STEM

Savvy

ELECTRICAL V. II SUMMER 2019

INTERVIEW
Advice from an Electrical Engineer

TOOLS
Get Familiar with a Soldering Iron

SCIENCE ACTIVITY
Learn about Electromagnetic Concepts by making a Homopolar Motor

Brought to you by:
Gearbox Girls &
FRC Team 5414
—Pearadox

CONFIDENT • CREATIVE • CAPABLE

GIRLS IN STEM

Science, Technology, Engineering, Math

EDITOR'S NOTE

•VOLUME 2•

ELECTRICAL ISSUE

ABOUT US

This magazine seeks to fill a role being neglected by most media. By using art to communicate the wonders of STEM, we can give girls access to a magazine that not only encourages, but sustains their interest in STEM.

Cheers,

Gearbox Girls & Pearadox

TABLE OF CONTENTS

S.T.E.M.

/stem/

noun

1. an acronym for the fields of Science, Technology, Engineering, and Math
2. something anyone is capable of pursuing

INTERVIEW

YVONNE RIEGER

Project Manager and Electrical Engineer

by: Julia Rieger

Years in the field:	30+
Age:	56
Job Title:	Senior Project Manager
Company:	Invista of Koch Industries

Q: What is your current career and what do you enjoy about it?

A: *"I manage multi-million dollar capital projects to improve plant processes. My job is essentially overseeing a project's life cycle from start to finish. I manage all aspects of the engineering process, so I do need my industry skills. But working with contractors and others also requires me to communicate with people.*

I enjoy getting to work with people and being very flexible with time. I love getting to see the big picture in a project, and through my efforts, see the whole success and completion. For my particular position, I get to work in 3 different locations. A plant in Victoria, Texas and 2 offices in both downtown Houston and the JFK area. This makes traveling a big part of my job, which is something I have loved all my life."

Q: How did you get interested in STEM? Was there a specific instance where you realized you wanted to work in the field?

A: "I have always enjoyed working with science and solving technical problems. In high school, I also loved math a lot and figuring out challenges.

A big reason I decided to pursue STEM was because I knew it was a field not pursued by many women, especially in my time in school. I wanted to challenge the stereotype that women cannot be into that kind of stuff. I also wanted to prove to my male counterparts that they are not so much smarter than me.

I came out of high school knowing 100% I wanted to enter this field. I cannot imagine a specific "ah-ha" moment, because I have always wanted to do it. I was, however, [debating] between the medical field and engineering. I think the thing that discouraged me was the number of years of schooling required for the medical field, and since I was new to the U.S., I didn't have the money nor capability to pursue that dream. Engineering is great, and challenges me. I love it!"

INTERVIEW

ELECTRICAL ENGINEER

Q: Was there another field you thought you would be in or was STEM always your top interest?

A: "Like I said, I actually always wanted to be in the medical field. I dreamed of saving lives and creating a better world. However, engineering is saving lives and changing the world too, just not in the way I thought.

I knew I wanted to be in STEM, and if I wasn't going to be a doctor, electrical engineering stood out to me the most. Electrical engineering is the most popular and probably highest paid. It's the hardest to get into and is very competitive. I like it because, as I mentioned, I love math, and the field has a lot of it. In school I really loved solving electrical circuits, and I like to work with smaller sciences.

I would say though, don't get too worked up deciding over a field to be in "forever"; it doesn't work like that. After so many years, it matters more about your experience and dedication and work ethic rather than your major or what school you graduated from."

Q: Some may consider STEM a "boy's thing". What is your response to this?

A. "I have to say definitely not. Women are actually much more capable and adaptable to change. They are more open to ideas and more logical at solving problems.

For example, when I worked on a patent I had for a company product, my male coworker voiced the opinion that it won't work or it's not possible to package it. He did not have an open mind and misread the situation. In the end I did not give up and found a way to package it not just successfully, but more efficiently. I saved the company 6 million dollars, and in only one year.

