

# Sound Science with the LEGO NXT

Bill Church  
Littleton High School  
Littleton, NH

Barbara Bratzel  
Shady Hill School  
Cambridge, MA



Center for Engineering  
Education and Outreach



*Our Purpose:*

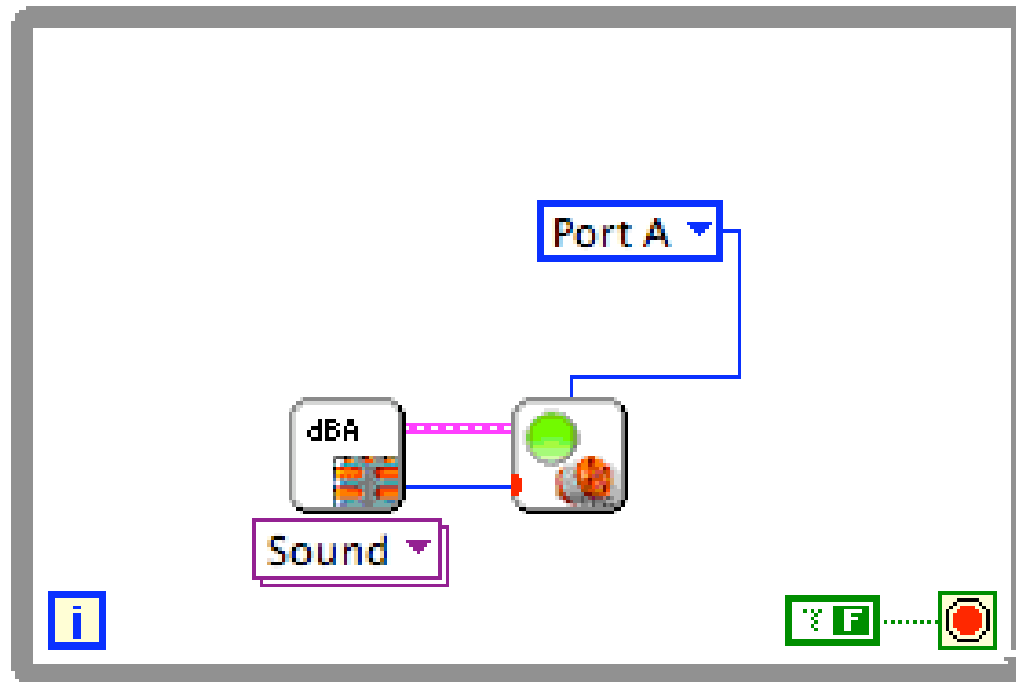
***To Improve Education Through Engineering***

**Tufts University, Medford, Massachusetts, USA**

# Applause Meter

Build an applause meter that spins slowly when the applause is muted, then picks up speed as the applause increases.

