INTERMEDIATE PROGRAMMING LESSON

DATA WIRES

By Droids Robotics
Lesson Objectives

Learn what Data Wires are and how to use them

Prerequisites: Display Block, Sensor Block, Brick Buttons
Data Wires

A Data Wire allows you to take an output from one programming block and input it into another.
## Data Wire Types

<table>
<thead>
<tr>
<th>Data Type</th>
<th>Input</th>
<th>Output</th>
<th>Output Data Wire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logic</td>
<td>![Image]</td>
<td>True or False</td>
<td>![Image]</td>
</tr>
<tr>
<td>Numeric</td>
<td>![Image]</td>
<td>Number</td>
<td>![Image]</td>
</tr>
<tr>
<td>Text</td>
<td>![Image]</td>
<td>Text</td>
<td>![Image]</td>
</tr>
<tr>
<td>Numeric Array</td>
<td>![Image]</td>
<td></td>
<td>![Image]</td>
</tr>
<tr>
<td>Logic Array</td>
<td>![Image]</td>
<td></td>
<td>![Image]</td>
</tr>
</tbody>
</table>

Images from EV3 Help
## Automatic Data Wire Conversions

<table>
<thead>
<tr>
<th>From Data Type</th>
<th>To Data Type</th>
<th>Output/Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logic</td>
<td>Numeric</td>
<td>False = 0, True = 1</td>
</tr>
<tr>
<td>Logic</td>
<td>Text</td>
<td>False = “0”, True = “1”</td>
</tr>
<tr>
<td>Logic</td>
<td>Logic Array</td>
<td>Array with one element</td>
</tr>
<tr>
<td>Logic</td>
<td>Numeric Array</td>
<td>Array with one element (0 or 1)</td>
</tr>
<tr>
<td>Numeric</td>
<td>Text</td>
<td>Text that represents a number</td>
</tr>
<tr>
<td>Numeric</td>
<td>Numeric Array</td>
<td>Array with one element</td>
</tr>
<tr>
<td>Logic Array</td>
<td>Numeric Array</td>
<td>Same size array with all elements equal to 0 or 1</td>
</tr>
</tbody>
</table>

These conversions are automatically performed in the programming blocks. For example, you are allowed to connect a numeric value (like what color a sensor sees) to a text value (on a display block).

Content from EV3 Help
How to Create a Data Wire

The block with the output must be placed before the block with the input.

The input and the output must be the same data type or one that can be automatically converted (see slides 4 and 5).

1. Click on the output on the block.
2. Hold and drag the wire.
3. Move the icon into the correct input and then let go of the mouse.
The Display Block can be used in wired mode to display data from another block to the screen.

For the challenge, you will need to display a number on the screen. Pick Text Mode → Grid from the bottom left corner of the block.

To pick Wired Mode, click on the top right corner of the Display Block and pick wired.
**Data Wires Challenge**

**CHALLENGE:** Make your robot drive forward slowly over different colors. Have the robot display the color the color sensor sees as it moves. Stop when you hit a button on the brick.

**STEP 1:** Turn the motors on in a Steering Block and drive slowly forward

**STEP 2:**
- Inside a Loop, add a Color Sensor block.
- Add a Display Block in Wired, Text Grid Modes.
- Wire the Sensor Block’s output into the Display Block’s text input (first input)

**STEP 3:** Exit the loop when a brick button is pressed
Challenge Solution

The code is in a loop so the robot keeps checking what color the sensor sees and displays it until you press the center button and exit the program.

Start the motors so that the robot goes over the lines slowly.

Check what color the sensor sees.

Data wire to take the color sensor reading and input the value into the display block.

Display what color the sensor sees on the screen with a number.

0: No Color
1: Black
2: Blue
3: Green
4: Yellow
5: Red
6: White
7: Brown
More Complex Wiring: Switches

A. If you want to drag data wires out of switches, you will need to change the switch to tabbed view

B. Once you switch to tabbed view, you can drag data wires out

C. Different options in the switch can connect to the same wire
More Complex Wiring: Loops

You can connect wires both into and out of a loop like in the example below:

- Note that the data coming out of the loop through the wire will only be the last pass through the loop.
- In the example above, the color sensor is read twice in the loop. However, the data wire will only have the second (and last) reading and that second reading will be displayed.
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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