

# Women Inventors Who Changed the World



Dr. Cynthia Furse

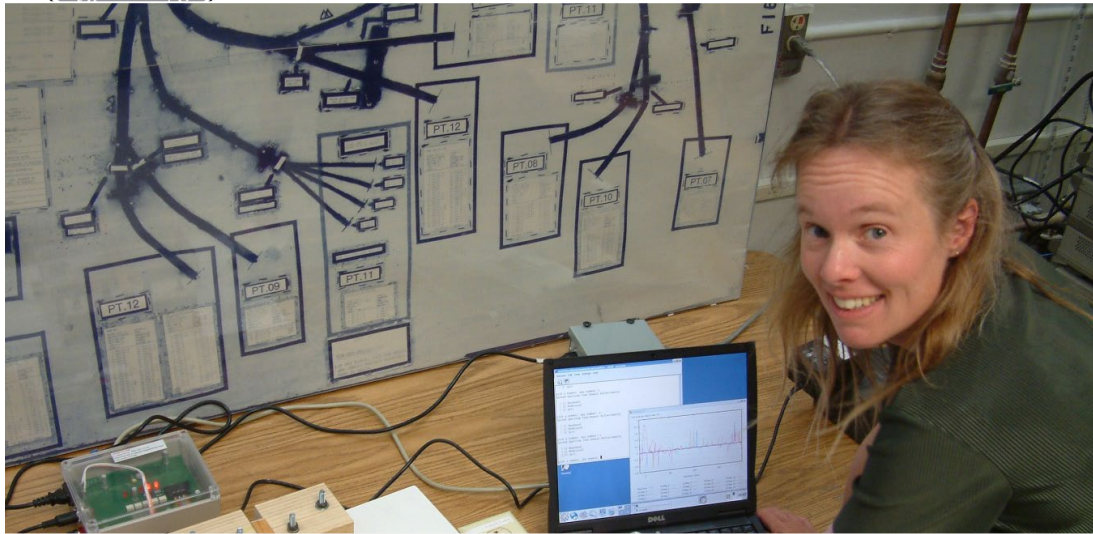
[cfurse@ece.utah.edu](mailto:cfurse@ece.utah.edu)

[https://en.wikipedia.org/wiki/List\\_of\\_women\\_innovators\\_and\\_inventors\\_by\\_country](https://en.wikipedia.org/wiki/List_of_women_innovators_and_inventors_by_country)





# Let Me Introduce Myself...



- *Professor*
- *Teacher*
- *Business Executive*
- *Wife, Mom & Grandma*
- *Dreamer ....*
- *Inventor*



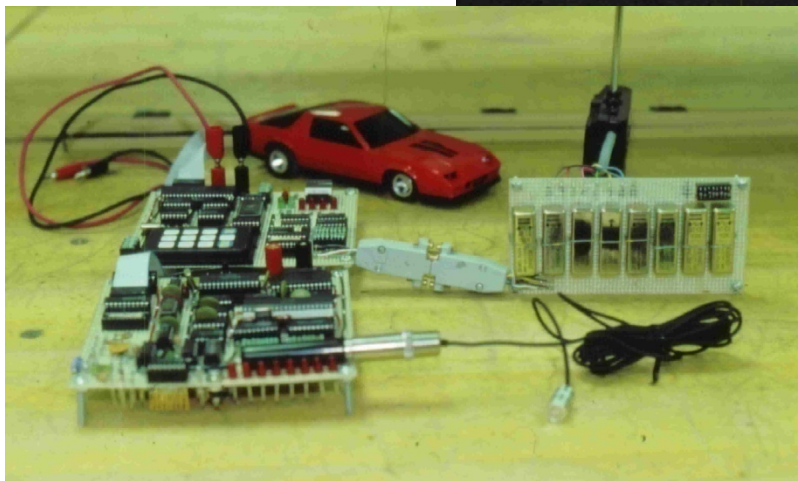
# I Became an Engineer to Change the World