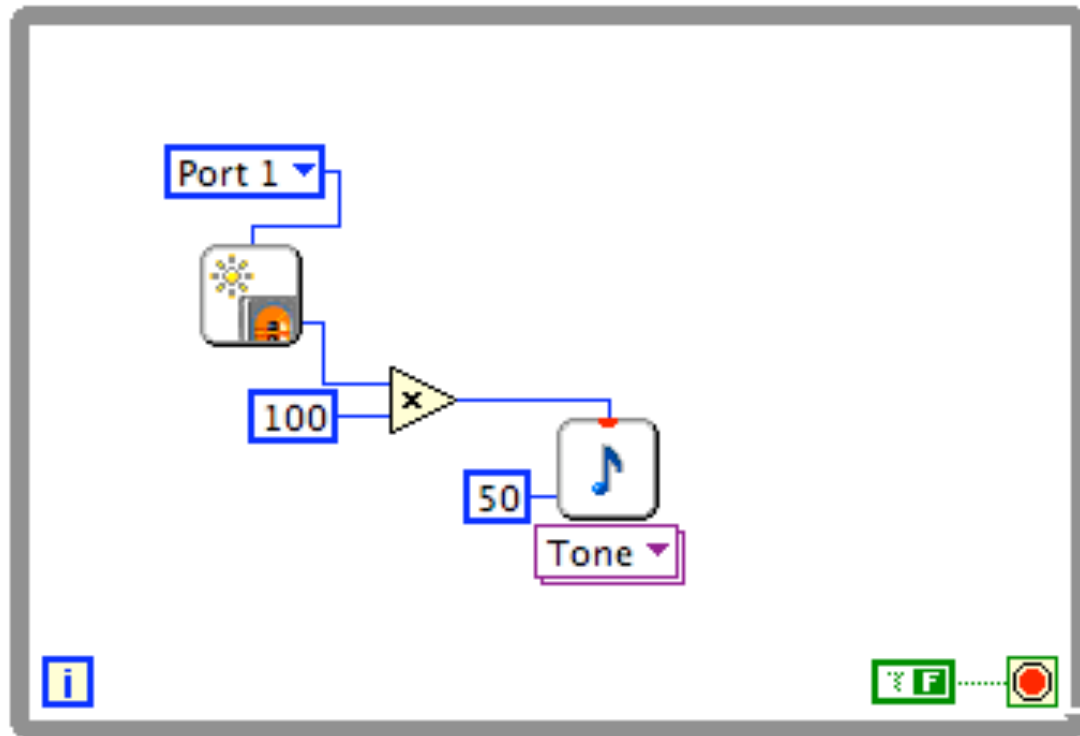
# Applause Meter Program



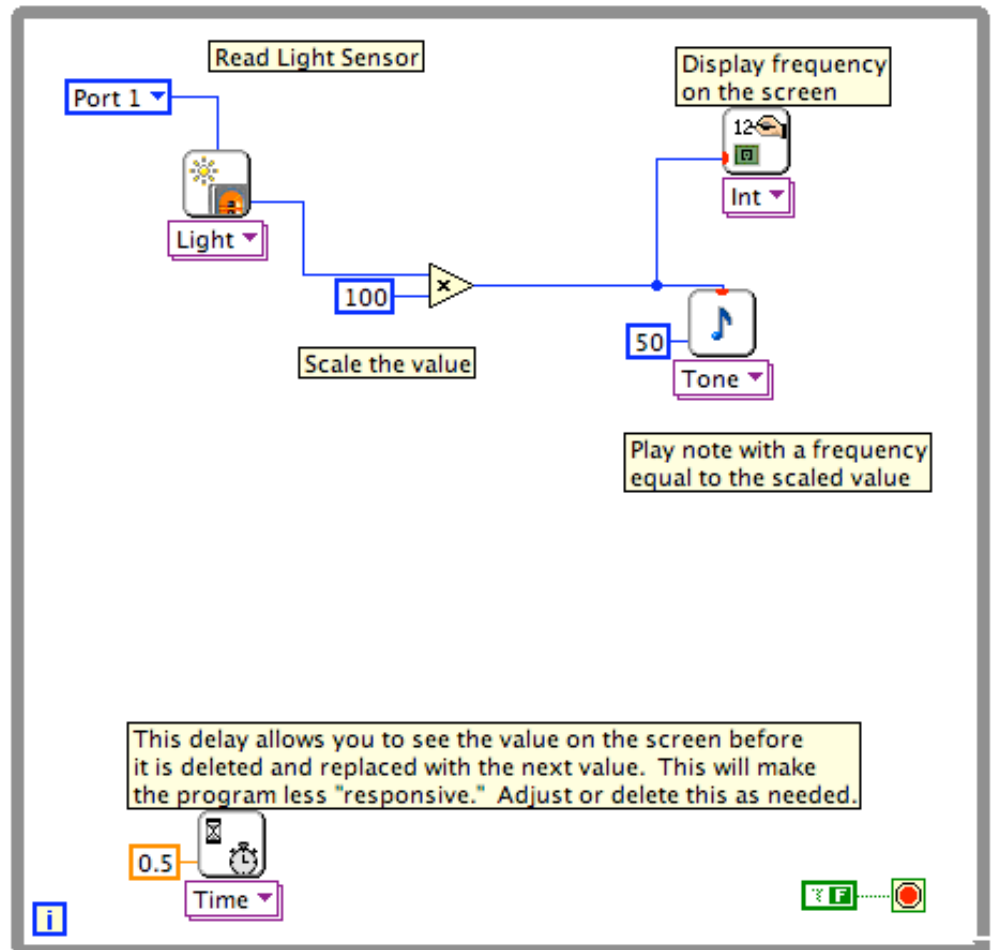
# Musical Instrument

Build a musical instrument using either the light sensor or the ultrasonic sensor. Write a program to convert your sensor readings into tones that are audible to people; the human ear can detect frequencies between about 20 and 20,000 hertz. Then download the program and move your NXT around to create a song.

