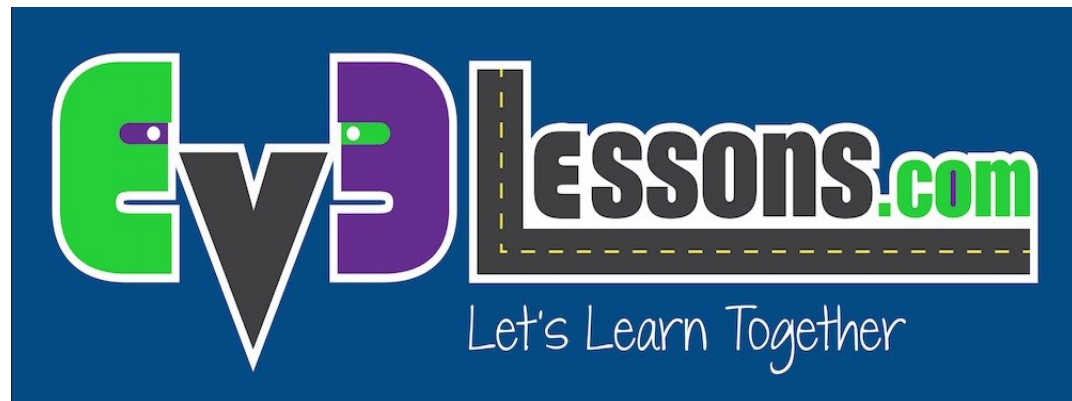


# INTERMEDIATE PROGRAMMING LESSON



## INTRODUCTION TO MY BLOCKS

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By Sanjay and Arvind Seshan



# Lesson Objectives

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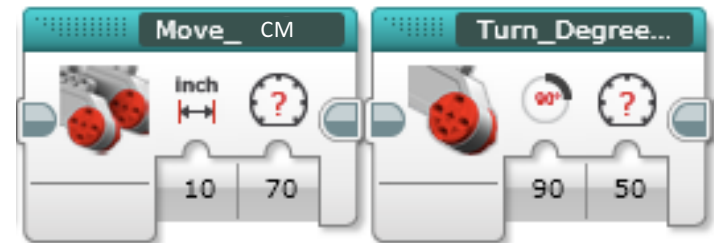
Learn how to make custom blocks in the EV3 Software (My Blocks)

Learn why a My Block is useful

Learn to construct a My Block with Inputs and Outputs (Parameters)

# What is a My Block?

- A My Block is a combination of one or more blocks that you create that can be grouped into a single block
- My Blocks are basically your own custom blocks
- Once a My Block is created, you can use it in multiple programs
- Just like any other block in EV3, My Blocks can have both inputs and outputs (parameters)



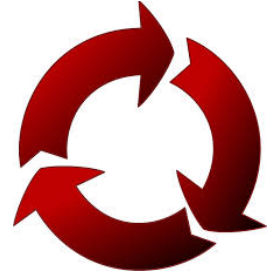
The two blocks above are examples of My Blocks:

- Move\_Inches tells the robot to move the number of inches we input
- Turn\_Degrees tells the robot to turn the amount we input
- These My Blocks will be taught in separate lessons.

# When do You Use a My block?

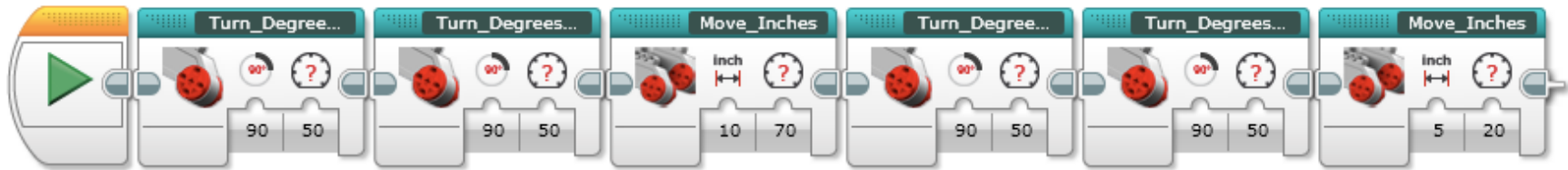
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- Whenever the robot is going to repeat an action inside your program
- When code is repeated in a different program
- Organize and simplify your code



# Why Should You Bother?

Because of My Blocks, your missions will look like this...



