

# ADVANCED EV3 PROGRAMMING LESSON



## Random Block

---

By Sanjay and Arvind Seshan

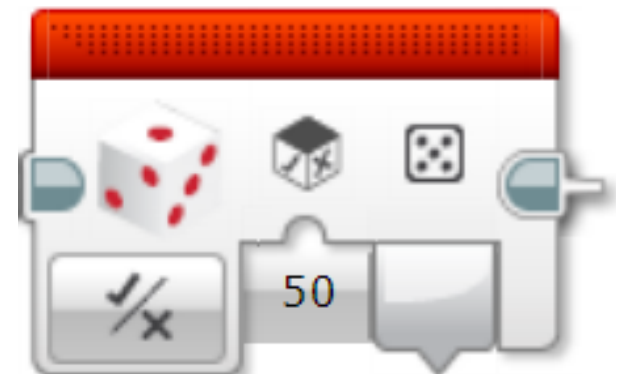
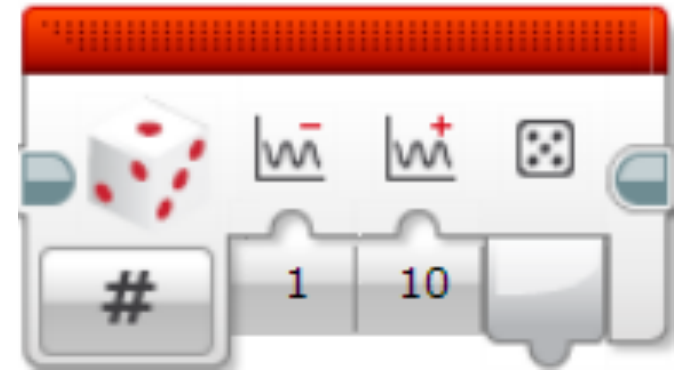


# Lesson Objectives

- Understand what the random block does
- Fix the random block's "lack of randomness"
- Create a game using the random block
  
- Prerequisites: Math Blocks, Data Wires, Variables, Constants, My Blocks with Inputs and Outputs

# What Does the Random Block Do?

- Random Block (Numeric Mode)
  - Two inputs: The minimum and maximum values for the output
  - It outputs a number between the range specified
  - The output is only integers (no decimals/fractions)
  
- Random Block (Logic Mode)
  - One input: The probability of True being the output
  - It outputs either True or False



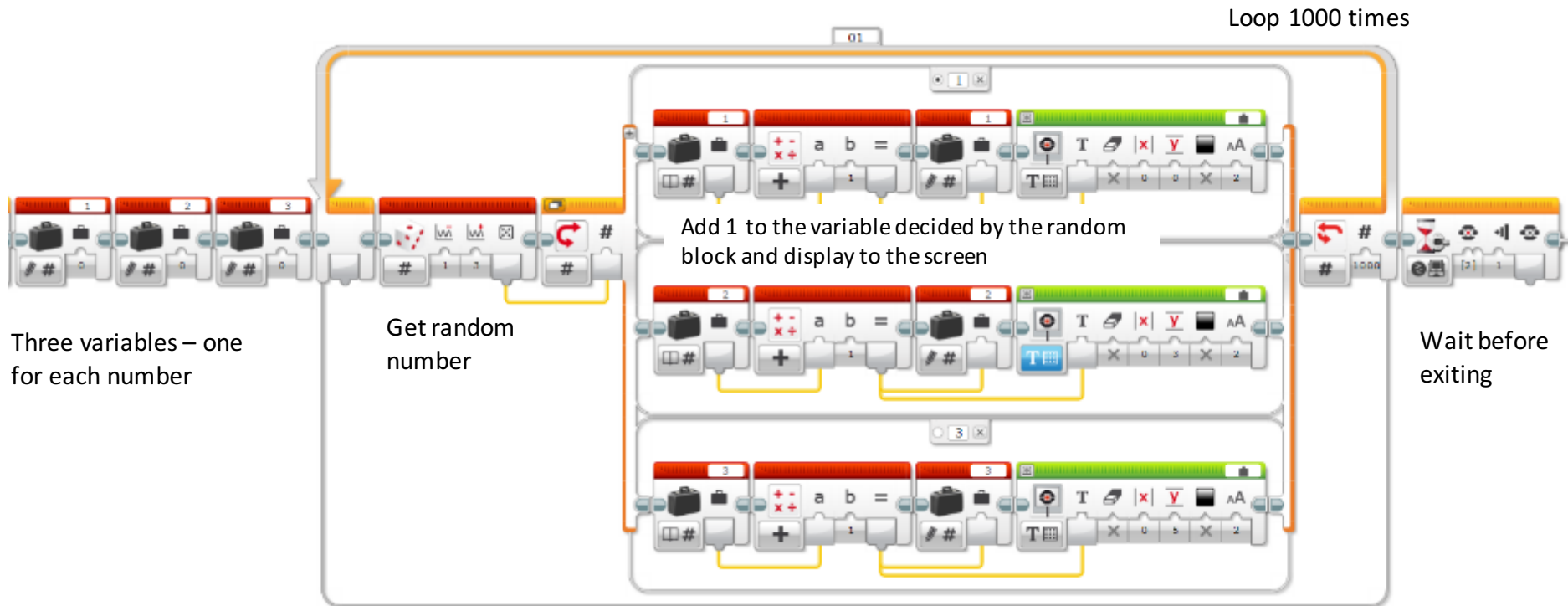
# What Can You Use a Random Block For?