# Musical Instrument Program



# Musical Instrument Extension: Play a Song

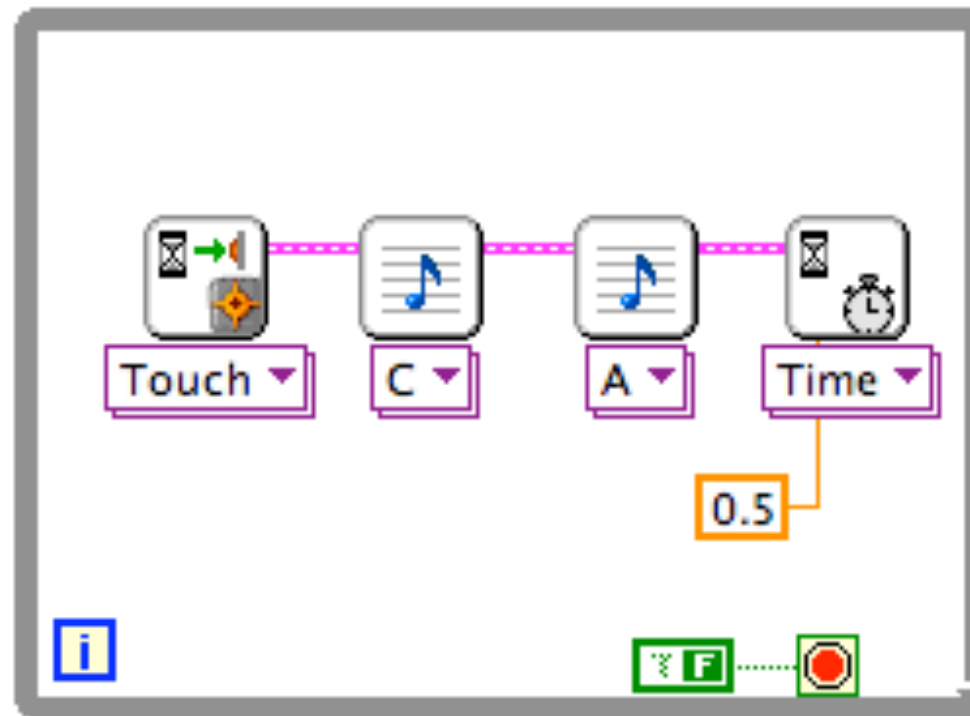


# Telephone

- You have probably made that classic device, the string-and-cup telephone. But, do you know which type of cup works best? Which type of string? How taut you should pull the string? To find out, we will use a sound sensor to test different telephones.



