Lesson Plan #1
Application of AI in Robots

SAINT

HANDS ON INTRODUCTION TO ARTIFICIAL INTELLIGENCE IN PRIMARY EDUCATION USING MINECRAFT

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REVISION HISTORY

Version	Date	Author	Description	Action	Pages
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(*) Action: C = Creation, I = Insert, U = Update, R = Replace, D = Delete

REFERENCED DOCUMENTS

ID	Reference		Title
1	2022-1-FR01-KA220-SCH-000087794		SAINT Proposal
2			

APPLICABLE DOCUMENTS

ID	Reference		Title
1			
2			

Table of content

Lesson Plan: Application of AI in Robots

Grade Level: Primary (Ages 9-12)

Subject: Computer Science / Technology

Learning Goals:

1. Grasp the foundational principles of AI and its application to robotics, including aspects of perception, representation, reasoning, and interaction.
2. Explore the societal implications of AI and robotics, and study case studies and success stories.
3. Apply acquired AI and robotics knowledge in practical settings, such as the Minecraft environment.

Session 1: Understanding AI, Perception, and Decision-Making in Robots (45 minutes)

Objective:

Students will understand the concept of AI, how it perceives the world through sensory input, and makes decisions based on that information.

Activities:

1. Introduction (5 minutes):

- Start the session by explaining what Artificial Intelligence (AI) is and how it is used in robots. You could use simple examples like autonomous cars or voice assistants to illustrate the idea.
- Emphasize that AI is not about creating machines that think like humans, but rather about creating systems that can perform tasks that would normally require human intelligence, such as understanding natural language or recognizing patterns.

2. Discussion: Perception and Decision-Making (10 minutes):

- Begin by discussing how humans perceive the world through our five senses - sight, hearing, touch, smell, and taste. Use simple examples to illustrate this, such as recognizing an object by sight or identifying a sound.
- Next, introduce the concept of sensors in robots, explaining that they serve a similar function to human senses. For example, a robot might use a camera to see its environment or a microphone to hear sounds.
- Transition into how AI makes decisions based on the information it perceives. You could use examples like a self-driving car deciding when to stop or start based on the data from its sensors or a voice assistant interpreting spoken commands and deciding on the appropriate response.

3. Minecraft Activity (25 minutes):

- First, instruct students to build a robot model in Minecraft. Each model should have different blocks representing different sensors - for example, a glass block could represent a camera (sight), wool could represent a microphone (sound), etc.
- Encourage students to be creative and think about the functionality of each sensor in a real-world context. After completion, each group should explain their robot model and how each "sensor" contributes to the robot's perception of its environment.
- Next, guide students to create a simple AI in Minecraft using Redstone and command blocks. This AI will represent a self-operating door that opens when it detects a player and closes when the player leaves. This activity introduces students to the concept of AI making decisions based on sensory input.

4. Wrap-up (5 minutes):

- Conclude the session by summarizing the main points from the discussion and the Minecraft activity.
- Reiterate the importance of perception in AI and how AI uses sensory input to make decisions.
- Preview the topics for the next session, which will delve deeper into the decision-making process in AI, including the concepts of representation, reasoning, and learning.

Materials Needed:

- Minecraft Education Edition
- Computers with internet access

Session 2: Learning, Interaction, and Societal Impact of AI in Robots (45 minutes)

Objective:

Students will understand how AI learns, interacts in a natural way, and its societal impact.

Activities:

1. Discussion: Learning, Interaction, and Societal Impact (15 minutes):

- Begin with a review of machine learning, explaining how AI can learn from data and experiences, and adapt its actions over time.
- Introduce the concept of natural interaction in AI, describing how AI systems are designed to interact with humans in an intuitive and natural manner. Discuss examples such as voice

assistants like Siri or Alexa, and how they use Natural Language Processing to understand and generate human language.
- Discuss the societal impact of AI, touching on both positive and negative implications. Discuss how AI can contribute to job creation and improve accessibility but also raise concerns about job displacement and privacy.
- Facilitate a conversation about the ethical considerations of AI use and development, emphasizing the importance of responsible AI integration into society.

