



AI for Children

Artificial Intelligence Curriculum for Elementary and Secondary Schools

Meet the Robots Hoo and Ray

Perception and Learning

01



npi | National Pedagogical Institute
of the Czech Republic

We create methodologies in cooperation
with the National Pedagogical Institute.

Teaching material for Elementary Schools–AI in Computer Science

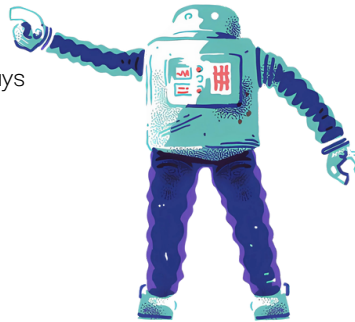
About the robots Hoo and Ray

Concept

A comprehensive educational concept on AI for computer science in lower elementary (grades 3–5), developed as part of the AI Curriculum for Elementary and Secondary Schools, is called Hoo and Ray. It consists of 9 lesson plans, each designed for a 45-minute class. Fairy tales and activities with the robots Hoo and Ray, who were created to help people but often mix things up, guide children through concepts such as data, machine learning, bias, large language models, and ambient intelligence.

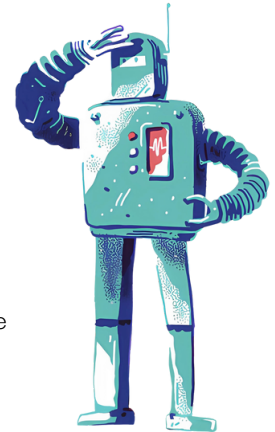
Robot Hoo

Hoo is programmed as a curious and slightly unsure robot. He always tries to understand others. He also collects various human artifacts he finds online—rare memes or old internet trends. He then shows them to Ray, who sees no value in them.



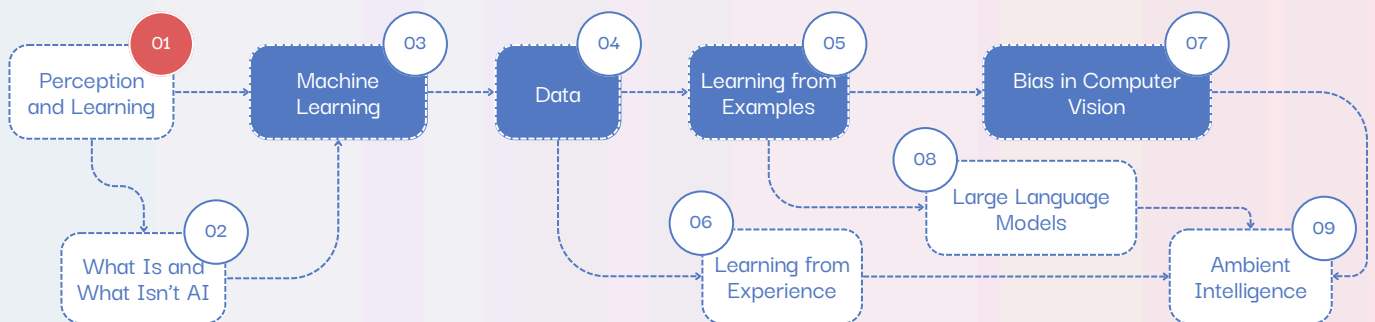
Robot Ray

Ray is programmed for practicality. He constantly looks for ways to process data efficiently. Human emotions don't interest him—what matters are the numbers. He always generates fast and accurate responses, though he often takes things too literally. Ray spends his time building complex mechanical models.



Learning progress map

The Learning Progress Map defines the concepts that children should understand at the lower elementary level. The most important (core) concepts are shown in solid blue; recommended concepts are shown in solid white. Each concept is accompanied by a lesson guide and a presentation.



All materials can be found at kurikulum.aiidetem.cz/en.

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Presentation

Editable template
in Canva

Feedback
form



These teaching materials were translated using ChatGPT.
 Please note possible imperfections in the expressions or wording.

Glossary of terms

Artificial Intelligence (AI)

There is no single, universally accepted definition of artificial intelligence.

However, all definitions agree that it refers to a system that simulates human thinking and behavior.

AI usually takes the form of a computer program designed to solve tasks that once required significant human intelligence and were considered the domain of humans (or animals).

It is also a scientific field, with roots dating back to the first half of the 20th century, focused not only on understanding intelligent systems, but above all, on creating them.

Machine Learning (ML)

Just as humans can learn from examples and experiences, so can human-made machines.

Machines use a method called machine learning, which enables AI systems to go beyond simply following pre-programmed instructions and instead come up with new solutions on their own.

