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Introduction to LabVIEW

October 14, 2008

www.robojackets.org

Goals for Today

- Get everyone up and running with LabVIEW
  - Install LabVIEW
  - Install the NXT Toolkit
- LabVIEW overview
- Introduction to the NXT Toolkit

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Installing LabVIEW

Installing LabVIEW

- **Windows** (XP, Vista tried)
  - Insert CD, click **setup.exe**
- **Mac** (Not tried - yet)
  - Insert CD, **copy** to app folder
- No **Linux** support

  for toolkit :(

Installing LabVIEW

- Hopefully everyone has done this…

- If not, you should get started (we can help)

- Did anyone have any problems/thoughts? (that everyone should know about)

- Notable fringe cases? (Mac, Vista, Linux, under virtualization?)

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Installing the NXT Toolkit

1. Connect to wireless network **maria**

2. Open a browser (Firefox, IE, etc.)

3. Type **sara**, hit **enter**

4. Download either **win.zip** or **mac.zip**

5. Download **patch.zip** (for later)

   - If you can't figure that out, I've also got CDs
   - Or you can download from
     http://zone.ni.com/devzone/cda/tut/p/id/4435

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Installing the NXT Toolkit

1. Unzip the toolkit

2. Close LabVIEW

3. Windows

   1. Click **setup.exe**

4. Mac

   1. Mount image

   2. Read instructions (no idea)

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Installing the NXT Toolkit
Patch for 8.5

1. Unzip **patch.zip** and open the directory where LabVIEW is installed

   C:\Program Files\National Instruments\LabVIEW 8.5\

2. Copy **vi.lib** directory and paste it into the LabVIEW directory

3. In the copy warning dialog box, select **Yes to All**

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Installing the NXT Toolkit
Mass Compiling

1. Launch LabVIEW

2. Select **Tools >> Advanced >> Mass Compile**

3. Browse to

   LabVIEW 8.5\vi.lib\addons\NXTToolkit

   and select **Current Folder**

4. Click **Mass Compile**

5. Wait …

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LabVIEW Overview

What is LabVIEW?

- LabVIEW is a graphical programming language
- Intuitive
- Used in research, industry and education (that's us!)
- Instrumentation

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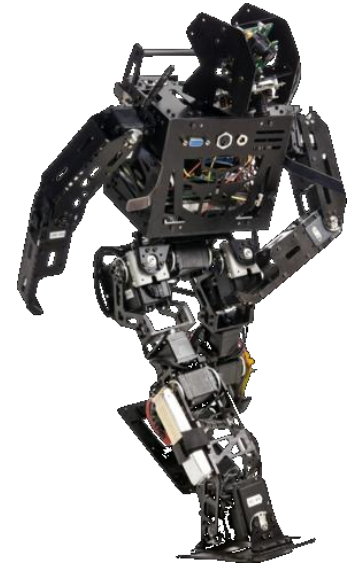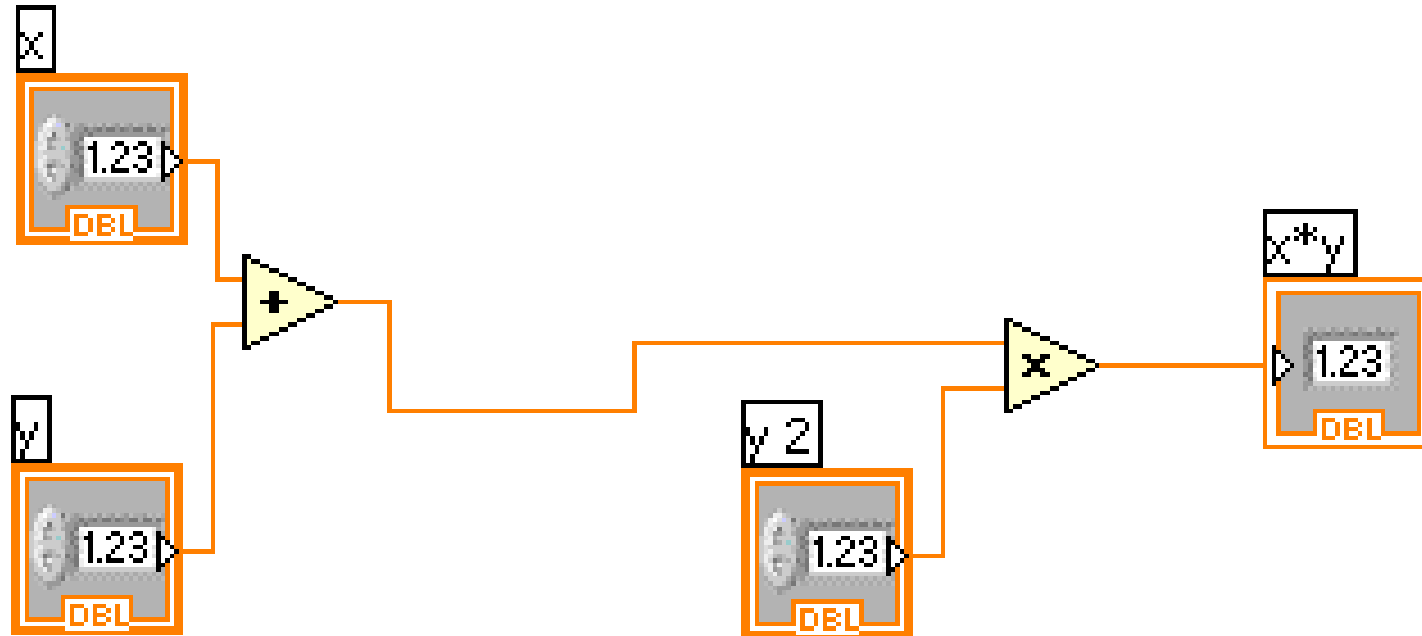
Data Flow

