

## HP3 Automatic Measurement System

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**Abstract.** This paper introduce the thought of USB interface application, an automatic measurement system is as an example. The PC control system of automatic measurement by the Labview software programming, then control relay, and control the work state of the HP3. It shows that the design of USB interface application system is realized by using labview programming easy and high efficiency.

### Introduction

Traditional way of communication transmission speed is slow, weak anti-interference ability, installation problems and seriously hindered the development of data acquisition equipment, with the rapid development of electronic information technology. Computer and peripheral equipment get rapid development and application. A new generation of universal serial bus (USB) has the advantages of low transmission, high speed, supporting hot plug and the advantages of easy to expand, is very good to solve the above problem, therefore the serial bus technology in the computer system and has been widely used in communications equipment, in order to meet the requirements of data collection and transmission speed. So put forward the design and implementation of high-speed USB interface.

### NI-VISA

NI - VISA (Virtual Instrument Software Architecture, hereinafter referred to as "VISA") is the U.S. national Instrument NI (NationalInstrLrment) developed a kind of used to communicate with all kinds of Instrument bus advanced application programming interface. 1 / VISA bus software is an integrated software package, not limited by platform, bus and the environment, can be used to the USB[1], GPIB, serial port, VXI, PXI and Ethernet system configuration, programming and debugging. VISA is virtual instrument system I/O interface software. VISA based on the bottom-up structure model to create a unified form of I/O control function set. On the one hand, for beginners or simple task designers, VISA provides a simple and easy to use control function set[2], in the application form is quite simple; On the other hand, for complex system of phones, VISA offers a very powerful instrument control and resource management.

### Labview and Call VISA Conditions

Labview (Laboratory Virtual Instrument Engineering Workbench) was developed by NI company based on graphical programming language of the program[3]. The user by using the method of creating and call subroutine programming, to create the modular program, and programming is simple and intuitive. A Labview program is divided into three parts: the front panel and block diagram program and ICONS/connection port. The front panel is used for simulating the real instrument front panel; Block diagram program is to use graphic language to objects on the front panel controls (divided into two kinds of control measure and instructions) to control; Icon/connection port is used to define the Labview program as a subroutine, so as to realize modularization programming.

When on the USB communication, VISA offers two types of function for Labview calls [4], USB INSTR device with USB RAW device. USB INSTR device is accord with USBTMC protocol of USB device, can control through the use of USB INSTR class function, you do not need to configure when communication NI - VISA; And USB RAW device is refers to besides clear accord with USBTMC specifications of the instrument of any USB devices, communication to configure the NI - VISA.

### HP3

HP3 is a high-speed data acquisition card, can be used for high speed data acquisition, VB, VC, Labview for secondary development. The Handyprobe HP3 is a portable USB oscilloscope with a full differential input that will allow you to measure voltages up to 800 V peak value with a maximum sampling rate of 100 M Samples/s into a memory of 1 MiSamples. The Handyprobe HP3 comes with the versatile Multi Channel measurement software that allows to do measurements in a quick and convenient way. With the software, the Handyprobe HP3 can be operated as an oscilloscope, a multimeter, a spectrum analyzer and a Y-t recorder. The captured data can be viewed in many different ways, in a single graph or in multiple views, each displaying a different property of the measured signal.

### Call Library Function Node (DLL)

Relative to the CIN, NI more recommend users to use DLLS to share programming language developed code based on the text. In addition to the sharing and reuse of code, developers can also use the Function modules of DLL encapsulation, so that these modules can be use different development tools. In labview, using DLL generally has the following several ways:

(1) To use their development and the function in the DLL.

(2) To call to the operating system or hardware driver suppliers API.

For the former method, it can be realized through the following steps:

(a) To be defined in labview DLL prototype;

(b) To Generated C or C ++ file, complete code for the function of realizing the function for function add DLL export declarations;

