

BottleSUMO

Putting it all together

Broadcast - EVENT BLOCKS

When I Receive Message BLOCK



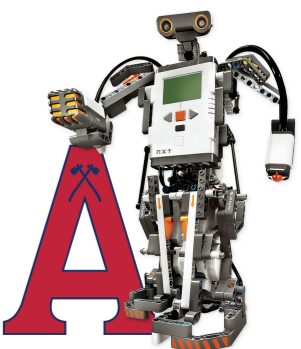
Runs the blocks attached to it when a specific message is broadcasted by either the Broadcast Message or the Broadcast Message and Wait Block.

Broadcast Message BLOCK



Broadcasts the specified message. All of the WHEN I RECEIVE MESSAGE BLOCKS that have been set to the specified message will activate.

This Broadcast Block sends the specified message and immediately proceeds to the next block.



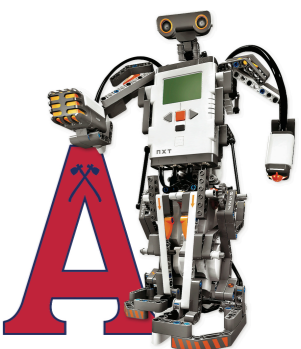
Simple BottleSumo Code Using Action Blocks

See if you can follow the coding blocks to understand how this simple BottleSumo program works.

The image shows a Scratch-style code editor with a toolbar at the top containing icons for a robot, a light sensor (6%), another light sensor (90%), and two motor icons labeled B (1°) and C (0°). The code is organized into two main sections:

- Initialization:**
 - when program starts** (yellow block)
 - set movement motors to B and C** (pink block)
 - wait 3 seconds** (orange block)
 - broadcast BottleSUMO** (yellow block)
- Main Loop:** A **when I receive BottleSUMO** (yellow block) triggers a **forever** loop (orange block):
 - if 3 is reflected light intensity < 20 %?** (blue block):
 - move backward for 1 seconds** (pink block)
 - move right: 100 for 0.5 rotations** (pink block)
 - else** (orange block):
 - if 2 is reflected light intensity < 20 %?** (blue block):
 - move backward for 1 seconds** (pink block)
 - move right: 100 for 0.5 rotations** (pink block)
 - if 4 is distance < 15 cm?** (blue block):
 - start moving straight: 0 at 100 % speed** (pink block)
 - else** (orange block):
 - start moving straight: 0 at 50 % speed** (pink block)

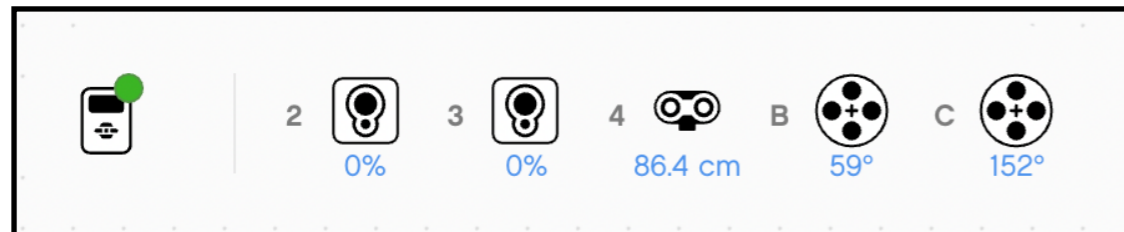
A yellow callout box points to the 'when I receive' block with the text: "Main driving code. Robot sensors will keep robot on the table. If the ultrasonic sensor sees a bottle it will drive to push bottle off the table."



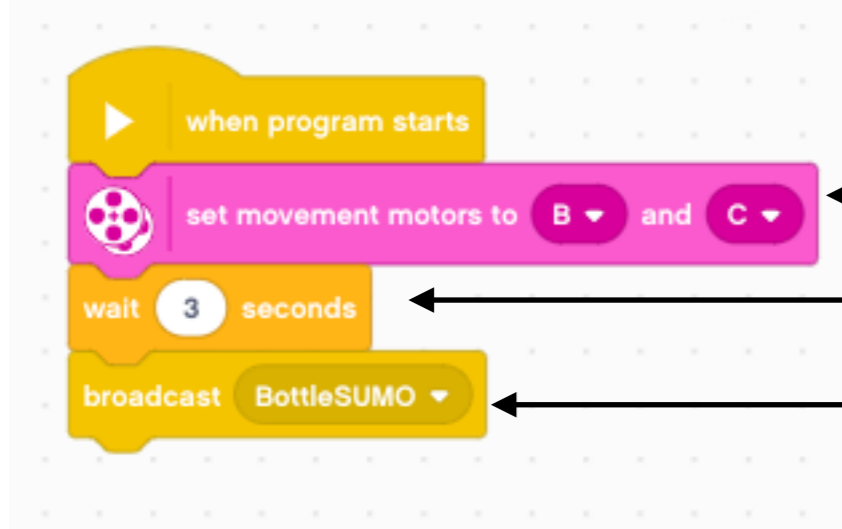
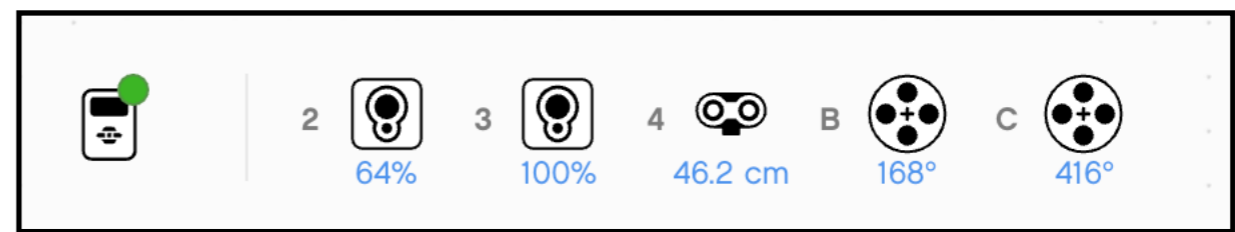
Simple BottleSUMO

