INTERMEDIATE PROGRAMMING LESSON

LOGIC OPERATIONS & DECISION MAKING

By Droids Robotics
Lesson Objectives

Learn what the Logic Block does

Learn how to use the Logic Block

Prerequisites: Data Wires, Sensor Blocks
Logic Operations Block

The Logic Block does a Logic operation on its inputs, and outputs the result.

A Logic Block takes inputs that are True or False, and produces a True or False output.

Logic values can be used as inputs into loop exists and switch conditions.

It is found in the Red Programming Pallet tab.
<table>
<thead>
<tr>
<th>Icon</th>
<th>Mode</th>
<th>Inputs</th>
<th>Output/Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>![AND Icon]</td>
<td>AND</td>
<td>A, B</td>
<td>• True if both A <strong>and</strong> B are both true, otherwise the result is False</td>
</tr>
<tr>
<td>![OR Icon]</td>
<td>OR</td>
<td>A, B</td>
<td>• True if either A <strong>or</strong> B (or both) is/are True. The result is False if both A and B are False</td>
</tr>
</tbody>
</table>
| ![XOR Icon] | XOR | A, B | • True only if one (and exactly one) of A and B is True  
• The result is False if both A and B are True  
• The result is False if both A and B are False |
| ![NOT Icon] | NOT | A | • Outputs the opposite of what you input.  
• The result is True if A is False  
• The result is False if A is True |

The icons are Venn Diagrams. The dark shaded areas identify what needs to happen for the block to output True.
**Logic Blocks in Three Easy Steps**

**CHALLENGE:** Make your robot drive forward until EITHER the Touch Sensor is pressed or the Color Sensor detects black.

**STEP 1:** Turn the motors on

**STEP 2:** Add the Logic and Sensor Blocks

- A. Use a Logic Block in the OR mode
- B. Add the inputs: Take a color sensor and a touch sensor blocks and wire them into the Logic Block as inputs

**STEP 3:** Add a Loop and loop exit condition:

- Place the Sensor and Logic Blocks in a loop
- For the exit condition of the loop, select logic. Wire the result of the Logic Block into the exit condition
- If the result of STEP 2 is True, you should exit the loop and stop the robot
**Challenge Solution**

**STEP 1**
This program is designed to keep the robot moving until the touch sensor is pressed OR the color sensor sees black.

**STEP 2**
- Take the data from the touch sensor and the color sensor and wire them to the inputs in the Logic Block.
- The Logic Block is in OR mode. The results are wired into the exit condition for the loop.

**STEP 3**
- Exit the loop only when the output of the logic block is True.
- Turn motors off.
Credits

- This tutorial was written by Sanjay and Arvind Seshan from Droids Robotics. To contact the authors, email team@droidsrobotics.org
- More lessons at www.ev3lessons.com

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