs short,...

We were always obsessed with computing

Fascination never stopped doing math

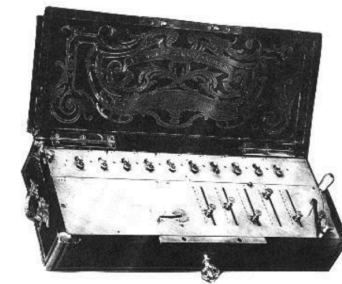
faster, better...



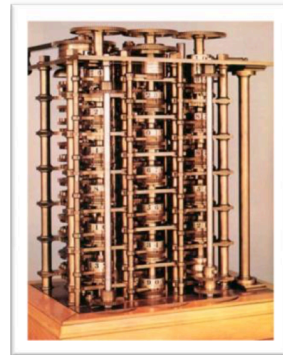
Napier's Bones
Multiply, divide
1600s



Slide Rule
Logarithm, trigonometry
1600s



Arithmometer
First commercial calculator
1800s



Analytical Engine

First mechanical computer
1800s (Babbage)

This is the "magic" of mathematicians



Computing is natural to girls!

First computer programmer:

Augusta Ada Byron

Suggested to Babbage to use the binary system (numerical system that only uses 0 and 1)

Decimal	Binary
0	0
1	1
2	10
3	11
4	100

Then and now in computing



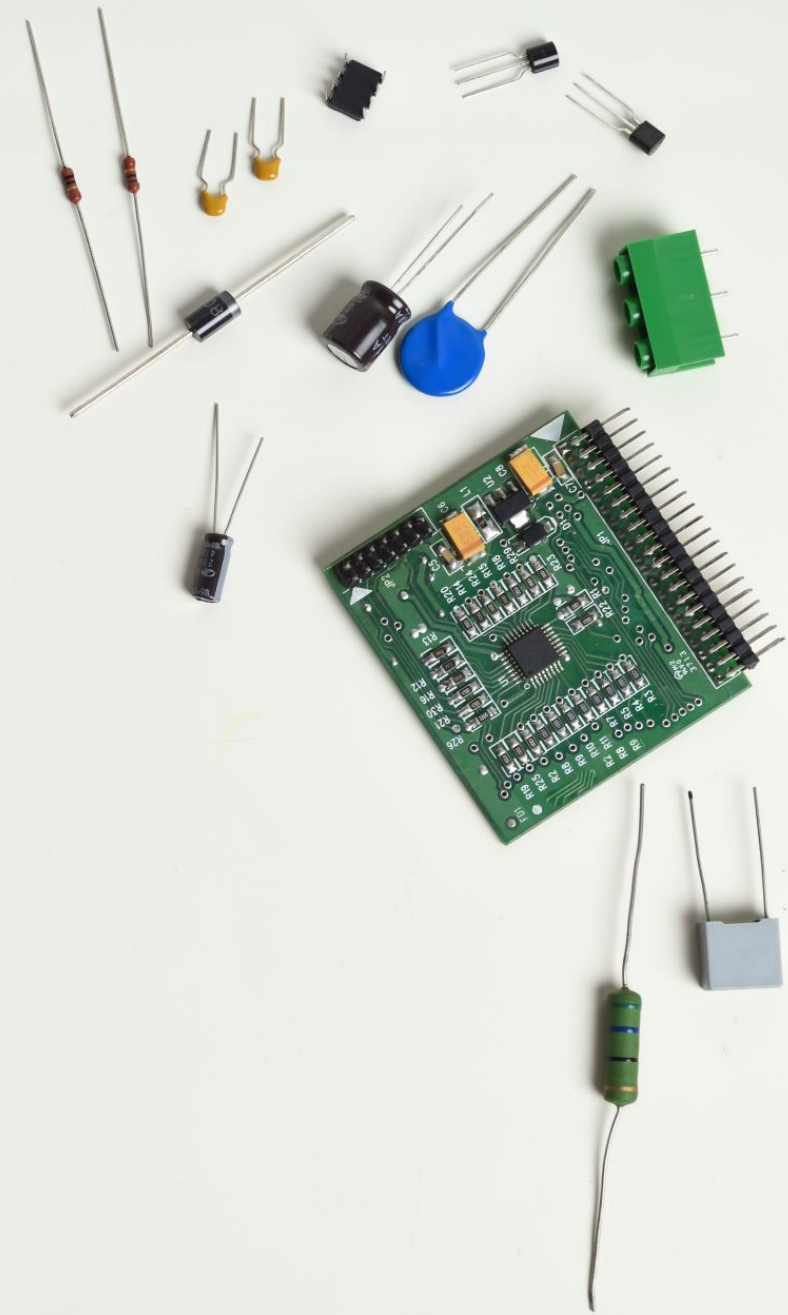
1st electromechanical computer



This is the "magic" of mathematicians, mechanical and electrical engineers, and computer scientist

