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Design of Virtual Oscilloscope Using Labview

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ABSTRACT

LabVIEW is a Graphical Programming Language that uses inbuilt modules and functions instead of complicated code. We can use a LabVIEW With little knowledge of programming language. We build a user interface with a set of tools and objects. "Virtual Oscilloscope in LabVIEW" operates as like as original Oscilloscope. By using LabVIEW developing software which based on computer visual virtual instrumentation to program the Virtual Instruments with traditional instruments functions. So, the aim of this project to develop the software Module in LabVIEW which shows all the operation of Oscilloscope, in short it replaces Oscilloscope hardware by software. This system has all the functions which are available in Oscilloscope.

Keywords— LabVIEW; Virtual Instrumentation, DAQ and Oscilloscope.

INTRODUCTION

With the development of computer technology, the instrument industry is undergoing a sea change. Computer powerful processing and display capabilities, it can be in the data acquisition, analysis and expression of any one of the aspects to enhance the performance of the instrument. Virtual instrument to represent a new instrument to change the thinking of traditional instruments, they take full advantage of powerful computer hardware and software resources, the close combination of computer technology and measurement techniques, and integration of electronic measurement, signal processing, computer and network technology new measuring instruments, low cost, easy to use and the advantages of a wide range of applications. In this project we developed a oscilloscope based ^[1-3] on data acquisition card and general-purpose

computer hardware development platform, developed by National Instruments LabVIEW software development platform to try to develop a multi-function virtual digital oscilloscope. It is collected by the instrument hardware external signal, the instrument display and measurement functions through software programming. On this basis, the design of the virtual oscilloscope system, which is the focus of this report. This section explains the design of the virtual oscilloscope, and gives the detailed design of the various functional modules, and each module in accordance with the oscilloscope overall functionality integrated. Finally, the system tests the virtual oscilloscope system can do for its systematic analysis. The results show that, the oscilloscope design to meet the general engineering test has some practical value in use the virtual oscilloscope can achieve waveform

display, channel selection, data collection, data reading, writing and storage, spectrum analysis, printing and waveform parameters measurement. It also has a friendly user interface and can be operated conveniently. The Oscilloscope acquires and displays waveforms from channel. Enter your channel(s) and run the VI. While running, you can adjust the vertical position, volts per division, and the time base. You can set the polarity to best use the range of your DAQ device. This VI supports digital and analog triggering. For digital triggering, you must connect the appropriate high-to-low or low-to-high TTL trigger signal to the trigger pin of your DAQ device. For analog triggering, you set the trigger level and slope. View the help window description of each control for more information about its use.

LabVIEW TOOLS

With MAX, we can configure our National Instruments hardware and software, add new channels, interfaces, and virtual instruments, execute system diagnostics, and view the devices and instruments connected to our system. We can access to MAX from the Tools menu of a Front Panel or a Block Diagram. If we choose, for instance Devices and Interfaces from the Configuration Tree and click on the + sign next to it we get a list of the devices in the system. By choosing a device from the list we see all the information, tools and help items related to that device on the information/help window.

Using MAX, we using the hardware NI USB 6008 it provides a connection to eight analog input (AI) channels, two analog output (AO) channels, 12 digital input/output (DIO) channels, and a 32-bit counter with a Full-Speed USB interface.

PROJECT DESCRIPTION

We here discuss in detail about the program built for oscilloscope and its functions. the channels can be kept active at the same time and a single channel can also be used. Signal is acquired through built array which stores the input given by the channel. A bundle of individual elements is

created for the channels as well as for voltage and time base division. All the list are given as input to signal scope acquire and then forwarded to scaling function that perform horizontal-vertical scaling. After successful acquisition of the waveform and returning of true signal at the nor gate results in Start Input Signals through a function generator in the form of a voltage from DAQ Assistant(both channels) Signal is acquired through VI scope acquire and captured in the front panel Signal is saved in file and signal is scaled vertically and horizontally Acquired signal is triggered by analog or digital means and output signal is forwarded for error check Displayed on screen at the front panel. DAQ reset starts the process of signal acquires again and stops the loop Stop stopping of signal acquisition process. After that signal is updated according to the changes acquired for the horizontal and vertical base. With the help of scope waveform graph, the graphical plot is displayed in 2-D format. It displays magnitude on the Y-axis and time on the X-axis. Volts per division are changed according to the shift in the time base. Error at the output is maintained with the help of error handler which checks for invalid channel, invalid trigger detail, and invalid time base. If any error is recorded it is shown I the error code with details. Figure 2 shows the detailed component of the oscilloscope. Figure 1 shows the block diagram of channel multifunction oscilloscope. It illustrates the program with subVIs for scope acquire, scope error handling. Front panel control is defined for the user and controls are used to make the application more wide and user friendly. Front panel of the virtual oscilloscope is designed according to the control panels of the hardware oscilloscope By testing and carefully analyzing the results at the front panel waveforms are measured with respect to phase, amplitude and frequency. Results displayed at the output terminal shows the versatility of the designed virtual instrument. Figure 2 shows the front panel screen and output signal for the channel .Sine wave at the front panel displays results from

