

# INTERMEDIATE PROGRAMMING LESSON



## EV3 CLASSROOM: PARALLEL BEAMS (EVENTS)

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By Sanjay and Arvind Seshan



EV3 CLASSROOM LESSON  
BY EV3LESSONS.COM

# Lesson Objectives

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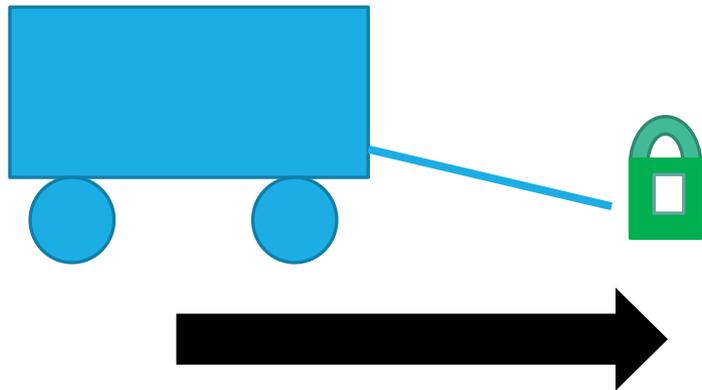
- 1) Learn what an event is and how to use them
- 2) Learn when you might use events

# What are Events?

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Events allow you to run two or more blocks at the same time.

What if you have one or more attachment arms connected to motors and you want to turn these arms while the robot is moving to complete a mission

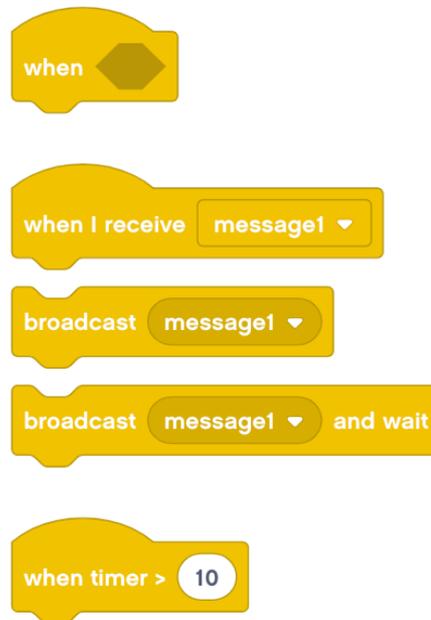


Robot lifting up  
hoops and driving  
forward.

# Event Blocks

Events are triggered by different conditions (e.g. sensor values, message broadcasts, or when a program starts)

In this lesson we provide an example of each.



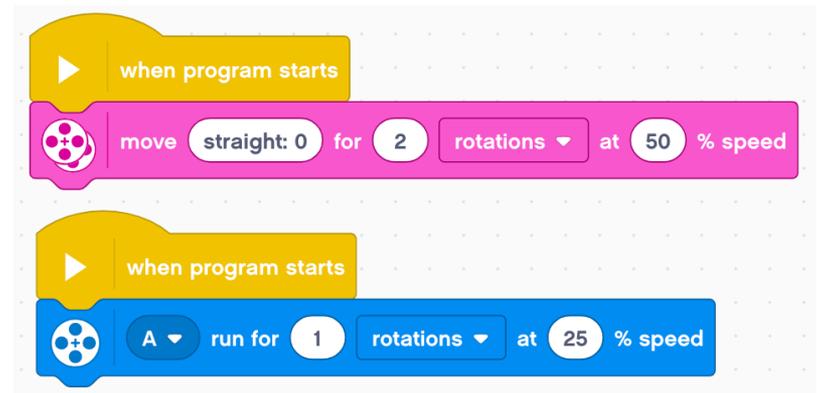
# When Program Starts



This block is used to start your programs.

If you have more than one in a project, you can have two separate pieces of code run when the program starts.