- Graphical programming language
- *Data Flow* language

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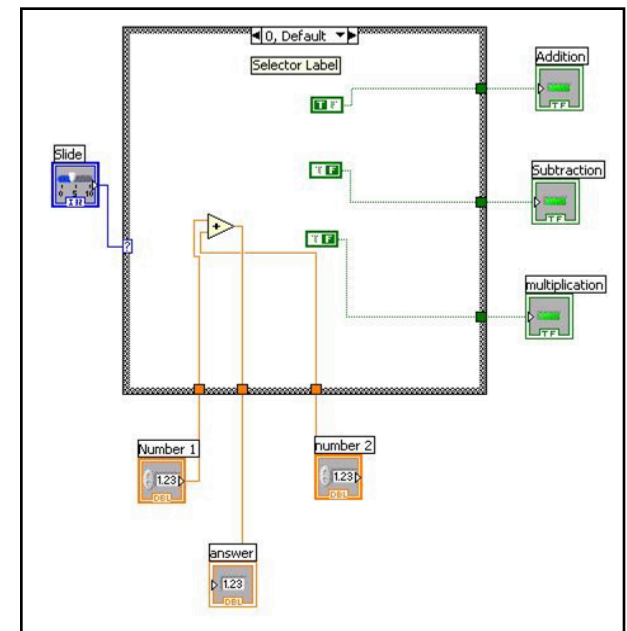# LabVIEW Virtual Instruments

Called **"VI"**

Front Panel

- User Interface
  - Controls = Inputs
  - Indicators = Outputs

Block Diagram

- Data travels on wires from controls through functions to indicators
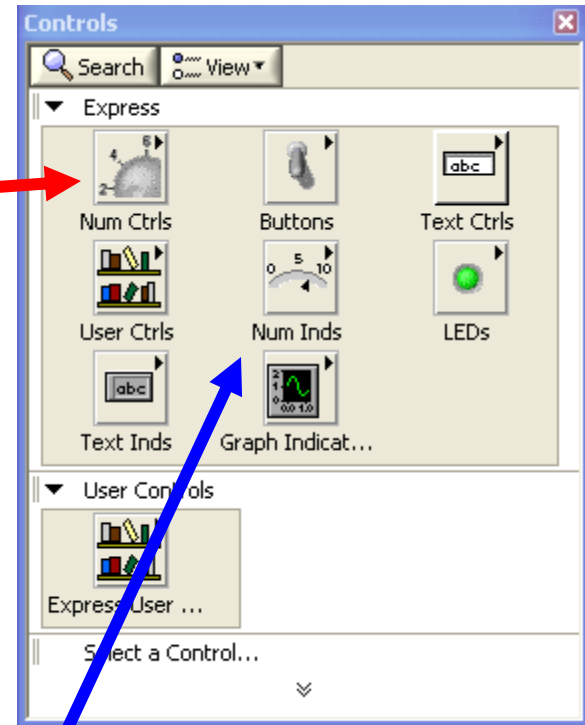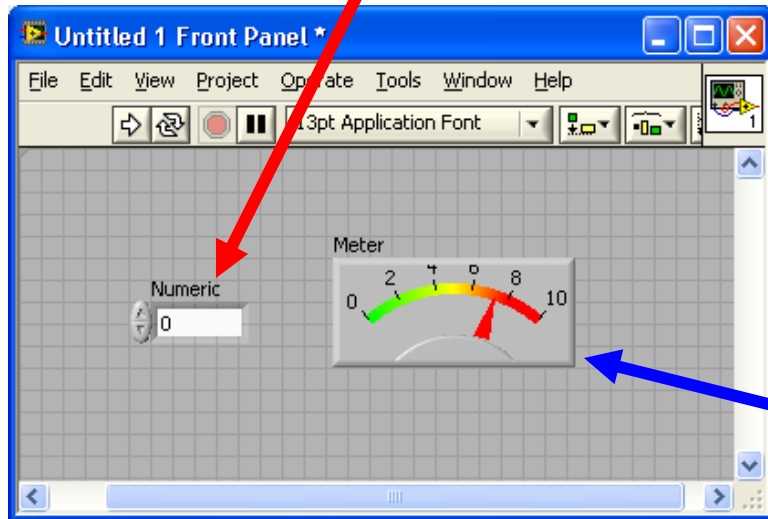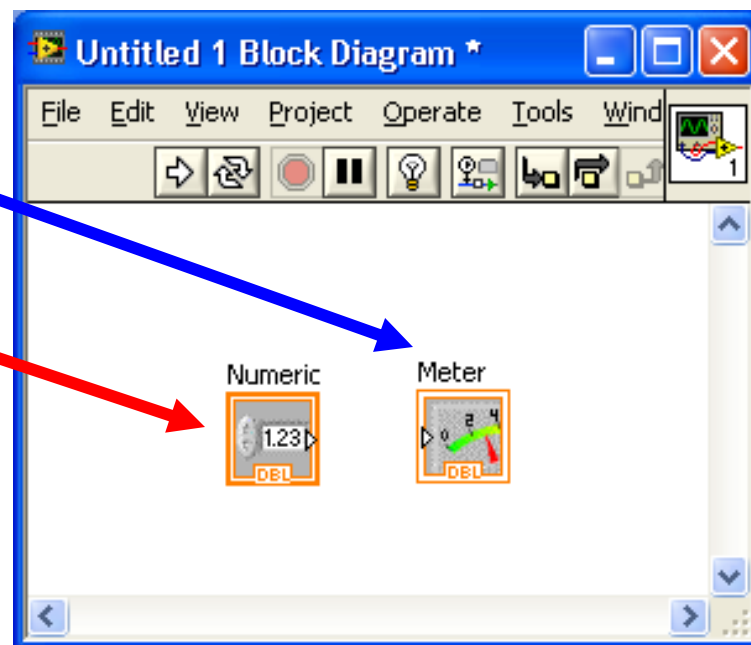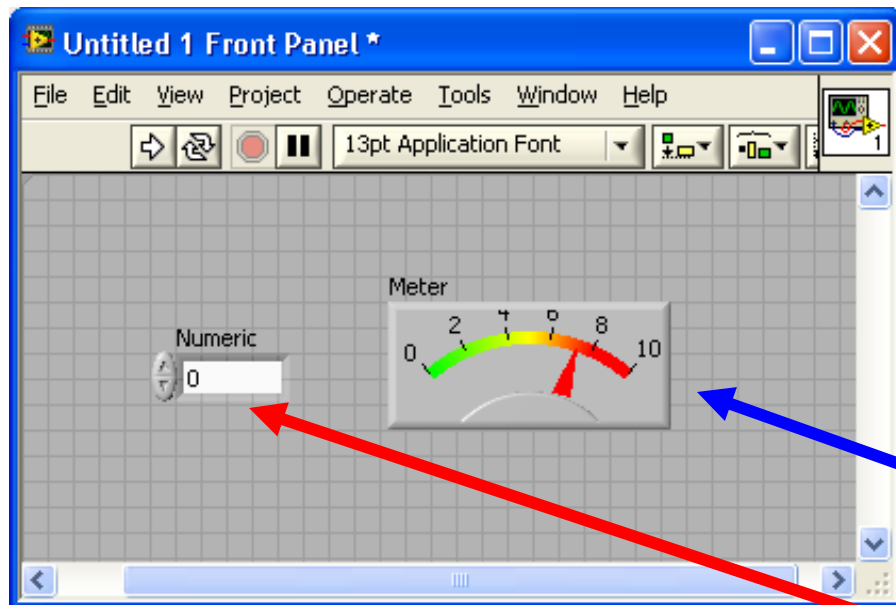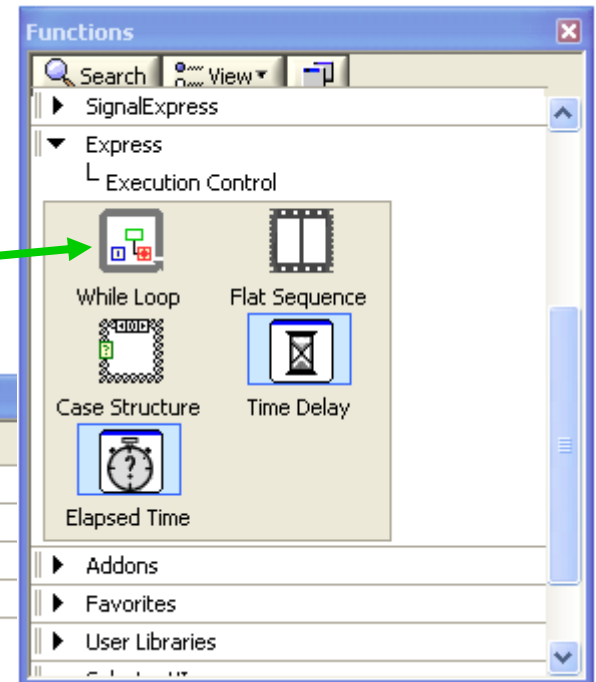- Blocks execute by dataflow