My point is, everyone will try to put you down, just take that as their own fault. Just because they don't have an imaginative or innovative enough mind to see an opportunity for success, doesn't mean that you can't solve the problem yourself."

Q: Is there anything you want girls who may be intimidated by STEM to know? If you ever felt this, how did you push through it?

A: "That you need to have confidence, and your worth is as much or better than any guy's. It is ridiculous that something so simple as a gender should reduce someone's capabilities. People are out there making rocket ships, skyscrapers, and clean energy sources. How can we think so small when there are so many possibilities out there? Join STEM, we need it, and we need you! If you have the confidence to think of doing something, the work ethic of seeing it through, and the pride to celebrate when you are successful, anyone who judges you based off of superficial qualities are stupid for it.

I was not intimidated by STEM, in fact, I welcomed the challenge. To me, proving wrong the people who teased and judged was the most satisfying feeling you can get. And though I was confident in my abilities with math and science, I did feel uncertain with other things. Everyone is different, with unique challenges and things they need to get through. I don't believe anyone is perfect, and because of that, I will not tolerate someone being negative towards another who is trying.

To those reading this interview, go do something you never thought you could. Have some belief in yourself!"

SCIENCE ACTIVITY

HOMOPOLAR MOTOR

by: Justin Nguyen

VIDEOS FOR HOMOPOLAR MOTOR HELP & RELATED PROJECTS

How to make a Spinning Motor Propeller

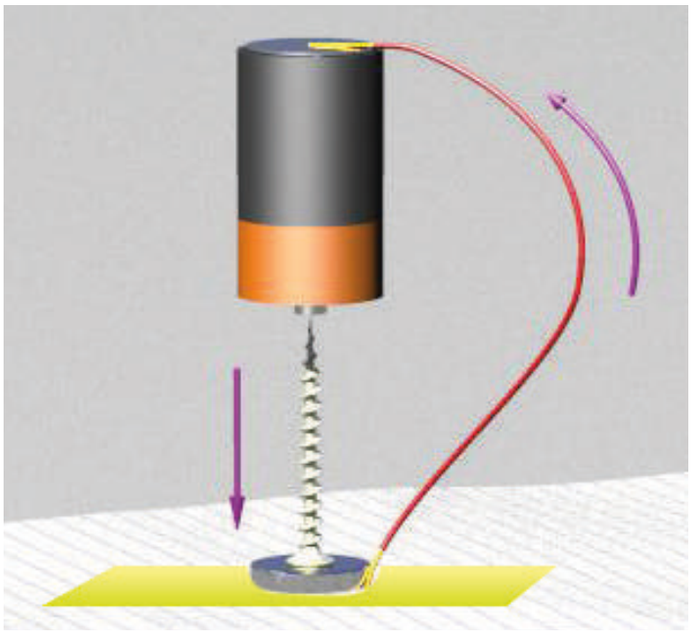
Watch video

How to make a Simple Magnet Car

Watch video

How to Light up a Light Bulb with a Magnet

Watch video



Challenge: **Make a spinning propeller out of a homopolar motor with house-hold objects by manipulating its magnetic fields.**

Materials:
- 1 Battery
- 1 Screw
- 1-2 Magnets (roughly 1/2 in. in diameter)
- Copper wire
- Tape
- Paper

Step 1. Attach magnet to the screw.

Step 2. Connect the sharp end of the screw to the battery's negative end.

Step 3. Cut out a ½ in. by 3 in. sheet of paper (depending on diameter of magnet) and tape it to the magnet.

Step 4. Tape one end of the copper wire to the positive end of the battery.

Step 5. Bend the copper wire so that the other end is touching the magnet.

TOOLS

SOLDERING IRON

by: Julia Rieger

What is a Soldering Iron?

A soldering (saw-ter-ing) iron joins metal together by heating and melting solder (a malleable metal) and letting it cool to meld 2 materials together. It is commonly used to connect two separate or cut wires.