Sensor (also known as detector or probe)

In general, a sensor is a source of information for a control system.

More specifically, it is a technical device that measures a particular quantity and converts it into a signal—usually electrical, optical, or mechanical.

Examples of sensors include:

- temperature sensor
- light sensor
- humidity or water level sensor
- sound sensor
- electronic tongue
- pressure sensor
- flow sensor
- motion detector
- ultrasonic distance sensor
- dust sensor...

Robot

A robot is a machine that operates with a certain degree of autonomy. It performs tasks—sometimes exactly as described by humans (using an algorithm), and sometimes it learns to complete the tasks on its own (using machine learning).

A robot can perceive its surroundings through sensors, respond to them, interact with them, and, with the help of artificial intelligence, even form its own internal representation of the world.

Lesson Overview



Recommended Age, Lesson Length

Children aged 8-11, 45–90 minutes.

Building Blocks

Human senses, sensors.

What Are the Students Learning?

Humans perceive using their senses, machines using sensors.

Why Are They Learning This?

Understanding how machines perceive is important for understanding the subsequent curriculum.

How Do We Know They Have Learned It?

They will describe the differences in perception between humans and machines.

They will state the positive benefits of technology for individuals or society.

Tools

Teacher: Printed worksheets and presentations (to be shown).

Students: Writing supplies.

Note: Gender equality is key for AI for Children, but for brevity we use masculine formulations in our methodologies.

Digital Competence

Facilitating Learners' Digital Competence.

Bloom's Taxonomy

Understanding: Students will learn the differences between human senses and machine sensors and their functions.

Analyzing: Students analyze and evaluate how technologies mimic human senses and how they can be used to solve specific problems.

Five Big Ideas

1-A-II Sensing (Computer Sensors).

3-A-I Nature of Learning (Humans vs. machines).

5-D-II AI for Social Good (Using AI to Solve Societal Problems).

Engage

min
00

Presentation slide 01

Read and discuss with students.

Hi kids! We're robots Hoo and Ray – together we're HooRay! We live here with you humans on planet Earth. Our main program is to learn new things, and you help us a lot with that. We're also programmed to help you! You teach us what's right and what's not. Actually, without you – we wouldn't even exist. Seriously!

**Can you think of a time when you learned something new? What did you need to learn it?**

Kids might say they learn at school, but it's good to highlight that we learn all through our lives. They might also mention they used one of their senses—like sight—to learn something.



Learning is awesome! You discover something new, try it out, and then you know how to use it! We robots learn too—but in a slightly different way. You explore the world through your senses, and we do it through our sensors.

**What comes to your mind when you hear the words human senses? Why do we need them? What do they give us?**

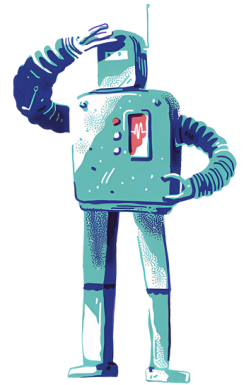
Possible answers: Thanks to sight, we can see; touch helps us feel things; we hear sounds with our hearing; without taste, we wouldn't know what yummy food is; and with smell, we can sense different scents. Children can confuse human sensory organs (eye, ear...) with senses (sight, hearing...). Thanks to the senses we obtain information about our surroundings.

How do robots get information about their surroundings? What comes to mind when you hear the word sensor?

Possible answer: A sensor is a device (a component) that can detect certain things.



You humans might find that your senses sharpen or fade as you grow older. But for us robots? Humans can simply swap out our sensors for better ones—depending on what we need! Like right now - Ray now has a cool new moisture sensor, so he can tell when his feet are getting wet!



Evocative questions for older children

**Which senses do you use when you're learning? What would we miss the most—our eyes or our ears?**

Possible answer: If we couldn't see or hear, learning would be much more difficult.

When people have a disability—like blindness—they can be helped by guide dogs. Can you think of a sensor that could replace a guide dog?

Possible answer: Most likely a camera built into a device—like a smartphone—with an app that can recognize what's in the image and describe it using speech.

Can you think of more examples?

Possible answers: Microphones that allow us to "hear" sounds; temperature sensors that allow us to "feel" temperature.

Understand

min
07

Hand out the worksheets to the students.

First activity

Presentation slide 02

Your senses help you, humans, learn new things. And now—we have a challenge for you!

On your worksheet, you'll see five pictures representing the human senses. Write the name of each sense below the corresponding picture.