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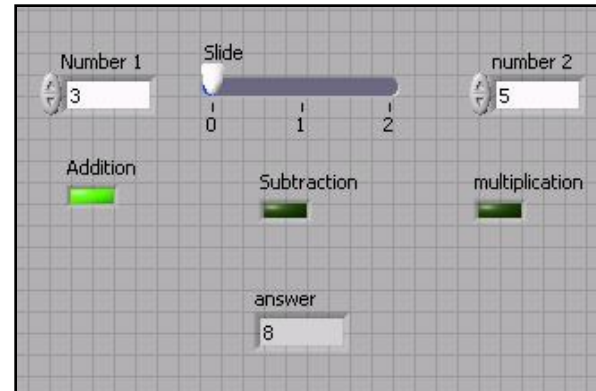
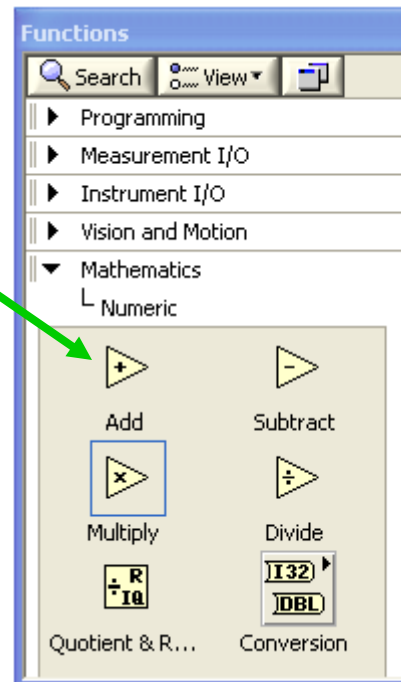# Controls Palette

