



Designing an AI with a Robot

AI exploration phase

P4 - Validating Models through Robotics Activities

AI and Exploration Topics. What are we exploring?

Task-oriented AI system design: designing AI around a real task.

Classification linked to action: what the AI recognises drives what the robot does.

Defining categories and training data: choosing the classes and the data the model needs.

Responsible use: judging whether a use is desirable.

Bias, errors and limits: anticipating where the system fails.

Prototyping an AI + robot system for an SDG: turning the idea into a first feasible build.

Materials Needed and to Create. What must be prepared before the activity?

Computer or laptop with internet, 1 per group

Robot or robotics kit, 1 per group

Post-its, a few per group

Activity sheets per group: viability criteria, prototype planning, materials for a storyboard or mock-up

Summary sheet of the most feasible SDGs



Exploration Steps and Description. What do participants actually do?

Each group chooses an SDG-linked challenge and follows the first Design Thinking stages to turn a general idea into a concrete, viable AI + robot proposal.

Activity 1 - Reconnect and define the challenge (30 min)

After recalling inputs from "AI Detectives: How Do Machines Learn?" and "From Data to the Machine's Brain", the mission is presented: **design a simple AI + robot system** that helps answer an SDG-linked challenge. Each group chooses its project using viability criteria.

Activity 2 - Empathise (30 min)

Each group fills a guided **empathy map** of its context or user (which can be a classroom, garden, playground): who benefits, what the problem is, what does not work now, and what the real context limits.

Activity 3 - Define and ideate (30 min)

The group states the problem in one sentence and turns it into a **How might we...?** question. It then brainstorms ways to detect the problem, possible robot actions and categories the AI should recognise, and keeps the best ideas against three criteria: useful, possible, trainable or programmable.



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Exploration Steps and Description. What do participants actually do?

Activity 4 - Prototype (90 min)

Each group builds a first prototype (storyboard, diagram, mock-up or first test) covering project name, SDG, problem, what the AI recognises, the classes, the robot action and data needed, following the full flow: **input then classification then decision then robot action**.

Expected Output. What do participants create, produce or gain from the exploration?

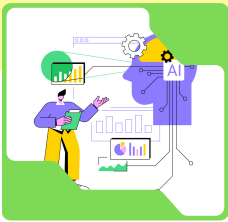
Each group moves from a general idea to a concrete proposal: a How might we...? question, a defined AI task and robot action, and a first prototype, with anticipated data needs and limits.

The Hook and the Playfulness. What makes this fun/exciting for young people?

Each group shifts from talking about AI to designing its own solution as a mission: create a useful robot connected to a real problem and show the idea is feasible, not just attractive.

Success indicators. How do we know it worked? What shows participants learned?

- The group designs from a real problem, connects AI to an automated action, and combines a model with a robot or simulation.
- It justifies the project against an SDG and a concrete context.
- It formulates a clear, viable How might we...? question. (Provisional, to review: names a concrete context and a useful action, and explains why it is achievable.)
- It names 2 to 3 observable categories the AI would classify and a coherent robot action for each. (Provisional.)
- It anticipates at least one realistic error or limit and what would be needed to improve it. (Provisional.)



Appendix - Designing an AI with a Robot

Appendix 1

Empathy map template

Content of the appendix

Guided empathy map for Activity 2. Each group fills one for its context or user (which can be a classroom, school, school garden, playground, the centre bins, a shared space).

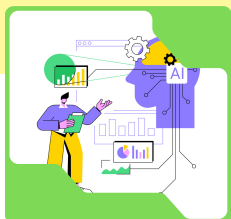
Fields on the template

- Names of the group members
- Who are we empathising with?
- What do you want this person or these people to do?
- What do they see?
- What do they say?
- What do they do?
- What do they hear?
- What do they feel?

Guiding questions

- Who benefits from the project?
- What problem does this person, space or community have?
- What is not working well enough now?
- Why is it important to improve it?
- What limitations are there in the real context?
- What would the system need in order to be genuinely useful?

Example of the template used in UAB



Appendix - Designing an AI with a Robot

Appendix 1

Design template

Content of the appendix

Design template for Activity 4. Each group uses it to sketch its first prototype.

Fields on the template

- Names of the group members
- Make a diagram of how your solution works.

What this first design should include (at least)

- project name
- SDG
- concrete problem
- what the AI recognises
- which classes/categories it will have
- what the robot will do when it recognises a class
- which materials/data are needed
- a first sketch of the full flow

Prototype format (can combine several)

Storyboard, system diagram, an if-this-happens-the-robot-does-this flow, paper mock-up, interaction diagram, a first test training, a first simple robot program if possible. Recommended flow: input then AI classification then decision then robot action.

Example of the template used in UAB