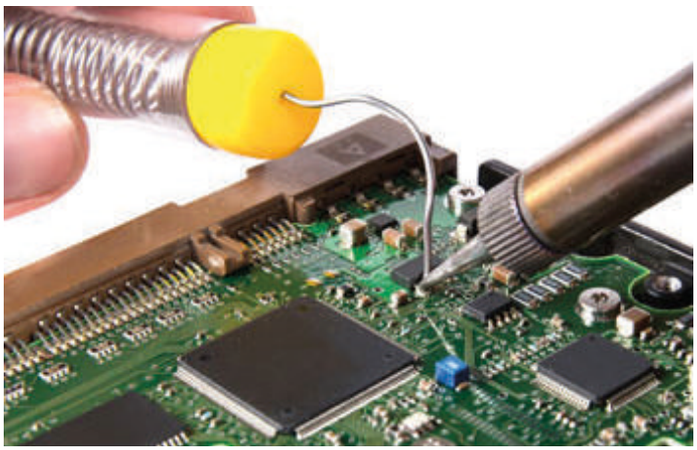
Soldering Iron

What is the Difference?

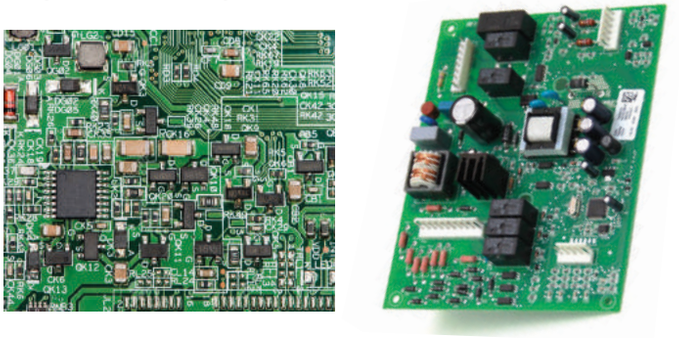
Soldering Iron vs Solder

- *Solder (saw-ter) is a metal alloy (usually lead and tin) that is melted by a soldering iron to join less fusible metals*
- *A soldering iron is the tool we use on solder, it is extremely hot, enough to melt solder to fuse metals*