channel A after the acquisition and scaling process. It is proved that with the help of controls like position, and volts per division the waveforms are easy to scale and adjust according to the user demands.

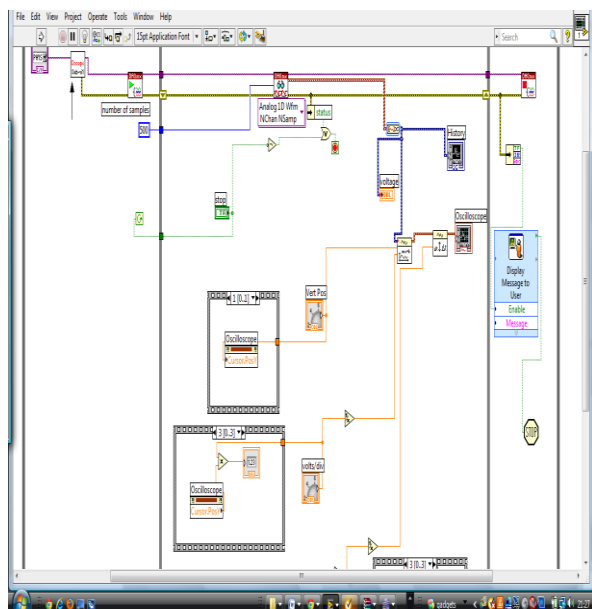


Figure 1: block diagram of oscilloscope

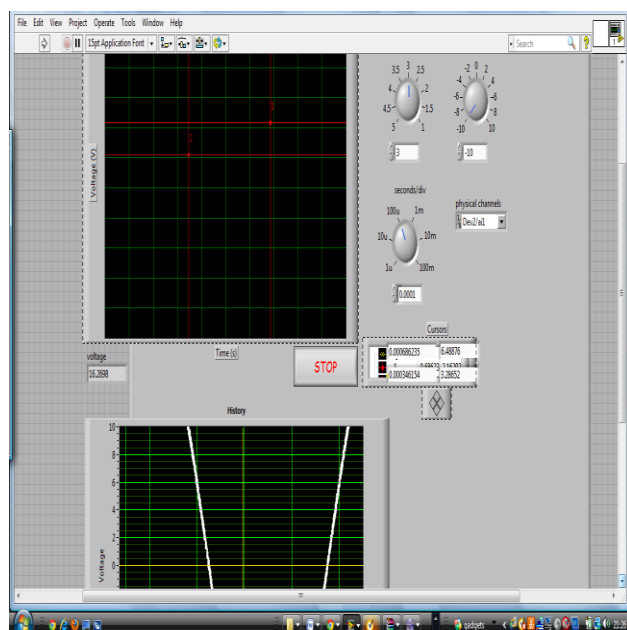


Figure 2: front panel diagram of oscilloscope

CONCLUSION

In this simulation based project, we have designed a virtual oscilloscope using labVIEW 2012. The results and waveforms obtained using this module are accurate and it has the facility of storing the waveforms and the parameters which can further

be analyzed for some other applications and hence the virtual oscilloscopes are more economical and efficient as compared to the traditional CRO. Virtual instrument provides the real environment experience for users. It shows that the practical experiment of the device software proves to be a convenient, fast and easy in operation for measurement of signal. By selecting suitable hardware input and software design, the system proves to be a high precision measuring system. It not only reduces the development time for the device but also makes it user friendly and easy to expand to higher levels of abstraction. The software and hardware combinations make the technology cost effective, time efficient and operation convenient.

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