Using Event Blocks

Sensor reading with both colour sensors OFF the table.



Sensor reading with both colour sensors ON the table.

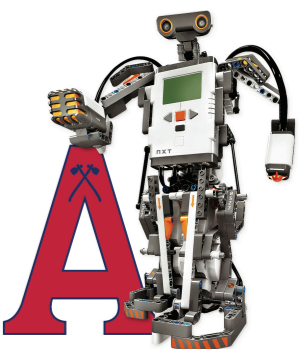


This program sets the motors to B & C

Waits 3 seconds.

Then moved to the Broadcast Message block, which we defined as BottleSUMO.

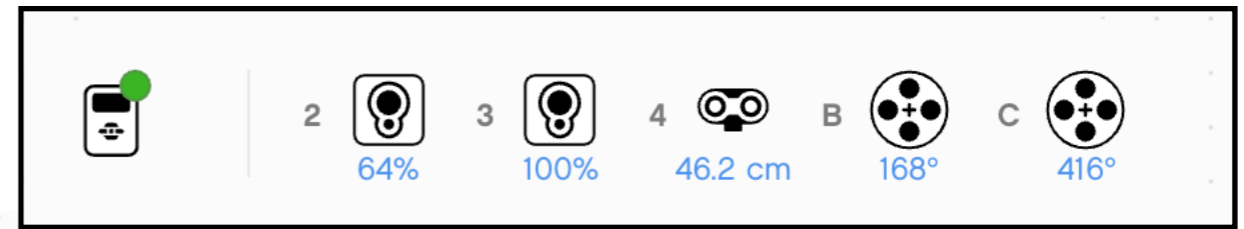
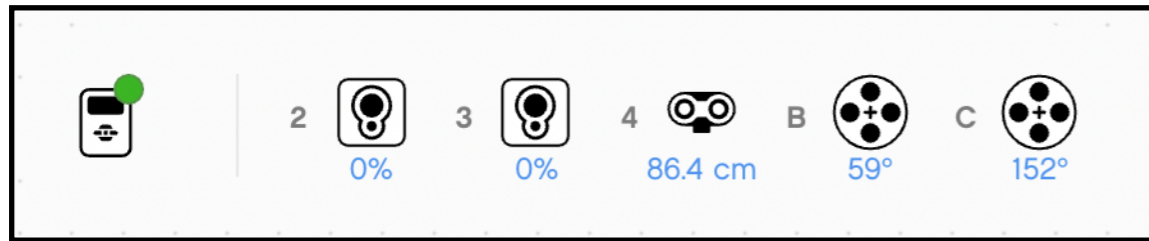
The next slide will show how we DEFINED the broadcast message block to run the BottleSUMO program.



Simple BottleSUMO - Using Event Blocks

Sensor reading with both colour sensors OFF the table.

Sensor reading with both colour sensors ON the table.

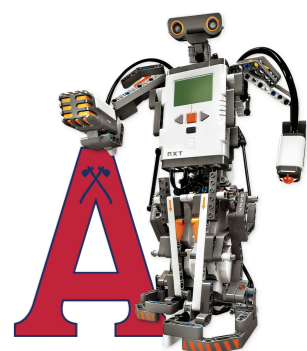


Think about it.

Your BottleSUMO robot needs to:

- Stay on the table
- Finding the bottle
- Push the bottle off table
- Robot must stay on the table, after the bottle(s) are removed.