# Telephone Tone Generator



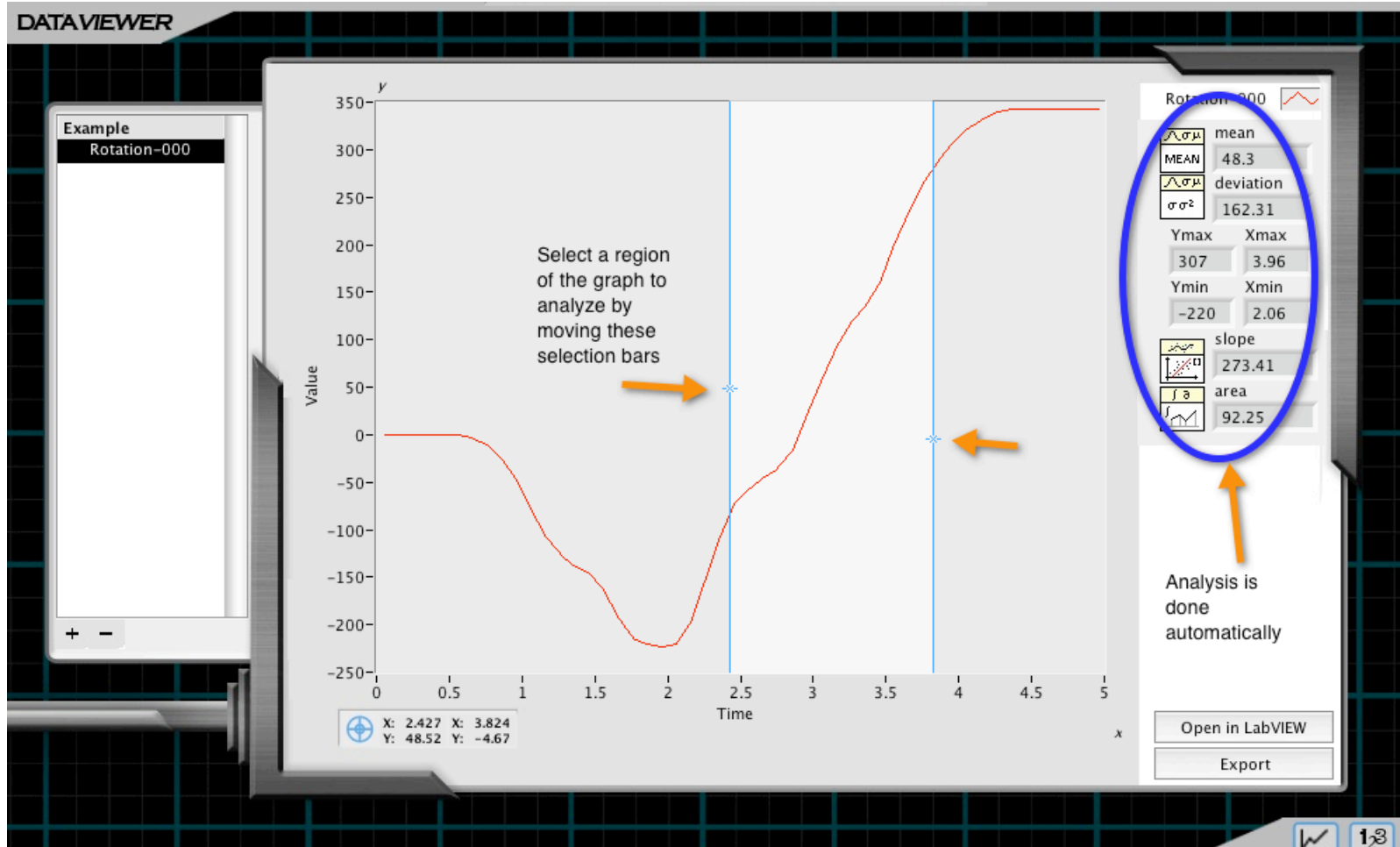
# Telephone Logger



# The Data Viewer

The screenshot displays the LabVIEW Data Viewer interface. On the left, a sidebar titled "Example" contains a blue circle around a "+" button, with an orange arrow pointing to it and the text "Click here to add a data set". The main area features a graph with a vertical axis labeled "Value" (ranging from 34 to 47) and a horizontal axis labeled "Time" (ranging from 0 to 9000). A status bar at the bottom of the graph shows coordinates: X: 200, X: 8800, Y: 40.5, Y: 40.5. On the right, a panel titled "LiveData-000" lists various statistical functions: mean (NaN), deviation (-0), slope (NaN), and area (NaN). Below this panel are buttons for "Open in LabVIEW" and "Export".

# Analyzing your Data



# Telephone Extension: Make a Musical Instrument

## NOTES:

1) This program will display the sound level from your NXT's sound sensor and play a note depending upon whether the sound level is above an upper threshold or between an upper and lower threshold.

2) Make sure that your NXT is connected to the computer.

3) Make sure the sound sensor is in Port 2.

4) If you would like to see the program hit "ctrl-E" (PC) or "apple-E" (mac)

