

GIRLS in **ENGINEERING**

Make • Connect • Discover

Berkeley
Engineering



Inspiring the Next Generation of Engineers, 30 Girls at a Time

Lizzie Hager-Barnard (UCB)

Claire Tomlin (UCB)



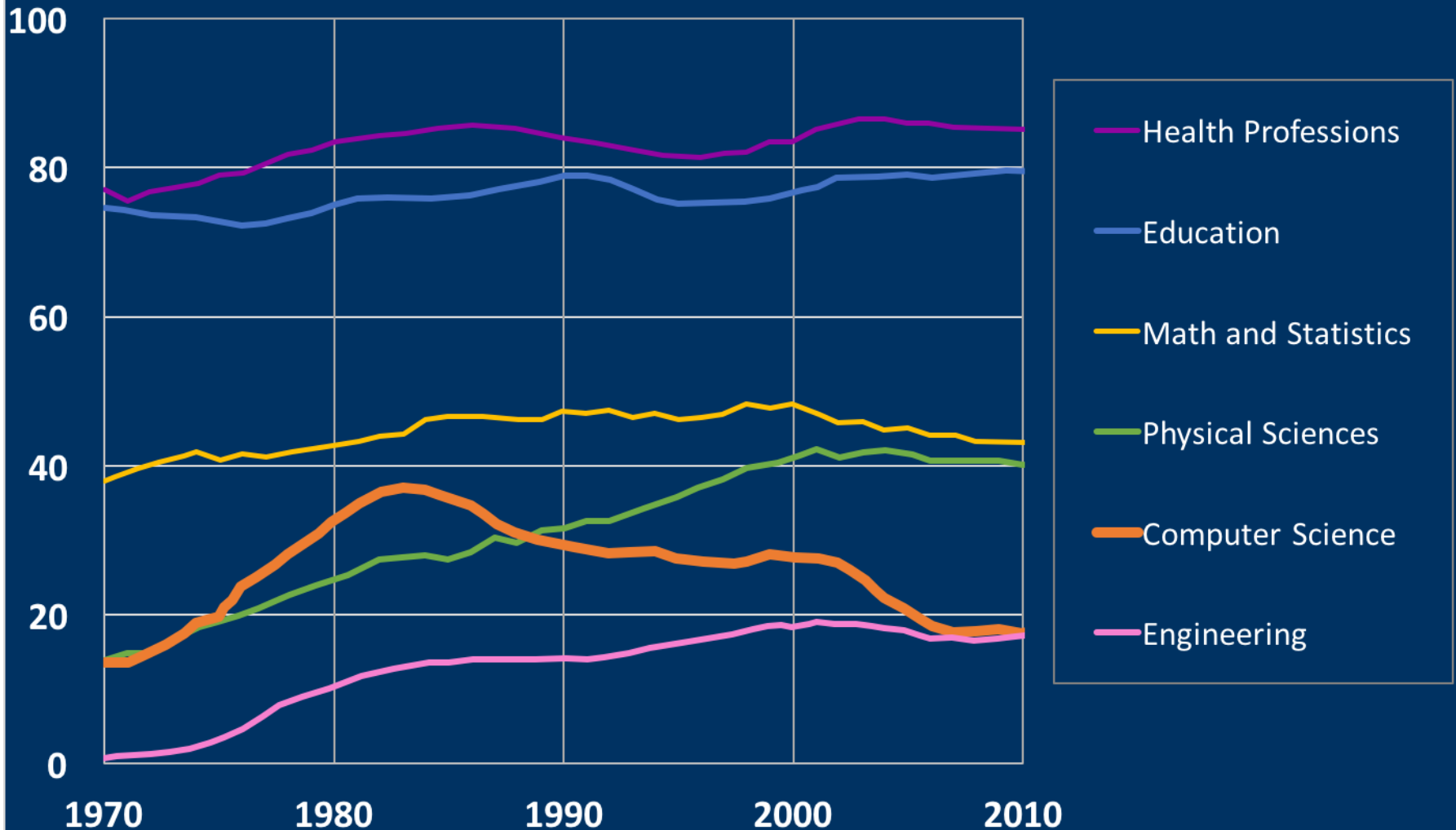


Program's Goals

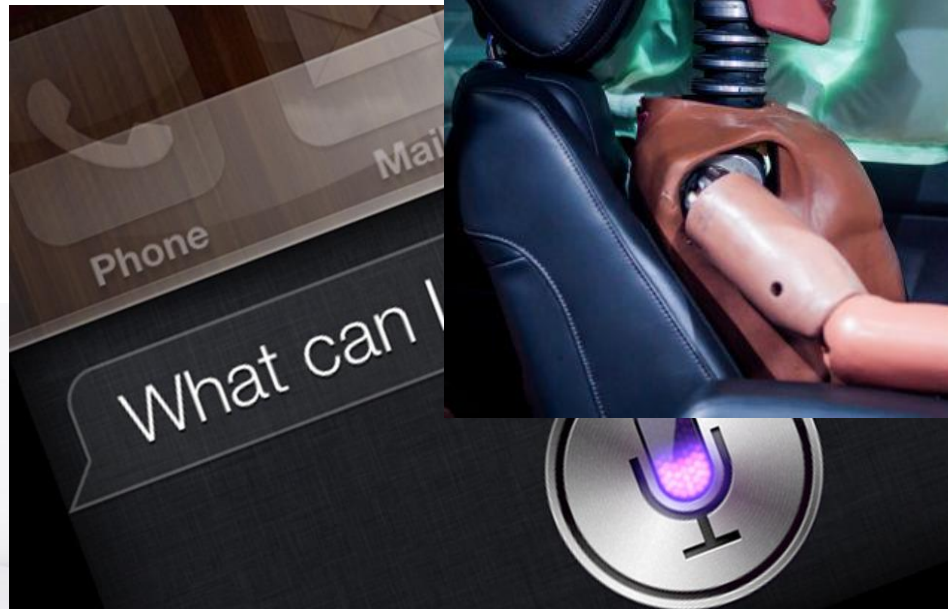
- **Expand** view of engineers
- **Excite** girls about STEM early on
- **Inspire** advanced STEM study
- **Strengthen** pipeline of women engineers!