2. Minecraft Activity: Learning in AI (10 minutes):

- Instruct students to create an environment within Minecraft that forces the game's AI-controlled mobs to adapt their behaviour. This could be a maze or a series of obstacles that the mobs need to navigate.
- Explain that this activity is an exploration of reinforcement learning, a type of machine learning where an agent learns to behave in an environment by performing actions and observing the results.
- Encourage students to adjust the environment and observe how the mobs adapt to these changes over time.

3. Offline Activity: Natural Interaction (10 minutes):

- Ask students to imagine they are designing their own 'AI assistant' and brainstorm what tasks they would like this AI to perform.
- Students then create a 'dialogue' between them and their imagined AI assistant, writing down how they would give instructions and how they expect the AI to respond.
- Encourage students to role-play this dialogue, one playing the user and the other the AI assistant, to gain a better understanding of natural interaction in AI.

4. Group Activity: Societal Impact (5 minutes):

- Divide students into small groups and have each group brainstorm both benefits and drawbacks of AI in society.
- Ideas could range from increased efficiency and accessibility to job displacement and privacy concerns.
- Each group shares their thoughts with the class, promoting a balanced discussion about the societal impact of AI.

5. Wrap-up (5 minutes):

- Review the key concepts from the session, including how AI learns from data and experiences, how it interacts with humans in a natural and intuitive manner, and its potential societal impact.

- Reinforce the importance of these concepts in understanding the role and potential of AI in our society.
- Encourage students to think about how these concepts might apply to real-world examples of AI they encounter in their daily lives.

Materials Needed:

- Minecraft Education Edition
- Computers with internet access
- Paper and pencils

Session 3: Case Studies and Practical Application of AI in Robots (45 minutes)

Objective:

Students will explore real-world applications of AI and apply learned concepts.

Activities:

1. **Guest Speaker or Case Study Discussion (15 minutes):**

- Introduction: Briefly introduce the guest speaker or the case study to be discussed.
- Presentation: The guest speaker shares their experiences and applications of AI and robots in their field, or the teacher presents a case study showcasing real-world application of AI and robots.
- Discussion: Facilitate a discussion where students can ask questions to the guest speaker or share their thoughts about the case study. Encourage them to link the real-world applications to the concepts they've learned in the course.

2. **Minecraft Activity #1: Real-world Application (15 minutes):**

- Explanation: Briefly explain the task. Students will recreate or represent an aspect of the real-world application of AI they learned from the guest speaker or the case study.
- Activity: Students work individually or in small groups to create their Minecraft models. They can recreate a particular AI tool or represent a scene where the AI tool is applied.
- Sharing: Students share their models with the class, explaining what they've created and how it represents the real-world application of AI.

3. **Minecraft Activity #2: AI Application in Minecraft Environment (10 minutes):**

- Instruction: Guide students to apply the concepts they've learned about AI and robots by creating a complex AI behavior within the Minecraft environment. This could involve creating a system using Redstone and command blocks.
- Activity: Students work on their Minecraft projects, trying to incorporate as many learned concepts as possible.
- Discussion: Have students explain their projects to the class, focusing on the AI concepts they've used.

4. Wrap-up and Unit Reflection (5 minutes):

- Recap: Summarize the main points from the session, particularly the real-world applications of AI and robots.
- Reflection: Ask students to reflect on what they've learned about AI and robotics throughout the course. This could be done verbally or in writing.
- Future Consideration: Encourage students to think about how they could apply these concepts in their own lives, and what they think the future of AI and robotics might look like.

Materials Needed:

- Guest speaker (in-person or virtually)
- Computers with Minecraft and Internet access
- Supplies for presentations (poster board, markers, etc.)