EV3 CLASSROOM: VARIABLES

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Objectives

1. Learn about different types of variables
2. Learn how to read and write to variables

Prerequisites: Color Sensor, and Display Blocks, Wait blocks
Variables

What is a variable? Ans. A variable stores a value that you can use later in your program. Think of it like a notepad or a box that holds a value for you.

You can name the variable whatever you want

You can define the type of variable:
- Variable (Holds a number)
- List (Holds a set of numbers ... 1,2,3,10,55)

You can either....
- Write – put a value into the variable
- Read – retrieve the last value written to the variable
Why Variables?

Variables are an easy way to transfer data across code.

You can also use variables to transfer data into a My Block without an input (e.g., A variable for wheel size in Move Inches – You probably do not want this to be an input since it rarely changes. You may also use the value in other locations and want to change it just in one spot.)

List variables can store multiple data items and make it easy to process all of them. We will cover list variables in a separate lesson in the advanced section.
Creating a Variable

To create a variable, scroll down to the Variables section.

Select Make a Variable and Name it.

In the example below, a variable called “circumference” has been made.
Writing to a Variable

Once you have created the variable, it will appear in the menu bar.

In the example below, Circumference is set to the circumference of the EV3 Educator robot wheel in centimeters.

Circumference = \( \pi \times \text{Wheel Diameter} \)

Circumference = \( 3.14 \times 5.6 \)

This can be calculated using a Math Block
Reading a Variable

The variable can now be used in any block with an oval shape operator where you would normally type in a value.

In the example on the right, the circumference is used to move the robot forward 20 centimeters (20 CM/Centimeters in a Circumference).

For example, if the circumference was 10CM, the robot would have to move 2 rotations to move 20CM.
Putting it all together

In this example, the program moves 20CM

First set the variable “circumference” before using it in the program

Use the variable in the movement block
Changing Variables

Once you have created the variable, it will appear in the menu bar.

In the example below, counter is initialized to 1. The change by 2 will add 2 to the counter.

The display block will show a 3 on the screen since \(1 + 2 = 3\)

Note that you can change by a negative number as well – this will subtract from the variable.
Challenges

Challenge 1:
◦ Can you make a program that displays the number of times

Challenge 2:
◦ Can you make a program that displays the number of times that you have clicked the up button?

Challenge 3:
◦ Can you write a program that counts the number of black lines you have crossed?
Challenge 1 Solution: Count Clicks

- Initialize the Counter variable to 0
- Every time the Up button is pressed, increase the Counter variable by one
- Wait until the button is released otherwise it will go through the loop multiple times each time you press the button
- Write that Counter Variable to the screen to display
Initialize the Counter variable to 0

Start moving the robot

Every time a black line is seen, increase the Counter variable by one

Wait until the sensor sees white, otherwise you will count the same black line multiple times.

Write that Counter Variable to the screen to display
Non-numeric Variables

Variables can also store text

Unlike EV3-G, any variable can store text or numbers (there are no variable types)

In the example on the left, we use the “Error Message” variable to store text that describes what went wrong.

The program lets the user know if the robot travelled too far or too little if the goal was to move 500 degrees.

Note: 1sec at 50 % speed should move 500 degrees.
Discussion and Next Steps

We use variables in the following lessons:

- Advanced: Menu System
- Advanced: Parallel Beam Synchronization
Credits

- This tutorial was created by Sanjay Seshan and Arvind Seshan
- More lessons at www.ev3lessons.com

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