Grades 3-5: Introduction to AI Course

Human Senses vs Computer Sensors

Time Estimate: 30-50 minutes

Learning Objectives

In this lesson students further their understanding of human vs computer sensors and establish what computers can sense that humans cannot (i.e. infrared emissions, low/high frequency sounds, magnetism).

- **Describe how sensor inputs are converted to analog or digital signals**
- **Demonstrate a limitation of computer perception**
- **Build an application using perception**
- **Demonstrate a limitation of computer perception**
- **Define sensor inputs, analog and digital signals, and gain an understanding of how the inputs are converted**

Materials Needed

- Computing device
- Whiteboard and markers
- Magnet and metal objects
- Smartphone/tablet with a frequency analysis app (optional)
- Printouts or visual aids of analog vs. digital signals
- Small objects that could act as sensors (e.g., light bulb, magnets, sound-making items, etc.)

Supplemental Materials

See supplemental materials at the end of the lesson plan.

- **Computer Sensor Poster (Page 8)**
- **Matching Senses Worksheet (Page 9)**
- Human and Computer Sensors Slideshow **(Download in Google Slides)**

Activities

WARM UP

Time
5 minutes

Description

Begin by asking students the following question:

"What can you sense with your five senses?" and list their responses on the whiteboard (sight, hearing, smell, taste, touch).

Have students brainstorm with each other responses to the following questions:

1. Can a computer sense the same things we can?
2. What might a computer sense that we cannot?

Show a picture of a computer and a human side by side. Prompt a few quick responses from the class, asking them what kinds of things each might be able to sense (e.g., infrared light for a computer vs. visible light for humans).

TEACHER DEMONSTRATION

Time
10 minutes

Description

Demonstrate the following as an introduction to the class activity:

1. **Magnetism**: Show a simple magnet and metal objects. Ask students: "What can you sense about this object?" (e.g., weight, color). Introduce the idea that computers (with sensors) can detect magnetic fields and even use magnets in sensors (such as in a compass or a hard drive).
2. **Infrared Emissions**: If available, use an infrared thermometer or camera. Point it at different objects in the classroom (e.g., a warm coffee mug, a cold glass of water) and show the temperature differences. Ask students, "Can you see that with your eyes?" and highlight that infrared sensors detect heat that humans cannot see.
3. **Sound Frequencies**: Use a frequency analysis app or sound-making items (like a whistle or high-pitched sound). Explain that humans can hear sounds within a certain frequency range, but computers can detect both higher and lower frequencies. Ask students: "Can you hear this sound?" and compare it to a sound computer sensors can pick up that humans can't.

CLASS ACTIVITY: WHAT CAN A COMPUTER SENSE?

Time
10 minutes

Description

Divide students into their groups and give them a set of items to experiment with (magnets, light bulbs, a smartphone with an app for detecting frequencies, etc.).

Each group will rotate between stations, where they will explore:

- **Magnetism**: Use a magnet to find out which objects in the room are magnetic (e.g., paper clips vs. wooden objects).
- **Sound Frequencies**: Listen to sounds from the app or items that emit high/low frequency sounds, and note which ones they can hear.
- **Light**: Have them hold their hand in front of a light sensor on a smartphone or tablet to see how the light level changes, discussing how sensors convert light into data.

After students rotate through the stations, lead a class discussion about their findings from each station. As they rotate through, students can keep notes on a piece of paper to share out during discussion.

★ BONUS: DIGITAL PLATFORM ACTIVITY

Time
20 minutes

Description

Want to extend this lesson with an interactive digital experience designed for students in grades 3-5?

Students will explore how computers and robots use sensors like cameras and microphones through a guided online activity on the Skill Struck AI literacy platform.

Set up a **free** AI literacy account for your class:

Create a Free AI Literacy Account

skillstruck.com/free-ai-literacy-2025-2026-skill-struck

Access the lesson here once you've created your free account.

WRAP UP

Time
5 minutes

Description

Write the following question up on the board and have students come up to write a statement connecting what they've learned to the real world.

"Now that we've learned about sensors, can you think of any cool ways a computer might use sensors in the real world?"