It was engineers who...

- created the world's tallest, fastest roller coaster
- designed the airplane or the car that takes you and your family to the theme park
- came up with text messaging
- invented the smart phones or solar plants
- were the minds behind almost all of today's technologies



Engineers find ways



To turn dreams into reality



To turn challenges into opportunities

Many flavors to
choose from:

<https://tickle.utk.edu/departments/>
<https://tickle.utk.edu/engineering/>

Engineer's Day
Thursday, October 29, 2020
Join us!

Electrical

Mechanical

Civil

Aerospace

Biomedical

Material

Chemical

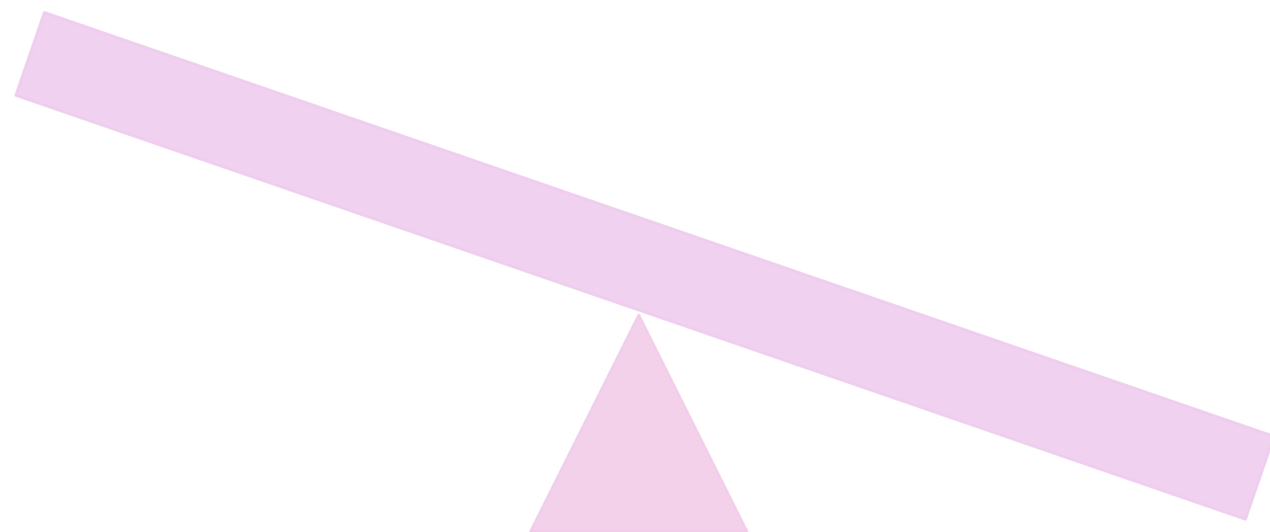
Computer

Environmental...

Question is....

Do you want to lead the change
Or
Watch it happen





I CAN! 😊

Can you?!