Instead of this....



This makes your code easier to read and easier to modify!!!

# What Makes a Useful My Block

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Note: Making My Blocks with inputs and outputs can make them far more useful. However, you need to be careful not to make the My Block too complicated.

Question: Look at the list of three My Blocks below. Which ones do you think are useful for to use?

- Move5CM (Moves the robot five centimeters)
- MoveCM with a centimeter and power input
- MoveCM with centimeter, power, angle, coast/brake, etc. inputs

Answer:

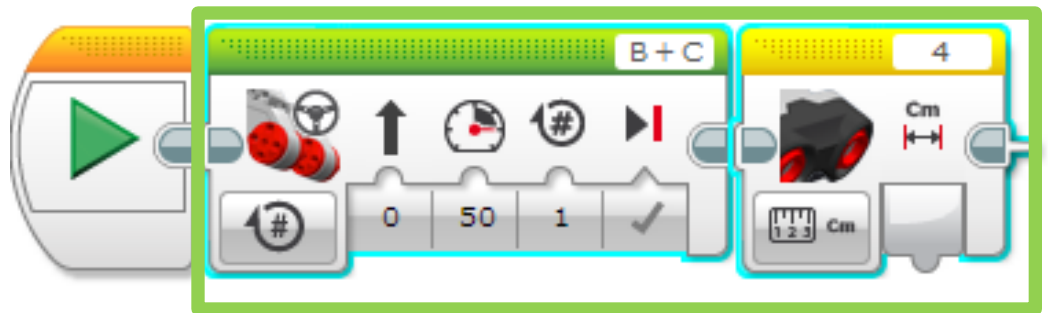
- Move5CM may be used often, but you will be forced to make other My Blocks for other distances. This will not be fixable later.
- MoveCM with centimeters and power as inputs is probably the best choice.
- MoveCM with centimeters, power, angle, coast/brake, etc. might be most customizable, but some of the inputs might never be used.

# Step 1: Highlight Blocks

- For this lesson, our goal is to move a **desired amount of rotations** at a **desired power** and **return the ultrasonic value** at the end

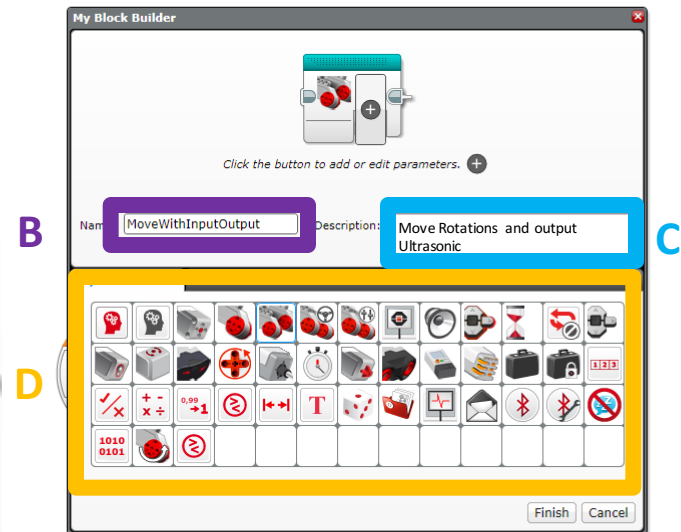
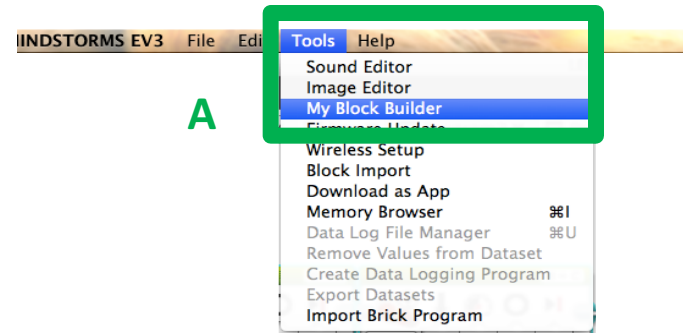
- Question:** What would be the input(s) and output(s) for our My Block?
- Answer:** The inputs are power and rotations. The Output is distance measured by the ultrasonic sensor.