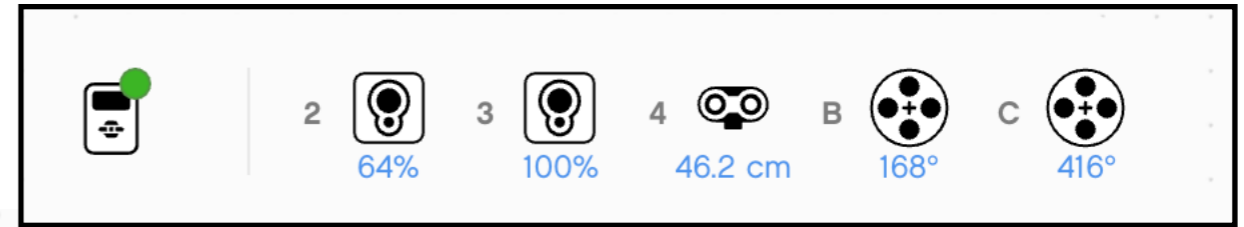
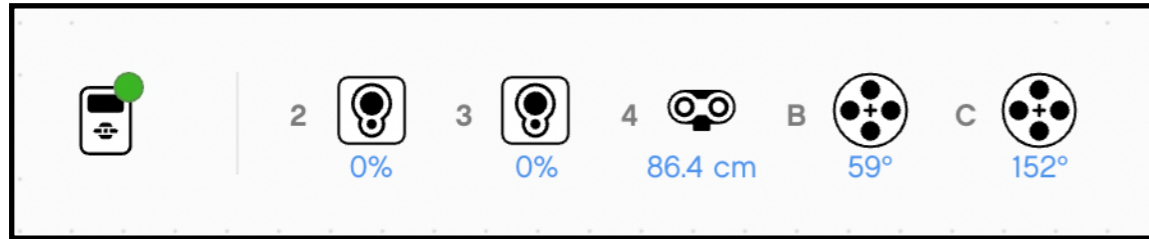
```
when I receive BottleSUMO
  forever
    if (3 is reflected light intensity < 20 %) then
      move backward for 1 seconds
      move right: 100 for 0.5 rotations
    else
      if (2 is reflected light intensity < 20 %) then
        move backward for 1 seconds
        move right: 100 for 0.5 rotations
      if (4 is distance < 15 cm) then
        start moving straight: 0 at 100 % speed
      else
        start moving straight: 0 at 50 % speed
```



Simple BottleSUMO - Using Event Blocks

Sensor reading with both colour sensors OFF the table.

Sensor reading with both colour sensors ON the table.



Forever loop - program runs and repeats actions inside the forever loop.

```

when I receive BottleSUMO
  forever
    if (Sensor 3 is reflected light intensity < 20%) then
      move backward for 1 seconds
      move right: 100 for 0.5 rotations
    else
      if (Sensor 2 is reflected light intensity < 20%) then
        move backward for 1 seconds
        move right: 100 for 0.5 rotations
      if (Ultrasonic sensor 4 is distance < 15 cm) then
        start moving straight: 0 at 100% speed
      else
        start moving straight: 0 at 50% speed
  
```

The robot looks for the bottle with the Ultrasonic sensor **WHILE** checking to see if it's on or off the table using the colour sensors.

If:

- FIRST program check colour sensor 2 (left side) to see if it's off the table.
- If it is we want the robot to move away from the edge of the table.
- Robot backs up for 1 second and then moves right for 0.5 rotations.

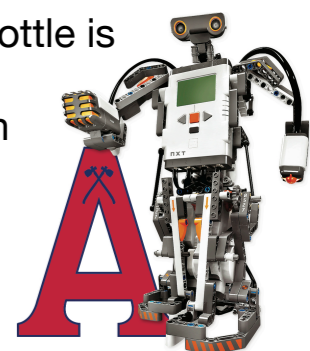
Else:

Another If statement is added under the Else portion of the first If/Else statement.

- program check colour sensor 3 (right side) to see if it's off the table.
- If it is we want the robot to move away from the edge of the table.
- Robot backs up for 1 second and then moves right for 0.5 rotations.

Add an If/ELSE below the new If statement.

- program uses the ultrasonic sensor (port 4) to see if the bottle is within 15 cm of the robot's sensor.
- **IF** - we want the robot to move towards the bottle to push it off the table.
- **ELSE** - If there is NO bottle



Simple BottleSUMO

Finding a better solution

Think of all the programming lessons you learned in this workshop.

The simple BottleSUMO program you built 'works'.

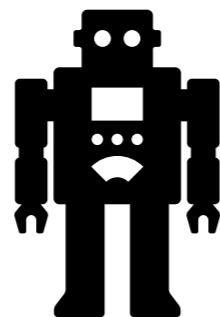
The current program is randomly moving around the table. Each action is based on how the sensors react.

Can you think of anyway to improve how your robot **searchers** for the bottle(s)?

Can you think of a way to ensure the bottle is pushed off the table?

We won't give any more solutions to the BottleSUMO workshop.

There is more than one way to program your robot to find the bottles.



Good Luck