Solder

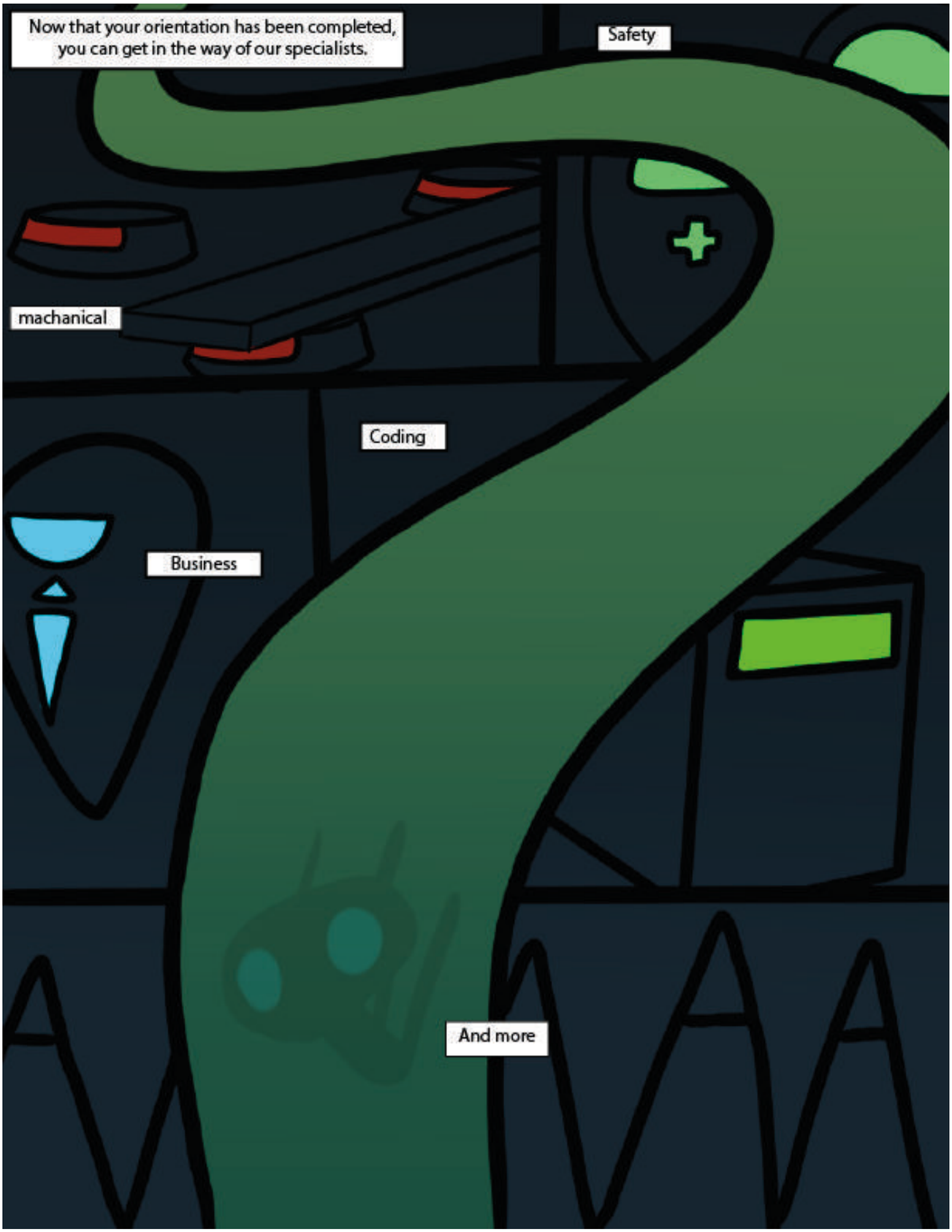


A circuit board is used to connect electronic components. The green material is non-conductive (electricity cannot pass through), but small lines of conductive material connect the electronic components, ensuring electricity only flows where you want it to.