Control
Numeric
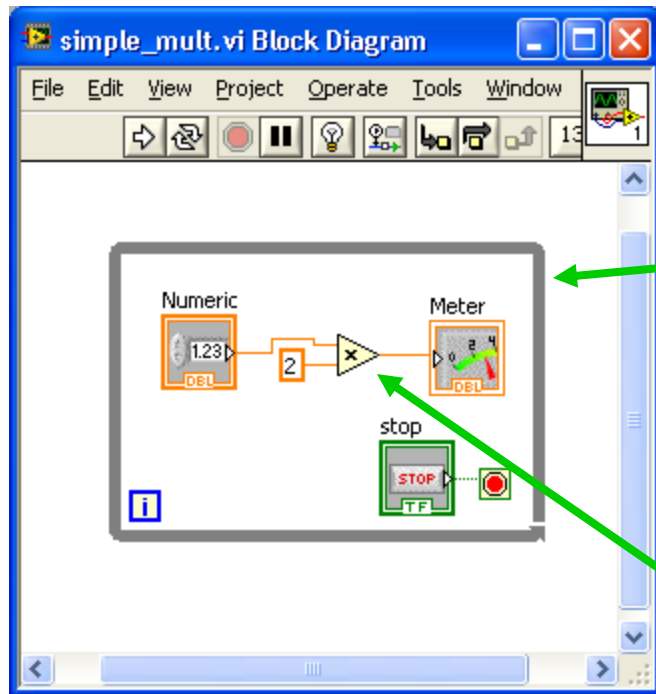
Indicator
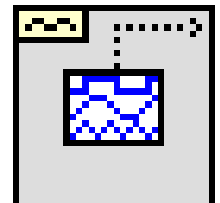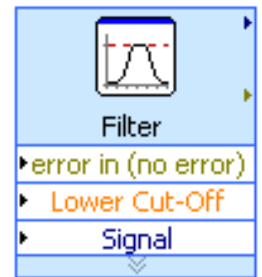Meter

Front Panel Block Diagram Mapping

Functions and Structures Palette

Types of Functions

- **Express VIs:** Interactive Vis with configurable dialog page (blue)

- **Standard VIs:** Modularized VIs customized by wiring

- **Functions:** fundemental elements of LabVIEW (yellow)

Variables
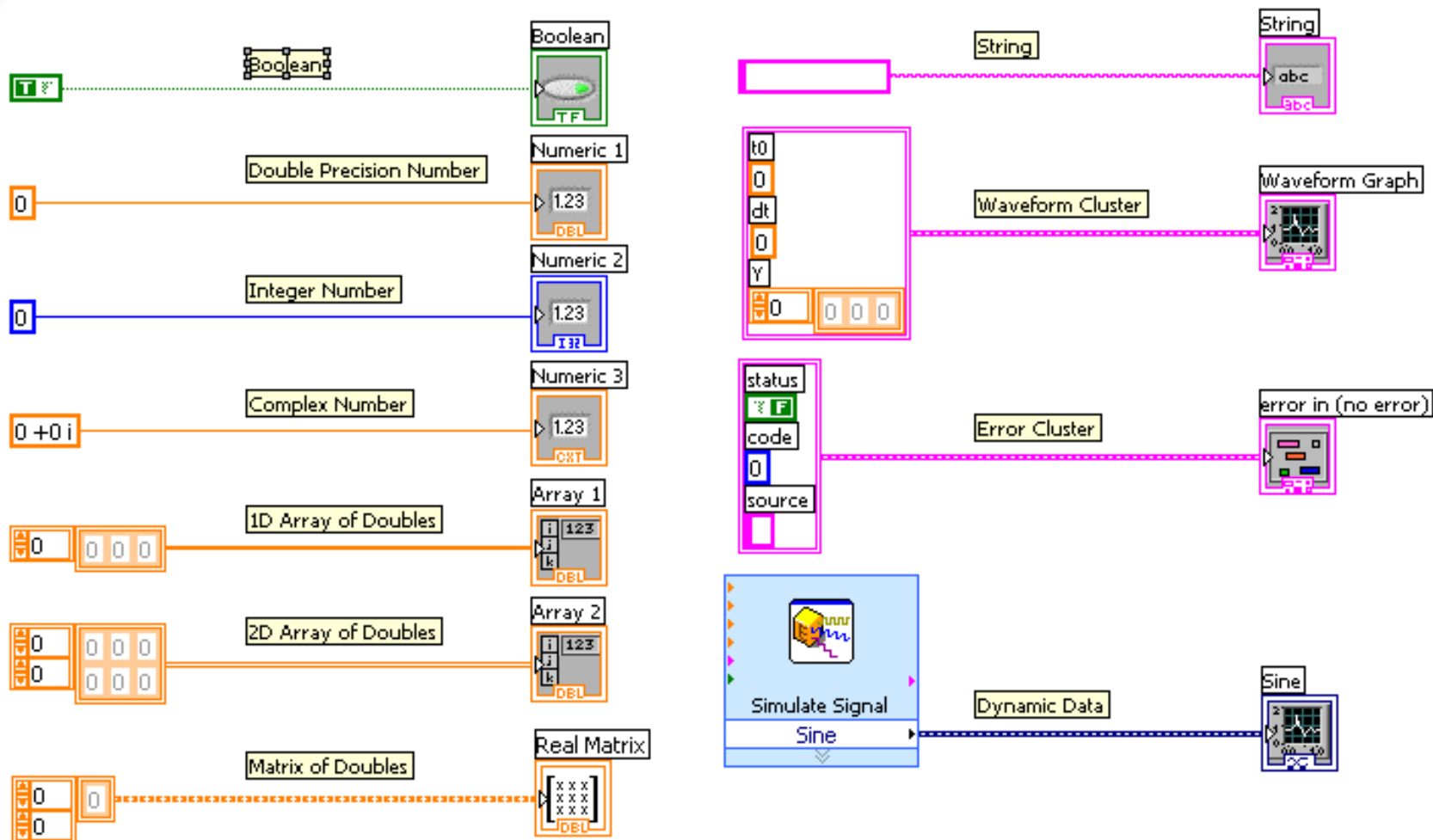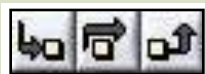
Status Toolbar

Run Button

Continuous Run Button

Abort Execution

Additional Buttons on the Diagram Toolbar

Execution Highlighting Button

Retain Wire Values Button

Step Function Buttons

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It's Broken :(

- **Finding Errors**

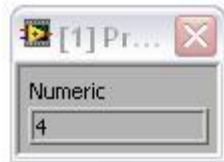Click on broken **Run** button.
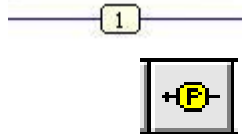Window showing Error appears.