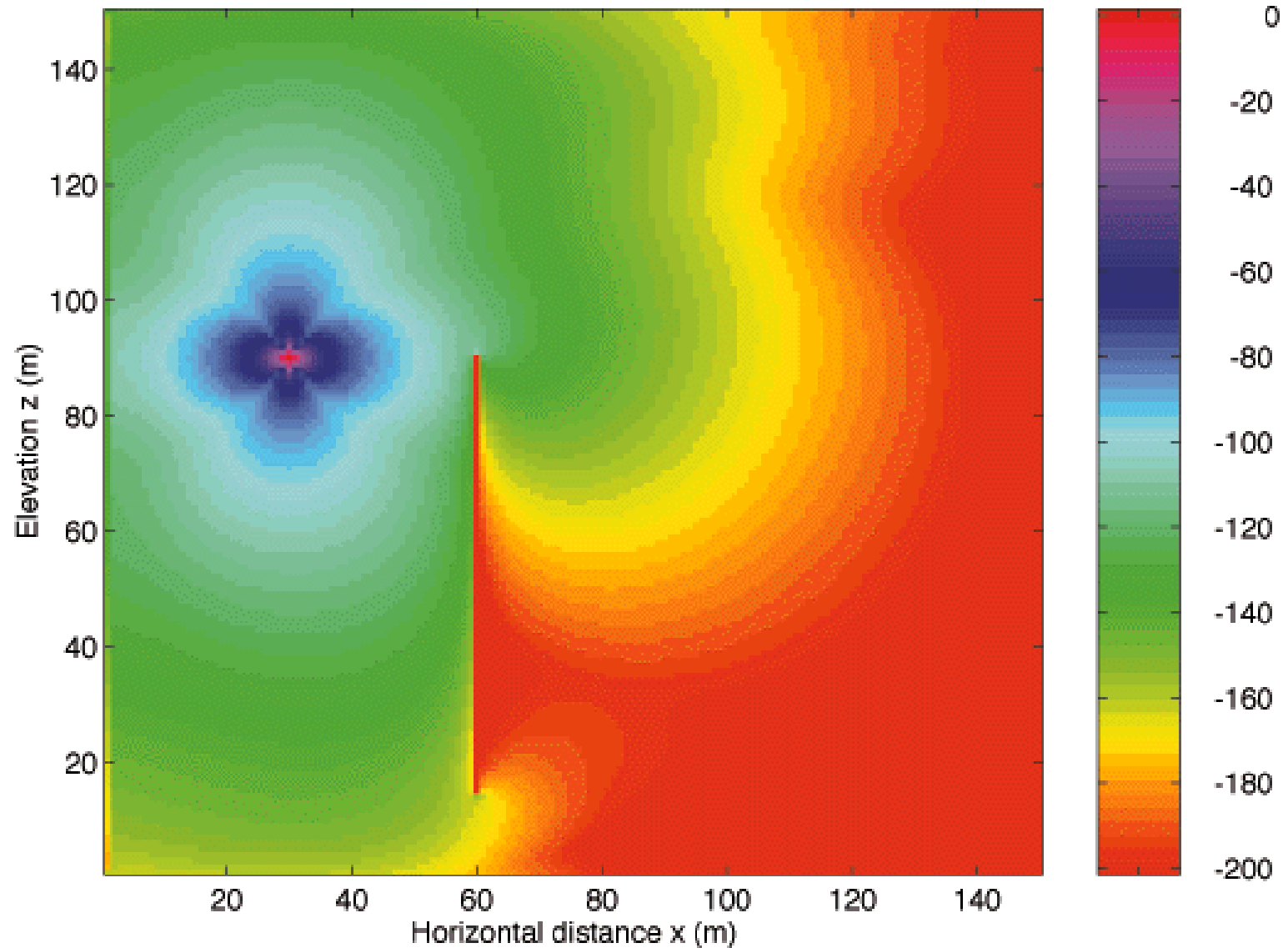


# BSEE -- Voice Controlled Wheelchair



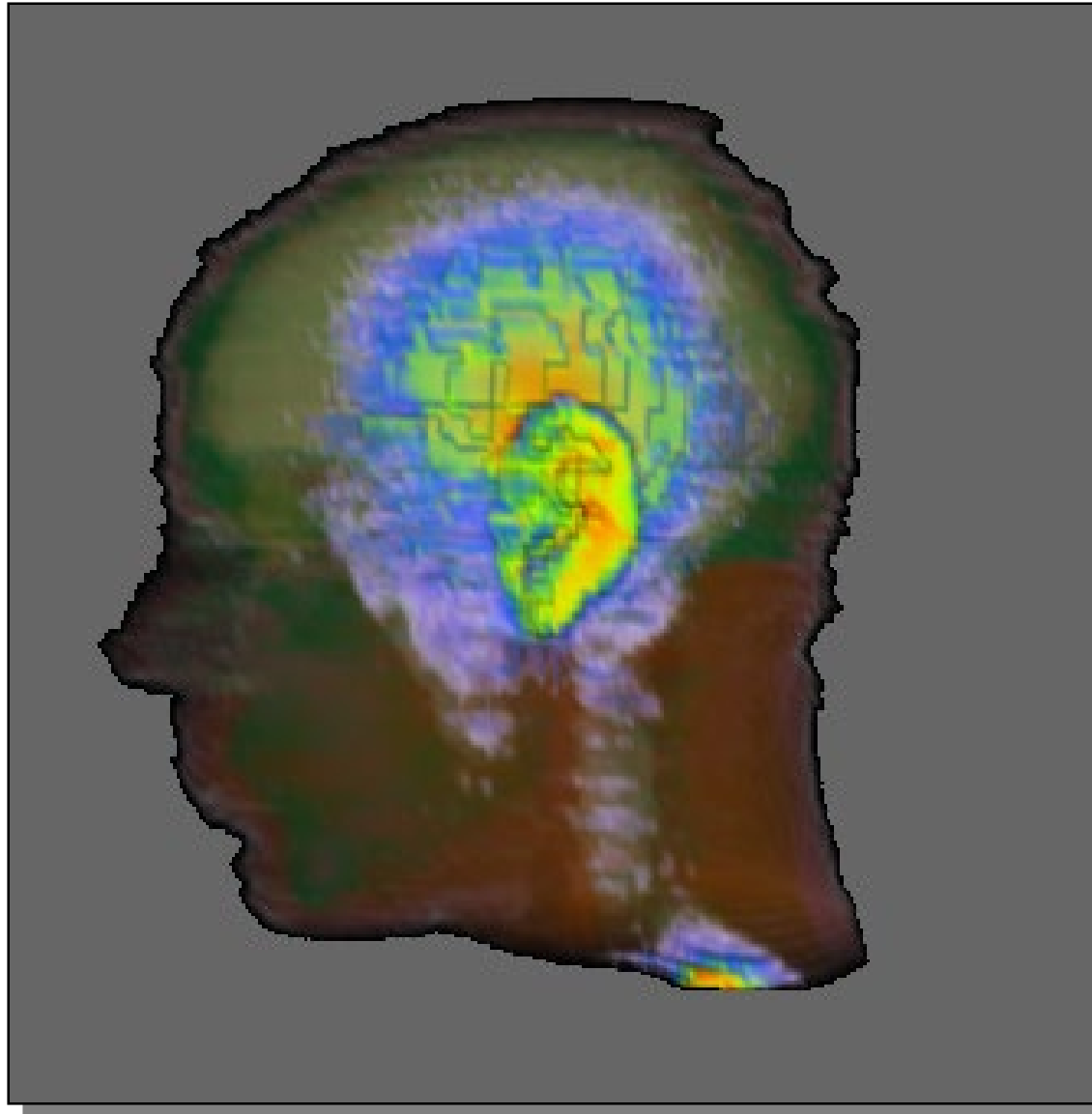


# MSEE – Oil Sands / Brain Cancer





# PhD – Cell Phone Safety



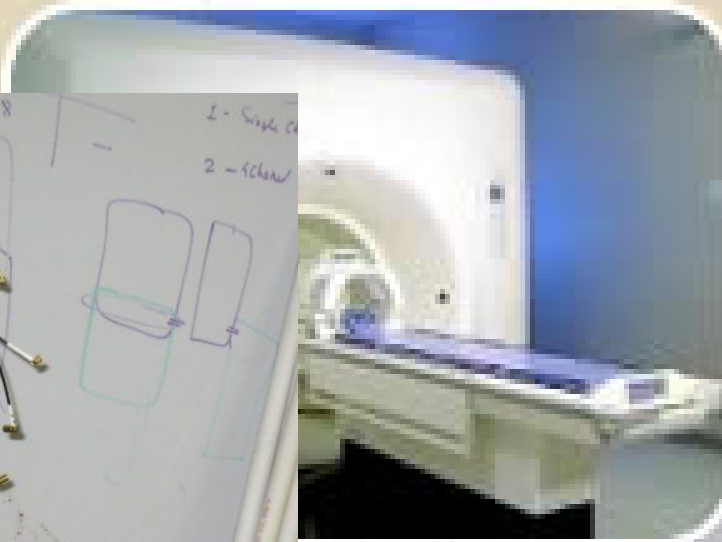


# Finding Faults in Flight





# I Became an Engineer to Change the World







# Let's take a look at some of the things *women engineers* have designed to improve the world

Paper, Indigo, Silk, "Software", Food Canning, Nitrates, Wringer Washer, Furnace, Windshield Wipers, Bullet-proof vests, Submarine Periscope, Automatic Telephone Switching Equipment .....



# Ling-Chi Si (2640 B.C.)



First Empress of China  
Developed the process  
to remove SILK from  
the cocoon and set up  
silk cultivation farms.

Computer and Engineering  
Horizons, Fall/Winter 1998

[https://64.media.tumblr.com/835e03163cae6f601e2eda6654e5ca92/tumblr\\_inline\\_myndlmn64r1riz1wu.jpg](https://64.media.tumblr.com/835e03163cae6f601e2eda6654e5ca92/tumblr_inline_myndlmn64r1riz1wu.jpg)



# Penthesilea (1187 B.C.)



Queen of the Amazons  
Invented the BATTLE AX!