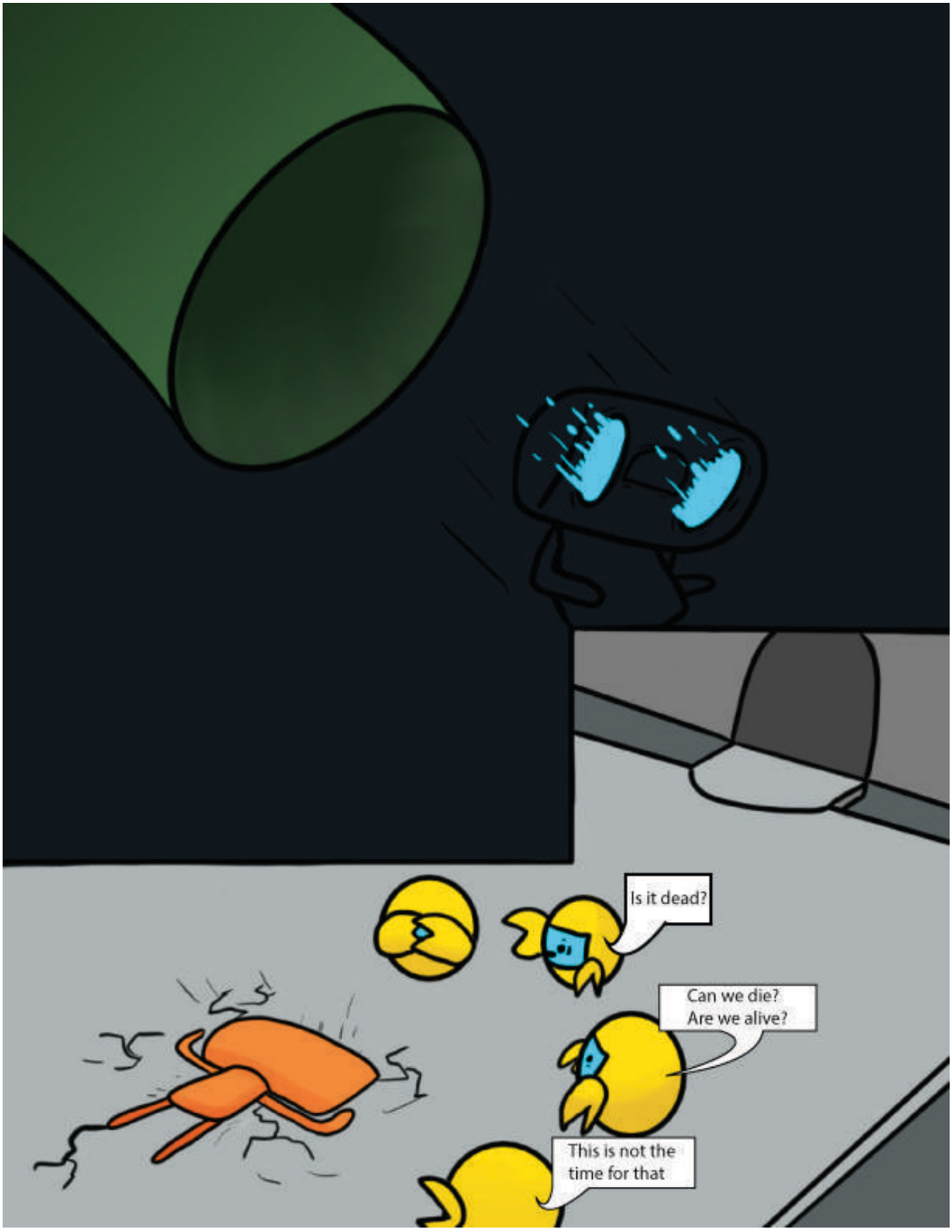
Circuit Board

ADVENTURES OF PERRY:
Twisted Wires



E.L. JANECKA

ADVENTURES OF PERRY:
Twisted Wires



E. L. JANECKA

ADVENTURES OF PERRY:
Twisted Wires

E.L. JANECKA

ADVENTURES OF PERRY:
Twisted Wires

E. L. JANECKA

SPOTLIGHT

PEARADOX 5414

by: Kayleigh Weldon

Pearadox 5414 is a high school robotics team that builds industrial-sized robots, participates in global competitions, and imparts invaluable knowledge. Students on Pearadox are immersed in an environment that allows them to be mentored by professional engineers while working together to overcome unique challenges. Pearadox is not only about building robots—chairmans, marketing, and business are extremely important subsystems on our team. These subsystems handle sponsor relations, branding Pearadox, and making sure our team participates in reaching out to the community and the world. Pearadox has many initiatives to introduce girls into STEAM (Science, Technology, Engineering, Art, and Math), such as the Girls Get Together, an event we created to network girls and engineers, and this magazine, which we made an improvement the lack of career-focused girl magazines.

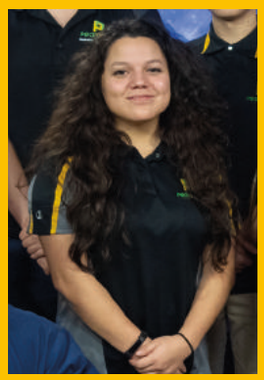
STUDENT INTERVIEW

Anyssa Castorina, 18 years old, -year member at Pearadox, serving as co-captain and technician. Between NASA internships, winning a prestigious "Dean's List" award congradulating her efforts in robotics, and earning a full scholarship at Rice University, Anyssa has accomplished much with the experience she has gained at Pearadox.

What opportunities have you been given because of Pearadox?

"I've been able to learn so much because of this team, including how to use many tools such as a C.N.C. Router, a lathe, and other power tools, [and] how to work with electronics."