Percentage of Bachelor's degrees conferred to women in the U.S.A.



Why Do We Care?



- (1) <http://arstechnica.com/cars/2016/06/a-second-airbag-supplier-snafu-hits-toyota-1-4-million-cars-recalled/>
- (2) <https://i.kinja-img.com/gawker-media/image/upload/dcqeohll3cy5ytjkdqvq.jpg>
- (3) http://www.laykor.com/media/catalog/product/cache/2/image/9df78eab33525d08d6e5fb8d27136e95/1/_1_793.jpg

Studying the Gender Gap

NEW FORMULAS FOR AMERICA'S WORKFORCE 2
GIRLS IN SCIENCE AND ENGINEERING

Why So Few?

Women in Science,
Technology,
Engineering,
and Mathematics



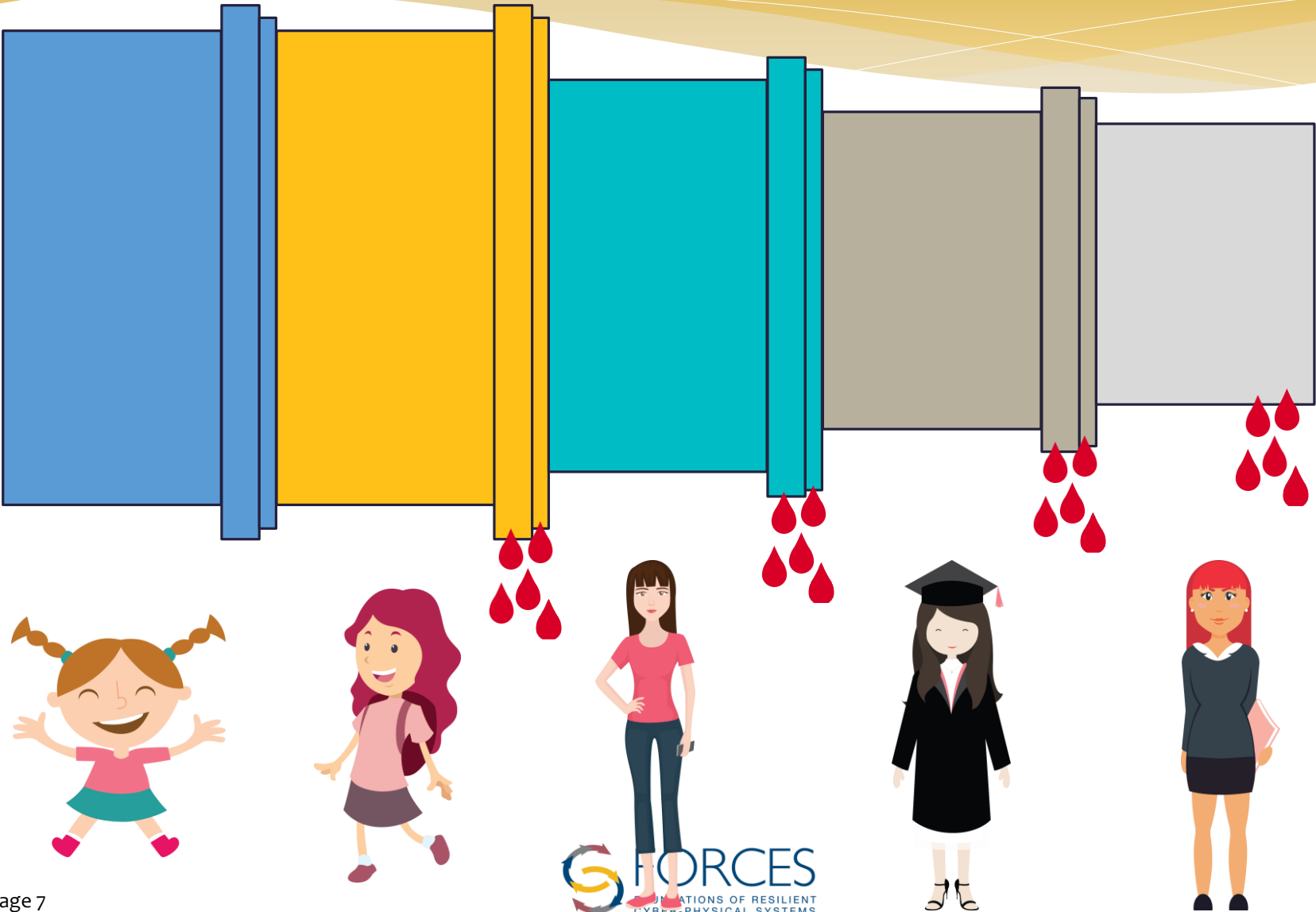
girl scouts

Generation STEM

What Girls Say about Science,
Technology, Engineering, and Math

A Report from the Girl Scout Research Institute

Why Middle School?



