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Laboratory Virtual Instrument Engineering Workbench (LABVIEW)

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Abstract: Lab VIEW (Laboratory Virtual Instrument Engineering Workbench), invented by National Instruments. Lab VIEW is also called system design platform and development environment for a visual programming language. Lab VIEW is an interactive program development and execution system in which one creates program using graphical notation. This paper gives idea about basic functional blocks of Lab VIEW programs, operations features and advantages. LabVIEW is used for Data acquisition, signal Processing (Analysis) and hardware control for typical instrument based on Labview.

Keywords: LABVIEW

I. INTRODUCTION

Bitter,Rick eta1[2] LabVIEW is a graphically-based programming language developed by National Instruments. Its graphical nature makes it ideal for test and measurement (T&M),automation, instrument control, data acquisition, and data analysis applications.

By jeffrey Travis[3] The LabVIEW development environment works on computers running Windows, Mac OS X, or Linux. LabVIEW can create programs that run on those platforms, as well as Microsoft Pocket PC, Microsoft Windows CE,Palm OS, and a variety of embedded platforms, including Field Programmable Gate Arrays (FPGAs),Digital Signal Processors (DSPs), and microprocessors.

LABVIEW Fundamentals,national intrument ,august 2005[4] In LabVIEW, We build a user interface by using a various tools and objects.The user interface is known as the front panel. We add code using graphical representations of functions to control the front panel objects. This graphical source code is also known as G code or block diagram code. The block diagram contains this code. The block diagram act as a flowchart.

II. LITERATURE REVIEW

Hugo A. Andrade [5] labview was originally developed in the early 1980's.It is composed of several sub-tools for making the development.This makes applications very simple and efficient.

shodhganga [6] Shaik (2011) presented an ARM based DAQ on a single chip which is an intelligent remote unit based on embedded technology for Data Acquisition, Monitoring and output control.Patel Hiren & Patel Dipak (2012) have focused on industrial automation with ARM Cortex-M3 Microcontroller and GUI based LabVIEW software tools. The tools available with LabVIEW prove very beneficial in developing application faster and easier.

Name-version	Build Number	Date
LabVIEW Project Begins		April 1983
LabVIEW 1.0 (for Macintosh)		October 1986
LabVIEW 2015	15.0f2	August 2015
LabVIEW 2015 SP1	15.0.1f1	March 2016
LabVIEW 2016	16.0.0	01/08/16

III. LABVIEW PROGRAMMING

1. Dataflow Programming

Graphical programming Northern Region ,August 2010[8] The programming language used in LabVIEW, and referred as G.It is a dataflow programming on the programmer connected different function and nodes by drawing wires. These wires propagate through variables and node can execute all input data become available.Since the case for multiple nodes simultaneously, G is capable for parallel execution. Multi-processing hardware is manually exploited by the built-in scheduler, which multiplexes multiple OS threads over the nodes ready for execution.

2.Graphical Programming

Hogskolen i telemark [7] In Labview there are various programming are include like VB, C#, Maple, MATLAB, MathScript etc. It is more like a "drawing program" than a Programming Language. LabVIEW programs are called virtual instruments. Each Virtual instrument has three component like a block diagram, a front panel, and a connector panel. Controls and indicators on the front panel. It allow an operator to put input data into or extract data from a running virtual instrument. The front panel defines the inputs and outputs for the given node through the connector panel. The graphical programming also allows non-programmers to build programs simply by dragging and dropping virtual representations of lab equipment.

Graphical programming Northern Region, August 2010[8] LabVIEW is a graphical programming language. Like text based languages, It has common programming devices like data types (numbers, strings, arrays, etc.), structures (for loops, while loops, case structures) and functions (file I/O, comparisons, etc.). It using function blocks, wires and loops in place of text strings. LabVIEW compiles to machine code when run and performs at similar speeds to applications written in text based languages. It continually compiles our program during design to help us to catch errors while we written a code.