- **Execution Highlighting**

Click on **Execution Highlighting**; data flow is animated using bubbles. Values are displayed on wires.
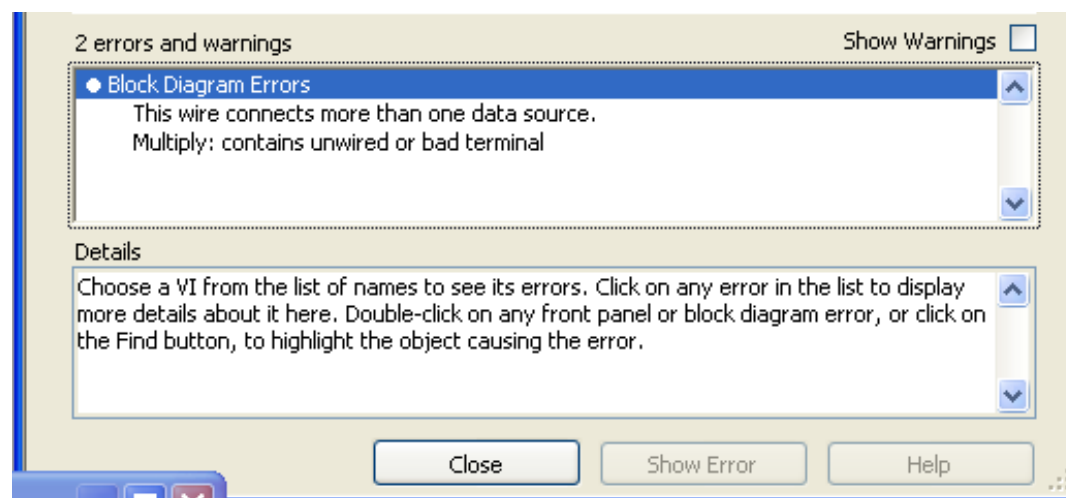
- **Probes**

Right click on a wire to display a probe which shows data as it flows through the wire segment.

You can also select the probe tool from the Tools palate and click on a wire.

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Broken Example :(

Context Help
Broken wire
This wire connects more than one data source.
Click here for more help.

Untitled 2
File Edit Opera

2 errors and warnings   Show Warnings ☐

● Block Diagram Errors
    This wire connects more than one data source.
    Multiply: contains unwired or bad terminal

Details
Choose a VI from the list of names to see its errors. Click on any error in the list to display more details about it here. Double-click on any front panel or block diagram error, or click on the Find button, to highlight the object causing the error.

Close   Show Error   Help

Protips

- <Ctrl+H> – Context Help
- <Ctrl+E> – Toggle Between Front Panel and Block Diagram
- <Ctrl+Z> – Undo
- **<Ctrl+B> – Remove Broken Wires from Block Diagram**
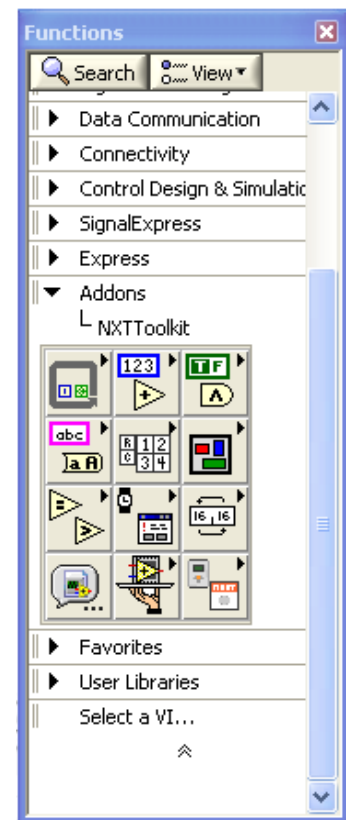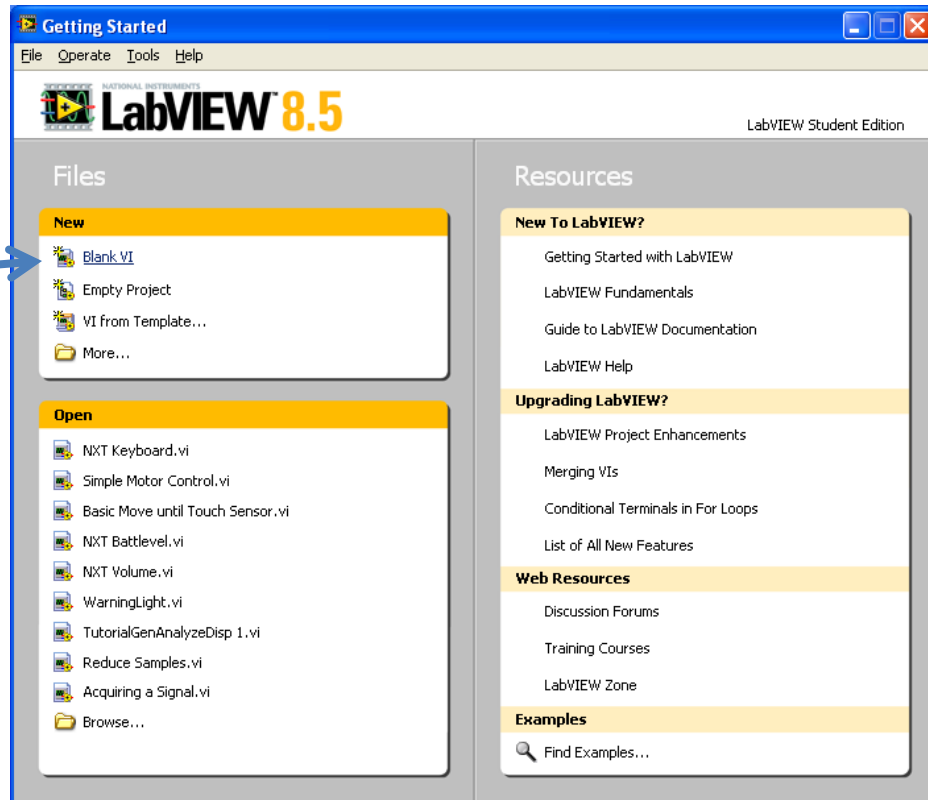
NXT Toolkit

