

Introducing Ms. Kimberly Ploskonka



Name:

Kimberly Ploskonka

Job Title:

Deputy Director for Space and Terrestrial Communications, C5ISR Center

Length of Time as a U.S. Army Engineer:

21 Years

Education:

Bachelor of Science degree in chemical engineering from Rutgers College of Engineering

Executive Master of Technology Management degree from Stevens Institute of Technology

Master of Accountancy degree, specializing in governmental accounting, from Rutgers School of Business

How does your job support the U.S. Soldier? My team develops communications systems to help Soldiers securely talk to one another, wherever they may be on the battlefield.

What is a typical day like for you? There really isn't a typical day or week as the deputy director. In my role, I help the Space and Terrestrial Communications director lead an organization of more than 350 people by providing direction and oversight of the professional, technical, business, and administrative activities of the organization. That means, I make sure everything is running smoothly by working with our diverse staff to understand their needs, and I make sure they have the resources necessary to succeed. I rely on strong communication, collaboration, and problem-solving skills to resolve a variety of challenges every day.

What drew you to the STEM field originally? Science and math were always my favorite subjects in school, and I found solving problems fun. After attending a high school specializing in medical sciences, I decided to pursue a degree in chemical engineering.

Why is STEM important to our national security and our national future? To maintain national security and to support our military in the future, we need to develop cutting-edge technologies that will give us an advantage over adversaries. STEM education is vital to making sure we have the very best engineers and scientist to develop the next-generation missile, armored vehicle, or stealth aircraft.

What should students study to further their interests in a STEM field? I encourage students to take full advantage of the many STEM educational opportunities that are available at the elementary, middle, and high school levels. In addition, there are many "at home" and virtual STEM activities to increase a student's exposure to STEM. Learning about STEM early in a student's education will hopefully build a passion for it and encourage careers in engineering and science.

What is the most important STEM-related innovation you've witnessed in your career? During my career, I have witnessed many important STEM innovations, and the most significant capability that comes to mind are robotics for disaster recovery. I can vividly recall robots being deployed during 9/11 and Hurricane Katrina, making a profound impact on disaster recovery operations. The military uses bomb squad robots as well as small unmanned aerial vehicles to provide valuable information to our key decisions makers.

What is your favorite technology for personal use? I would be completely lost without my smartphone! It combines every capability I need: a phone, text, internet, audio, camera, and video camera into one easy-to-use platform that I can use anywhere.

What is the next great technological frontier? In my opinion, the next great technological frontier is filled with fully autonomous vehicles dominating the roadways. The thought of machines performing intelligent actions for humans, such as driving an automobile, will change our society significantly.

Why is it important for engineers and scientists to engage with STEM outreach activities? Our engineers and scientists play an integral part in shaping and empowering the next generation of innovators and problem solvers. Sharing the technologies developed at the C5ISR Center with STEM students can encourage our next generation to strive toward improvements in technology and to change how things work in the future.

STEM Activity/Challenge



Materials:

- Popsicle sticks
- Paper, cardstock, cardboard
- Paper towel roll tubes
- Small plastic cups
- Aluminum foil
- String or rubber bands
- Pipe cleaners
- Straws
- Tape
- Plastic spoons
- Other useful items in your home

Materials to test device:

- Small wrapped piece of candy
- Candy target – you can use a basket, container, or draw your own target
- Tape measure

Automatic Trick-or-Treater...

Marketing companies are constantly looking for new ways to solve problems, thus meeting current demands within their communities. With Halloween coming up, there is a need for devices that will allow people to provide candy from a distance, such as a treat toss or long-arm grabbers so that we can trick-or-treat safely while maintaining a safe distance.

Mission: You have been asked by your boss to design a device that will allow homeowners to pass out candy while maintaining a safe distance.

Requirements:

- The candy must not be thrown or passed by hand; your device must do the work.
- The device must be able to provide candy from a distance of 6-feet apart

Design Process:

ASK: What is the problem you need to solve? Design a device to pass out candy that will allow the homeowner to maintain a safe distance.

IMAGINE: Brainstorm and decide on one idea. How will your new device pass out candy?

PLAN: Draw a picture of the new device. What will your device look like?

CREATE: Use the materials to create a prototype of your design.

IMPROVE: How can you improve your device?

Questions to ask:

If you had more choices of materials, what would you use and why?
 How will your design be effective in allowing customers to keep their distance while passing out candy?

Ask an adult to
Share your STEM
 on Facebook.
 Use
#C5ISRCenterSTEM

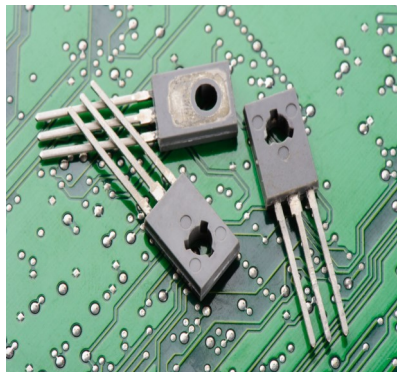


AEOP offers our nation’s youth and teachers opportunities for meaningful, real-world STEM experiences, competitions and paid internships alongside Army researchers. **Learn more at www.usaeop.com**

The Army Education Outreach Program (AEOP) eCYBERMISSION registration is open for students, team advisors, and volunteers! eCYBERMISSION is a web-based STEM competition that helps students grades 6-9 learn about real-life applications of STEM. Teams of three or four students are instructed to ask questions or define problems and then construct explanations or design solutions based on identified problems in their community. Learn more at <https://www.usaeop.com/program/ecybermission/>.



