◉ INTERNET OF THINGS

THEME	Architecture in Internet of Things projects (IoT)
FORMAT	Group (all students participate simultaneously)
PREPARATION	1 hour
ACTIVITY LENGHT	30-45 minutes
DIFFICULTY LEVEL	Average

◉ PEDAGOGICAL GOALS

Understand the concept of architecture in engineering projects and how is the basic architecture of Internet of Things projects.

Identify architectural components in some examples of IoT systems.

◉ NECESSARY MATERIAL

Blackboard and pen.

Leading the activity:
This activity consists of three steps. The first two are conducted with the whole class as a single group. For the third stage, the suggestion is to divide the class into smaller groups.

Step 1 Architecture:
Start a collective discussion with the class about architecture, what is it, what is the role of the architect. See examples of questions you can ask:

- What is architecture?
- What does na architect do?
- Why is it important?

Observe whether students perceive that architecture refers to art or the technique of designing a building or a building environment.

Try to lead the discussion to the conclusion: "The architect has a fundamental role in the city, as it is the professional who has the technique of designing buildings and supervising the constructions".

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Step 2 Architecture in Internet of Things projects:

Explain to the class that architecture in engineering projects in general and IoT in particular is *a structure that can be copied to originate similar things, a skeleton of something we want to build.*

Draw on the blackboard the reference architecture that we presented in class (see below) and explain each component:

Perception / performance	Network	Application
Perception / performance: Parts of the IoT system that interact with the physical world.	**Network:** Responsible for making connections in the IoT system.	**Application:** Uses the other two components (perception and network) to do something useful, to deliver a service to people.

Present the example of the intelligent lighting system, in which the light poles detect by themselves when a lamp is burned out and request a replacement automatically.

Ask students if they can identify the components of the architecture. While discussing with them, introduce the three components described below.

1. The perception component is the Intelligent Lighting Pole, because it perceives that a lamp is burned out.
2. The network component can be the Internet with a cable connection.
3. The application component is the Urban Lighting Manager, which requests the replacement of the lamp and indicates the location of the Lamp Posts that are defective.

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Step 3 Practicing:

- Divide the class in 4 groups.
- Read aloud or ask a student to read the example of the Smart Dumpsters for the class:

> *A system of smart dumpsters has been designed to notify a municipal central station when they are full, or ready to be emptied. That way, the driver of the garbage truck could know exactly which streets contain the most dumpsters and which have not yet accumulated as much garbage. With this information, he could define the garbage collection routes, prioritizing streets with full dumpsters. This type of optimization would allow a collection that saves fuel, in addition to making the city cleaner faster.*
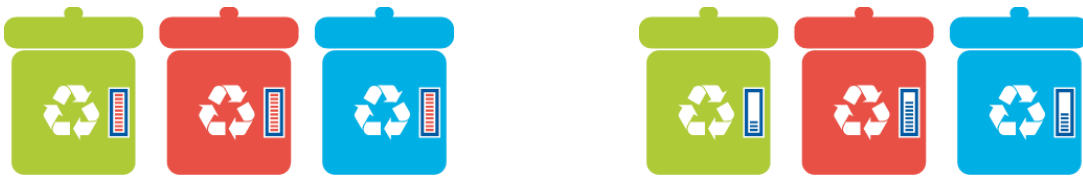
- Ask the groups to identify the three components of the architecture of this system (perception / performance, network, application).
- Share the outcome of the discussions.
- Check if the students identified the three components:
    1. Perception/performance: Smart Dumpster that detects it filling level.
    2. Network: as the Smart Dumpster will need to communicate with the central when it is full, it needs an Internet connection. It can be wired or wireless.
    3. Application: in this example there are two applications. The Dumpster Fill Level Monitor, which offers the service of indicating the fill level of the dumps, and the Garbage Collection Routes Generation System, which offers the service of generating the waste collection routes, prioritizing the fuller dumps and optimizing truck paths.

Discussion and reflection:

After completing the activity, discuss with your students the importance of using a reference architecture. See some examples of possible questions.

- Do you think that engineers use an architecture to design systems? Why?
- Do you remember other situations where there are structures that we use to copy and create similar things? Which ones?

Credits:

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