**What Middle School Kids Can Do!**

STEM challenges are usually a big hit in the classroom, and many of them spark fresh ideas and opportunities for kids like you to come up with clever new inventions. STEM can give you a chance to solve real problems while learning skills you may not get in other classes. You get to build and test your ideas and bring your imagination to life. Whether you’re designing a cool gadget or coming up with a product that helps someone, inventing lets you show who you are and what you care about.

Middle school students like you are creative and capable of coming up with impressive inventions. Just take a look at a few amazing inventions created by middle school age kids. As you read, decide WHY these students invented these devices, WHO each invention helped, and HOW each invention helped these people.

**1. Tethys Water Tester**

A 12-year-old girl named [Gitanjaloi Rao](https://www.youtube.com/watch?v=gVgaJN3GI6U) invented a device to test drinking water for poisonous lead. She named it Tethys after the Greek goddess of fresh water. She learned about a town in Flint, Michigan where the drinking water was dangerous for children in half of the homes. When people drank the water, it caused serious health problems. She wanted to help them, and she figured out how to design a device that made it easy for people to test their drinking water for lead. Her invention was faster, less expensive, and easier to make than other methods.

**2. SmartWander Sock**

When he was 14,[Kenneth Shinozuka](https://www.ted.com/speakers/kenneth_shinozuka) decided to find a way to help his grandfather, who suffered from [Alzheimer’s disease](https://www.youtube.com/watch?v=tFX1nQLZUVM). He noticed that his grandfather would get out of bed at night without anyone knowing it. He might get injured, or he could wander off and get lost. Kenneth invented a sensor device called SmartWander to alert family members when his grandfather wandered. He placed the sensor on his grandfather’s sock, and it sent an alert to a smartphone whenever his grandfather started moving. The idea worked well and helped his grandfather remain safer. Kenneth’s idea became popular and now SmartWander sells nationwide.

 **3. Energy Turbine**

Hanna Herbst was 14 years old her pen pal in Ethiopia wrote her about not having any lights or a flow of fresh water where she lived. Hannah became curious and learned that many people poor countries don’t have regular access to energy to produce electricity for their needs. This problem became important to Hannah and she wanted to solve it. So, [Hannah invented a small inexpensive turbine](https://app.discoveryeducation.ca/learn/videos/44ca0b15-ba95-49a2-bb62-dfe895138d48/) that converts energy from ocean currents into electricity. Her inexpensive invention worked for people in small areas. Even more important, it brought attention to the need for affordable renewable energy solutions in developing areas and inspired others to work on it.

 **4. Solar-Powered Tent**

Daniela Orozco remembers the many homeless people she saw on her way to school when she was around age 14 or 15. Looking for a way to help them, she worked with a team of 12 teenage girls (the DYI Girls) to invent [a solar-powered tent](https://mashable.com/feature/diy-girls-solar-powered-tent-homeless#xBptcuAOuSqC) that converts solar energy into electricity. They succeeded in inventing a tent that provided shelter and a source of power for the homeless and for people affected by natural disasters. The tent is also water resistant and can be moved easily. The girls who invented this tent are especially big cheerleaders for STEM and for girls getting involved in engineering.

 **5. Lion Lights**

At age 11 Richard Turere invented [a simple, low-cost, solar-powered device](https://www.ted.com/talks/richard_turere_my_invention_that_made_peace_with_lions?referrer=playlist-ted_under_20&autoplay=true&subtitle=en) that safely scared hungry lions away from his family’s goats, cows, and sheep in Kenya. Richard was responsible for herding and safeguarding his family’s livestock, but lion attacks were growing increasingly frequent. He tried many ways of stopping the lions but nothing worked. Then he noticed that the lions did not come near the light of his torch when he went out at night to check on the livestock. Richard then invented a series of flashing LED lights and spaced them around the livestock pens. This worked! Richard’s invention saved the animals, was cheap, and it could also run on wind power. His solution helped other livestock owners in his community also avoided having to hurt the lions.