- Step 1: Select the two blocks in the code that you want to turn into a My Block



# Step 2: Launch My Block builder

- A: Go to Tools → My Block Builder - If you encounter an error, view the next slide
- B: Pick a My Block Name
- C: Add a Description
- D: Select an Icon for the whole My Block





# Common Error Messages

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**ERROR 1: You must be on a diagram with a selection to create a My Block:**

- SOLUTION: You need to highlight all the blocks again before going into My Block Builder

**ERROR 2: Start Blocks are not allowed in the selection when creating My Blocks. Remove any Start Blocks from your selection and try making your My Block again.**

- SOLUTION: Un-highlight the start block before going into My Block Builder

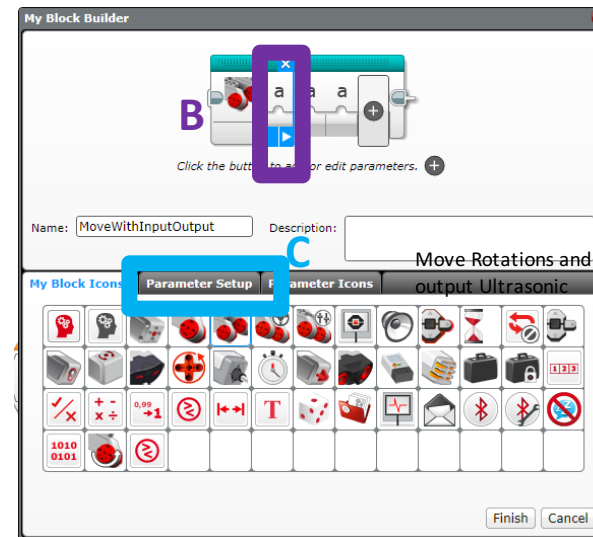
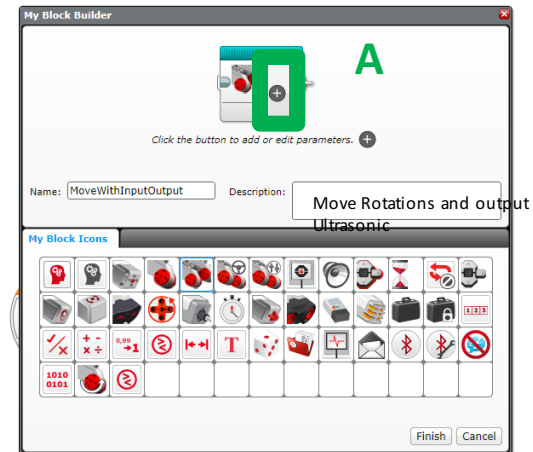
If you continue to have trouble at this step, just select a single block in your program and create a My Block from it. You can edit add more blocks to a My Block at any time. However, you cannot change the inputs and outputs of a My Block after creation.

# Step 3: Add Inputs/Outputs

A. We need to add two inputs and one output so we will click the + button three times

B. Go back to the first parameter

C. Go to Parameter Setup



# Step 4: Setup Parameter for Power

The screenshot shows the 'My Block Builder' window. At the top, there is a preview of a block with three 'a' parameters and a '+' button. Below the preview, there is a text field for 'Name' containing 'MoveWithInputOutput' and a 'Description' field containing 'Move Rotations and output Ultrasonic'. The 'Parameter Setup' tab is active, showing a 'Name' field with 'Power', a 'Parameter Type' dropdown set to 'Input', a 'Data Type' dropdown set to 'Number', and a 'Default Value' field set to '50'. There are also 'Min' and 'Max' fields set to '-100' and '100' respectively. A 'Parameter Style' section shows four icons: a button, a slider, a vertical slider, and a dark grey box. The vertical slider icon is selected with a checkmark. At the bottom, there is a blue bar with the text 'Set min & max values (only available with slider)' and 'Finish' and 'Cancel' buttons.

A. Pick a Name

B. Select Input

C. Power is a Number

D. Choose a default value

E. Choose button Style

# Step 5: Setup Parameter for Rotation

Now click on the second parameter

The screenshot shows the 'My Block Builder' window. At the top, a block icon is displayed with three 'a' parameters. The second 'a' parameter is highlighted with a purple box. Below the block icon, there is a text box with the instruction 'Click the button to add or edit parameters.' and a plus sign button. Below this, there are two text boxes: 'Name: MoveWithInputOutput' and 'Description: Move Rotations and output Ultrasonic'. At the bottom, there are three tabs: 'My Block Icons', 'Parameter Setup', and 'Parameter Icons'. The 'Parameter Setup' tab is active. It contains several fields: 'Name: Rotations', 'Parameter Type: Input' (selected), 'Data Type: Number', and 'Default Value: 2'. To the right of these fields is a 'Parameter Style' section with a green border, containing four icons. The top-left icon is selected with a checkmark. At the bottom right of the 'Parameter Setup' section are 'Finish' and 'Cancel' buttons.