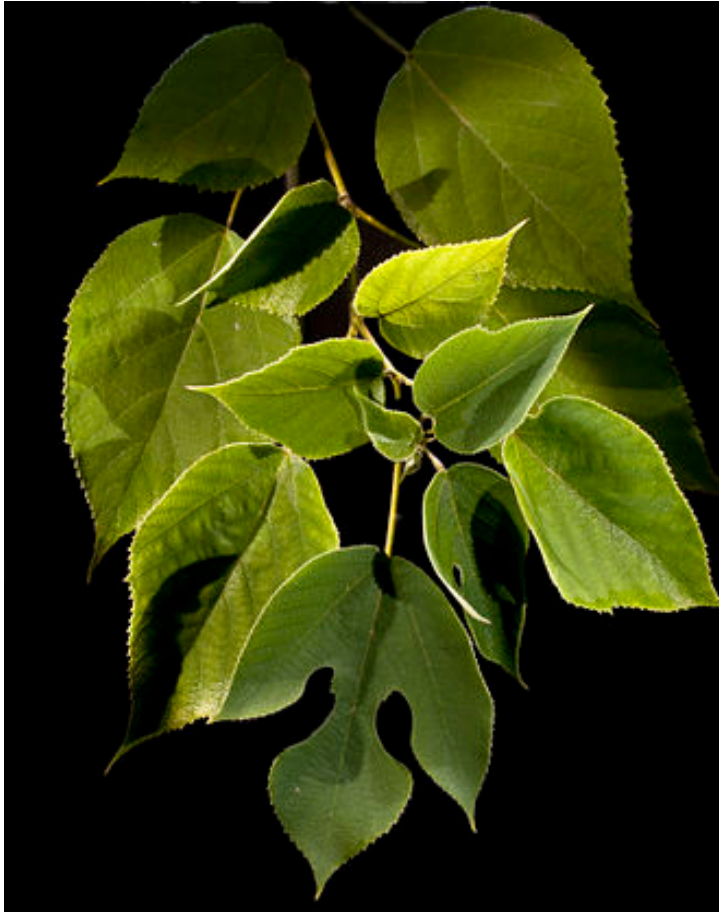


Computer and Engineering Horizons, Fall/Winter 1998  
<https://en.wikipedia.org/wiki/Penthesilea>





# Shi Dun (c. 105)



Empress of China  
First PAPER, made from  
bark of mulberry trees.

Computer and Engineering Horizons, Fall/Winter 1998





# Eliza Luca Pinckney



Developed techniques for  
**INDIGO CULTIVATION** in  
the early plantation days in  
the Carolinas.



Computer and Engineering Horizons, Fall/Winter 1998



# Ada Byron Loveless (1843)

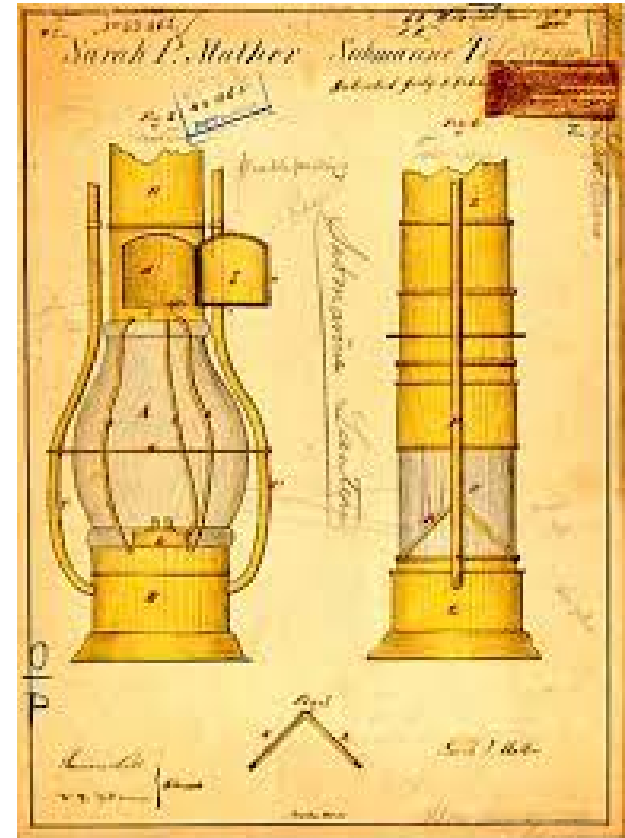


Wrote a technical paper  
envisioning SOFTWARE  
(and coined the term),  
ARTIFICIAL  
INTELLIGENCE, AND  
COMPUTER MUSIC

Computer and Engineering Horizons, Fall/Winter 1998



# Sarah Mather (1845)



SUBMARINE TELESCOPE AND LAMP

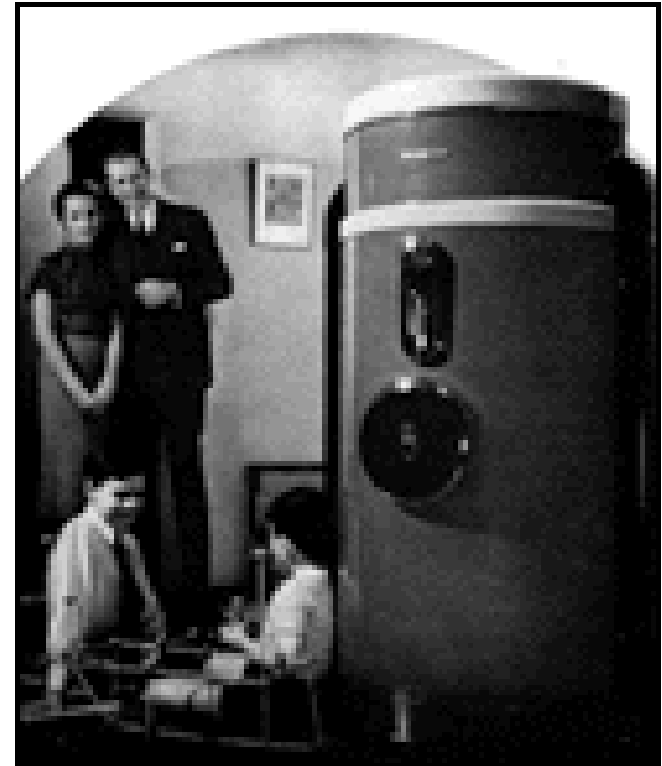
<http://www.geocities.com/Pentagon/Quarters/7433/two.jpg>



# Amanda Theodosia Jones (1880s)



OIL BURNING FURNACE  
VACUUM PACK CANNING

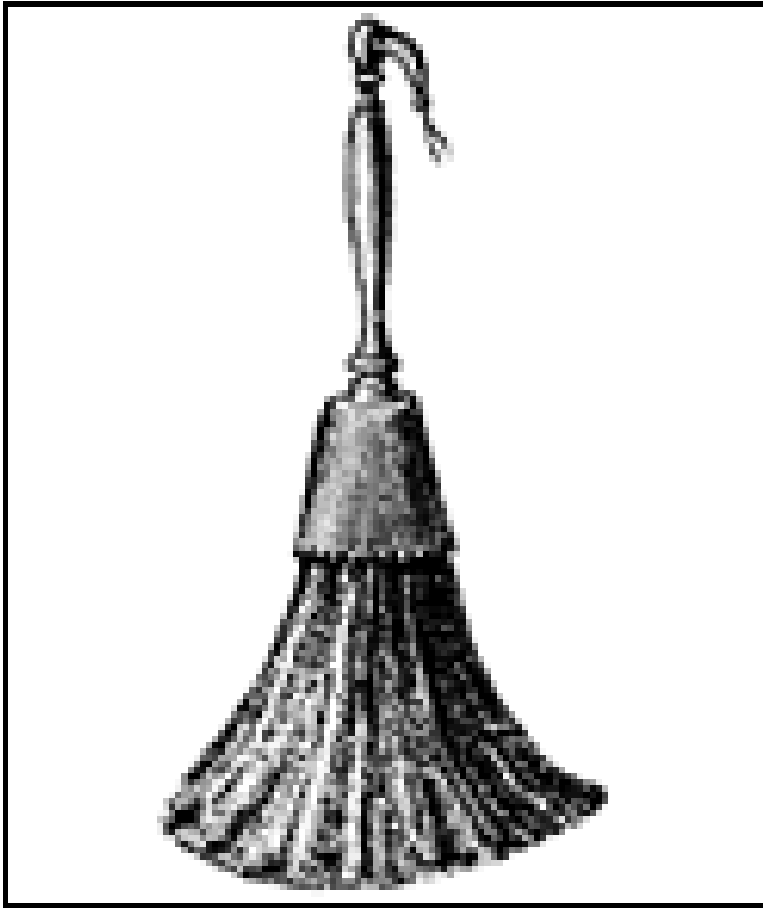


<http://www.pbs.org/wgbh/pages/amex/technology/forgotteninv.html>





# Susan Hibbard (1876)



Susan Hibbard's patent of the FEATHER DUSTER in 1876 was hard fought.