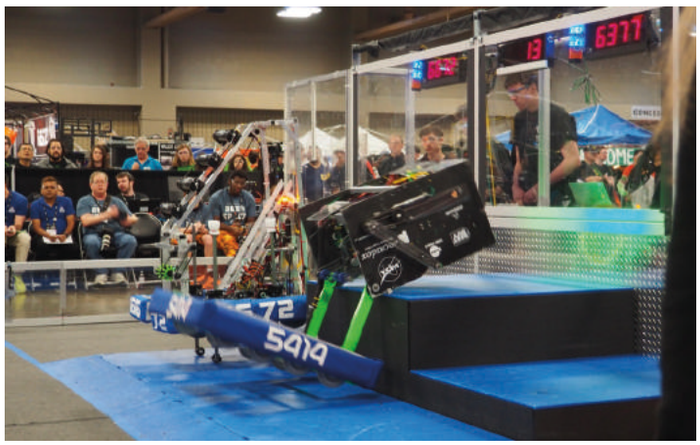
How has Pearadox prepared you for a STEM field?



"Being on the team has taught me a lot about engineering, and it has also given me the confidence to use the knowledge and not be afraid to expand my knowledge by asking questions."

Presenting Pearadox's 2019 Robot: Waste Management!

Pearadox 5414 had an amazing 2019 season, thanks to our unique and efficient robot, Waste Management. The robot is 125 pounds, sporting different manipulators such as the cargo intake, hatch intake (Moth), and jaw-dropping center of gravity shift flip.



With Waste Management, the team was able to participate in 3 district competitions, the Texas State Championship, and the Houston World Championship. It was awarded 2 Autonomous Awards, an Excellence in Engineering Award, and won us a finalist place in 4 competitions. Additionally, we were in the top 12 teams during the world championship, an event consisting of more than 400 robotics teams.

UPCOMING EVENTS

by: Julia Rieger

Texas Robotics Invitational (T.R.I.)

JUNE 28-29

T.R.I. is a small scale robotics competition hosted by the FRC team Spectrum #3847. It is more fun and quirky than our other, more serious competitions, and because of that, has a series of fun "mini" competitions. One of them is the all-girls drive team round, which poses a fun challenge for teams to make all drive team roles (the most important) filled by girls. Join us, it's free!

Introduce a Girl to Engineering Day

FEBRUARY 21

February 21st, Introduce a Girl to Engineering Day, is something us at Pearadox celebrate and take full advantage of. We post videos annually covering the intimidation many girls feel in STEM, and how to push through it. We also publish tool introductions, personal stories, interviews, and room tours to our YouTube channel— Pearland FRC 5414

Girls Get Together

SPRING SEASON

The Girls Get Together is an event ran by Pearadox and the Gearbox Girls designed to help girls network with real women engineers. With these events, we have reached more than 300 girls and boys interested in pursuing STEM in their future.
We run the events at our spring robotics competitions, run by F.I.R.S.T. (For Inspiration and Recognition of Science and Technology)

F.I.R.S.T
FIRST Lego League: 4th- 8th Grade
FIRST Tech Challenge: 7th - 12th Grade
FIRST Robotics Competition: 9th- 12th Grade

Girls Gear Up!

If your girl scout troop is interested in earning their robotics badges , you can sign up for a class on the "Girls Gear Up! " page on our website for FREE! (depending on skill level required, cost for materials may vary).

For more information on F.I.R.S.T. and robotics, visit www.pearadox5414.org or www.firstinspires.org