A. Pick a Name

B. Select Input

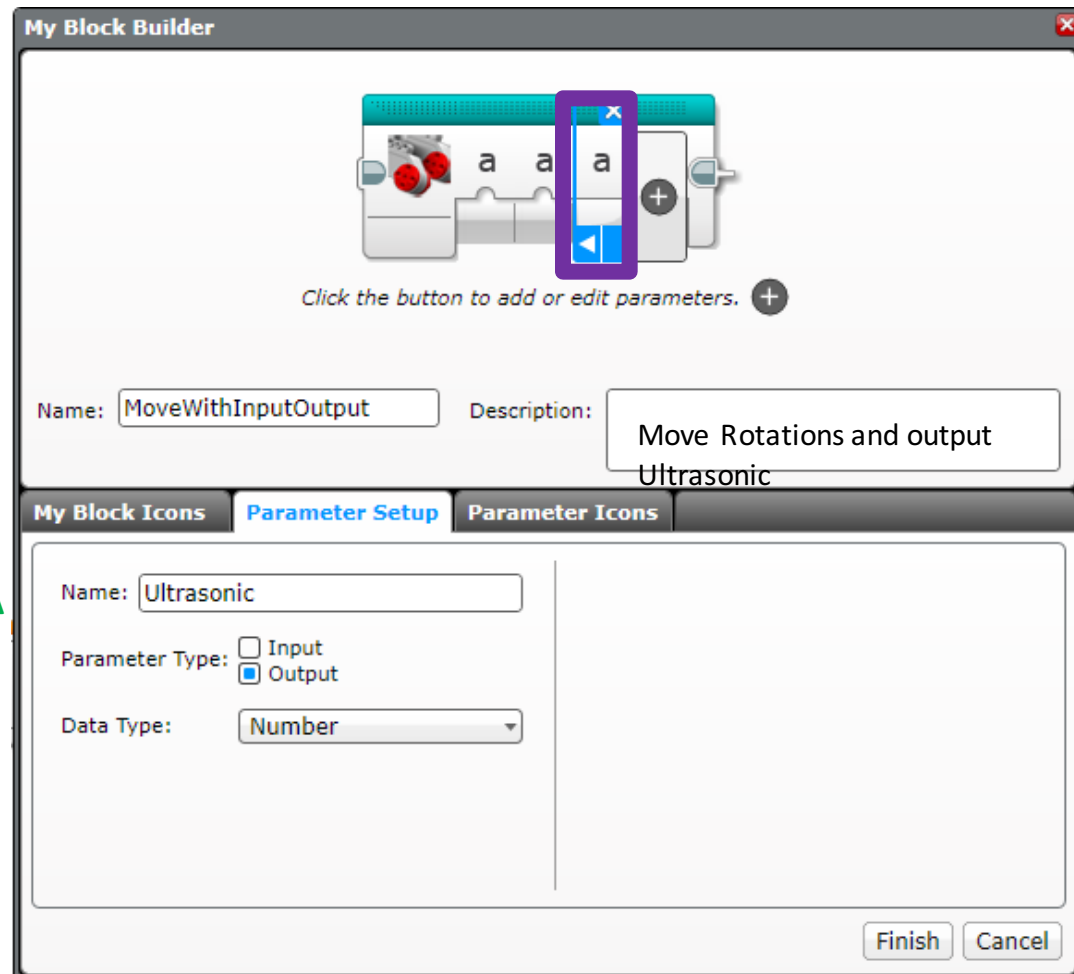
C. Rotation is a Number

D. Choose a default value

E. Choose button Style

# Step 6: Setup Parameter for Ultrasonic

Now click on the third parameter



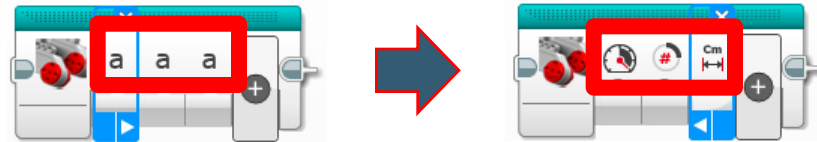
A. Pick a Name

B. Select Output

C. Ultrasonic output is a Number

# Step 7: Setup Parameter Icons

In this step, we will change the icons for the parameters from “a” to an image of your choice.