Why the Gender Gap?

Confidence **Stereotypes**

Unconscious bias



Lack of family-friendly policies

Cultural norms

Lack of encouragement

Misconceptions

DILBERT



DilbertCartoonist@gmail.com

How Do We Make a Difference?

GIRLS in ENGINEERING

Make • Connect • Discover

How Do We Make a Difference?

- * Make it interesting
- * Make it fun
- * Boost confidence
- * Provide role models





Girls in Engineering -- Session 4

Jacobs Day Computer Science Day

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
7:30 AM	Depart Mira Vista (Bus 1) Depart La Escuelita (Bus 2)	Depart Mira Vista (Bus 1) Depart La Escuelita (Bus 2)	Depart Mira Vista (Bus 1) Depart La Escuelita (Bus 2)	Depart Mira Vista (Bus 1) Depart La Escuelita (Bus 2)	Depart Mira Vista (Bus 1) Depart La Escuelita (Bus 2)
7:45 AM	Bus #2 stops at Anna Yates	Bus #2 stops at Anna Yates	Bus #2 stops at Anna Yates	Bus #2 stops at Anna Yates	Bus #2 stops at Anna Yates
8:00 – 8:15 AM	Campus drop-off	Campus drop-off	Campus drop-off	Campus drop-off	Campus drop-off
8:15 – 9:00 AM	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast
Engineering Leadership: Communication & Team Skills					
9:00 – 9:45 AM	Welcome & Introduction: What is Engineering?	Design Thinking	Presentation Skills	<i>Depart UCB by bus at 9am</i> <i>Arrive around 9:30am</i> Field trip <i>Wrap-up field trip</i>	Team Project Workshop
9:45 – 10:30 AM	Team Project Workshop	Team Project Workshop	Team Project Workshop		Snacks and break
10:30 – 11:00 AM	Snacks and break	Snacks and break	Snacks and break		Snacks and break
Design Innovation: Hands-on Learning					
11:00 AM – 12:15 PM	Exploring Engineering Fields: What do Engineers Do?	Bioengineering	Introduction to Computer Science	<i>Depart around 12:15pm</i> <i>Arrive at UCB around 1:00pm</i>	Breaking Point: Engineering Tools
12:15 – 12:25 PM	Transfer to lunch	Transfer to lunch	Transfer to lunch		Camp evaluations, Transfer to lunch
12:25 – 1:45 PM	Lunch	Lunch	Lunch	Late lunch	Lunch
1:45 – 2:00 PM	Transfer to afternoon session	Transfer to afternoon session	Transfer to afternoon session	Transfer to afternoon session	Prepare for Team Presentations
Tours & Laboratory Experiences					
2:00 – 3:45 PM	Lab Tour & Workshop: Robotics	Prototyping and Design Innovation	Computer Programming Projects	Lab Experiments: Materials Engineering	Team Presentations & GIE Celebration **Banatao Auditorium, Sutardja Dai**
3:45 – 4:15 PM	Wrap-up	Wrap-up	Wrap-up	Wrap-up	Wrap-up
4:15 – 4:30 PM	Buses Depart Campus pick-up	Buses Depart Campus pick-up	Buses Depart Campus pick-up	Buses Depart Campus pick-up	Buses Depart Campus pick-up

30 girls

6 volunteers

4 assistants

+

5 days

=

GIE



30 girls
6 volunteers

4 assistants

+

5 days

+

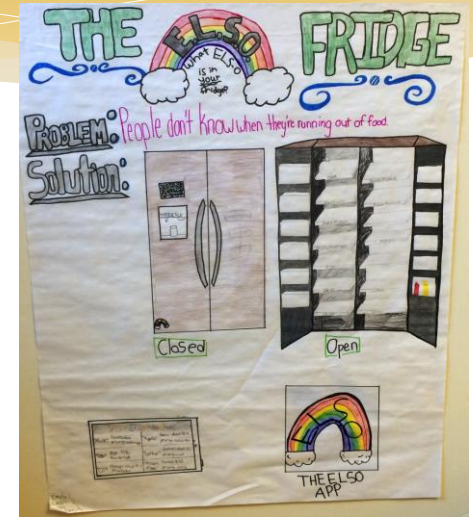
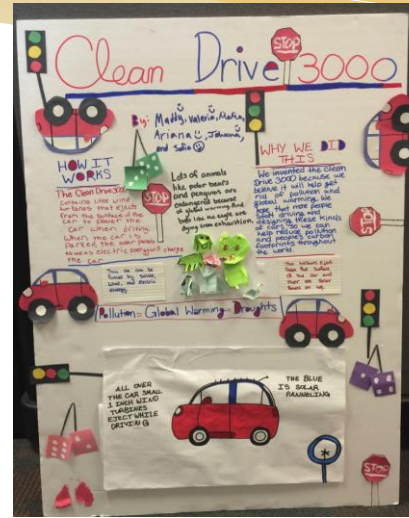
8 locations

=

GiE



Team Projects and Presentations



**Family and friends,
Food,
Fun!**

95% of campers bring guests

I never knew...