Second activity

Presentation of slides 03 (sensor samples) and 04 (activity)

You humans use senses, that's clear. We robots use sensors. Your second challenge on the worksheet is to match each human sense with a sensor that serves a similar function.

Note: A microphone doesn't match with taste (the mouth)—that's a trick! Taste corresponds to an electronic tongue. Children can find many connections between the senses and sensors.

TIP

You can start by discussing in smaller groups so that each student has a chance to speak. Then, one student from each group presents the results. This allows students to share different ideas with each other.

Third activity

Presentation slide 05

Optional activity – do this only if time allows.

Now take a look—either as a whole class or in smaller groups—at which senses you would use most when learning the following activities (listed in the left column). But be careful: only circle two senses for each activity—the ones you think are the most important.

In the right column, write down one sensor that a robot would most likely use for that same activity.

Afterwards, have a conversation. Which sensors did Hoo and Ray use when they were learning to do the same things as you? For example: preparing your favourite meal, climbing trees, reading a story, building a fort, going shopping, playing a musical instrument, playing a team sport, learning new languages



Presentation slide 06

min
25

Read the story to the students.

One sunny morning, the robots Hoo and Ray set off on an adventurous journey. They wanted to explore the world, learn something new, and discover how they could be more helpful to humans.

Their first stop was a hospital—after all, where better to help than in a place where people need it the most? Right at the entrance, they asked a busy nurse how they could be of assistance. The nurse, clearly in a rush, simply said, “Bring the patients something that might help them.”

Eager and full of enthusiasm, Hoo and Ray took her words quite literally. They started bringing in things they thought would be helpful... only, it turned out those were mostly things that would help robots, not people.

The first patient nearly jumped out of bed when the robots tried to place a small solar panel on his chest. “This will help you stay charged and full of energy, just like us!” explained Hoo with a wide smile, while Ray carefully tilted the panels toward the sun. Another patient was left speechless when she found a set of lubricants and oils on her nightstand. “Just so nothing squeaks!” said Ray proudly. “We use them too!”

When one patient discovered a robot maintenance manual by his bed, he couldn’t help but laugh. “This is for you, not me,” he chuckled. But Hoo and Ray were convinced otherwise. “Maintenance is everything,” Hoo replied firmly, while Ray shook his head at the patient’s ungratefulness.

When the nurse came by to check on the rooms, she was met with a scene straight out of a sci-fi comedy. Every patient had been “upgraded” with various odd devices that Hoo and Ray had enthusiastically installed—regardless of whether anyone had asked for them.

Mr. Cloud was wearing a strange helmet with an emotional sensor, meant to read his wife’s mood and adjust the room’s lighting accordingly to reduce his stress. Unfortunately, the helmet wasn’t quite working and kept switching colors so fast that Mr. Cloud looked more like a disco ball than a relaxed patient, which only stressed him out even more.

In the next room, Mrs. Cauliflower was surrounded by small robotic flowerpots with “optimal growth sensors” designed just for her by the robot duo. And over in bed number 8 lay Mr. Snore, encircled by “sensory pillows” meant to track his sleep and help him rest better. However, the pillows kept beeping every hour to report on his sleep quality—meaning he didn’t get any sleep at all.

Finally, when the nurse found out that Hoo and Ray had been handing out USB flash drives with the message: “To store your memories and important moments...”, she realized there had been a slight misunderstanding about what might actually be helpful.

Reflect

min
30



Read aloud with your students and discuss together.

You see, kids, even though we truly wanted to help, it didn’t always work out the way we hoped. It’s a bit like a fish trying to ride a bicycle – we were just not built for it! Still, despite all the mistakes we made, we learned a lot along the way. We often learn by trial and error... and that’s actually a pretty good way to learn! Now you also know that we need sensors to be able to do all kinds of things.



Can you remember which sensors and similar devices the robots used in the worksheet?

Possible answers: Pressure sensor, microphone, light sensor, temperature sensor, motion detector, smoke sensor, humidity sensor, camera, sound sensor.

Describe in your own words how humans and machines differ in how they perceive.

Possible answer: Humans use their senses and special sense organs like eyes, ears, mouth, nose or skin. Robots rely on sensors, such as cameras, temperature detectors, smoke sensors, or motion sensors to understand their surroundings.

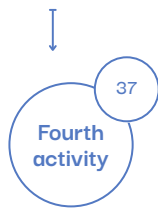


And you know what else we found out? That every new thing we learn brings us one step closer to becoming better helpers for humans. And that gives us robot joy! Well... something like joy, because feelings are a bit tricky for us robots. But in our metal heads, our base program gives us extra points whenever we do something helpful.



Now that you know how machines sense the world, can you think of some examples of how they could help people?

