SWENext Newsletter - K-8

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Electrical Engineering

Have you ever had a power outage at your home due to a storm? No lights, no TV, no Wi-Fi, no microwave, no hair dryer, no game system…and once your cell phone battery runs out, no cell phone!

Everything that you miss during a power outage is everything that an Electrical Engineer works on. And more!

Electrical Engineers design, develop, and test electrical equipment. Some of this equipment includes electric motors, machinery controls, lighting and wiring in buildings, radar and navigation systems, communications systems, power generation and electrical systems in cars and planes.

Watch the video below to learn more about what Electrical Engineers do.

Meet Sowmya Nagesh, Electrical Engineer

Sowmya works for Caterpillar Inc. in Peoria, Illinois. She has a master's degree in Electrical Engineering from the University of Illinois.

Here's her story in her own words:

Growing up in India, I was your typical awkward lanky teenager who was good at solving brain games and had a penchant for trivia. I got better at math as I went through my high school years. My undergraduate internship was at Indian Space research organization, which is the equivalent to NASA in India. That was the first taste that I had of what research would look like.

By the time I got to Chicago to attend graduate school at the University of Illinois for Electrical and Computer Engineering, I knew I wanted to challenge myself constantly for whatever role I would get into. The first job I had in the United States was as a Software Integration Engineer at Caterpillar Inc., where I worked on implementing engine controls software for large mining equipment. For the next job, I worked as a machine system validation engineer for motor grader programs. This constantly tested my problem-solving capabilities.

I always wanted to fulfil my dream of contributing to better air quality and lower emissions in these massive machines that we make at Caterpillar Inc. So, in my current role as Senior Performance Engineer at Caterpillar Inc., I work on clean emission systems to development strategies on engines, from 7 liter to 175 liter diesel, dual fuel and gas engines.

My work involves constant visits to the electrical hardware-in-the-loop lab and the test cells for troubleshooting. I have to take calls from all over the world to help troubleshoot issues in the field. The hands-on work in the lab, where you have to isolate issues in the wiring, or debug a script, or analyze data to get to the bottom of a problem, is what keeps me going back to work every day.

Being an engineer means you never quit learning, be it a new process or technology. Adaptability is a trait that you must develop as an engineer.

Another trait is to learn from your failures. If your design fails, go back to the drawing board and collaborate or brainstorm your ideas. Every engineer I know is a good listener. Resilience, adaptability and persistence are always great building blocks in your engineering career.

Register for Invent it. Build it.

Middle school SWENexters: now's the time to **register for Invent it. Build it.**, our largest hands-on engineering event.

When registering, don't forget to enter the early-bird phrase "**BETHATENGINEER**" to be entered into a special raffle at the event!

Register today >>

Take on the SWENext Club Challenge

SWE is challenging the next generation to create an exciting engineering demo and to celebrate women engineers who broke boundaries in their field. **The winning club will come to SWE's Annual Conference, WE18, in Minneapolis, MN this October and show their demo to women engineers.**

Find out more about how to **start a SWENext Club** and take on the **SWENext Club Challenge**.

SWENext Engineering challenge with a chance to win a freebie!

Robotics engineers design and build machines that take the place of a human to complete a task. These engineers used computer-aided design and manufacturing systems to make their robotic machines. These machines range from robotic arms to lift cranes.

Be proud of your new creation and share it with SWENext! Each month, a lucky winner will be selected from the submissions to win a SWENext freebie. Don't miss the chance! All it takes is a few minutes and a great picture. **Please email your entry to swenext@swe.org by May 31.**

This month, we're challenging you to make your own mock robotic hand. You'll need to prepare a few different raw materials to fabricate a finished hand. To get started, collect the following materials:

- Cardboard
- Scissors
- Bendable plastic straws
- String/yarn/cord
- Hot glue/Elmer's glue/Tape
- Thick rubber bands
- Pencil
- Ruler
- Utility knife (Have an adult help you with this!)
- Markers or other decorative materials

Follow the instructions below to get designing and building:

1. Trace an adult size hand on cardboard and carefully cut it out with scissors.
2. Glue the bendable straws on each finger so the bendy part is on the palm, and the long part is on the fingers.

3. Trim the edges of the straws to align with the edge of the fingers.
4. Turn the hand over so the palm is facing down. Mark the locations of joints and knuckles. By pressing down hard with the end of a ruler, score the cardboard on your markings so the fingers will curl and bend properly.
5. Turn the hand palm side up again, then mark the location of the joints on the other side. Slice small sections of the straw off (at 45 degree angles, **as shown here**) to help the fingers bend properly as well.
6. Run a piece of string through the straw on each finger, then leave a long tail of string coming out of both ends of the straws.
7. Flip the hand palm side down again. Cut one rubber band per finger to turn them into rubber strips. Tie one end of each rubber strip to the string coming out of the top of the hand.
8. Glue the other end of the rubber strips as close to the base of each finger as possible without stretching them out, **as shown here**.
9. Decorate your hand.
10. Test out the hand by pulling downward on the strings. How well do the fingers bend? Can you pick up any objects or make hand signs with it? Take pictures to let us know!

If you're feeling extra creative after making your hand, **check out this video** to try and follow steps to make a mock robotic arm.

130 East Randolph Street, Suite 3500
Chicago, IL 60601
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