In the example on the right, the robot will move straight for two rotations while simultaneously running Motor A for 1 rotation

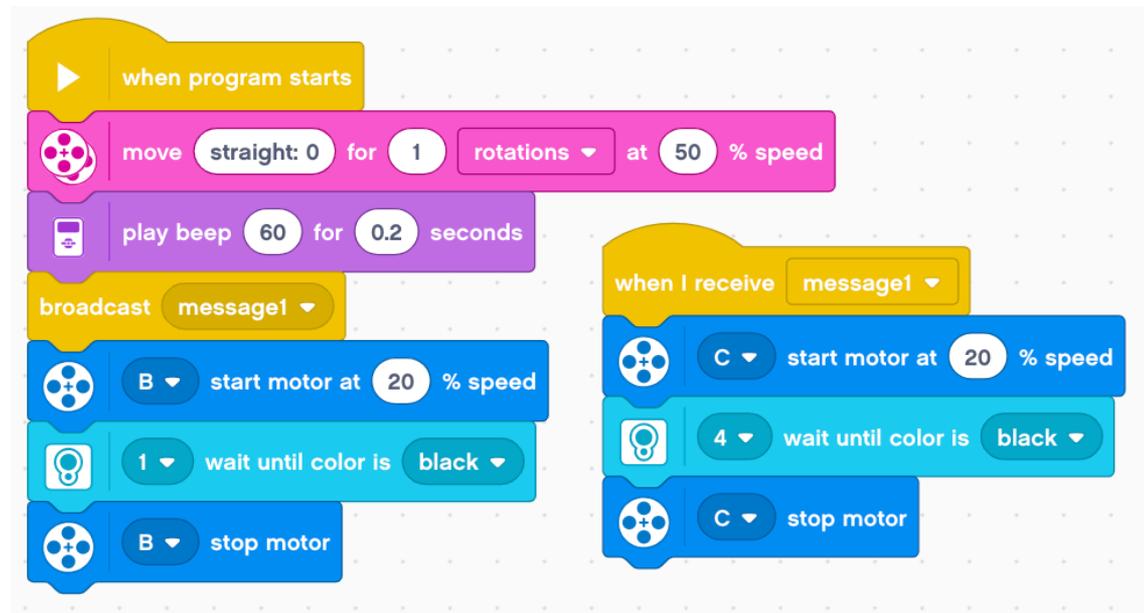


# Broadcast Messages

Messages can trigger events when you want to (even in the middle of code)

Broadcast message: sends the message and then continues the rest of the code below it.

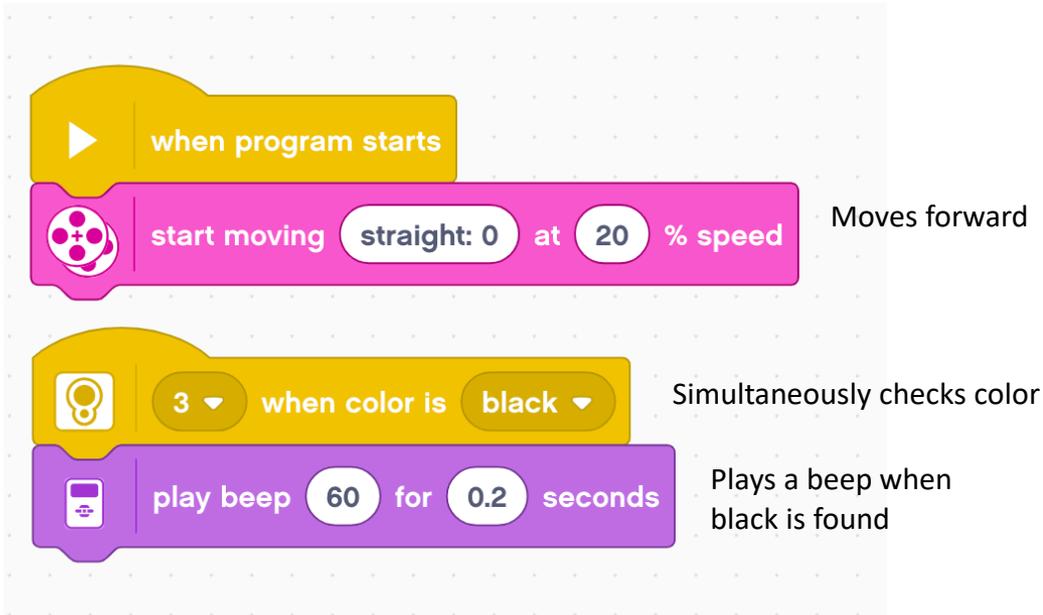
Broadcast message and wait: sends the message and waits for all the code under that received message finish and then continues the code under the broadcast message block