NXT Toolkit

• Only blocks in the NXT Toolkit can be used with the NXT

•Math, motor control, flow control (while loops etc), sensors, readouts…

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NXT Toolkit Activity
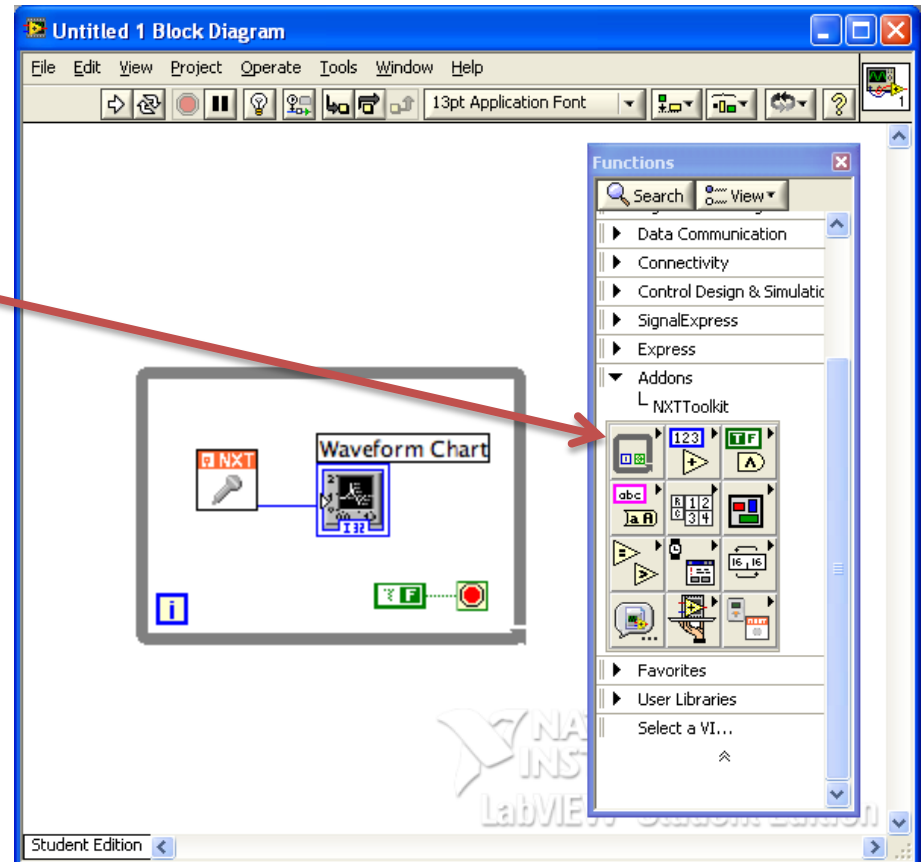
Make a new **VI**

NXT Toolkit Activity

Add a **while loop**

NXTToolkit>>
Structures>>While Loop

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NXT Toolkit Activity
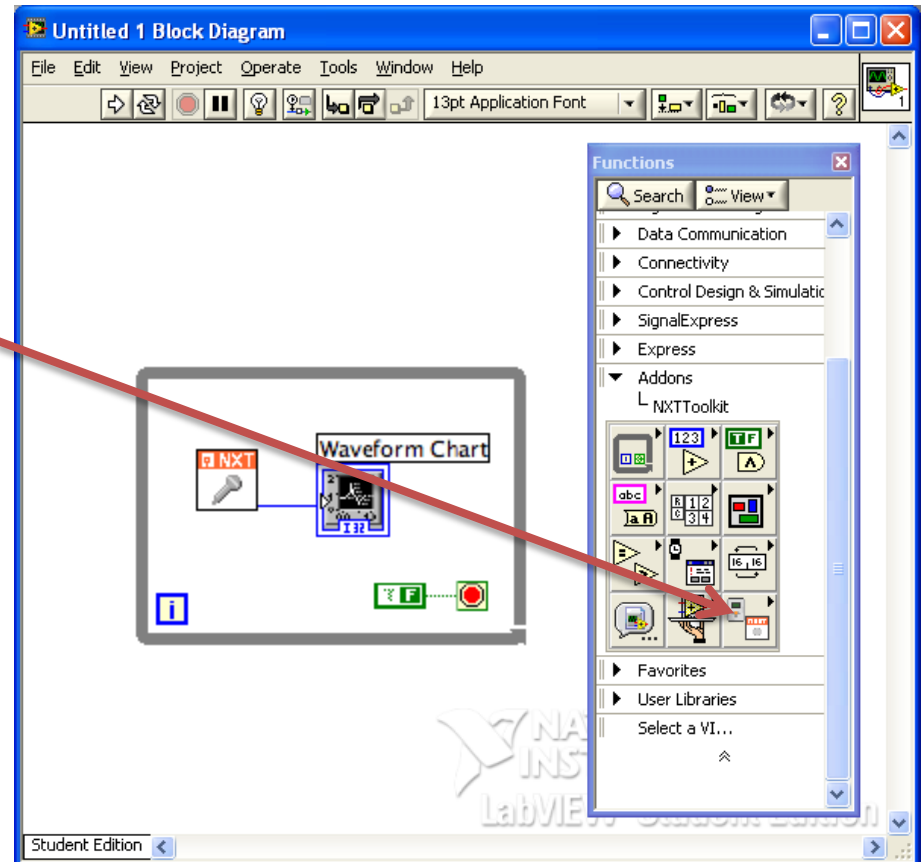
Create a **constant**

