

## BASICS OF INSTRUMENTATION LABVIEW EXERCISES

As a reference, download the *LabVIEW Fundamentals* manual from the National Instruments website

<http://www.ni.com/pdf/manuals/374029a.pdf>.

Additionally, the best guide is always the LabVIEW help. Try Ctrl+?

### BASICS

*Loops.* Write a vi that creates a vector of 10 random numbers (double precision) in the range [1,5]. Use a for loop first and then a while loop. Change the constant 10 to a control. Use an indicator to output the vector. How can you see the data format of a value?

Hint: read about controls and indicators, learn what *auto-indexing* means.

*Sub VI's.* Turn the vi above into a usable function that takes the vector length as an argument and provides the vector as an output. Save the vi.

Hint: look at the LabVIEW fundamentals pdf, Sub VI's.

*Text files.* Open a new vi. Add in the block diagram the vi from the previous exercise. See how you can connect an input and get the output. Save the output vector in a text file. Then read it from the saved file.

Hint: find the *Write to text file* node, open its detailed help, look at the example.

*Display format.* Adapt the vi from the previous exercise to round the random vector to integers. Use the round function and the data conversion functions. Show the vector of integers using 3 separate indicators: one that displays numbers in the usual decimal format, one in hexadecimal, one in binary.

Hint: right-click on an indicator, then *Display format*.

*Binary numbers and arrays.* Make a numeric control on the front panel with U8 representation. In the block diagram convert that number into an array of booleans representing its binary format. Show the array on the front panel. Where is the most significant digit? Now add a 1 as the most significant bit (thus getting a 9bit number), convert the array back to number and see if it makes sense.

Hint: you'll need the *Num to boolean array* node and the *Insert into array* or *Build array* node.

*Using delays.* Write a vi that counts to n with variable speed (m milliseconds per step). Use nice controls for n and m. Try different indicators to show the count. Add a stop control.

Hint: just look at the timing palette.