In fact, it came down to her squaring off against her own husband, George Hibbard, in patent court before she was justly awarded ownership of the patent.



# Madam Lefebvre (1859)

# NITRATES

Inventor of NITRATES for fertilizers and curing meat.



# Ellen Swallow Richards (1842-1911)



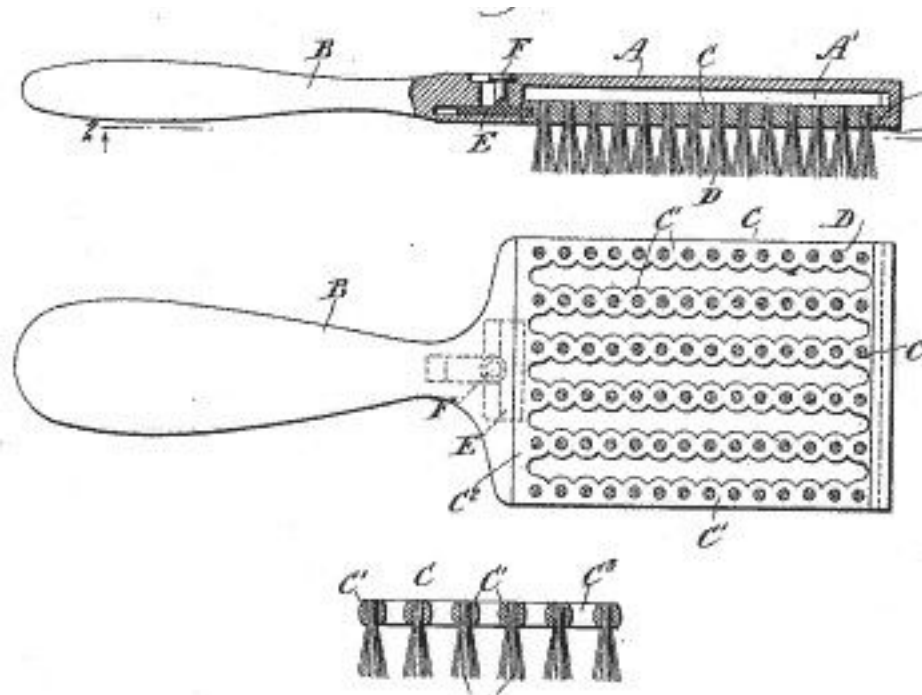
MIT's Chemistry Faculty 1900

**ENVIRONMENTAL  
ENGINEERING:**  
Her tests of sewage,  
streams, and water  
supplies of  
Massachusetts led to  
the formulation of the  
Normal Chlorine Map,  
the standard map for  
sanitary surveys.

# Lyda Newman



- Hairbrush with bristles
- Active in Women's Suffrage





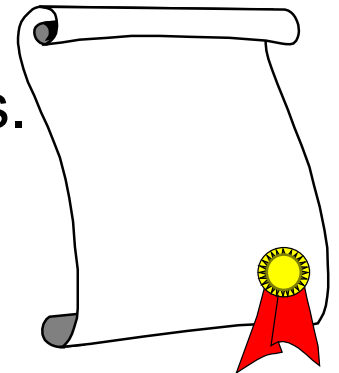


# First Women Engineers



Julia Morgan

- 1876 Elizabeth Bragg Received the FIRST ENGINEERING DEGREE awarded to an American woman in 1876 in civil engineering from the UC Berkeley. She never worked as an engineer.
- 1894 Julia Morgan (UC Berkeley) and Bertha Lamme (Ohio State U) both graduated as mechanical engineers.





# Kate Gleason (1865-1933)



- First woman to be president of a national bank
- First woman member of the American Society of Mechanical Engineers.
- Developed a machine to produce INEXPENSIVE BEVELED GEARS, and promoted large-scale development of LOW-COST HOUSING.



## Ellen Eglui (1888)



CLOTHES WRINGER for washing machines. In 1888 she sold the patent rights for \$18.00 because:

“If it was known that a Negro woman patented the invention white ladies would not buy the wringer”



<http://crux.astr.ua.edu/4000WS/EGLUI.html>

<http://www.oldewash.com/museum/lives.htm>



# Emily Roebling



- First female “field engineer” in charge of construction of BROOKLYN BRIDGE after her father and husband (the bridge designers) got the “bends” from building the caissons.
- She was the first person to cross the bridge on the cables, to demonstrate that they were safe to fearful workers.