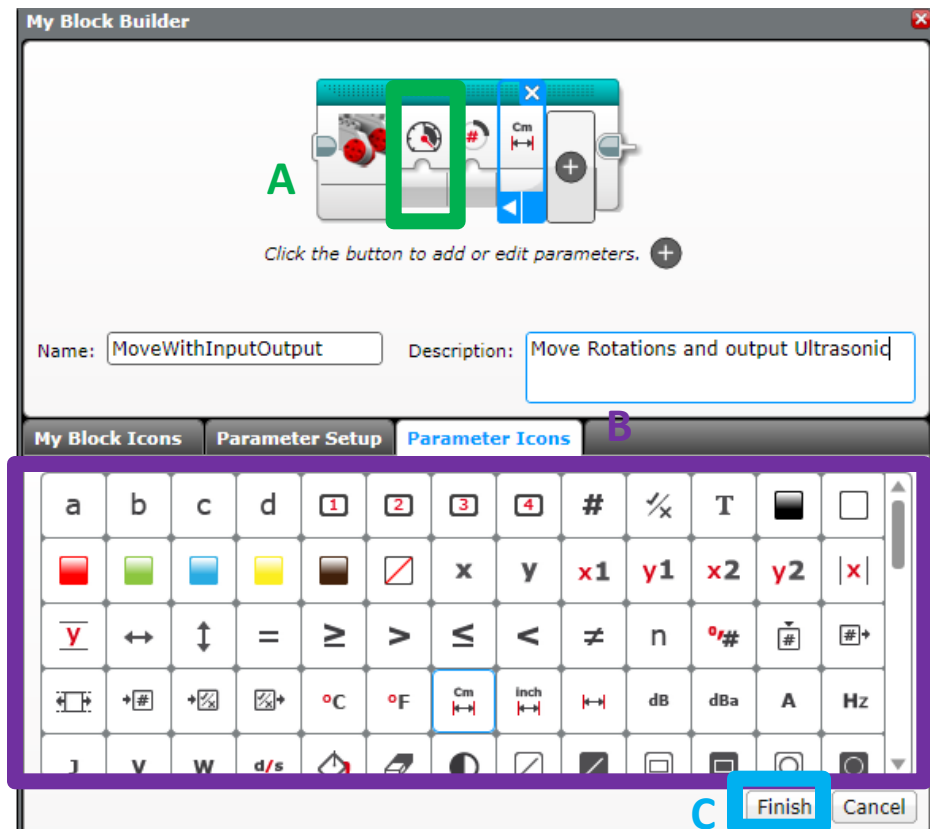


A. Click on a parameter

B. Click on the tab Parameter Icons if not already on this tab, and choose an icon

C. Repeat steps A and B for each parameter

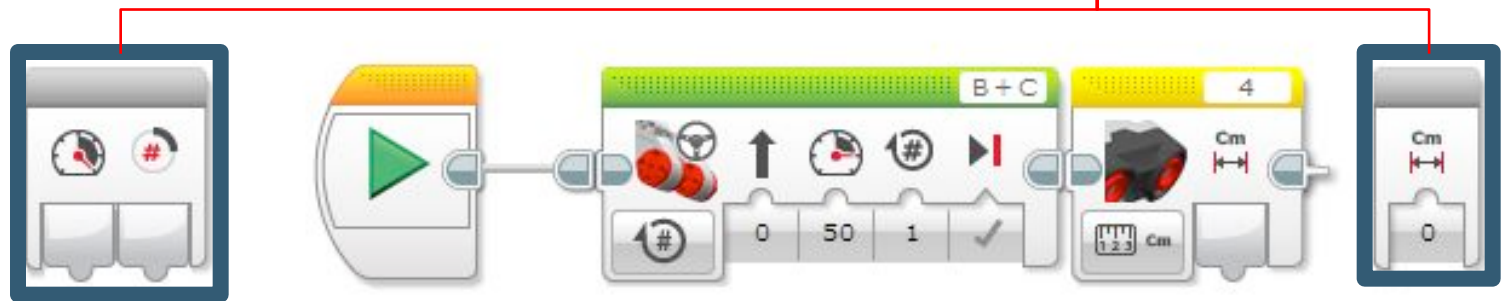
D. Press Finish when you are done.