I learned that most engineers
don't sit at a computer all day
(like many people think), they
do a lot of hands on activities!



By Galby

I never knew...

I didn't know that there is an issue with how heavy the coils are in MRI machines, and that it causes a lot of problems, especially with young Patients.

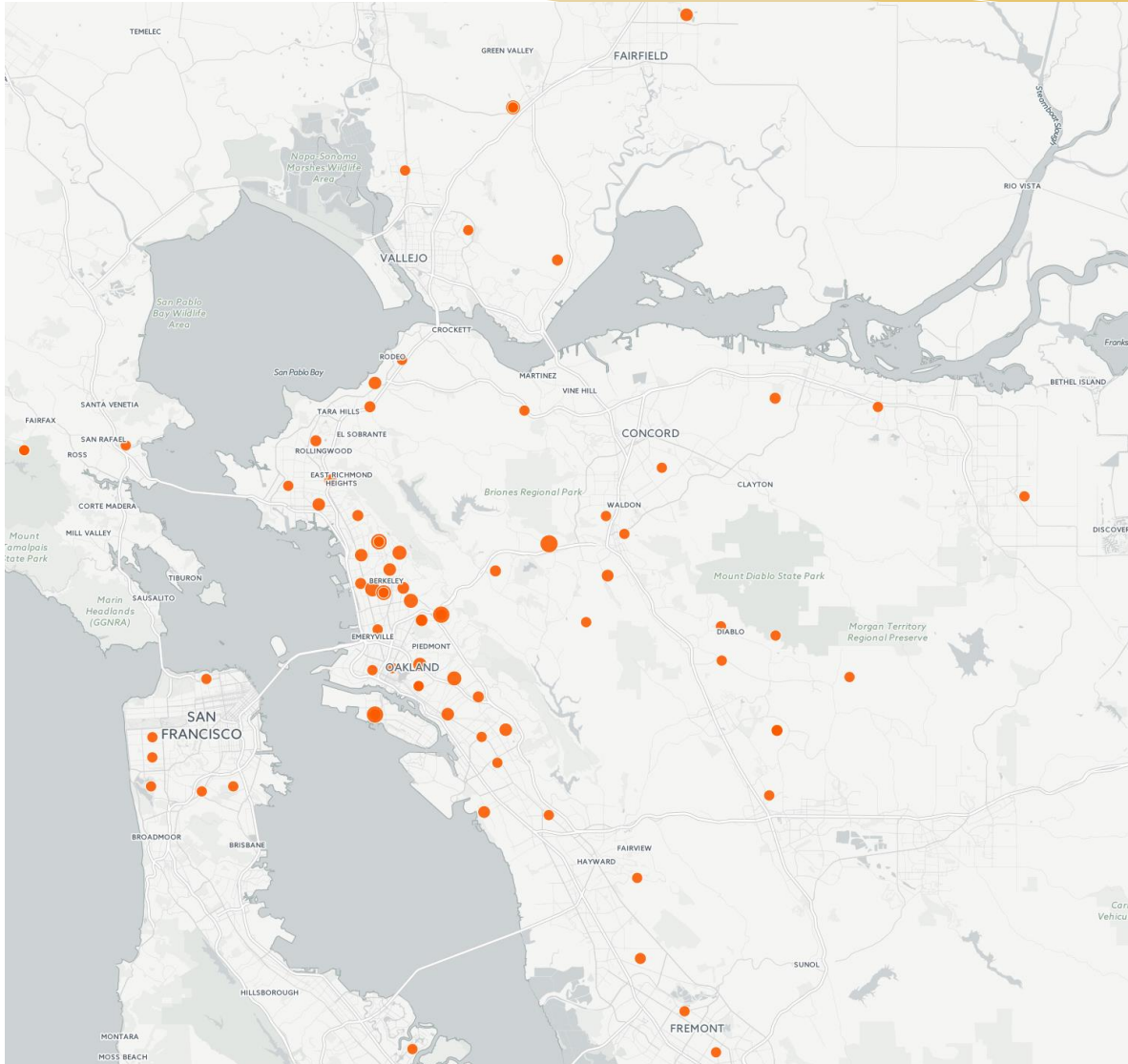


Frances Lebowitz

High School Volunteers



Summer 2016



338
applicants

59
schools

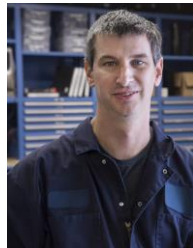
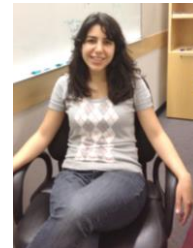
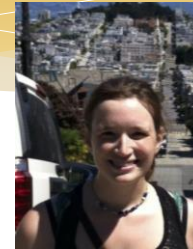
What Does it Take?

