



Introduction to Engineering Lab - ECE 101

Using *Variables* and *Constants*

October 31, 2015



Using Variables and Constants

Using Variables

- Think of a variable as a kind of suitcase that can carry information.
- When a program needs to remember a value (such as a sensor reading) for later use, it puts that value in the suitcase and stows it away.
- When the program needs to use the value, it opens the suitcase and uses the stored value. The variable is stored in the NXT's memory until its needed.



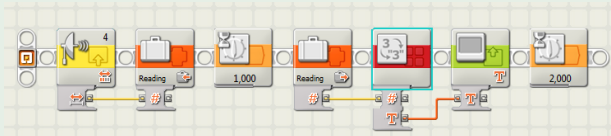
- The program can access this stored information at any time while running, but the data is lost once the program stops.

Using Variables and Constants

Defining a Variable

- Each variable has a name and contains a value. For example, a variable might be called Reading with a value of 56.
- Like data wires, a variable can contain either a numeric value (such as 56), a logic value (such as true), or a text value (such as hello).

Example



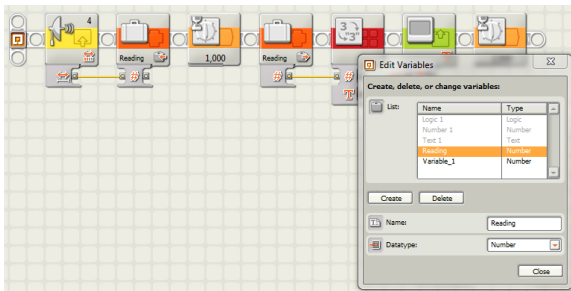
- 1 The Ultrasonic Sensor value is stored in a suitcase (a variable) on the NXT's memory.
- 2 The suitcase is opened, and the previously stored value can be used by the program.



Using Variables and Constants

Defining a Variable

- Before you can use a variable in your program, you'll need to define it in the Edit Variables dialog box.
- **Note that:** You can use variables only in the program in which you've defined them.





Using Variables and Constants

Changing Variable Values

- Sometimes you'll want to change a variable's value, for example to increase its value by one, such as when you want to use a variable to track a high score or a total number of Touch Sensor presses.
- How do you increase the variables value by one?

Initializing Variables

- When programming with variables, its important to initialize them by giving them a starting value.
- Initializing variables makes a program more reliable by making sure that each time you run the program, it will function the same way because it starts at the same place.



Using Variables and Constants

Using Constants

- A constant is a value that cannot be changed while a program is running.
- For example, if your program needs to convert a distance measured in inches to one in centimeters, you would use a constant to multiply the inch value by 2.54.
- By creating a constant in an NXT program (lets call it InchToCm) with the value 2.54, each time you want to perform this conversion you would simply use the constant InchToCm.





Bonus Exercise

Playing a game on the NXT

- Create a program that lets you play a game on the NXT. The NXT screen will display the game, and the NXT buttons will be the game controllers.
- When playing the game, targets will appear on the NXT display randomly on the left and right. When a target appears, you'll press the left or right NXT button quickly to destroy it, and the program will pop up the next target.
- The more targets you hit within 30 seconds, the higher your score. If you miss a target, your score will decrease.

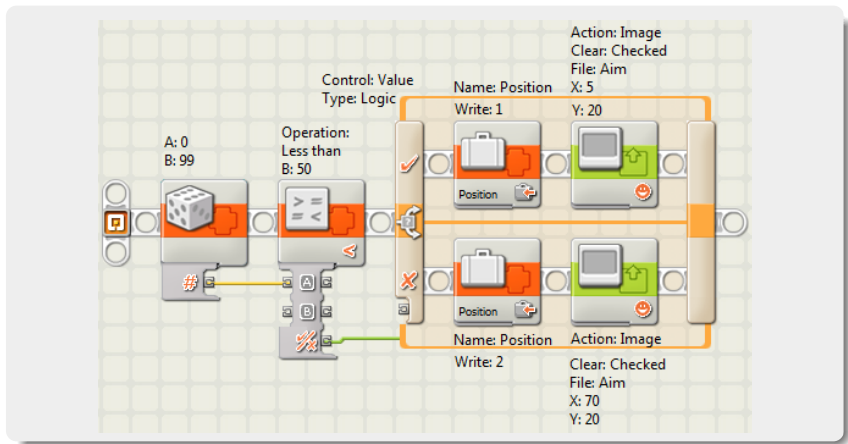
Your Goal (See Homework 5, Exercise 8)

- The program consists of several sections, each of which has a specific function in the program. You'll create these sections step-by-step.
- Describe analytically of how each section works and why you need it in the program.