- As a replacement for dice
- Making your robot *unpredictable* (e.g. *random animal movements*)
- Making a Game

# Challenge 1: Is the Random Block Random?

- Make a random number generation system to pick a number between 1 and 3
- In a loop, record how many times you get each number using three variables
- Run your system 1000 times
- Display the results to the screen
- What do you notice about the number of times you got #1 vs. #2 vs. #3?

# Challenge 1 Solution



# Challenge 1 Discussion

- You will notice that you got the #1 and #3 about 250 times each. But you got the #2 around 500 times
- This is due to a bug in the EV3 that causes the boundary values (1 and 3 in our example) to occur half as often as the middle values (2 in our example). This is true no matter what your range of numbers is.
- Can you think of how you might fix this problem to get a better random number?

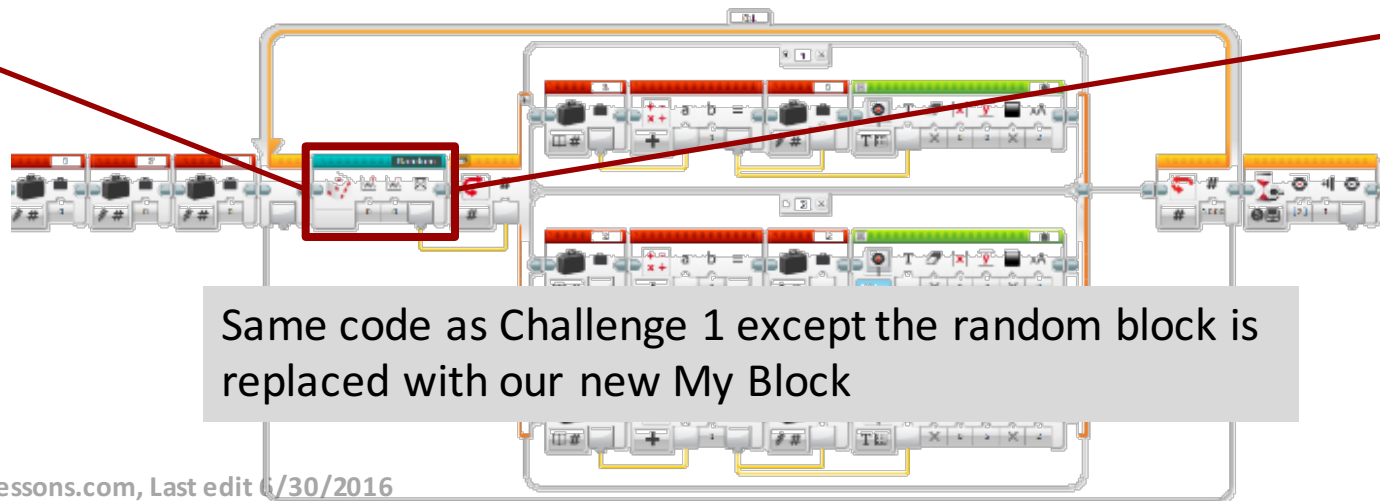
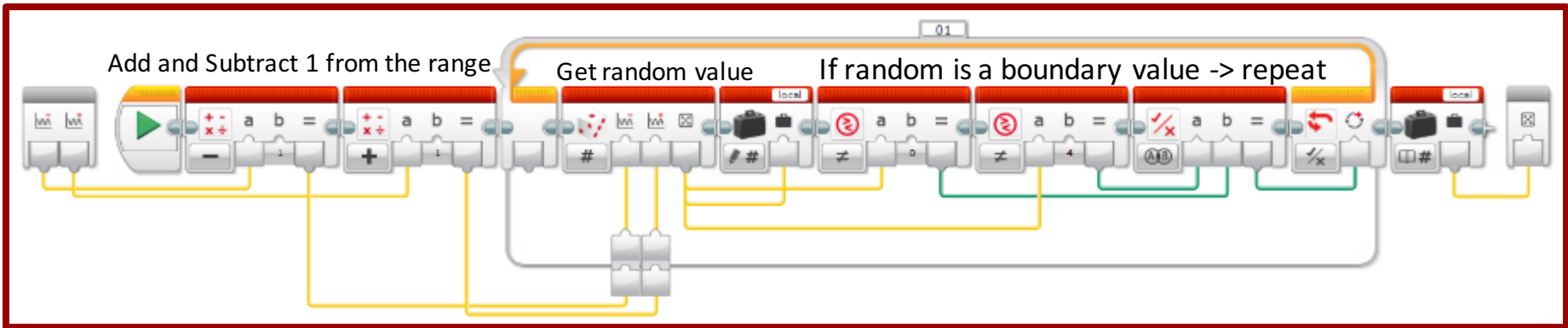
# Challenge 2: Fix the “Lack of Randomness”