- * **Faculty Support** -- Prof. Claire Tomlin
- * **College Support** -- Dean Shankar Sastry

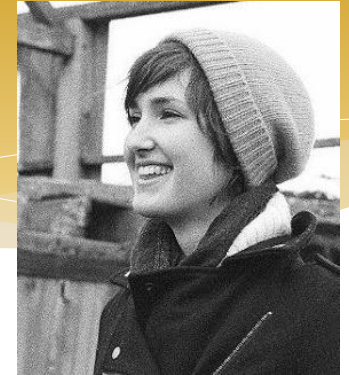
- * **Excited, passionate presenters**

- * **Funding:**
 - * College of Engineering
 - * National Science Foundation
 - * Local companies, foundations

Excited, Passionate Presenters



Jacobs Institute for Design Innovation



Prosthetic Hand Activity



Schedule – Part 1

Jacobs Day

Computer Science Day

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Design Innovation: Hands-on Learning					
11:00 AM – 12:15 PM	<i>To Be Determined</i>	Bioengineering	Introduction to Computer Science	<i>Wrap-up field trip</i>	<i>To Be Determined</i>
12:15 – 12:25 PM	Transfer to lunch	Transfer to lunch	Transfer to lunch	<i>Depart around 12:15pm</i> <i>Arrive at UCB around 1pm</i>	Camp evaluations, Transfer to lunch
12:25 – 1:45 PM	Lunch	Lunch	Lunch	Late lunch	Lunch

Schedule – Part 2

12:25 – 1:45 PM	Lunch	Lunch	Lunch	Late lunch	Lunch
1:45 – 2:00 PM	Transfer to afternoon session	Transfer to afternoon session	Transfer to afternoon session	Transfer to afternoon session	Prepare for Team Presentations
Tours & Laboratory Experiences					
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'We never knew that...
Engineers could change peoples'
lives.'

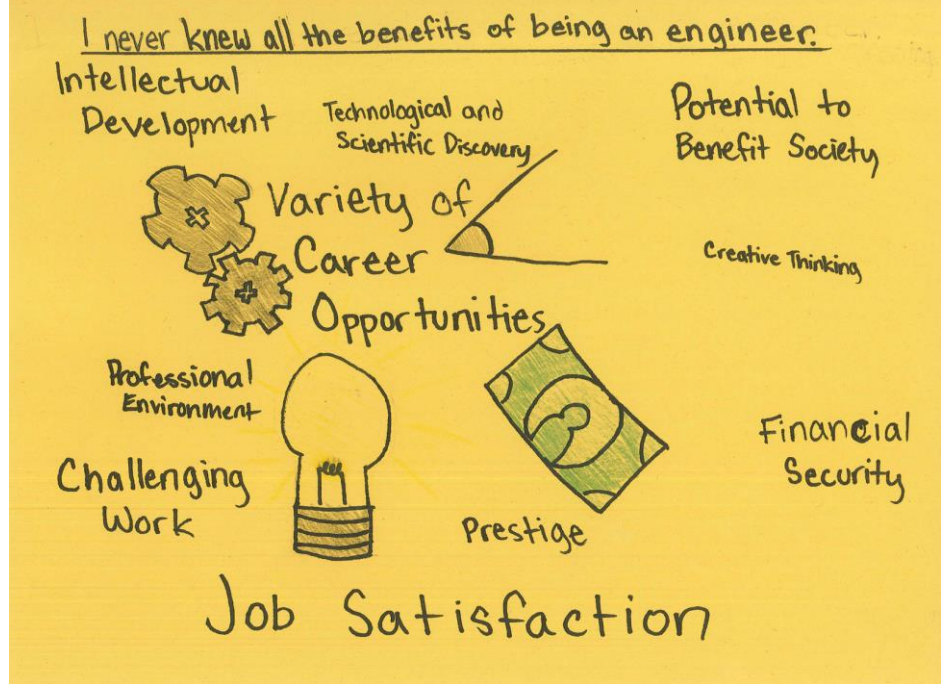
Using a
3D printer
we made
prosthetic
hands for kids!

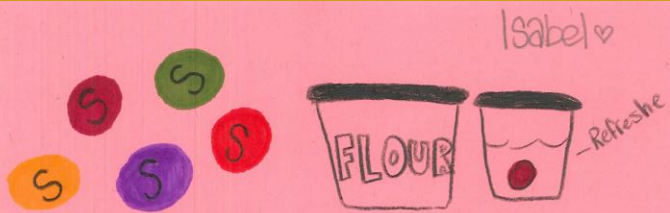


We Never Knew That...
Engineering
was so
Important!
Valentyn C.

I NEVER KNEW...

That children that need prosthetics can use a 3d printer. Its amazing that something I overkooked can help so many children. Because children are always growing, they grow out of their prosthetics, and need them replaced. Its expesive, and 3d printers can provide inexpensive replacements. It makes me happy to know many different people can obtain prosthetics.





I NEVER
KNEW THAT,

Oil , Cornstarch ,
Flour AND Sugar

COULD MAKE A
GOOD COATING FOR
A SKITTLE!

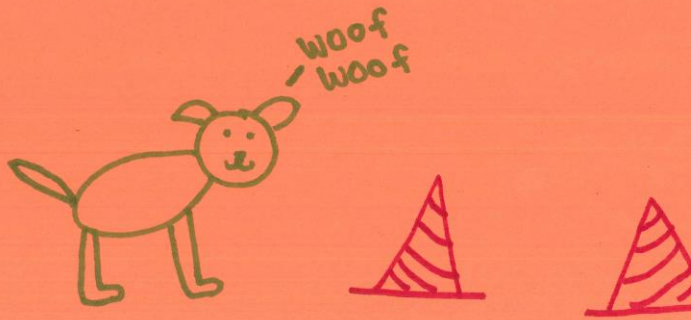


We never knew that...