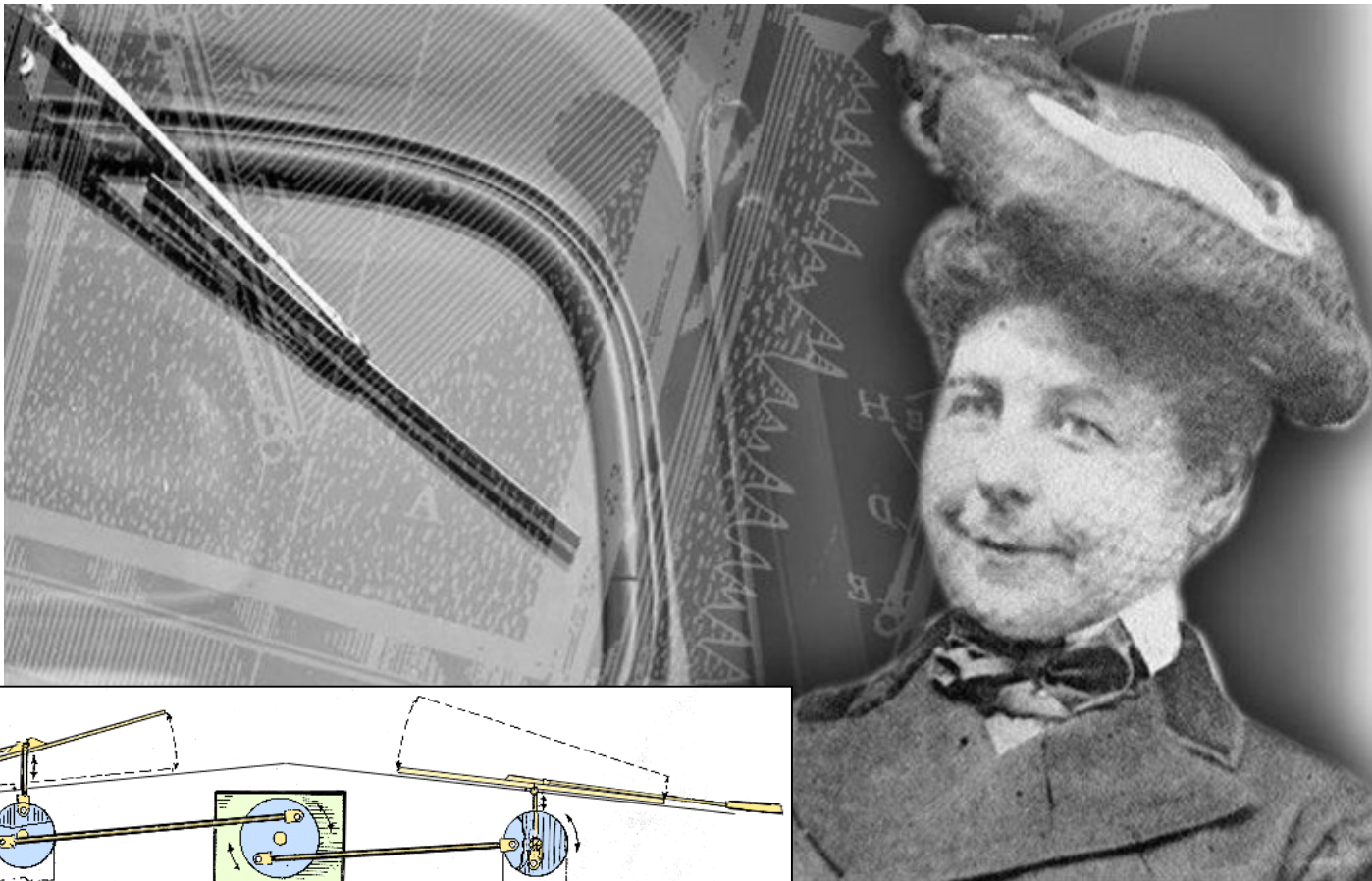


<http://www.ecn.purdue.edu/ESCAPE/special/women/Histore/roebling.html>





# Mary Anderson (1903)



After seeing that street car drivers had to lean out the window on rainy days to see where they were going, Mary Anderson invented **WINDSHIELD WIPERS**, operated from within the street car.



# Mary Engle Pennington



Preservation and safeguarding of milk, development of refrigerated railroad cars, chief of the U.S. Department of Agriculture Food Research Laboratory.

[http://www.upenn.edu/AR/Women\\_at\\_Penn/index.html](http://www.upenn.edu/AR/Women_at_Penn/index.html)



# Lillian Gilbreth (1914)



- Mother of modern management. Pioneered industrial management techniques still in use today along with her husband, Frank.
- First "superwomen" to combine a career with her home life.
- Prolific author ("Cheaper by the Dozen"), the recipient of many honorary degrees, and the mother of 12.

<http://www.sdsc.edu/ScienceWomen/gilbreth.html>



# Beulah Louise Henry



**BEULAH L. HENRY**

The “lady Edison” of the 1920s and 30s. Her inventions include the **BOBBINLESS LOCKSTITCH SEWING MACHINE**, a **DOLL WITH BENDABLE ARMS**, a vacuum **ICE CREAM FREEZER**, a **DOLL WITH A RADIO INSIDE**, and a **TYPEWRITER THAT MAKES MULTIPLE COPIES** without carbon paper.





# Hedy Lamarr 1940s Actress and War-time Inventor

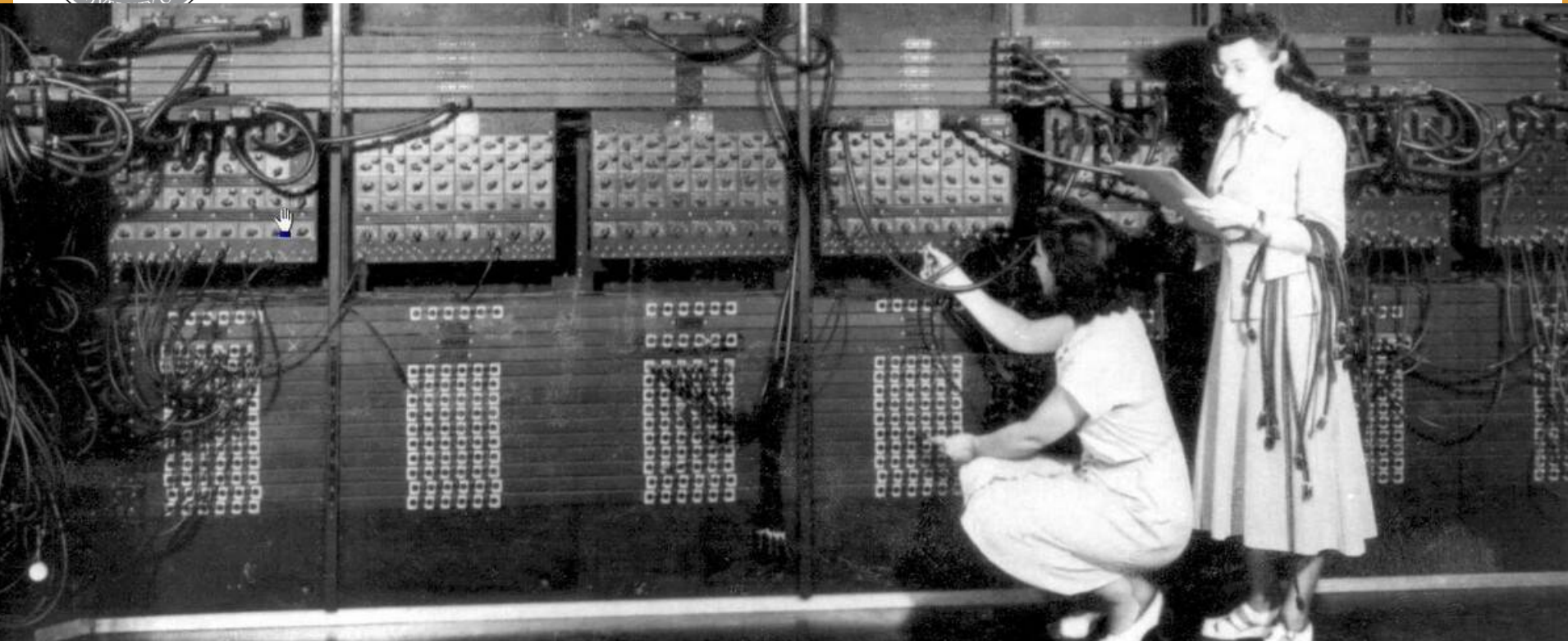


- ANTI-JAMMING DEVICES FOR RADAR (patent held by Sylvania still in use today)
- WIRELESS LOCAL AREA NETWORKING
- Redesign of aircraft wings for Howard Hughes

[http://www.newmedianews.com/022897/ts\\_hedy.html](http://www.newmedianews.com/022897/ts_hedy.html)



# Adele Goldstine (1946)



Manual for the ENIAC computer, right down to the transistors

<http://ftp.arl.mil/ftp/historic-computers/small/eniac2.gif>



# Evelyn Boyd Granville (1949)



- Ph.D. Mathematics from Yale 1949
- First African-American Woman to earn a math Ph.D.
- Developed computer programs to calculate trajectory of Mercury and Apollo space projects.

<http://www.lib.lsu.edu/lib/chem/display/granville.html>



# Grace Murray Hopper (1952)

## Computer Software, Computer Bugs!



- Development of COBOL.
- Digital computing: subroutines, formula translation, relative addressing, the linking loader, code optimization, and symbolic manipulation.