Bonus Exercise - Procedure

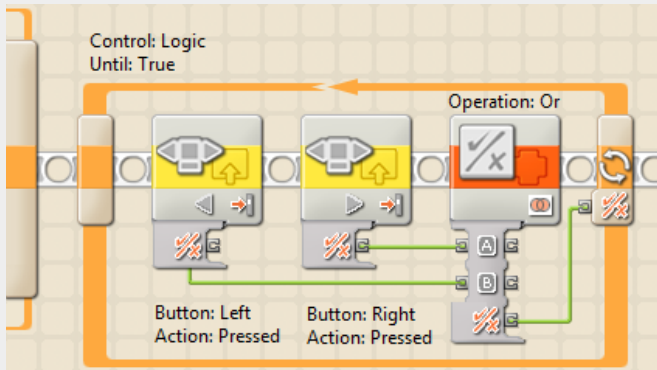
Step 1





Bonus Exercise - Procedure

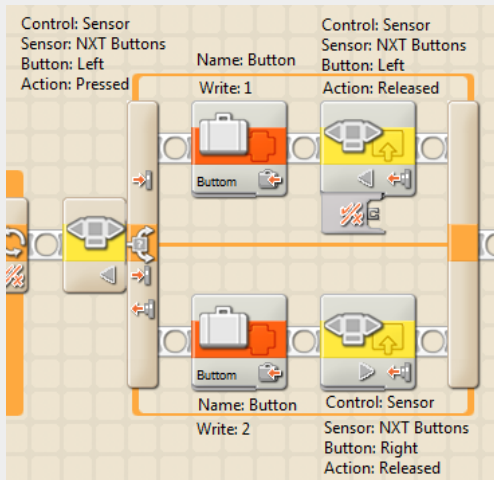
Step 2





Bonus Exercise - Procedure

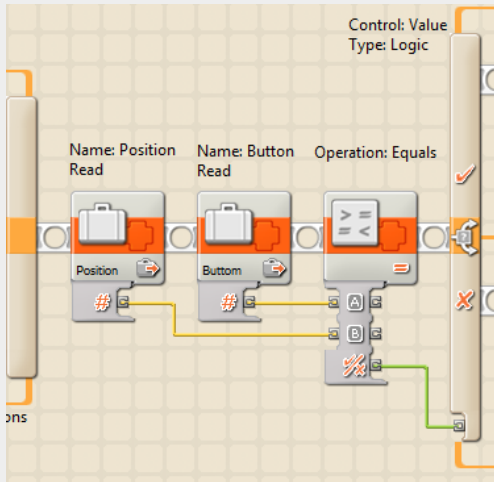
Step 3





Bonus Exercise - Procedure

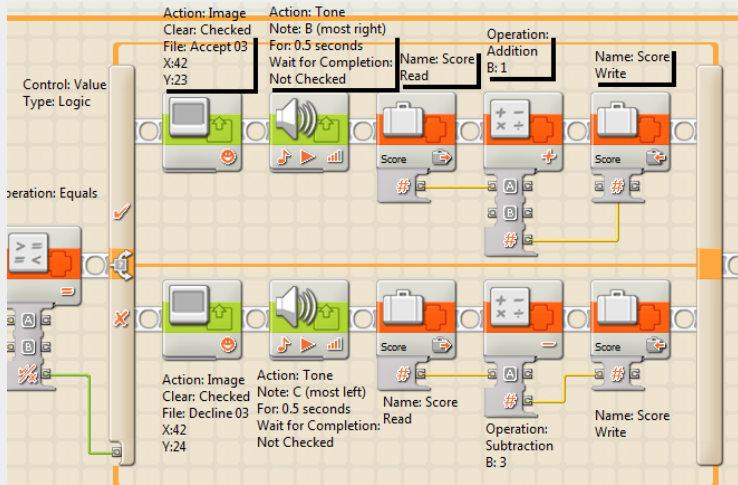
Step 4





Bonus Exercise - Procedure

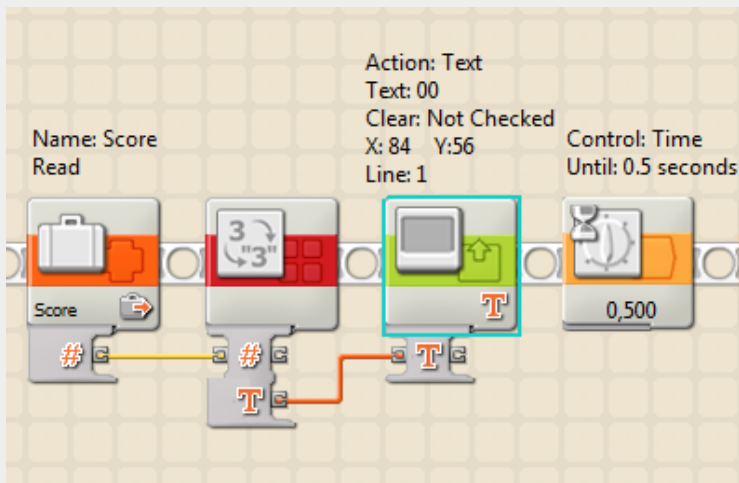
Step 5





Bonus Exercise - Procedure

Step 6





Bonus Exercise - Procedure

Step 7

- Drag all the blocks you placed in steps 1 to 6 into a Loop block configured to loop for 30 seconds.
- Finish the program by adding a block at the beginning (outside the loop) to set the initial score to zero, and add the following blocks to the end of your program (outside the loop) to display the final score.