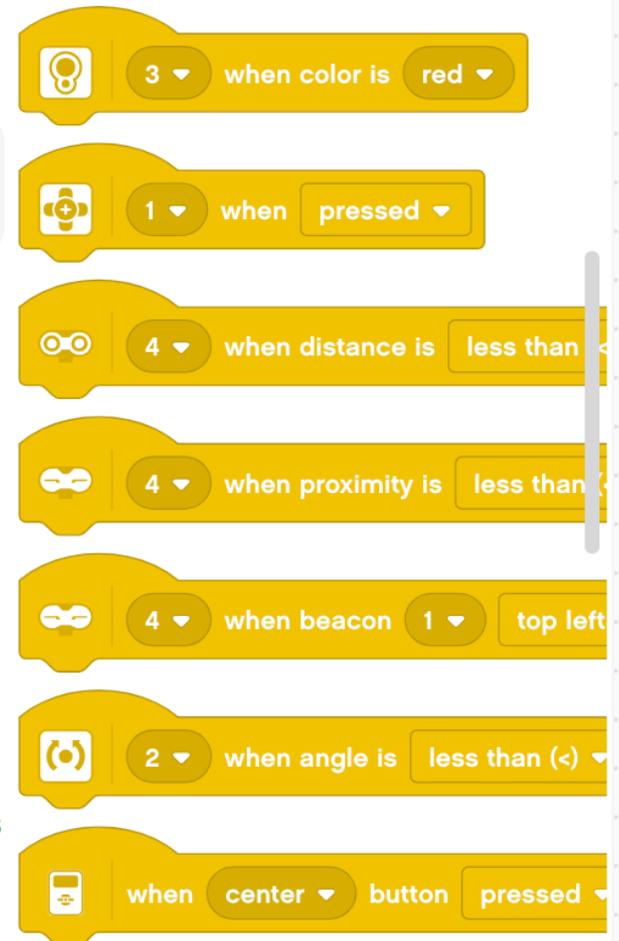
# Sensor Activation

You can use the Event Sensor blocks to trigger an event when a sensor condition is met.

In the example below, the robot moves forward and checks for the color black at the same time.



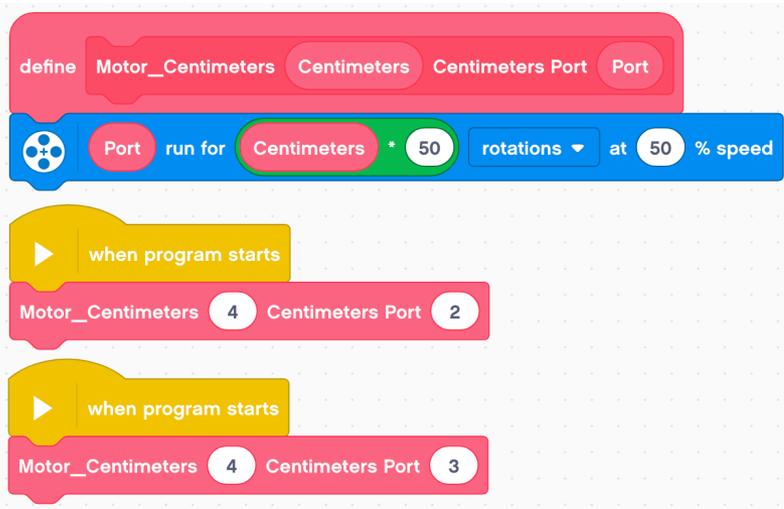
A Scratch script on a grid background. It starts with a yellow 'when program starts' block. This is followed by a pink 'start moving' block with 'straight: 0' and 'at 20 % speed'. To the right of this block is the text 'Moves forward'. Below the pink block is a yellow 'when color is black' block with the number '3' in a dropdown. To the right of this block is the text 'Simultaneously checks color'. Finally, there is a purple 'play beep' block with '60' and 'for 0.2 seconds'. To the right of this block is the text 'Plays a beep when black is found'.