**6. Sandless Sandbag**

Peyton Robertson – an 11-year-old 6th grader – grew up in the path of Florida’s powerful hurricanes. He noticed that the sandbags used to help protect people from flooding were really heavy and difficult to carry, and that there were gaps between the bags. He decided that he would invent [a new kind of sandbag](https://www.nbcnews.com/science/11-year-old-designs-better-sandbag-named-americas-top-young-8C11371015) that would work better. Instead of sand, he filled the bags with a lightweight polymer. When the bags came in contact with water, the polymer expanded and blocked the water. When dry, the bags were light weight and easy to carry. Peyton’s bags turned out to be easier to transport and use in flood-prone areas. Today these polymer sandbags are often used in flood-prone areas to prevent flooding.

**7. EZ Baby Saver**

Amazing new inventions can be made of simple materials – like rubber bands. Sixth grader Andrew Pelham, 12 years old, heard about a woman who accidentally left her 10-month-old baby in her van. The child died. Andrew couldn’t get that story out of his mind and he wanted to help. So, [he designed a simple, bright colored neon strap made from rubber bands and duct tape](https://www.youtube.com/watch?v=0ds3obQHKoY) to prevent children from being accidentally left in hot cars. One end of the bright, neon strap hooks to the back of the driver's seat, and the other end fastens to the inside door handle on the driver's side. Then, when a parent opens the door to get out of the vehicle, the strap blocks them and reminds them of the child in the back seat. Andrew shared instructions online, encouraging people to make their own EZ Baby Savers at home.

**8. SmartCane**

When she was 14, Riya Karumanchi met a blind woman who used a white cane to navigate. Riya was surprised that even with the cane, the woman bumped into objects and struggled to get around. She assumed these canes came loaded with cutting-edge technology to help people navigate and was shocked to realize that they were just sticks. She couldn’t believe that no one was working on that problem, so she invented a device now called [SmartCane](https://www.cbc.ca/news/canada/toronto/smart-cane-company-1.4806713). This device warns vision-impaired users about obstacles, wet surfaces and other dangerous conditions. GPS navigation gives them directions by using vibrations and audio. An emergency button connects them with emergency responders, family, and friends.

**Now it’s your turn to become a middle school inventor!**

As you answered the questions, *Why* did the student invent the device, *Who* did it help, and *How* did it help, you may have noticed that these young inventors all had several things in common. They were curious and interested. They noticed needs around them and wanted to help solve them. And all of them cared deeply about the problem they were solving.

You can learn a lot from these young inventors. Your world is also filled with problems, small ones and big ones. Start by observing real needs or problems you notice or hear about at home, in school, on the bus, and among family and friends.

You’ll see or hear about all kinds of issues like storm damage, traffic jams, health issues, aids for people with disabilities, protecting animals, clean water, reducing plastic waste, water damage, trash, and many others.

Maybe you’re more interested in personal problems like finger-nail biting, bad eating habits, ways to make life easier for your aging grandparents, and so on. What problem do you really care about?

**Read what young inventors have to say about inventing.**

*The most exciting part of inventing is solving real-world problems.* For example, Gitanjali Rao, who invented Tethys to detect lead in water, said she loves being able to take on issues that affect people’s daily lives and find ways to help improve them. Inventing gives her and other young inventors a sense of purpose.

*Failure teaches valuable lessons that make inventions better.* Young inventors frequently talk about the role of failure as they describe their journey. They often need to test, tweak, and sometimes completely restart their projects. For instance, during the invention of the solar-powered tent by the DIY Girls, the team faced many challenges, but each failure brought them closer to a better and more successful tent.

*One of the best experiences is working in teams.* Even those who usually work alone find that collaborating with others helps them think more creatively and come up with better ideas, designs, and inventions. Each of them have different strengths and contributions. All team members can play valuable roles in the work of inventing.

*Seeing their inventions work brings a sense of accomplishment and* *pleasure*. These kids enjoy knowing that they’ve created something that can make a difference. For instance, after seeing their tent invention come together, the DIY Girls felt a powerful sense of achievement, knowing that they had created something to help address homelessness in their community. Many young inventors speak about how their inventions give them confidence and inspire them to tackle other challenges.​

One young inventor, Emily Miner, helped her team invent [a solution for Styrofoam pollution](http://www.nanonerds.org/invention.html). She had this to say: “It made me realize that even though we’re all very young, it doesn’t matter how young you are. You can still make a difference in the world.”

So start small, stay curious, and let your imagination soar. Who knows what incredible inventions you’ll come up with!

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