CONSERVATION STATION

EDUCATOR COMPANION GUIDE

The Internet of Things: Infinite Possibilities

KEY LEARNING OBJECTIVES

Students will be able to:

- Identify STEM careers that match their skills, interests, and experiences.
- Identify cause and effect relationships in an ecosystem.
- Propose a smart device that could be used to monitor and save an endangered species.
- Create a video to communicate their research and solution to prevent extinction of their species.
- Explain how smart devices are used in urban environments to collect data and manage resources efficiently.

OVERVIEW

This Virtual Field Trip takes you inside Itron to discover the infinite possibilities of the Internet of Things. The Internet of Things refers to a collection of computing devices—such as smart phones, speakers, thermostats and sensors—that are connected to a network to send and receive data to improve our daily lives. This technology provides connectivity to allow for improved healthcare, banking, retail, manufacturing, safety, and the environment. At Itron, the Internet of Things connects utilities with real-time data to better manage two of the most critical resources to humanity; energy and water. Here, you will meet the team at Itron and learn how they use the Internet of Things alongside of their technologies to develop innovations that protect natural resources and ecosystems, conserve water and energy, and help create better connected, safe and more sustainable communities. This field trip highlights a variety of highly-skilled careers in engineering, research, technology, and executive management that work collectively to create more efficient and insightful utilities, smarter cities, and a more resourceful world by delivering technology and services. This VFT showcases how innovative solutions are used to improve quality of life and promote the well-being of people everywhere.

The pre-field trip activities in this companion guide are designed to introduce students to the topics they will learn about during the VFT. The activities designed for completion during and post viewership connect and extend student learning to classroom concepts.

MATERIALS

Capture Sheets

- Applying Your Knowledge and Skills to Careers in Technology
- Saving an Endangered Species Planning Guide
- Sustainable Cities and the Internet of Things

Itron | Discovery EDUCATION

SAVING AN ENDANGERED SPECIES SUGGESTED LINKS

- https://www.fws.gov/endangered/

SUSTAINABLE CITIES AND INTERNET OF THINGS SUGGESTED LINKS

- Auto dimming street lights
- Electric pole damage detection
- Residential neutral fault detection
- Gunshot sound detection devices
- Utility pole equipment theft detection
- Power outage detection
- Smart home devices
- Remote natural gas meters
- Advanced utility meter data collection

PRE-ACTIVITY

Have students fold a piece of paper in half. On the left side of the paper, have students create a list of all devices in their home that connect to the internet. On the right side of the paper, have them create a list of devices that could be connected to the internet and remotely controlled or monitored. Invite students to share their thoughts and ideas with the class.

DURING-ACTIVITY

Applying Your Knowledge and Skills to Careers in Technology

1. Distribute the Applying Your Knowledge and Skills to Careers in Technology capture sheet to students and review the background information.
2. Guide students to brainstorm their personal talents and interests and write them on the capture sheet.
3. Direct students to watch the Virtual Field Trip. While they watch, they should match some of their talents and interests with the careers featured.

POST-ACTIVITIES

Activity 1: Sustainable City

This activity will help students discover how smart devices can bring together infrastructure and technology to improve the quality of life in an urban environment. In this activity, students will select and research smart devices. They will explain how these devices work and describe the environmental, safety, or economic benefit for the city. Students will capture their learning by using the provided handout.

Activity 2: Saving an Endangered Species

This activity will help students demonstrate the interrelationship between engineering, technology, and science in the context of extinction prevention. In this activity, students will work in small groups to research an endangered species and work collaboratively to design a smart device to help monitor and save the species. Using the information that they gathered and the design they developed, students will create a video to present to the class.

MIDDLE SCHOOL NATIONAL STANDARDS

Science	Next Generation Science Standards • Evaluate competing design solutions for maintaining biodiversity and ecosystem services. (MS-LS2-5) • Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. (MS-ESS3-3)
Technology Education	International Technology and Engineering Educators Association • Make two-dimensional and three-dimensional representatives of the designed solution. • Brainstorming is a group-problem solving design process in which each person in the group presents his or her ideas in an open forum.

Name_____ Date_____

APPLYING YOUR KNOWLEDGE AND SKILLS TO CAREERS IN TECHNOLOGY

Developing innovative technology that provides solutions to managing our energy and water resources will help create a more sustainable, resourceful world. The excitement about engineering, conservation of natural resources, and analytics result in strong job opportunities in this area. Your interests, abilities, and goals all influence your career choices.

What are your talents and skills? List at least four.

_____

_____

What are interests or hobbies you enjoy? List at least four.

_____

_____

While watching the Virtual Field Trip, match some of your talents and interests related to each career highlighted.

	List two skills that are critical for each *professional's* work.	List two talents or interests that *you* have related to this job.
Director of Engineering	1. 2.	1. 2.
Mechanical Engineer	1. 2.	1. 2.
Senior Vice President	1. 2.	1. 2.
Environmental Scientist	1. 2.	1. 2.

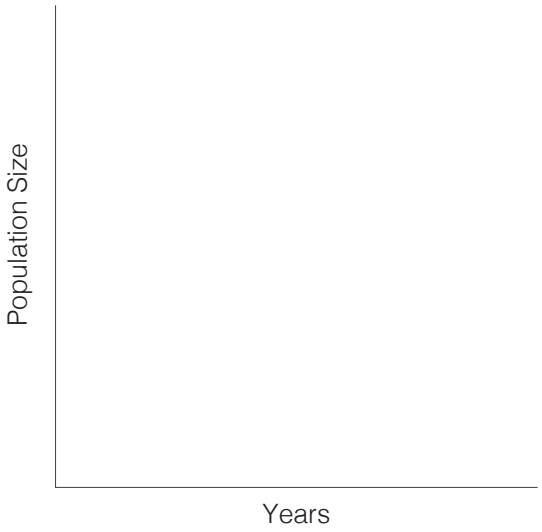
List two careers from the table and **describe** how they may match to your talents and/or interests.

Name_____ Date_____

SAVING AN ENDANGERED SPECIES PLANNING GUIDE

Challenge #1: Think like a scientist and build new knowledge.

1. What endangered species does your group want to study? _____
2. What part of the world does the animal live? Describe its habitat.
3. What is causing them to be endangered?
4. List 1–2 reasons why this species should be saved.
5. Create a sketch graph of how the population of your species has changed over time.



Challenge #2: Think like an engineer and design a solution to a problem.

6. As a group, brainstorm ideas of smart devices that could be used to help monitor and save this species. All ideas should be written down!

7. Review all the ideas that were brainstormed. Select an idea that everyone agrees would help your species the most.
8. On a separate sheet of paper, draw a prototype of the device that you selected. Include 2–3 sentences that highlight the important features of the device.

SUSTAINABLE CITIES AND THE INTERNET OF THINGS

Directions: Select 3–4 devices from the list below. After conducting online research, use the textboxes to explain how each device works and describe its environmental, safety, or economic benefit for the city. Draw a line from the textbox to where this device could be used effectively in the city.

- Water meters that automatically detect leaks
- Auto dimming street lights
- Traffic flow meters
- Automatic smoke detectors
- Electric pole damage detection
- Residential ground fault interruption detection
- Automatic gas leak detection and shut off
- Gunshot sound detection devices
- Public Wi-Fi
- Digital information kiosks