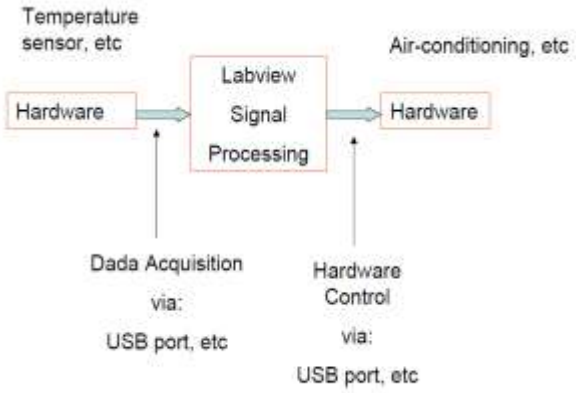
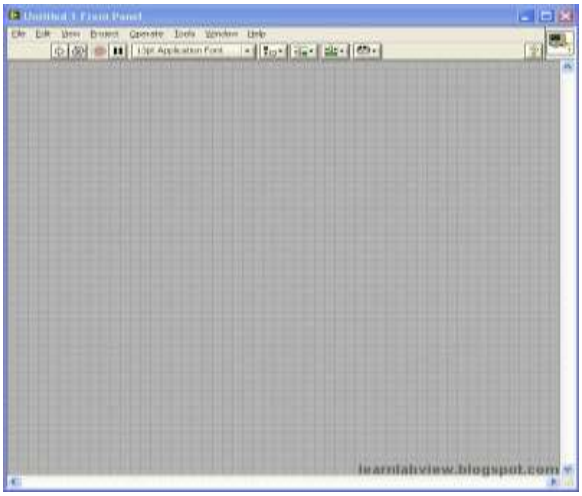


Fig.1. Schematic diagram of an instrument system based on LabVIEW.

LabVIEW is consisted of

1. Front Panel window
2. Block Diagram window

Front Panel window



"Introduction to LABVIEW" September 2003 [9] the front panel is the user interface of the virtual instrument. we build the front panel with controls and indicators, which are the input and output terminals of the virtual instrument respectively. Controls are knobs, pushbuttons, dials, and other input devices. Indicators are graphs, LEDs, and other displays. Controls simulate instrument input devices and supply data to the block diagram of the VI. Indicators simulate instrument output devices and display data on block diagram.

Block Diagram Window

Mihura Book ,May 29,2001[1] Fig. shows the Block Diagram Window, it is always connect with a front panel, which is another window. Every front panel has at most one block diagram, and every block diagram has exactly one front panel. The front panel is what the user sees (sometimes called a GUI, or graphical user interface), and the block diagram is the code, or the heart of the program

The different components are as follows:

1. Toolbar
2. Owned Label
3. Numeric Control
4. Free Label
5. Numeric Control Terminal
6. Knob Terminal

7. Numeric Constant
8. Multiply Function
9. Icon
10. Knob Control
11. Plot Legend
12. XY Graph
13. Wire Data Path
14. XY Graph Terminal
15. Bundle Function
16. SubVI
17. For Loop Structure

LABVIEW TOOLBAR

Below we see the LabVIEW Toolbar:

The behaviours of the different buttons are as follows:

Click the Run button to run a VI.

While the VI runs, the Run button appears as shown at left if the VI is a top-level VI, meaning it has no callers and therefore is not a subVI.

If the VI that is running is a subVI, the Run button appears as shown at left.

Click this button to display the Error list window,which lists all errors and warnings.

Click the Run button again and again it shows left, to run the VI until you abort or pause execution. You also can click the button again to disable continuous running.

Click this button to stop the virtual instrument immediately if there is no other way to stop the virtual instruments.

When we click the Pause button, LabVIEW is highlights on the block diagram. And location where we paused execution on the software ,and Pause button indicating red light.

IV. FEATURES OF LABVIEW

1]Design the software

–Signal and Image Processing

–Embedded System Programming

2]Control

–Automatic Controls and Dynamic Systems

–Mechatronics and Robotics

3]Measurements

–Circuits and Electronics

–Measurements and Instrumentation

V. ADVANTAGES OF LABVIEW

1]In labVIEW software it is beneficial for Graphical User Interface.

2]Drag and Drop built in functions.

3]Modular and Hierarchical design.

4]Professional Development Tools.

5]Multi Platforms.

6]Flexibility.

7]Distributed Development.

8]Visualization capabilities.

9]Simple application distribution.

10]Object oriented design.

11]Cost Reduction.

VI. APPLICATION OF LABVIEW

1] These is used for Automating Measurements and Processing Signal Data.

2] These software is Instrument Control.

3] Automating Test and Validation Systems.

4] Designing Embedded Control and Monitoring Systems.

5] Higher Education (University/College).

6] Communications System Design Suite.

VII. CONCLUSION

LabVIEW Communications is indeed a tool designed for studying RF communications, better equipped with special features for this purpose. Nonetheless, considering that this is still new in comparison with other versions of NI software, the best support to have while working on LabVIEW Communications would be from the NI forum (opened less than a year ago). It is still recommended to have LabVIEW System Design Software, as a lot of examples found on the internet with this software could be used as guides for LabVIEW Communications Design Suite.

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