AI for Children

Artificial Intelligence Curriculum for Elementary and Secondary Schools

Robots Have a Robo-Dog

Ambient Intelligence

09

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

Ambient Intelligence – Robots Have a Robo-Dog

Concept

The robots Hoo and Ray decide to get themselves a robo-dog. His name is Remindoodle, and he's always ready to help. The only problem? He doesn't always do what he's supposed to! In this lesson, children learn about a concept called ambient intelligence – a world where smart devices connected to the internet work together with artificial intelligence. It's a world where technology becomes an invisible part of our everyday lives. Together with the children, we'll think about the benefits this brings, as well as the challenges it might create.

Robot Hoo

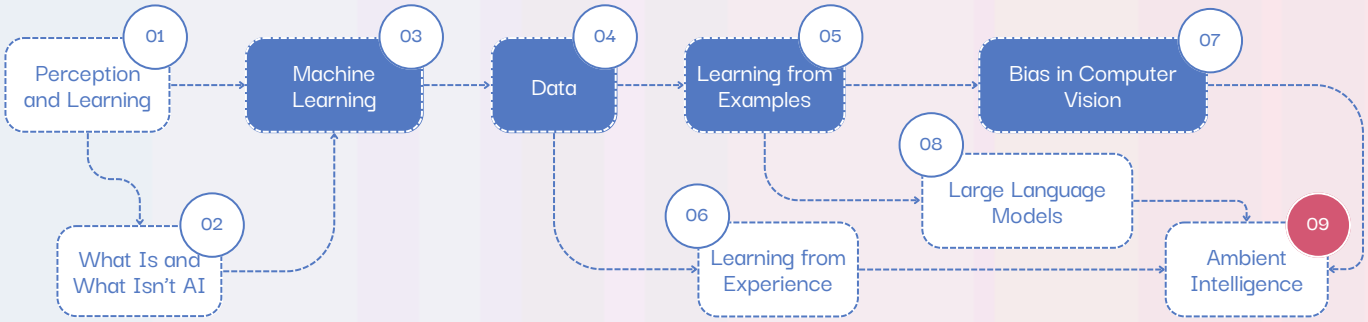
Hoo is programmed as a curious and slightly unsure robot. He always tries to understand others. He also collects various human artifacts he finds online–rare memes or old internet trends. He then shows them to Ray, who sees no value in them.

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 outlines the key concepts that children should understand during elementary school. The most essential ones are marked in solid blue, while the recommended concepts are shown in white. Each concept is accompanied by a teaching material and a presentation.



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

Presentation | Editable template in Canva | Feedback form

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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 called a detector or measuring device)
A sensor is a source of information for a control system.
More specifically, it is a technical device (a component) that measures a certain value and turns it into a signal.
Examples of sensors include smoke detectors, temperature sensors, and light sensors, among many others.

Internet of Things (IoT)
The Internet of Things (IoT) refers to a network of physical devices connected to the internet, which can communicate with each other and with other systems.
These devices are equipped with sensors, software, and other technologies that allow them to respond to their environment, follow instructions, and optimize various processes with little or no human help.
IoT is widely used today – for example in industry, healthcare, transport, and agriculture.
It can help with everyday tasks, increase efficiency in production, save energy, or improve quality of life.
Because these devices are connected to the internet, it's important to think about safety and privacy.
There are risks, such as hackers or misuse of collected data, so ongoing development in IoT also focuses on keeping systems secure.

Ambient Intelligence (AmI)
Ambient intelligence is the term for electronic environments that sense what people need and adapt to their behavior.
This concept uses technologies – such as smart sensors and artificial intelligence – in a way that blends into our everyday surroundings.
An ambient system reacts to users. For example, it can recognize when you're home and automatically adjust lights, heating, or music to suit your routine.
AmI is found in smart homes, offices, and even hospitals, where it helps make everyday life more comfortable.
But because it works quietly in the background, it also raises important questions about safety and privacy.

Lesson Overview

Recommended Age, Lesson Length
Children aged 8-11, 45–90 minutes.

Building Blocks
Ambient intelligence.

What Are the Students Learning?
Ambient intelligence is AI hidden inside everyday objects we use.
It can be a helpful assistant, but it also brings up ethical and safety questions.

Why Are They Learning This?
By understanding ambient intelligence, students can think critically about how AI systems work and what impacts they have.

How Do We Know They Have Learned It?
They will explain ambient intelligence in their own words, give examples of how it's used and what benefits it brings, and identify ethical and safety issues.

Tools
Teacher: Projector and slides for presentation.
Students: Writing tools and printed worksheets (one per group).

Digital Competence
Facilitating Learners' Digital Competence.

Bloom's Taxonomy
Understanding: Students explain the term ambient intelligence.
Creating: Students design their own device that uses ambient intelligence.

Five Big Ideas
5-D-II AI for Social Good (Using AI to Solve Societal Problems).
5-B-I AI & Culture (AI in Daily Life).
5-A-II Ethical AI (Ethical Design Criteria).

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

Engage

min 00

Read part of the story to the students.