If students use a reflection journal, have them put their responses in their journal.

Here are critical thinking questions for students:

1. How do computer sensors help us do things that humans can't do on our own?
2. Why do you think it's important for computers to be able to sense things like infrared light or sound frequencies that humans can't?
3. How would a robot that can sense magnetic fields be different from one that can't? What might it be able to do that the other robot can't?

Grades K-2: Introduction to AI Course

Activities for Further Learning

If you have extra time, here are some additional activity ideas to try with your class.

EXTRA UNPLUGGED ACTIVITIES

Create a sensor comparison poster

- Have each student choose one of the computer sensors (e.g., infrared, magnetism, sound frequency) and one human sense (sight, hearing, etc.).
- Create a poster that shows how each sense works (e.g., how humans see light vs. how a computer senses infrared light). They should include images, diagrams, and brief descriptions.
- In their groups, have students discuss how these sensors are used in real-world situations (e.g., how smartphones use light sensors or how infrared sensors are used in night vision technology).

Connection: Ask students to include examples from their own cultural backgrounds or home countries where technology (like sensors) is used. For example, sensors used in agriculture, medicine, or cultural preservation.

Interactive sensor exploration

- Set up various sensor stations where students can use different sensors, such as light sensors, infrared thermometers, sound frequency apps, and magnetism detectors.
- Have students record their findings, noting what they can sense with their own senses and what the sensors can detect that they can't (e.g., they might use a sound sensor to detect frequencies too high for their ears or use a magnet to find hidden metal objects).
- Students will rotate between stations, and each group will share their observations with the class.

EXTRA UNPLUGGED ACTIVITIES

Design your own sensor activity

- Have students work in small groups to brainstorm a problem that could be solved with a sensor (e.g., detecting pollution, improving agriculture, or helping people with disabilities).
- They will design a sensor system, explaining what it would detect, how it would work, and why it's useful.
- Students will create a simple diagram or flowchart of their sensor system, including what kind of data it would collect and how it would convert that data into a digital signal.

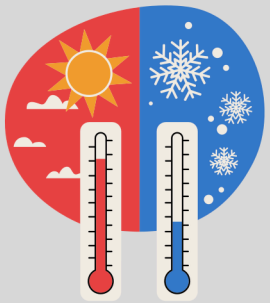
Community Connection: Ask students to think of specific needs or problems in their local or cultural community that could benefit from sensors. For example, students from different backgrounds might come up with ideas like using temperature sensors to help preserve traditional foods or humidity sensors to protect cultural monuments.

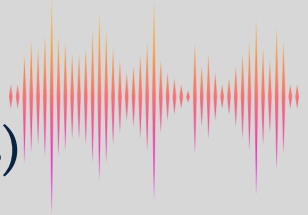
Grades K-2: Introduction to AI Course

Supplemental Materials

Let's compare
Analog & Digital Signals

Analog	Digital
Continuous wave that can take any value between a range	Uses steps like On or Off
Light, sound, temperature	Computers, smartphones, light switches
Can lose quality over time (sound gets fuzzy)	Does not lose quality over time (clear, no fuzziness)





Analog signals are smooth and continuous

WHILE DIGITAL SIGNALS ARE SHARP AND CLEAR

HOW COMPUTERS SENSE THE WORLD!

JUST LIKE HUMANS SENSE WITH SIGHT AND HEARING, COMPUTERS HAVE SENSORS TO "SEE", "HEAR", AND "FEEL"!

1 HEAT DETECTION

Infrared sensors can see heat! Detects things like hot objects or helps sleep in the dark

2 HEARING

Sound frequency sensors can hear things we can't! Detects high-pitched or low-pitched sounds

3 MAGNETIC FIELD

Can sense magnetism! Helps find directions and detect metals

DID YOU KNOW?

Some animals like snakes use infrared to "see" heat or that bats use high-pitched sounds to find food in the dark. Computers can do that too!

WHY ARE SENSORS IMPORTANT?

Sensors help robots, phones, and computers do amazing things, like guiding self-driving cars or helping robots move in dark rooms!