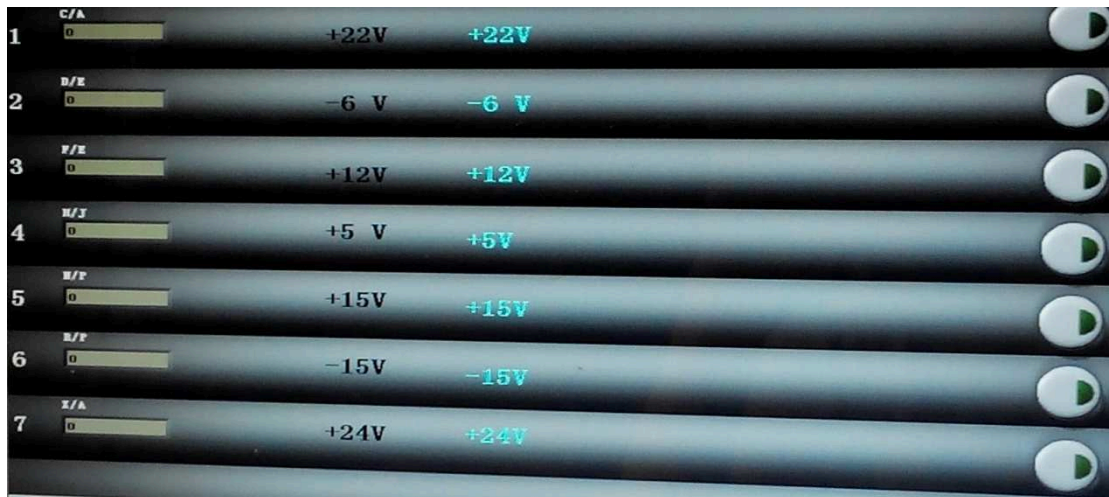
(c) To via an external IDE (e.g., vc ++ ) to create a DLL project and compile generated. DLL files.

Configure the Call library function node (CFN)

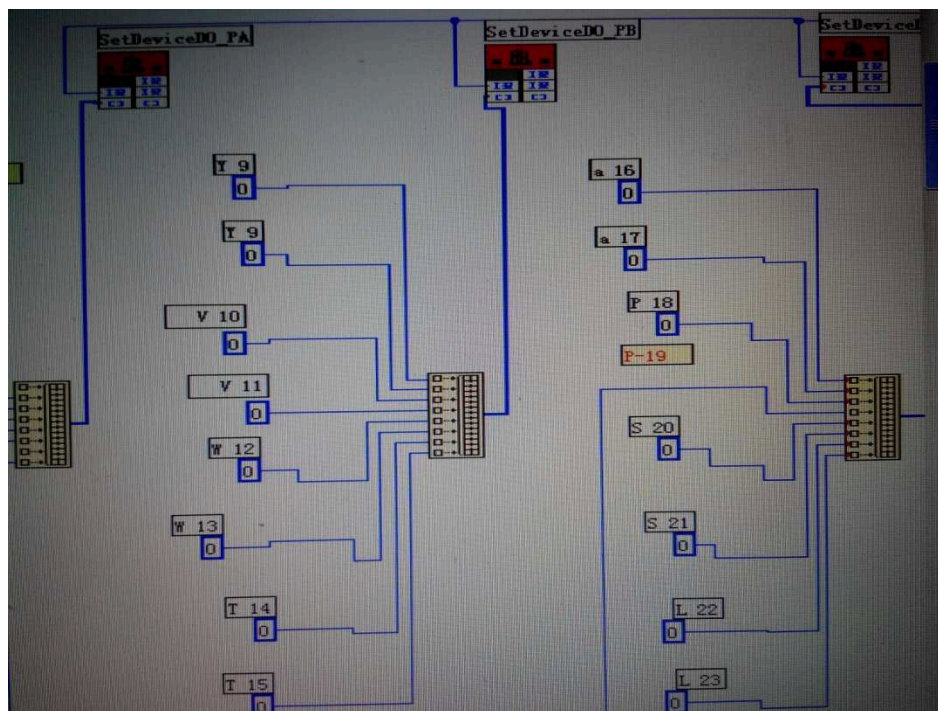
No matter use in labview development of DLL, or the hardware drive supplier (operating system) provided by the API, can all be done through configuration CFN

### System Design and Work Principle

This system is through PC control system of automatic measurement, through Labview software control relay, and control the work state of the HP3. System hardware can complete data acquisition function, and sending data to a USB controller, transmitting data via USB PC again. Relay control board USES is output board, board has six relay, can control a single relay on-off can one-time all open or close. According to the communication protocol to send panel command can work normally. Part of the interface and the design procedure is as follows:



The panel figure



Part of the program

### Summary

Through practical use shows that the design of USB interface application system is realized by using labview programming is very easy, low development difficulty, developers to quickly grasp; The developed system is stable and reliable.

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