A vertical stack of six yellow sensor event blocks. From top to bottom: 1. 'when color is red' with '3' in a dropdown. 2. 'when pressed' with '1' in a dropdown. 3. 'when distance is less than' with '4' in a dropdown. 4. 'when proximity is less than' with '4' in a dropdown. 5. 'when beacon 1 top left' with '4' in a dropdown. 6. 'when angle is less than (-)' with '2' in a dropdown. The bottom-most block is partially cut off and shows 'when center button pressed'.

# Events and My Blocks

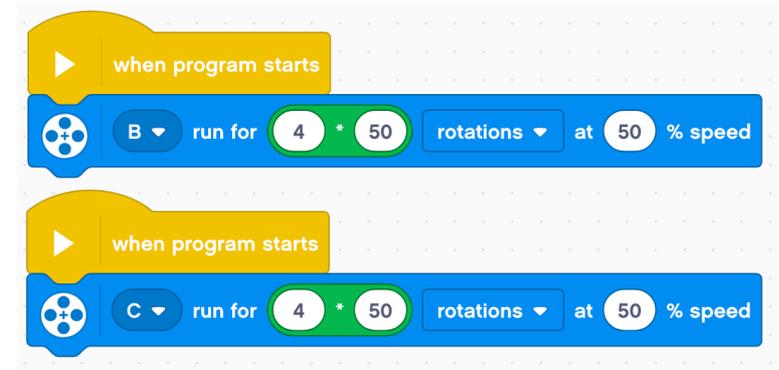
## Using My Blocks



The code on the left uses My Blocks. It starts with a 'define' block for 'Motor\_Centimeters' with parameters 'Centimeters', 'Centimeters Port', and 'Port'. Below it is a 'run for' block that uses the 'Port' parameter, followed by a multiplication of 'Centimeters' by 50, and 'rotations' at 50% speed. This is followed by two 'when program starts' blocks, each calling the 'Motor\_Centimeters' My Block with different port numbers (2 and 3) and a value of 4.



## Without My Blocks



The code on the right does not use My Blocks. It consists of two 'when program starts' blocks. The first block calls a 'run for' block for port B, with a multiplication of 4 by 50, and 'rotations' at 50% speed. The second block calls a 'run for' block for port C, with a multiplication of 4 by 50, and 'rotations' at 50% speed.

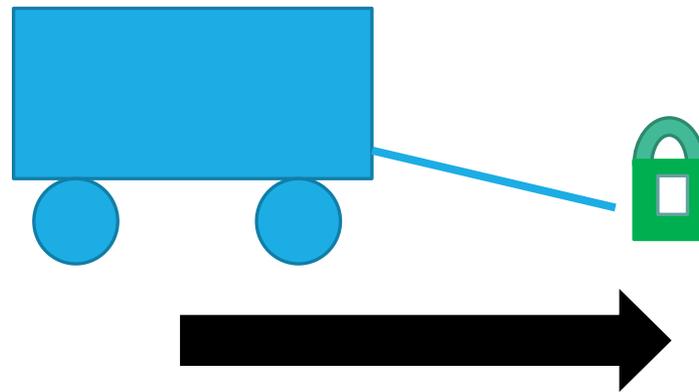
The code on the left and right may seem the same, but they are not. Only the code on the right will work properly.

The EV3 does not allow multiple identical My Blocks to run simultaneously.

# Challenge

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Can you write a program that uses parallel beams that have to move and pick up an object at the same time?



# Credits

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This tutorial was created by Sanjay Seshan and Arvind Seshan

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



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