for the loop
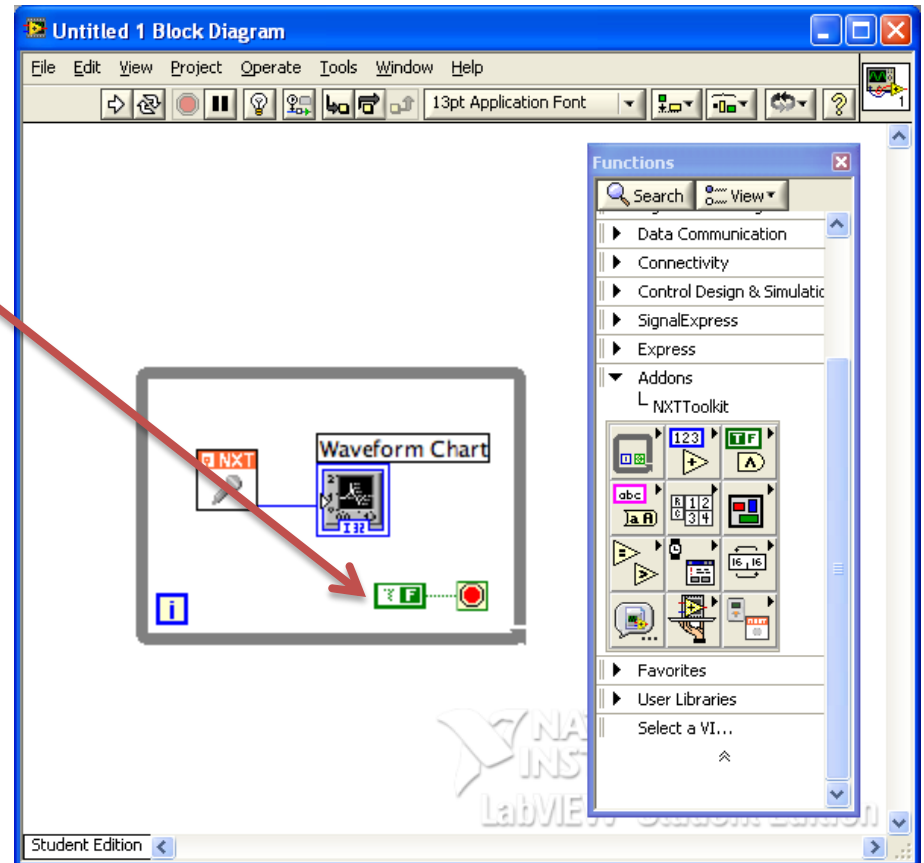
NXT Toolkit Activity

Add a **Sound Sensor**

NXTToolkit>> NXT Library>>
Input>> Sound Sensor

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NXT Toolkit Activity

Add **Waveform Chart**

(On the front panel)