You can code

Pixel the Dog to run!

And Jump over objects!



Gaitlin

I never knew that people

can earn money from the electrical company
for the solar energy they didn't use, that was
produced from their solar panels.



Survey Results

- * 88 percent of participants rated their overall experience as an 8, 9, or 10 on a 10-point scale
- * 95 percent of participants would recommend the camp
- * 100 percent of parents agreed with the following statements
 - * I would recommend GiE to a friend
 - * I am pleased with the educational content my child experienced
 - * I am pleased with the quality of the projects

Survey Results

- * 85 percent of participants reported that they were more likely to take more science and math classes in school
- * 67 percent of participants reported that they were more likely to major in engineering in college
- * 85 percent of participants reported that they were more likely to look for other ways to learn about STEM

Camper Feedback – Why GiE?

- * “Since most of my friends aren't into engineering, this camp could help them learn about it and get them excited about it because of all the fun activities.”
- * “It was a really fun experience and I learned a lot in one short week.”
- * “Because it was a great program for young women that might not know what they want to do.”
- * “Because I think it was really fun and I think everyone should try it.”
- * “Because it's an opportunity to learn a lot about engineering and complete a really cool project.”
- * “It teaches individuals about different types of Engineering and how it is a positive influence on the world. It also works with amazing ladies!”

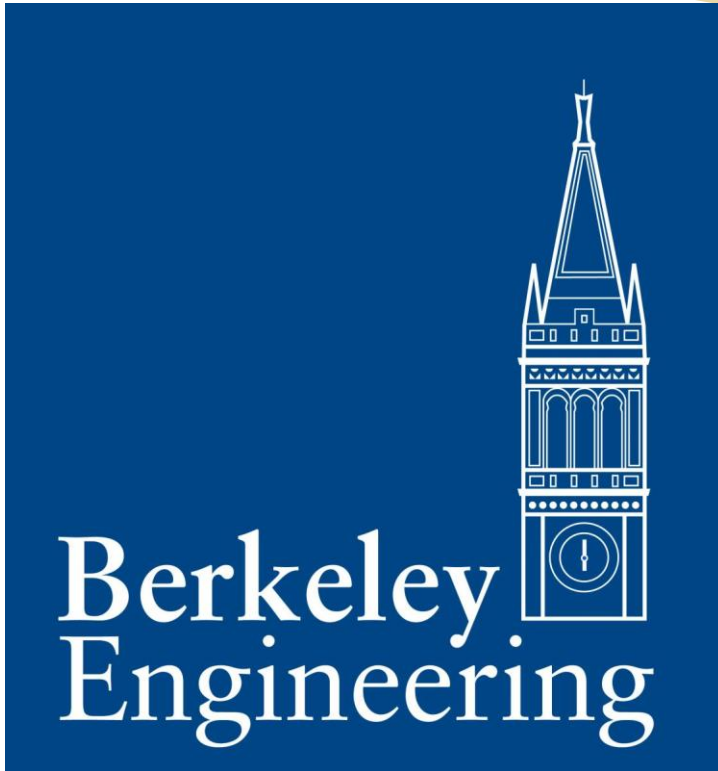
Camper Feedback – Favorite Part

- * “My favorite part about Girls in Engineering was getting to be an engineer for a week and doing awesomely fun hands-on activities.”
- * “I thought girls in engineering is a FABULOUS camp! This camp inspired me to work at google! I want to now! I loved our engineering hands on activities like twitter!”
- * “Meeting successful people in the field to give their point of view on engineering and give useful advice to us.”
- * “I approximately favored everything during Girls in Engineering!”
- * “My favorite part about GiE was all of the people I got to meet. I liked asking them questions and being able to understand about what they do, through the person that actually did it. I also really like the PAs & volunteers.”
- * “Getting to know other girls that like what I like! I have never met any girls as interested into science as me.”

Parent Feedback

- * “Girls in Engineering was an excellent program for my about-to-be 6th grade daughter. She was thoroughly engaged in the program, and now confidently states ‘I want to be an engineer!’”
- * “Thanks so much for this program! To be honest, I nearly had to force my daughter to go. Despite having a strong aptitude for math and science and two parents working in high tech, she was convinced that engineering was boring/geeky. Imagine my delight when she sheepishly admitted at the end of the first day that it was actually kind of fun, and by the end of the week said that maybe she ought to consider being an engineer after all.”
- * “I appreciate how seriously you took the girls, their ideas, their presentations, their enthusiasm. My daughter chose to ride the bus because she did not want to miss a moment of anything!”
- * “It was also extremely helpful that mentors discussed high school classes and college implications. Our daughter seemed to really listen to this advice vs. hearing it from her parents. I also feel like she really liked the girls-only environment. Mentioned several times how nice it was to do experiments without the "crazy" boys she's accustomed to dealing with in science classes.”