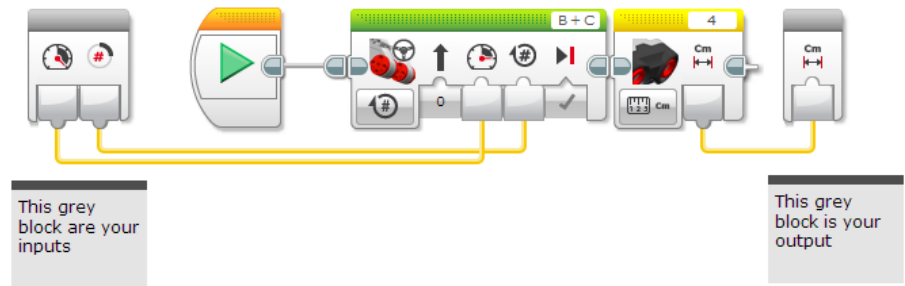
# Step 8: Add Data Wires

- A. When you click Finish (on previous slide) you will see this.

These grey blocks are our inputs/outputs (parameters) that were set up automatically by the My Block Builder

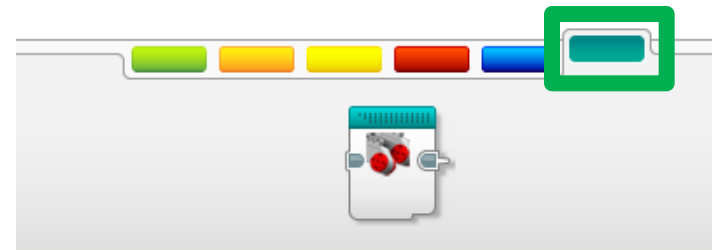


- B. Wire up the My Block by dragging a data wire from each parameter to its corresponding slot on the move steering block and sensor block.



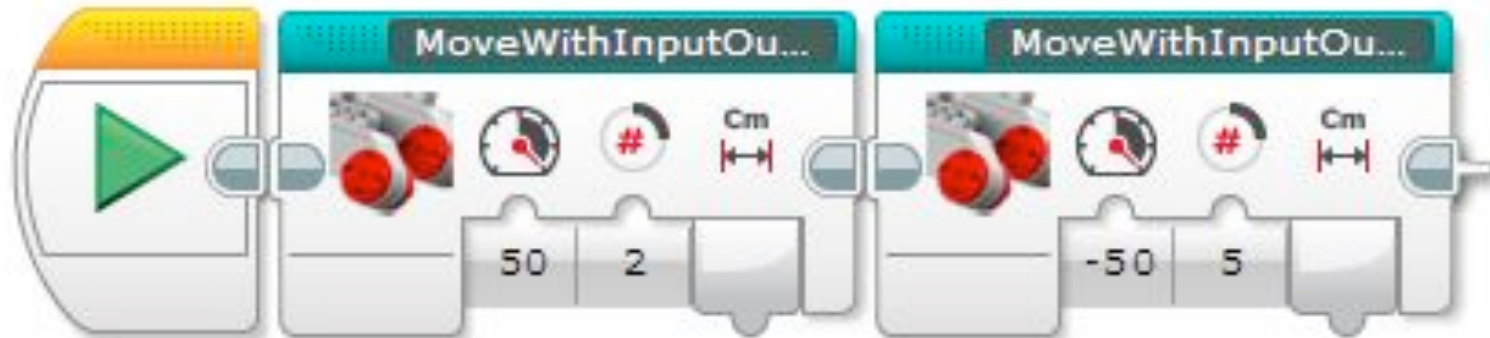
# Where is the My Block?

- A. Your My Block will appear in the turquoise tab. You can now use this block in any program.



- B. Below, the same My Block is used twice. Once to move forward 2 rotations and then backwards 5 rotations.

Note: The same My Block can be used with different input values.





# Credits

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This tutorial was created by Sanjay Seshan and Arvind Seshan

More lessons are available at [www.ev3lessons.com](http://www.ev3lessons.com)



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