<http://www.sdsc.edu/Hopper/tribute.html>





# Stephanie Kwolek (1966)



Polymer Fibers --  
mooring ropes, fiber-optic  
cables, aircraft parts,  
canoes, and lightweight  
bullet-resistant vests.

The most famous product  
of her discovery was  
Kevlar, a polymer fiber five  
times stronger than the  
same weight of steel.

<http://www.invent.org/book/book-text/64.html>



# Valerie Thomas



- NASA's image-processing systems for "Landsat," the first satellite to send multi-spectral images to study the Earth's resources from outer space.
- "Illusion Transmitter"



# Erna Schneider Hoover (1971)



Computerized switching  
system for telephone call  
traffic

<http://web.mit.edu/invent/www/inventorsA-H/hoover.html>



# Rosa Smith Eigenmann



In science, as everywhere else in the domain of thought, woman should be judged by the same standard as her brother.

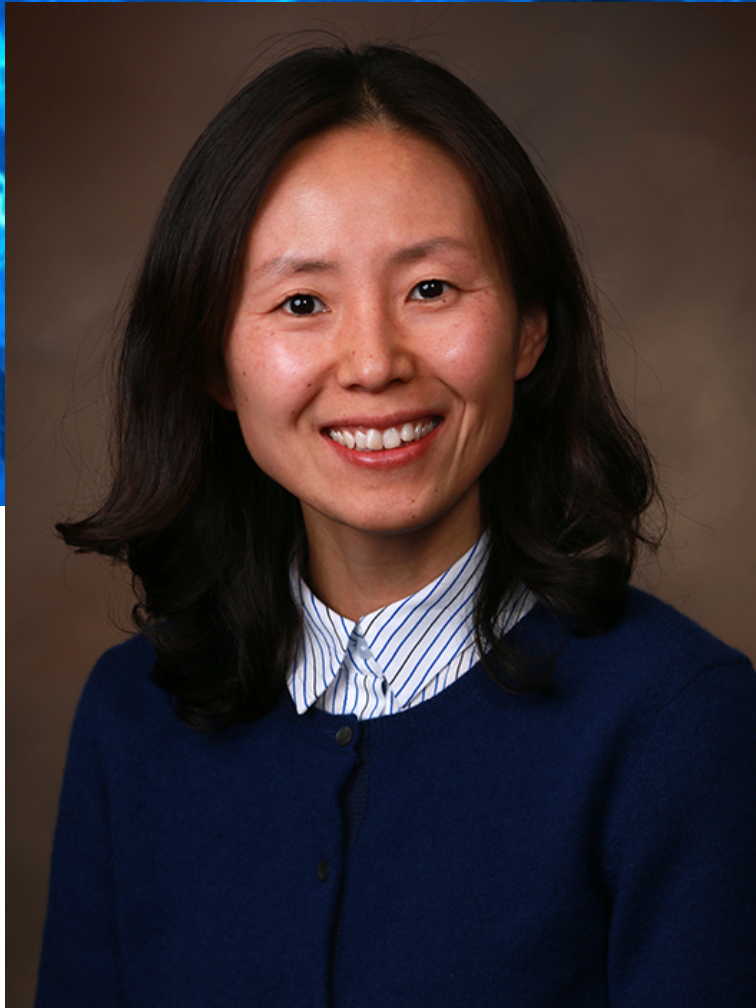
Her work must not simply be well done for a woman."





# Dr. Heayoung Yoon (ECE)

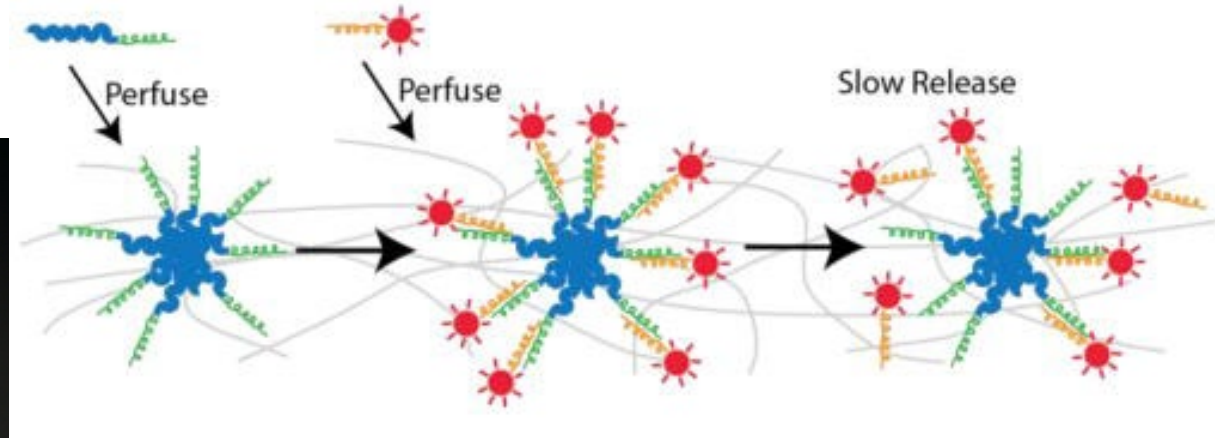
Perovskites for robust and reliable solar cells



Pictures from Yoon Lab and  
<https://en.wikipedia.org/wiki/Perovskite>



# Dr. Tara Deans (Biomedical Eng.)



Synthetic biology for  
regenerative medicine,  
drug delivery, cell-based  
therapeutics, and  
disease monitoring

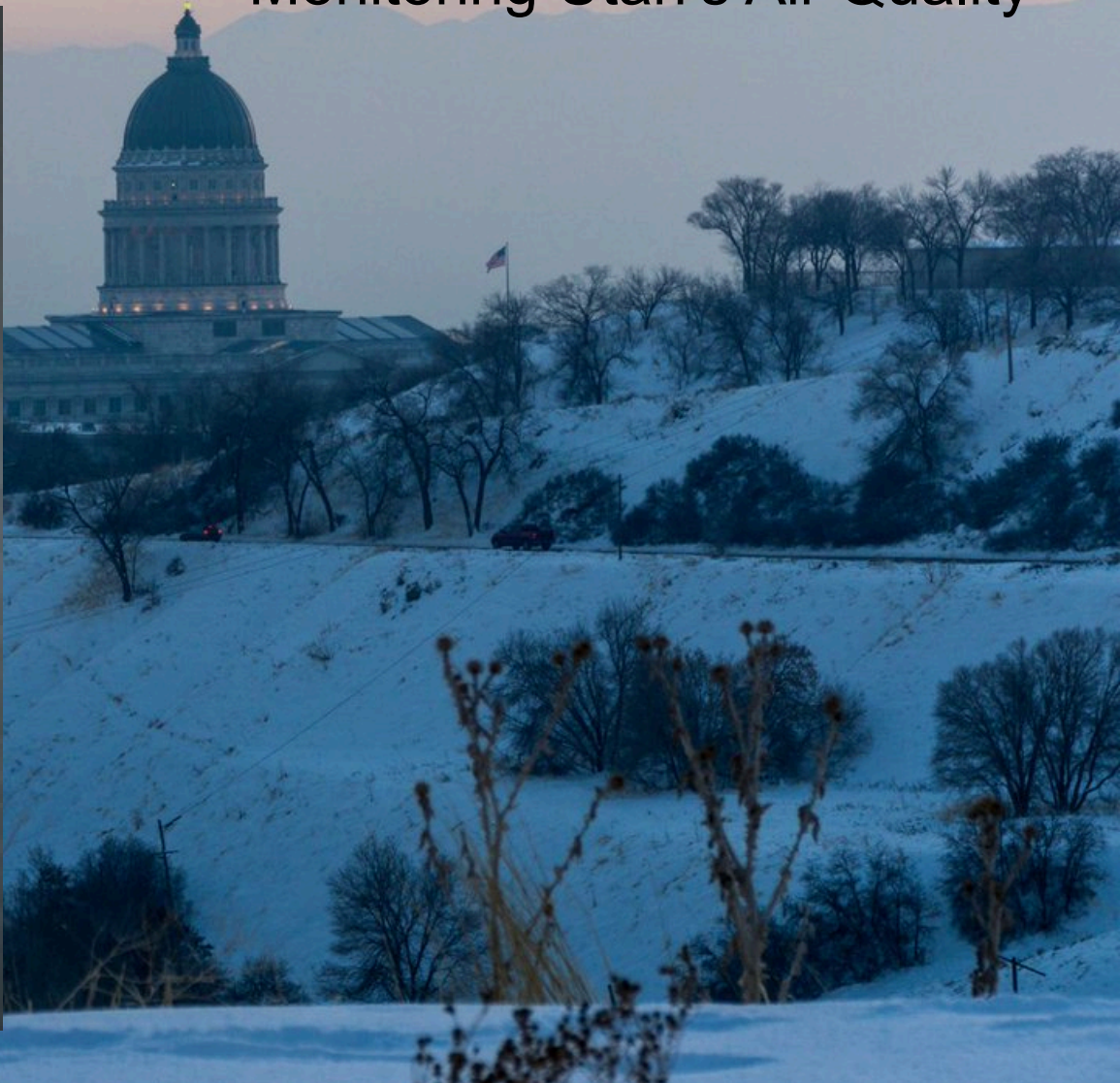
<https://pubmed.ncbi.nlm.nih.gov/29552703>