STEM IN THE NEWS



Fun Fact: Elemental carbon can take the form of one of the hardest substances (diamond) or one of the softest (graphite).

Carbon: The Future of Computer Technology

What if your cell phone could hold its charge for a month, or even longer? Now imagine if you had a computer that could improve its speed and functionality without losing power. This could be possible due to a single chemical element: carbon. A team of chemists and physicists at the University of California (UC), Berkeley have been investigating these possibilities over the last several last years.

Traditionally, circuits and transistors – the building blocks of electronics and the technology used to build computers – have been made out of silicon. However, silicon-based parts are reaching their limits on how fast they compute, how much power they need to operate, and how long they can preserve and maintain their power. To advance and keep up with the increasing demands for faster, longer-lasting, and inexpensive technology, the team at UC Berkeley has created a metallic wire made entirely out of carbon, called graphene.

The carbon-based graphene is constructed from tiny nanoribbons, all thinner than a single strand of hair and assembled into a pattern resembling chicken wire. The pattern allows the graphene nanoribbons to conduct the power between a computer's transistors and the switches that operate within a computer's integrated circuit.

The challenge of creating new technology for faster and more powerful computers has been to find a material that will be able to perform the conducting and non-conducting functions required of insulators and metals while improving speed and function. The graphene nanoribbons have only been able to conduct, or enable, the flow of electricity. The UC Berkeley team also needed the graphene nanoribbons to insulate, or prevent, the flow of electricity.

Felix Fischer, a UC Berkeley professor of chemistry, and his colleague Michael Crommie, a professor of physics, headed a team of researchers that spent several years testing how this material could perform all conducting capabilities needed to run a computer's central processing unit. Ultimately, the team was successful with chemically creating graphene nanoribbons using heat and a microscope so that they could be joined and fused together in just the right way.

Professor Fischer described the nanoribbons as "a set of Legos engineered so that there is only one way for them to fit together." He likened this process to taking a bag of Legos, shaking it up, and pulling out a fully assembled car. That, he said, is the magic of controlling the assembly of the nanoribbons with chemistry. Thanks to this research and innovation from the team at UC Berkeley, we can look forward to having computers with maximized speed and extended battery life sometime in the future.

Sources:

- *Metalized graphene ribbons make wires for all-carbon electronics*, by Michael Irving, Sept. 27, 2020 <https://newatlas.com/electronics/metalized-graphene-nanoribbons-wires-carbon-electronics/>
- *Metal wires of carbon complete toolbox for carbon-based computers*, by Robert Sanders, Sept. 24, 2020 <https://news.berkeley.edu/2020/09/24/metal-wires-of-carbon-complete-toolbox-for-carbon-based-computers/>

Answers from P.1

Black Cat = 6
 Bat = 14
 Trick or Treat Bag = 12
 ? = 8

SPOOKY JOKE:

Q. why didn't the skeleton like the Halloween candy?

A. He didn't have the stomach for it!



STEM Activity/Challenge



Materials:

- Measuring cup
- Mixing bowl
- Spoon
- 2 cups corn starch
- 1 cup water
- Food coloring – choose a bright Halloween color such as orange, purple, or lime green (optional)
- Fake spiders, googly eyes, or other small Halloween items (optional)
- Ziploc bag or container with lid to store Oobleck

NOTICE—

This activity can get messy!
Be sure you speak to your grownup **BEFORE** starting.



Spooky Halloween Oobleck

Directions:

1. Add about 5-6 drops of food coloring to your cup of water. You can add more or less depending on how bright you would like your Oobleck to be.
2. Add 2 cups of cornstarch to your bowl and mix in your colored water, stirring well.
3. Add your fake spiders, googly eyes, or other items to make your Oobleck a bit spookier. It may be a little hard, but keep mixing. If the mixture seems a little dry, you can add a bit more water to thin it out.
4. Experiment a little with your Oobleck. Form it into a ball and watch it melt into a liquid through your fingers. Poke it with your finger, but then slowly let your finger sink into it.

The Science Explained: Non-Newtonian Fluids

You may have noticed while experimenting with your Oobleck that it appears to be solid at some times and liquid at other times. Oobleck reacts to changes in pressure. If you touch the Oobleck, it will feel like a solid, but if you pick it up in your hands, the Oobleck will behave like a liquid and run through your fingers. When you squeeze Oobleck, the water is forced temporarily out of the mixture, causing the starch molecules to press against each other and making the mixture behave like a solid.

Oobleck is called a non-Newtonian fluid because it does not follow the rules of Newton's laws of motion. A non-Newtonian fluid has a different viscosity depending on the amount of force applied to it. In the simplest terms, viscosity is a measure of a fluid's resistance to flow. So Oobleck's viscosity changes based on force, as opposed to a fluid like water that has a constant viscosity. Water at a constant temperature will not become thicker or thinner no matter how fast you stir. As a mixture of cornstarch and water, Oobleck takes on properties of both liquid and solid. The relatively large, solid cornstarch molecules form long chains, while the smaller water molecules flow past one another in between the cornstarch molecules, allowing the chains to slide and flow around each other. This is what makes Oobleck behave like a liquid when it is not under pressure.

Resource: <http://www.sciencenter.org/documents/oo.pdf>



Now is a great time to get involved in STEM...

The C5ISR Center Educational Outreach Program is a collection of kindergarten through college-level programs designed to give the students of northeast Maryland and northern Virginia access to educational and extra-curricular opportunities in the areas of Science, Technology, Engineering and Math, or STEM .

For more information about our STEM Outreach Programs, visit us on the web at:

https://c5isr.ccdc.army.mil/student_programs/