Hey there, crew! Hoo and Ray here! How's it going? Do you remember our cat, Kitty? She was totally awesome – but since we sometimes forgot to feed and cuddle her, we decided it was better to let Carl take care of her. He's much better at that kind of thing. But... we kind of miss her now. So we came up with a plan! We're getting a new pet – one that's a little like Kitty, but also helps us with our cool robot inventions. And guess what we found? You've got to see it! But first – we've got a few questions for you!

Presentation slide 02

Think, pair, share
Think: First, students think about the topic on their own.
Pair: Then they team up in pairs and talk about their ideas.
Share: After some time, selected pairs share their thoughts with the whole class.

Imagine you had all sorts of things – devices – connected to the internet. A smartphone, a smartwatch, a fridge, or even toys. Because they're online, they can "talk" to each other and work together. How could they help you in everyday life?
Possible answer: Maybe the fridge could send a message to your phone when you're out of milk. Or your watch could remind you to take an umbrella if it's going to rain. Devices like these could help you stay organized, save time, and not forget important things.

Do you remember what machine learning is? It's a way for computers and robots to learn. So how could these smart devices work if they also had machine learning?
Possible answer: A smart alarm clock could learn how long it takes you to get up and what sounds or music help you wake up best. A smart flower pot could recognize when your plant needs water. Or your backpack might remind you to pack the right books and supplies for school each day.

Understand

min 10

Presentation slide 03

Read the story to the students.

After a few days, Hoo and Ray – the two robots – began to feel a strange kind of emptiness. Their internal system registered a new emotional status: L.O.S.S. – Lack Of Sentimental Support. Sure, Kitty had caused a fair share of trouble and confusion, but she was more than just a pet. She had been a part of their lives – a small, warm presence in their otherwise metal world. And even though they knew a living animal wasn't the best fit for two robots, they couldn't ignore the space she had left behind.

Ray thought for a moment. "What if we got ourselves a robotic pet to fill the gap? We wouldn't have to feed it, but maybe it could help us the way Kitty used to." Hoo paused, then nodded. "That sounds promising. Maybe a robo-dog... but if we're going to do this, it has to be something special. I don't want just a regular machine."

So they began searching. They checked out stores, browsed the internet – until they found something amazing: A robotic dog that didn't just look like a real one, but came with special features. It was built to help them remember things they often forgot – tasks, ideas, and even the little moments that once belonged to Kitty.

Presentation slide 04

Hoo and Ray were thrilled. They immediately ordered the robo-dog and named him Remindoodle. As soon as he arrived, he started acting just like a real dog – sometimes barking, sometimes jumping around or wagging his little antenna-tail. But most importantly, he reminded them what they needed to do. Everything was going smoothly… until one day, something unexpected happened.

What do you think went wrong?

Presentation slide 05

Hoo was just cleaning his sensors when Remindoodle suddenly started blinking in a strange way. Instead of his usual cheerful barking, he began projecting a video onto the wall. And in the video? Ray – with a deeply satisfied robotic expression – slowly pulling on a pair of long, striped knee socks. Hoo couldn't believe his optical units! Ray had been secretly ordering socks online… and trying them on in front of the mirror! Ray's indicator lights began flashing bright red. His internal system went into full panic mode, activating a critical alert: S.H.A.M.E. – System for Humiliating Accidental Metadata Exfiltration.

"Remindoodle, what are you doing?! Thank goodness Grandpa Knitting Machine and Auntie Calculator didn't see that!" Ray said, turning up his speaker volume as he scrambled to shut off the video. Hoo smiled ever so slightly. But then he realized – in all the chaos, he had completely forgotten about an important task: buying tickets for their favorite cat exhibition. Suddenly it hit him: he had come to rely on Remindoodle so much that without him, even the simplest things slipped his mind.

Eventually, Remindoodle started working normally again. But Hoo and Ray both understood something important: even technology has its flaws. Sure, Remindoodle was great at reminding them of tasks, but depending on him for everything could be dangerous. Later, when Carl asked, "So, how's life with Remindoodle?" Hoo thought for a moment and replied, "We've learned that artificial intelligence can do almost anything… except protect your dignity from Grandpa and Auntie."

And so, Hoo and Ray carried on, learning something new every day… But just to be safe, Ray hid his socks really, really deep in the closet.

Talk to the children about the story.
In the story about the robots Hoo and Ray, we came across some new words that remind us of real problems connected to smart technology. Encourage the children to explore these ideas and share their thoughts. Ask them questions that help them think more deeply and express their own view.

min 15

L.O.S.S. (Lack Of Sentimental Support) – Hoo and Ray's system gave them this error after Kitty left. Do you think this kind of error is similar to the feeling of missing someone or something? How is a robot's experience of the world different from a human's?

S.H.A.M.E. (System for Humiliating Accidental Metadata Exfiltration) – Remindoodle was recording what Hoo and Ray were doing – which means he was using different sensors and cameras that may have been connected to the internet. On one hand, that sounds great – because it helped the robots remember things. But on the other hand… most people (and probably robots too!) don't want their private moments shared. How would you feel if something personal about you ended up with your family – or even with strangers?