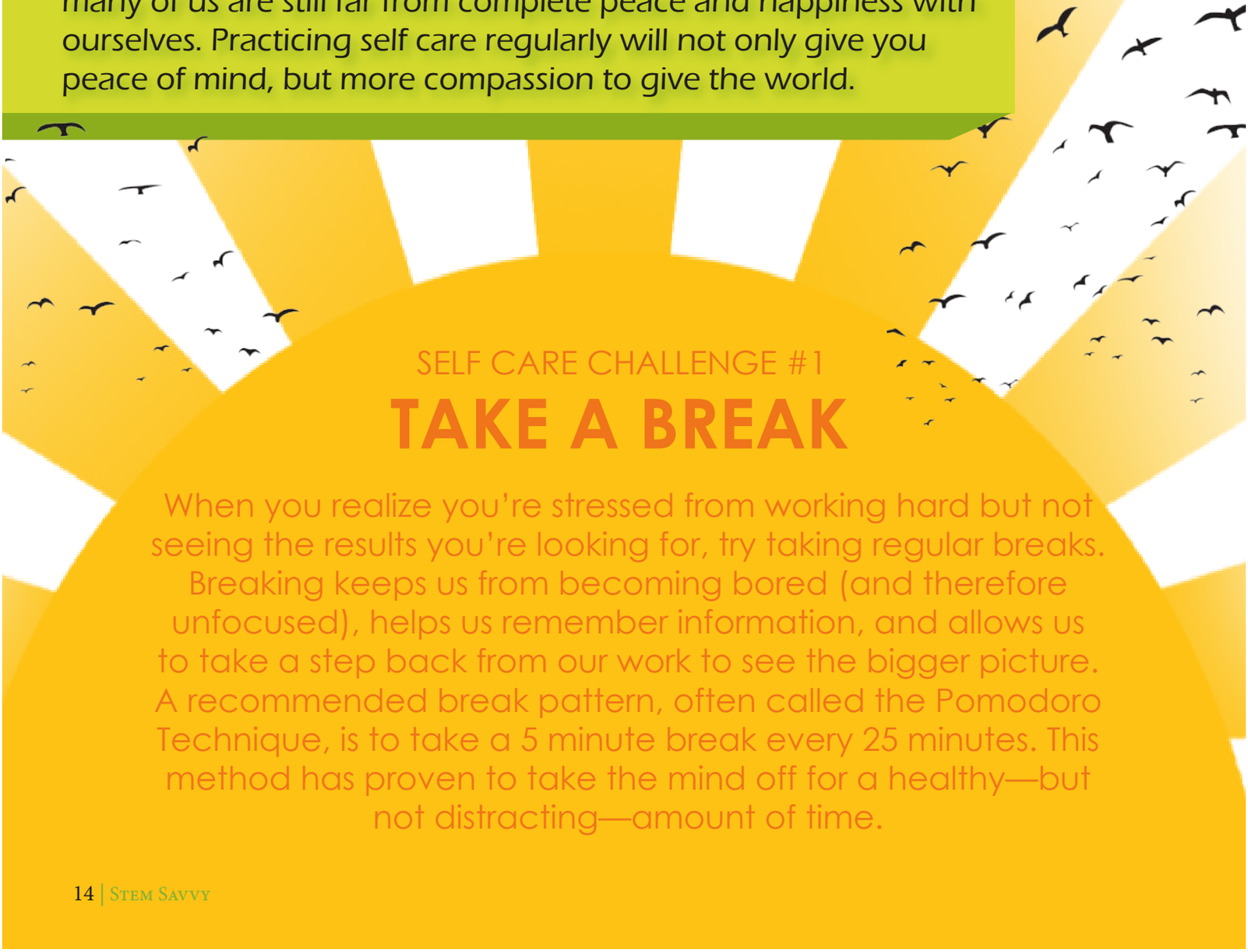
SELF CARE

TAKING BREAKS

by: Julia Rieger

> Our next issue's interviewee and genetic counselor, Ms. Tanya Eble, wisely noted that ""Having [to deal with] it all" has long been a catch phrase for women in [STEM] who juggle careers and family life, but having so many balls in the air can come at a price."

Self care is something EVERYONE needs to have a healthy mentality on life. Though it is becoming more normalized in society, many of us are still far from complete peace and happiness with ourselves. Practicing self care regularly will not only give you peace of mind, but more compassion to give the world.