Possible answers: Taking care of plants (like a self-watering greenhouse), driving us home (self-driving cars), vacuuming the floor (smart vacuum cleaners)...

**Presentation slide 07****Hand out worksheet 2.**

You've just learned how important senses and sensors are when it comes to learning new things. You also found out that robots can help us—if we give them the right instructions. Take a look at Worksheet 2 and, for each robot, write down what you would need help with. Try to describe clearly and exactly what the robot should do. Remember, misunderstandings can happen very easily, so think carefully about how you phrase things. For example, it's not enough to just say, "Walk the dog," because the robot doesn't know what that actually means. A better instruction would be: "Put the collar around the dog's neck, clip on the leash, leave the apartment..."

Presentation slide 08

If you're not sure how to advise robots, consider:

1. Whose role should they take?
2. What specifically should they do during the activity?
3. Where exactly should they help?
4. How should the task be done?
5. Why should they do this?

If there's extra time

**Presentation slide 09****If you have a computer or tablet with a camera, you can try the fun app Scroobly by Google.**

Unfortunately, the app doesn't work on mobile phones.

In your browser, type the web address: www.scroobly.com. Click on "Start", then click "Next" twice. Allow the browser to access your camera.

Children can then choose from different characters and animate them using their own body movements. The camera should ideally capture the upper part of the body, from the waist up. You can also turn off the background if you like.

You can even record your movements as a short video.

Why Scroobly?

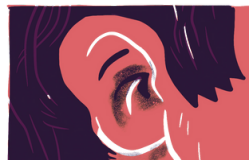
Scroobly uses a technology called computer vision. It's a type of artificial intelligence that can recognize what is shown in an image – in this case, the human body and face. Based on that recognition, the app animates characters in real time using your movements.

Kids! We've got a few challenges for you!



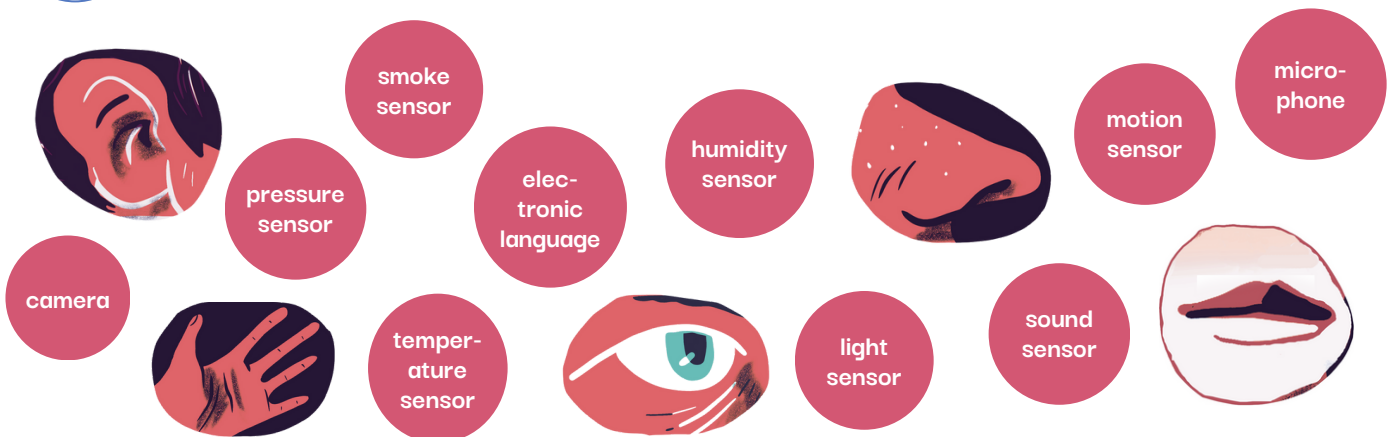
First activity

What are the names of the human senses shown in the pictures? Label each one so it's clear which sense it represents.



Second activity

Match the human senses with the sensors (also called detectors) that robots use. But be careful – some sensors can match more than one sense!



Third activity

Now, look at the activities listed in the left column. Which human senses would you use most when learning each of these things? Circle only two senses – the ones you think are the most important. Then, in the right column, write down one or two sensors that a robot would use for the same activity.

	Humans	Robots
Prepare a meal		electronic tongue, camera
Climb trees		
Read a story		
Build a bunker		
Play the flute		

Fourth
activity

Choose one robot (but you might have time to talk to them all) and explain what you need help with. Remember: misunderstandings can happen quickly, so think carefully about how you choose your words. Your goal is to make sure the robot understands how to help you—without making a mistake.