Funding and Support

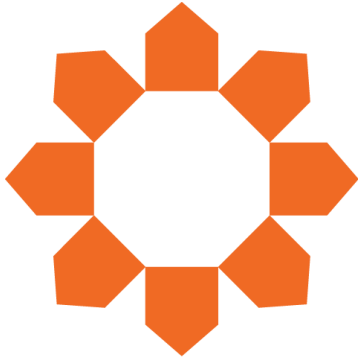


SanDisk®

The Peggy Jack Baskin
Foundation



Funding and Support



SUNGEVITY®



PLANT PV

New Materials for Photovoltaic Cells

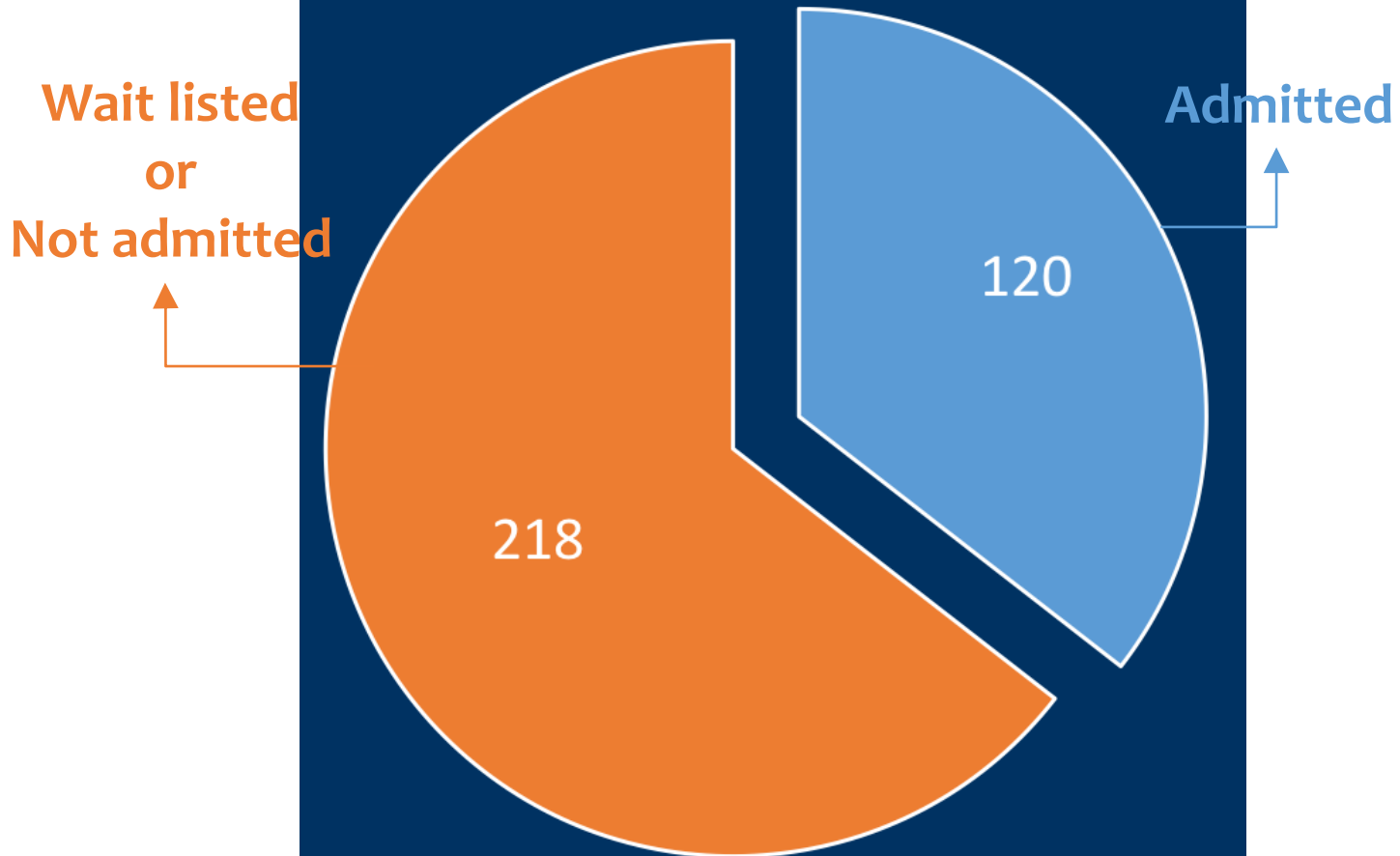


Growth of GiE



Summer 2016

GiE Summer 2016 Admissions



Excited, passionate presenters

Materials Science
and Engineering

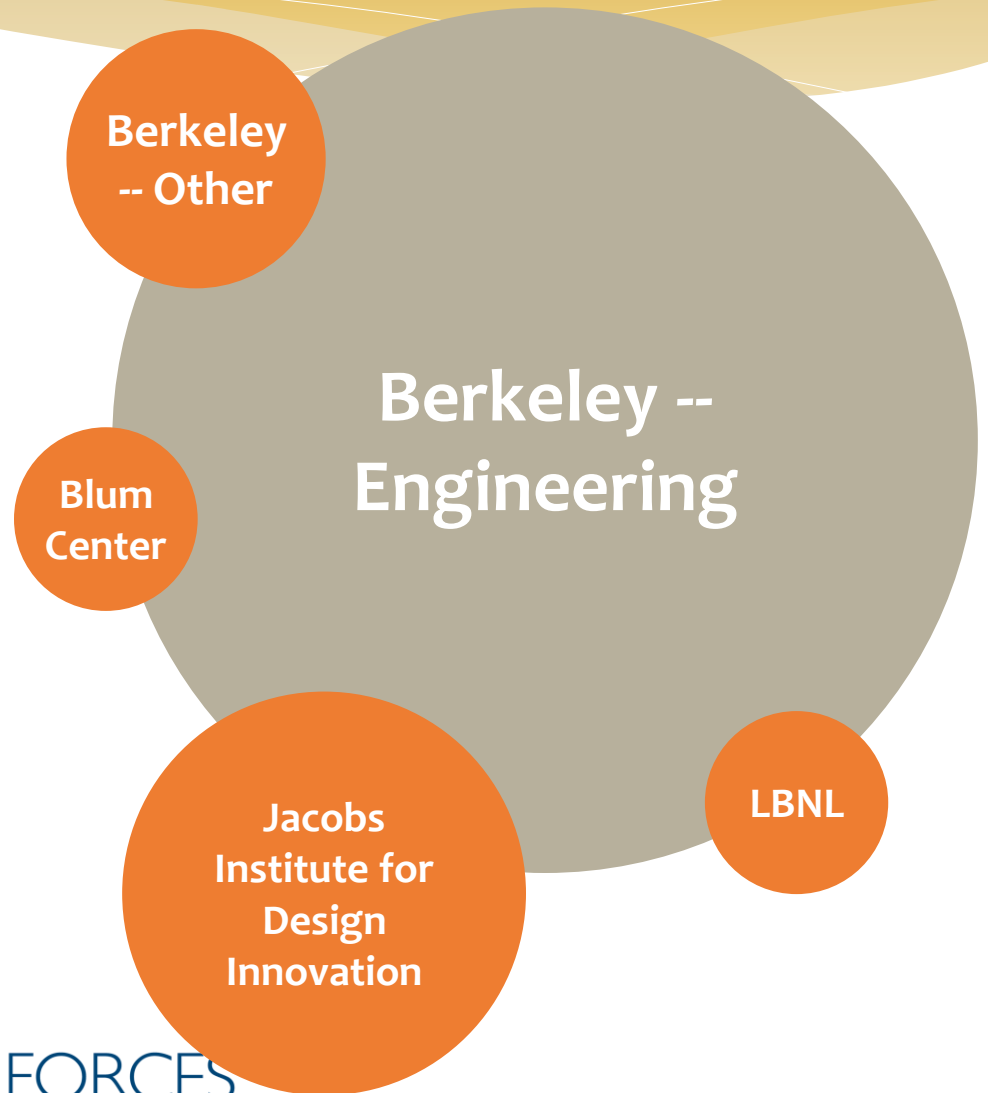
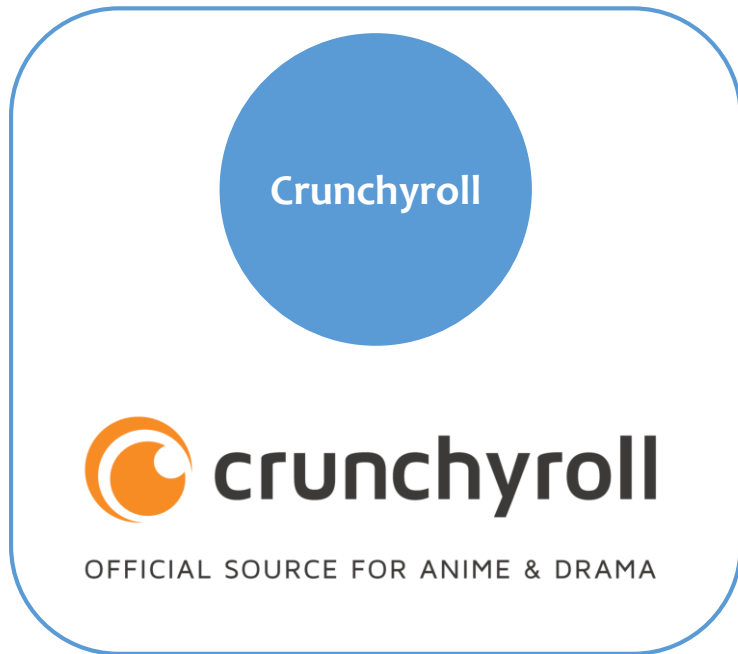
Nuclear
Engineering

Electrical Engineering
and Computer Science

Environmental
Engineering

Mechanical
Engineering

Excited, Passionate Presenters



Berkeley Girls in Engineering

- * Summers 2014, 2015 we ran the pilots:
 - * 60 middle school girls from east bay
 - * 2 2-week sessions at UC Berkeley
 - * 3 “modules” a day:
 - * Bioengineering, robotics, materials, coding, big data...
 - * What is Engineering?
 - * Leadership, talks, posters, elevator pitches...
 - * Week long project (in groups)
 - * Field trips: LHS, Pixar, Twitter
 - * Most of instructors (faculty, graduate students, staff, Pixar & Twitter engineers) are women
- * Summers 2016, 2017 we ran the program at scale