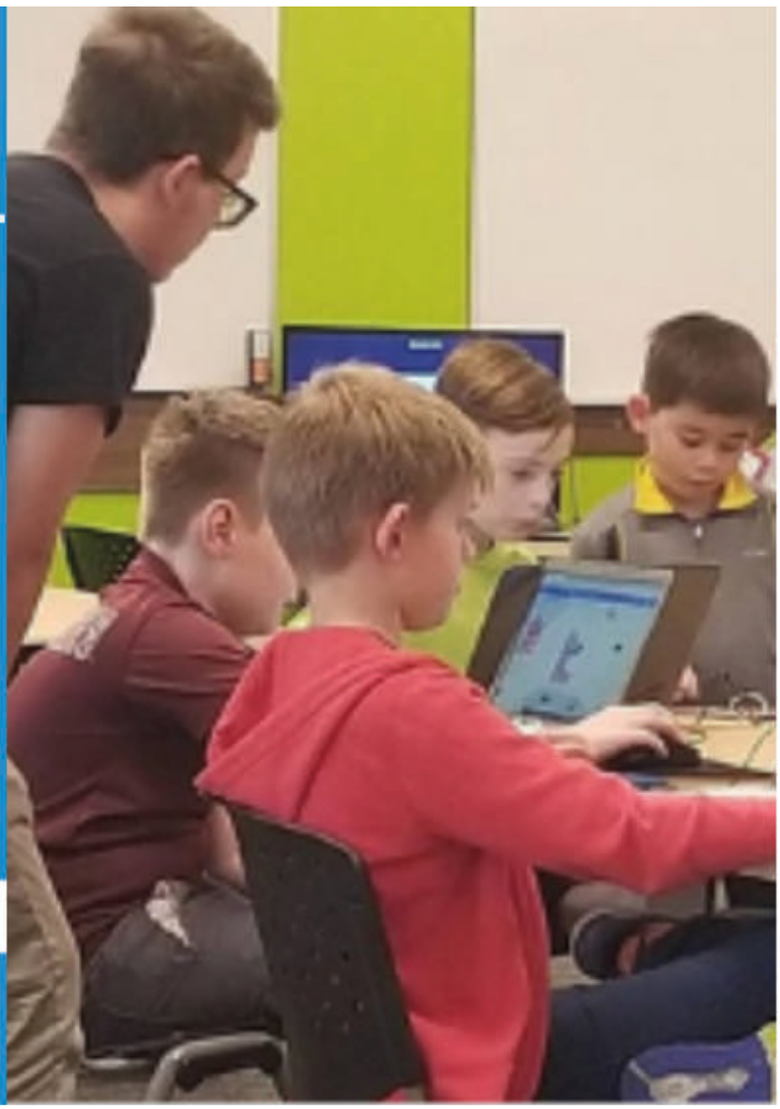
SELF CARE CHALLENGE #1

TAKE A BREAK

When you realize you're stressed from working hard but not seeing the results you're looking for, try taking regular breaks. Breaking keeps us from becoming bored (and therefore unfocused), helps us remember information, and allows us to take a step back from our work to see the bigger picture. A recommended break pattern, often called the Pomodoro Technique, is to take a 5 minute break every 25 minutes. This method has proven to take the mind off for a healthy—but not distracting—amount of time.

SPECIAL THANKS TO OUR

SPONSORS



CONTACT US

FIND ALL
MAGAZINE ISSUES AT:
https://gearboxgirls.weebly.com/

OR SCAN THE QR CODE:

REACH US AT:
gearboxgirls@gmail.com
pearlandfrc@gmail.com

FOLLOW US!
Instagram: @gearboxgirls5414

STEM SAVVY IS BROUGHT TO YOU BY PEARADOX 5414
ROBOTICS TEAM AND OUR SPONSORS!

Team Pearadox 5414:
Pearland, TX

Best Buy:
2632 Smith Ranch Rd
Pearland, TX 77584

Code Ninjas:
8325 Broadway St Ste 224
Pearland, TX 77581