# Dr. Kerry Kelly (Chemical Eng.)

Monitoring Utah's Air Quality





# Dr. Xiaoyue Cathy Liu - CvEE

Safe, Sustainable, Intelligent  
Transportation Systems



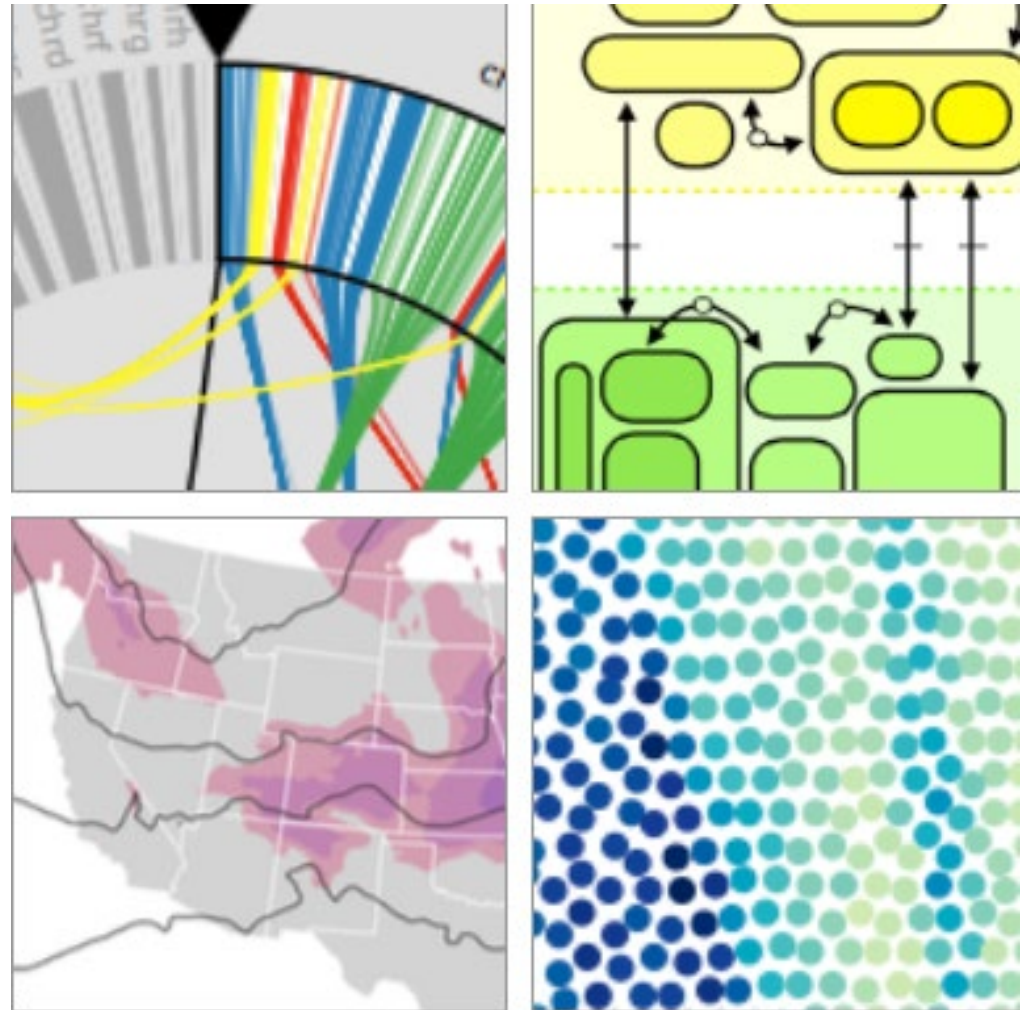
<https://venturebeat.com/2013/10/10/utah-based-wave-nabs-1-4m-to-bring-wireless-electric-buses-to-a-dozen-cities-exclusive/>



