SCIENCE CAREER ADVENTURES

Miguel the Acoustical Engineer:

Understanding Sound Waves

Who is Miguel?

Hi, I'm Miguel! I am an acoustical engineer. Acoustical engineering is a type of engineering that focuses on the science of sound and vibrations.

As an acoustical engineer, I specialize in underwater acoustics!

This means I research how sound and vibrations move through water. There is a lot of math and science involved in understanding sound. For example, sound moves at different speeds depending on the temperature!

What I'm Working On

Right now, I work in an engineering lab where I design, build, and test sonar. Sonar, or sound navigation and ranging, is used to find objects underwater using sound waves. Here are a few examples of how sonar is used!

- Military submarines use it detect enemy vessels.
- Oceanographers use it to map the ocean floor.
- Ecologists use it to tell the depth of a lake.

Submarines use sonar for navigation and to locate other objects in the water.

Sonar works by sending out sound waves from a submarine. It uses echoes of the sound to figure out if there are other objects around.
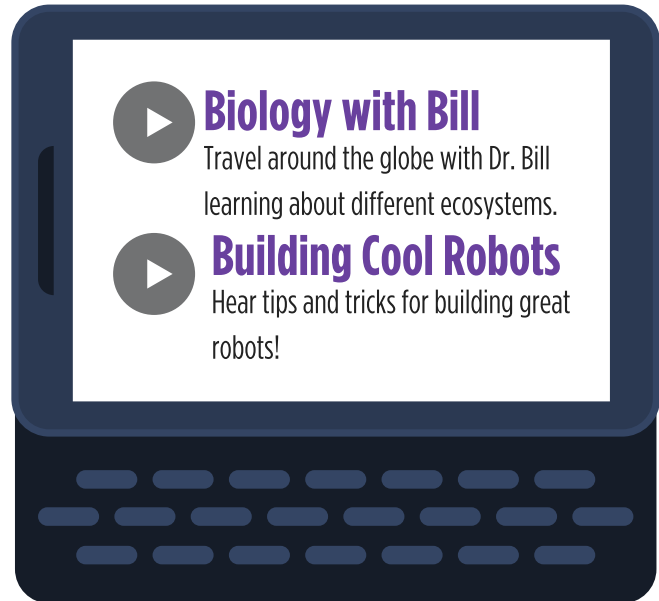
Did You Know?

Sound is energy that travels from one place to another in the form of sound waves. Sound waves are created from vibrations made by moving objects. The sound waves can move through air, water, or other substances and can be heard once the vibrations reach your ears!
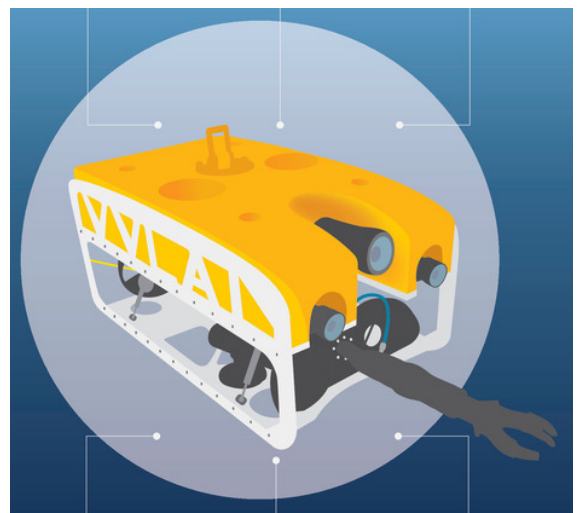
My Podcast

Today, I am recording a new episode for my podcast channel. My podcast channel focuses on what I do as an acoustical engineer!

A podcast is an audio file you can stream or download where people talk about all different kinds of topics. Podcasts usually come in a series of episodes, just like your favorite TV show. Scientists and engineers have podcasts to discuss projects they are working on! I listen to podcasts like Biology with Bill and Building Cool Robots.

> ▶ **Biology with Bill**
> Travel around the globe with Dr. Bill learning about different ecosystems.
>
> ▶ **Building Cool Robots**
> Hear tips and tricks for building great robots!

My podcast will talk about the things I am currently working on. For example, I am planning an episode about my new ROV. ROV stands for remotely operated vehicle. I want to use an ROV to see things in the ocean I can't see on my own.

Recording a New Podcast Episode

Today, I am recording a new podcast episode about testing out sonar on my underwater ROV. I steer my ROV using a tablet. I can control the ROV from shore or from a boat so I don't even have to get in the water!

My ROV has cameras on it so I can see under the water. But, often, the water is too dirty to see anything. I wondered if I could add sonar to my ROV to help me find things underwater. Then, I could use sound waves to locate objects like shipwrecks or things people lose at the bottom of the lake and make them a lot easier to find!

Gathering Information for the Episode

There are two types of sonar, but the kind I need for my ROV is called active sonar. This type of sonar works by sending out sound waves through the water. If the sound waves hit an object as they travel through the water, the waves will reflect off the object and be sent back to my ROV. The sonar system can then determine how far away the object is based off of how long it took for the sound signal to return to the ROV after it had been sent out. The ROV can send the data it collects back to me on a boat.

After I added sonar to my ROV, I decided to test it out. I went to Lake Michigan and started searching. After about an hour of searching, the sonar on my ROV detected a large object! I was able to navigate the ROV to get close enough to the object to take some pictures of it with the camera. It was so cool!

Recording and Uploading Podcast

Here is my plan for this episode:

For today's episode, I am going to talk about how sonar uses sound waves to locate objects. Before I record, I will write down a list of things I want to make sure I talk about so that I don't forget anything. Then when I am finished, I will upload my podcast to iTunes so my followers can listen. I love having a career as an acoustical engineer because I can apply my engineering skills both at work and in my personal life. It makes going to work really fun since I get to do what I enjoy!

After I have recorded my podcast, I will upload it to the Internet, including posting links on my social media so all of my listeners can stream it or download it for later!

Miguel's Sonar Ocean Adventures

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Episode 8: Ecolocation
How sound can help you find things!

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