- Create a new system that is more random in picking a number in Challenge 1 and fixes for the bug in the EV3 code
- Record how many times you get each number and compare the results to the previous results



# Challenge 2 Solution

In our solution, we subtract one from the lowest range value and add one to the highest range value, and reject those two values (so that we eliminate using the boundary values)



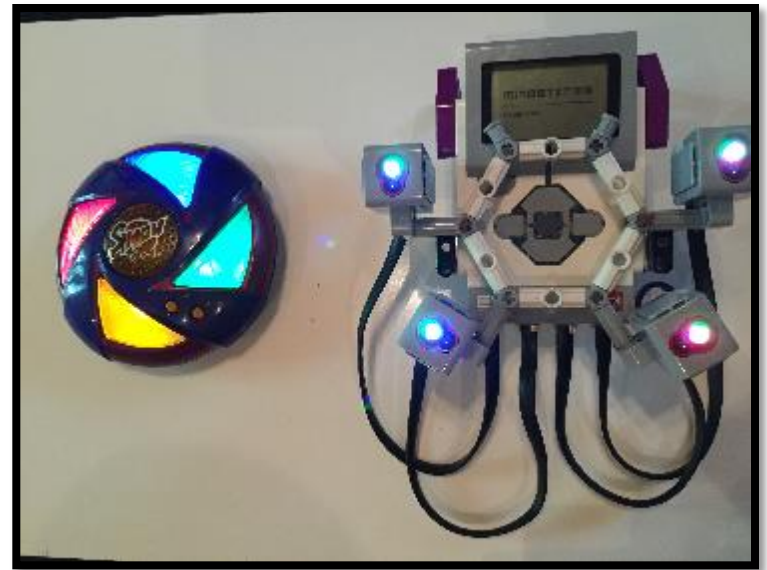
Same code as Challenge 1 except the random block is replaced with our new My Block

# Challenge 2 Discussion

- #1, #2 and #3 have an equal chance of being picked at random with our fix

# Bonus Challenge: Create a Simon Game

- Make a game that is similar to the Simon Game using your EV3
  - Unfamiliar with the game? See: [Wikipedia Simon Game](#)
- You can use touch sensors, color sensors, brick buttons (see Simon Game by Damien Kee), or even the Mindsensors PSP-Nx Controller (see the PSP-Nx Controller Lesson in Beyond on EV3Lessons.com)
- Our version (see photo on the right) uses four color sensors. The code to play the game can be downloaded on [ev3lessons.com](#)



# Credits

- This tutorial was created by Sanjay Seshan and Arvind Seshan
- More lessons at [www.ev3lessons.com](http://www.ev3lessons.com)



This work is licensed under a [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License](https://creativecommons.org/licenses/by-nc-sa/4.0/).