# Dr. Mariah Meyer (School of Computing)



## Visualizing Data



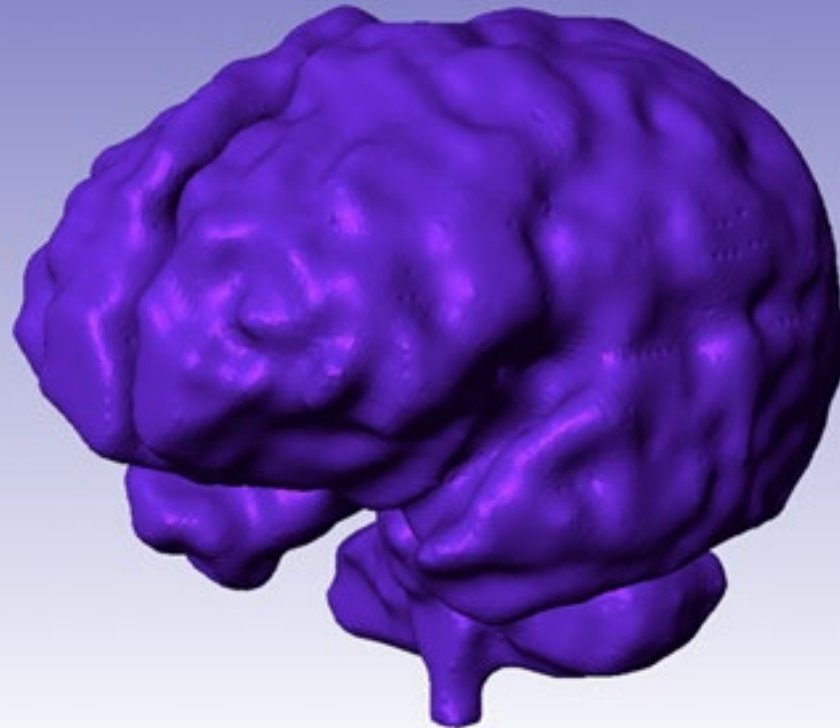
<https://www.cs.utah.edu/~miriah/>





# Dr. Brittany Coats (Mech. Eng.)

Utah Head Trauma Lab



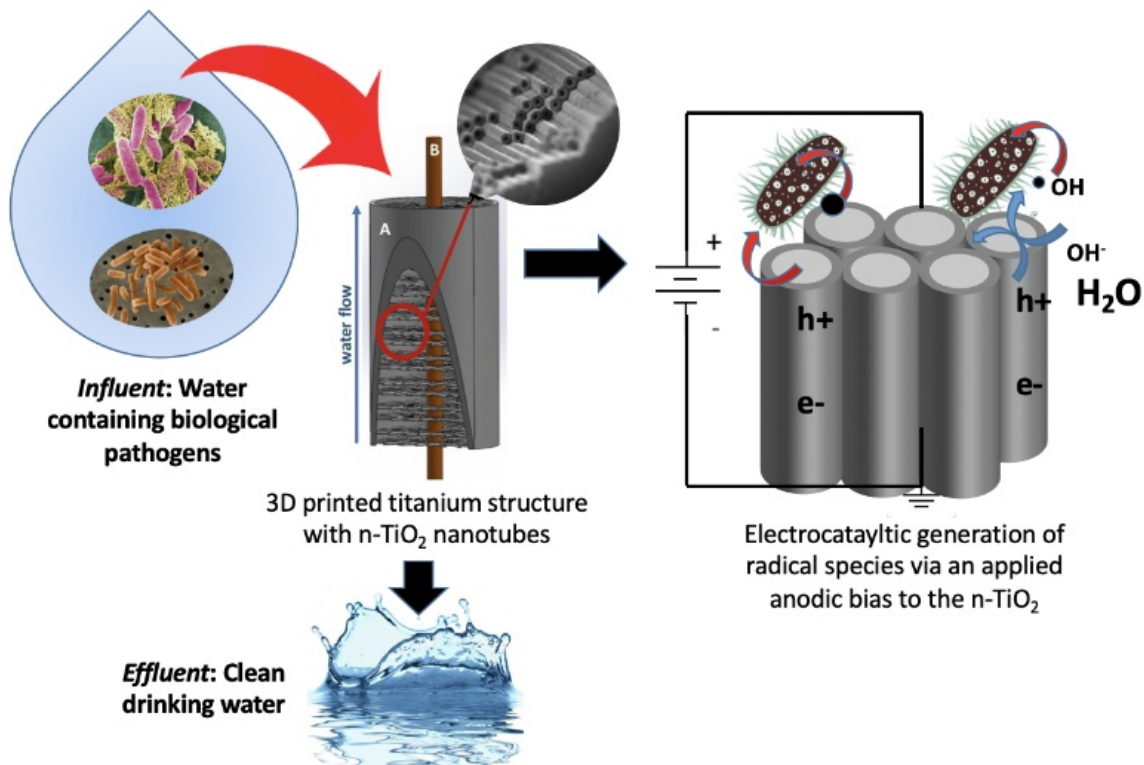
<https://pedtrauma.mech.utah.edu/>



# Dr. Krista Carlson (MSE)



## Safe Drinking Water



Nanostructured Ceramics for Electrocatalytic Water Purification



# Dr. Pania Newell (Mechanical Eng.)

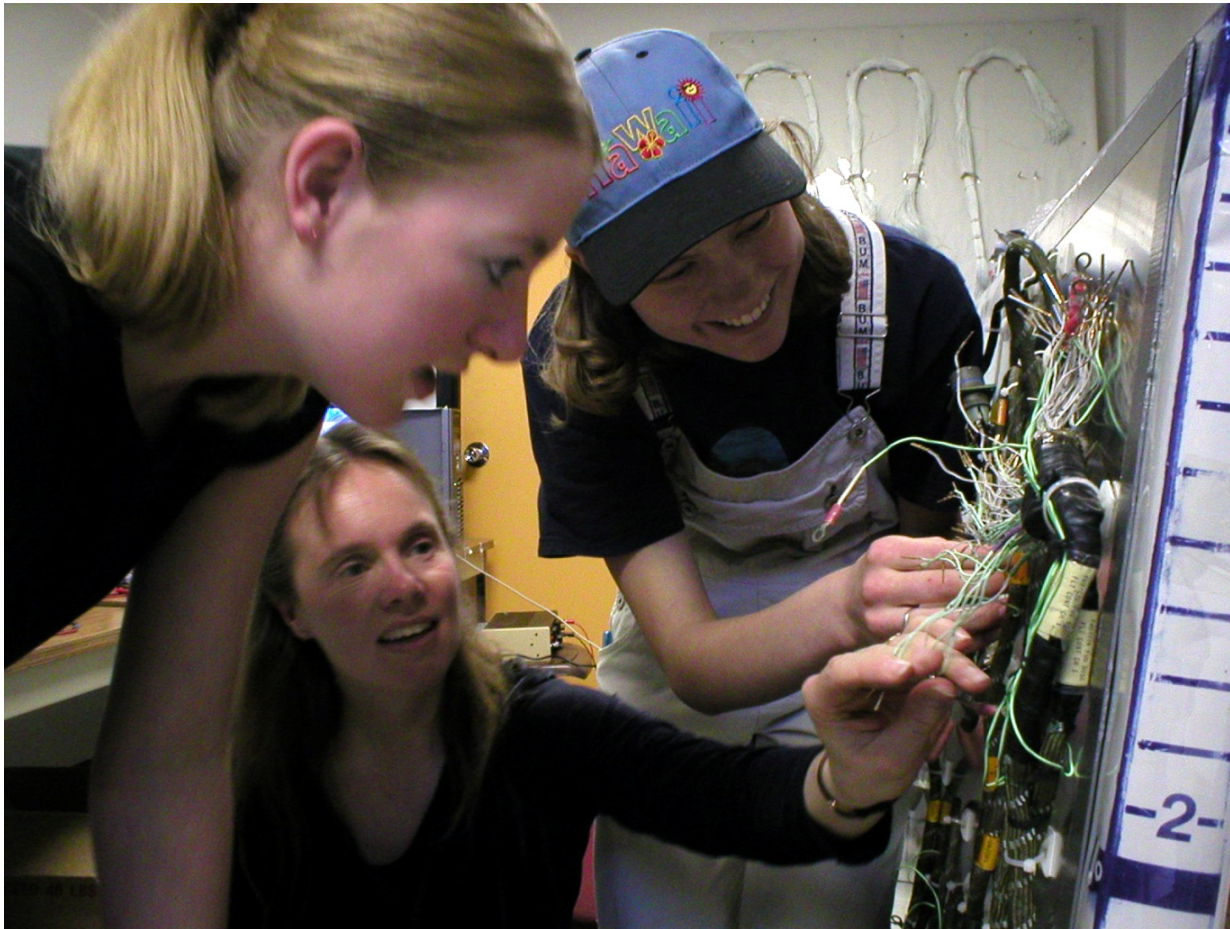
## This Academic Life







# Happy International Women's Week! -- She Invents!



\*Slightly modified by Dr. Yoon (3/30/2021)