NXTToolkit>> Graph>> Waveform Chart

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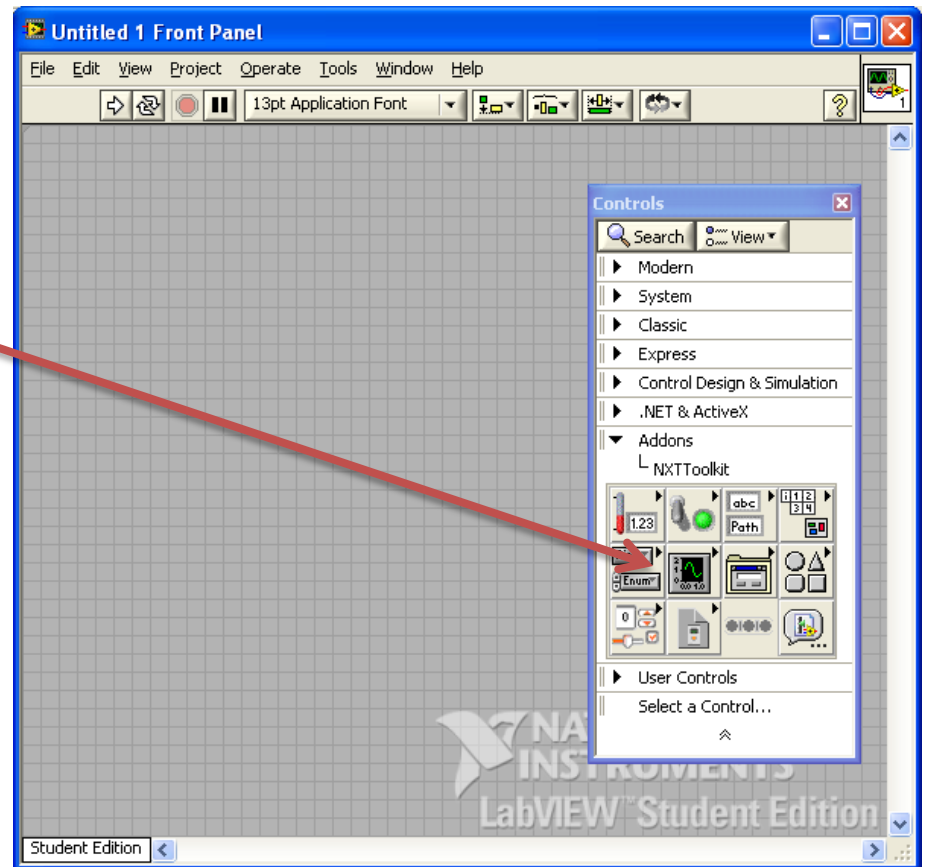
Running a VI on the NXT
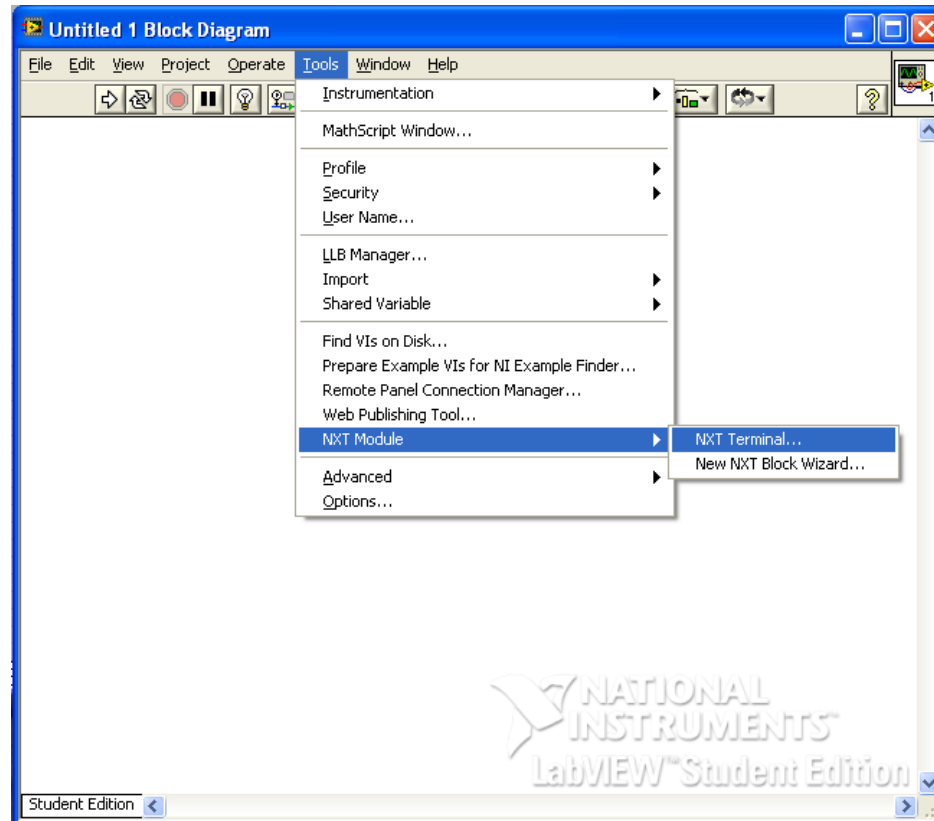
Running a VI on the NXT
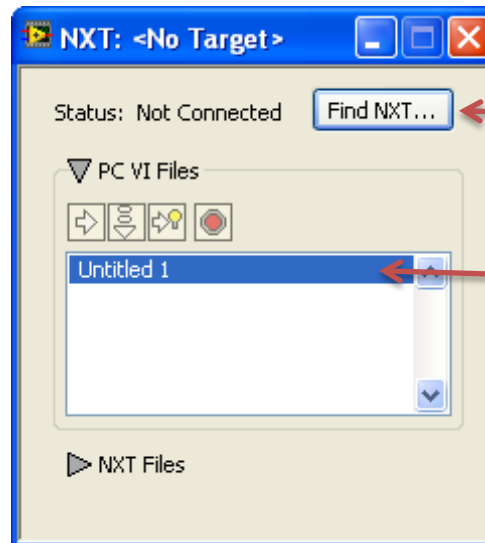
Find your NXT

Select your VI

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Running a VI on the NXT

Compile and Download the VI without running it

Debug – compile, download and run the VI while maintaining a link to the host computer

Compile, Download and Run without maintaining a link to the host computer

Abort stops running the VI

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Further Reading

- Checkout our wiki

  http://wiki.robojackets.org/w/LabVIEW_Resources

- See

  http://www.ni.com/labview/try/daq.htm

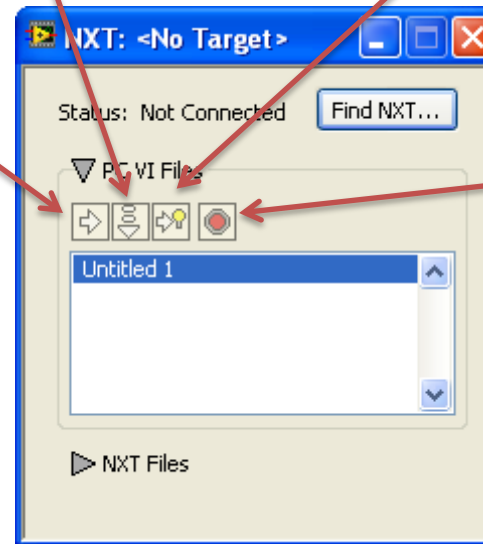 to check out LabVIEW

- Send me an email

  andyb@gatech.edu

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How soon do you want to try LabVIEW?

In 3 minutes.	In 3 hours.	In 3 days.
Instantly launch LabVIEW	Download LabVIEW (549 mb)	Request LabVIEW evaluation DVD
Step 1. Download the LabVIEW exercises	Step 1. Download the LabVIEW exercises	Step 1. Download the LabVIEW exercises
Step 2. Launch	Step 2. Download LabVIEW	Step 2. Request a DVD
System requirements	System requirements	System requirements

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