Remindoodle – When do you think it could be risky to rely too much on technology – like Hoo and Ray did with Remindoodle? Can you think of another example where being too dependent on smart technology might lead to a problem?

Presentation slide 06

min 20

Show the video to the students (3:24).
Link: www.youtube.com/watch?v=5BUa8lGpREY

The video features a demonstration of the petbot Loona. We recommend watching the entire video, as it shows toward the end that Loona can be used to remotely monitor your home through its built-in cameras. Loona is a great example of ambient intelligence – a technology that uses artificial intelligence to recognize people, voices, gestures, objects, and much more. Based on that, it can interact with its surroundings in many different ways, and it's connected to the internet.

A team of researchers is developing a robot companion called Petbot, designed especially for seniors – particularly those who live alone or may be showing early signs of memory loss. Petbot isn't just a friendly presence. It uses ambient intelligence to interact with its environment, check on daily routines, and help keep people safe. With its sensors and smart features, Petbot can notice if someone hasn't responded in a while, seems confused, or may have forgotten something important – like turning off the stove or getting up after a fall. It's designed to connect with a smart home system and can alert family members or emergency services if needed. Petbot is a great example of how ambient intelligence can support everyday life and help people stay safe and independent at home.

First activity

Imagine you could create a smart technology to help you in your everyday life. You might control it with your voice – or even with your facial expressions. It would learn from your habits and adjust to fit you better over time. And because it would be connected to the internet, it could also control other smart devices – like a smart fridge, a robot vacuum, or even the front door to your home. This kind of technology is called ambient intelligence.

min 25

Presentation slide 07

Ambient intelligence is artificial intelligence hidden inside the everyday things we use. That means the objects around us can learn from what we do and adjust to our needs and habits.

Divide the students into small groups.
Ask them to think about how this kind of technology could be useful for kids their age. In their groups, they'll work together to come up with ideas on how it could help with things like getting ready for school, doing homework, finding lost items, organizing their backpacks or rooms, or reminding them of important dates and events. Encourage them to discuss what would actually be helpful for them as kids in everyday life.

Presentation slide 08

Guiding questions to help students think:
- What takes up most of your time but doesn't really help you learn anything new?
- Which everyday task makes you tired or bored?
- What kinds of tasks often stress you out or make you unsure if you're doing them right?
- What could help you keep your room or backpack organized?
- Where would you like to use artificial intelligence – and where wouldn't you want it?

Hand out one worksheet per group.
Using the guiding questions, students will first come up with an idea for a product, then describe it on the worksheet.

Product name: Come up with a name that clearly shows what your product can do.
Who it's for: Think about who would benefit the most from this product.
Product description: Describe what your product does and how it could help. For example, it could help with school preparation, remind you of things, or keep you safe at home.
Collecting Information: Think about what kind of data your product would need in order to work well (for example: habits, movements, time) – and how it would keep that data safe and private.
Slogan & Promotion: Create a short advertising slogan that introduces your product and grabs attention. Who do you think needs this product most, and what are its biggest advantages?

At the end, each team presents their product and explains how it would help people – and why it would be useful!

Reflect

min 35

Read the story.

Hey there! So, how did it go? Did you come up with a way ambient intelligence could make your life better? Hoo and I found out that technology can do amazing things. But even if it seems like it understands people, and even if it can look cute – like Petbot (or us!) – it can never replace what truly matters to humans: relationships, understanding, and caring for one another.

How did it feel to work on designing your own ambient intelligence product? What part did you enjoy the most, and what did you find the most challenging?
Encourage students to reflect on which parts of the project they found most interesting or fun, and ask them to explain why. If they mention parts that were difficult – like planning safety features or thinking about how the product works – ask how they approached those challenges and whether they understand why those parts are important. Help them also think about what they might do differently next time and how this experience helped them grow.

Which product designed by your class would you want to own? What do you like about it? Why do you think it would be useful for you, and how would you use it in daily life? How is it different from other technologies you already know?
Ask students to give specific feedback on one product that really stood out to them. This will help them think more deeply about what makes an idea valuable. Follow up by asking: What exactly do you like about this product? Why would you want to have it at home? Is there anything like it that already exists? How is it better or different?

Would it bother you if your own product collected information about you? Why or why not? How would you feel if someone else – like a parent, friend, or even a stranger – could see that information?
Encourage students to reflect more deeply on questions of privacy and safety. Ask them whether they would personally mind if their own product collected and analyzed their personal data–and why.

Have you ever encountered a product that uses ambient intelligence?
Examples might include: smart phone charging that adapts to your sleep cycle, or a smart alarm in a smartwatch that tracks your sleep and wakes you up at the ideal moment... These kinds of technologies learn from your daily patterns and adapt to you–often without you even noticing.

Describe your idea for a smart product. What does it do, how does it work, and what slogan would you give it?

WHAT IS YOUR PRODUCT CALLED?

WHO IS IT DESIGNED FOR?

WHAT CAN IT BE USED FOR?

WHAT INFORMATION ABOUT PEOPLE DOES IT COLLECT

DRAW WHAT IT WILL LOOK LIKE.

COME UP WITH A SLOGAN