

## Code Week 4 All Challenge

### Let's Do and Learn Robotics Unplugged

We learn to code by challenging our students to be Robots, engaging and captivating their minds using Computational Thinking methods.

We try to make students understand that robots are not intelligent by themselves and that humans are the ones who give them precise instructions to do the things we want them to do.

#### *Primary school students – 1<sup>st</sup> to 3<sup>rd</sup> Graders*

In this activity we ask the students of the smaller classes to give precise instructions to the "robot" that we are impersonating, so that it moves forward and lifts an object.

We impersonate the robot using robotic movements and voice and whenever they do not give absolutely precise instructions, we answer "robotically" that the robot is not able to understand this command.

Students should describe in detail the way of movement, ie the foot that will rise first from the ground and start the movement, the corresponding movement that the back foot should make at the same time and of course how long the movement of the foot will be for each step.

We then, ask them to consider whether this command to move the foot is repeated further until we reach the goal. If they understand the repetition and what movements are exactly repeated, then they should say that the robot should repeat the same movement, which should have been given a name beforehand. Whenever the same move needs to be revoked then they just say the name. This way they understand the storage of the subroutines of each program and their recall when needed.

The same process is repeated for each part of the body that needs to move to achieve the goal.

Then we ask them to record on paper every different move that is needed, that is, the orders that must be given and in fact in the exact order of execution. Through the process of «Trial and Error», we come to the final code that the whole class considers ideal, so as to solve the initial problem.

The goal is to understand the step-by-step execution of specific commands that only the robot understands and leads it to solve each problem.

### *Primary school students – 4<sup>th</sup> to 6<sup>th</sup> Graders*

The corresponding activity for the students of the large classes dramatizes and simulates the movements of the same robot as we had before but proceeding the analysis of each body movement and comparing it with the corresponding movement of the robot.

In this activity, a robot must be used to compare with the human body. The aim is for students to study the human body as a system from an engineer point of view, which is controlled and operates in a similar way to robots.

Students are asked to describe in detail the parts of the human body that take part in the movement of the body, such as bones, muscles, tendons, etc., as well as the corresponding components of a robot for its movement.

We ask them to record the steps in detail when a person hears a sound or feels a touch and then moves in a direction, we have given him.

We ask them to compare the functions of the above components involved in the movement of both the human body and the robot.

The purpose of the recording is for students to understand how electrical signals are sent to and from the brain, which is the corresponding processor of a computer and passes through the nerve tissue, just like the electronic parts of a robot. Also, to discover the relationship that the human senses have with the sensors used by the robots, as well as the way the muscles are controlled by humans, giving different strength and energy each time, depending on the resistance they encounter and comparing them with the corresponding energy requirements of the motors depending on the load they have to handle each time.

#### *Materials:*

- A robot that is programmed to move and have at least one sensor.
- A projector for the presentation of the human body, focusing on the parts that will be needed for the activity.
- A worksheet for identifying and recording comparable points between a human body and a robot