Candy Factory

Model Number: **YE.318**

Lesson Subjects: Calculate command.

Accessories: For each kit – 2 wide rubber bands, small candy (optional).

Objectives:

- The children will become acquainted with the calculate command.
- The children will become acquainted with the use of the distance sensor in our model.

Lesson Plan:

1. Explain the conveyor and the model operation to the children.
2. Algorithm discussion.
3. Pseudo-Code
4. Explain the calculate command to the children.
5. Explain the distance sensor command add-on to the children.
6. Explain the use of the distance sensor in our model to the children.
7. Building and programming.
8. If necessary, display the programming screenshot.
9. Improvements.

Conveyor Belt – Model Operation:

A conveyor belt is a machine designated to move objects around on a platform, without human intervention.
In this lesson, we build a conveyor belt designated to create a line with candy wrappings.
In every factory, you first make the product. Then, in order to ship it to the stores, you must pack it. In every package, you must put the exact number of candy, to make the product identical in all the stores.
During today's lesson, we will build and program a conveyor belt that can count candies. Once the desired number of candy is counted – the conveyor will stop moving.

Algorithm Discussion:

1. Activate conveyor.
    1.1. Repeat the action for 5 times.
        1.1.1. Drive the conveyor
        1.1.2. Identify a candy
        1.1.3. Count the candy
        1.1.4. Stop when reaching the desired amount of candies.
    1.2. Wait for 15 seconds.

Pseudo Code:

1. Start.
    1.1. Move Motor (A, Right)
    1.2. Show on screen (0)
    1.3. Loop (5 Times)
        1.3.1. Wait until Distance sensor see's candy.
        1.3.2. Wait (2 sec)
        1.3.3. Counting (+1)
    1.4. Wait (15 sec)

Calculate Command:

Present the students with the calculate command button:

This command is used to calculate a mathematical exercise on the screen, within a chain of commands.
The button appears once in the toolbar (marked by a plus sign), but after copying it to the program screen you can click the red button and change the plus sign to another mathematical operation, like a minus:

The calculation command (+) will be used in the current model, to count the candies identified by the motion sensor.
Whenever a candy is identified, the numbers will increase by one.

The Distance Sensor Add-On Options:

This option is used in an add-on to other commands, such as the wait command we learned in previous lessons.
We can display this option by using the regular distance sensor add-on and clicking on its orange part, until it displays the image displayed above.
The meaning of this option is that the command will only respond when the distance sensor recognizes an object approaching it, proximity and distance are represented by numeric values in this command. The higher the value, the further away the sensor is from the object, and the lower the value, the closer the sensor is to the object.
For instance, we define the value 5 as representing proximity of a candy to the sensor on the conveyor belt. Whenever the sensor reaches this value it will begin to activate the chain of commands, and only when the sensor regains a higher value, it will be ready to activate the programming chain again with a new candy.

Pay attention, it is important to explain to the children:

The conveyor belt is programmed to count five candies to pack them, and to stop counting in the fifth candy. The counting of the calculate command is designated to realize the counting activity, and it is presented on screen. The counting itself is done using the motion sensor and the command loop, how so?
The command loop is defined to act only five times. The chain of commands within the loop can only act if the distance sensor sensed an object (a candy). This means that it must count five candies using the distance sensor, to stop the command loop.

Programming Screenshot:

Instructor Comments:

- The wait command in the loop should enable the object to pass out of the sensor's range, without being identified more than once.
- It is best to use small candy or M&Ms, also using a 2 beam is possible, but if you do, avoid using the black beams, as the sensor fails to sense this color in a good way.

Improvements:

- Build a crate to pack the candy.
- Build two charts for interventions when there is a computer error. We can add and subtract using two buttons, the following way: