Design of Temperature and Humidity Monitoring System Based on my DAQ

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Abstract: With the gradual improvement of human living standards and the cognitive desire for external things, people pay more and more attention to their growing environment, which makes the development of meteorological cause particularly important, the data measurement of meteorological elements also conforms to the development of measurement and control technology, and enter into intelligence, automation and networking. Human life is inseparable from temperature and humidity these two environmental parameters, so it is very necessary to detect them in real time.

Keywords: Temperature and humidity sensor; LabVIEW; data acquisition card.

1. Introduction

This paper will focus on using advantages of the ease of development and flexibility of virtual instruments, integrates it with traditional measurement systems, and realizes the connection of computer and temperature and humidity acquisition hardware through LabVIEW software, thus achieving the design of temperature and humidity monitoring system. This system uses the DHTM-02S temperature and humidity sensor linearly convert the collected temperature and humidity signals into the stable voltage signal for transmitting to my DAQ data acquisition card, then connect to the computer via the USB bus, with the support of computer software and drivers, the automatic collection, automatic processing and other functions of data have been completed.

2. Overall Plan Design of System

This design develops a temperature and humidity monitoring system based on my DAQ, according to the design principle from the whole to the local, through the overall analysis of the system function, the whole system is broken up into several parts that

realize different functions, and then the various parts are analyzed and designed, in order to realize the specific functions proposed by the temperature and humidity monitoring system, the system can be divided into the hardware part of the acquisition card and the computer software part. These two parts communicate via USB bus USB bus; complete the collection of temperature and humidity signals and the output of data, the computer uses LabVIEW software to complete data collection, processing, storage, and temperature and humidity with the support of the driver NI-DAQmx, and achieve the realization where the temperature and humidity exceeds the threshold alarm function.

3. Overall Design

The whole system is divided into computer software data processing part and data acquisition part of the acquisition card. The overall design block diagram is shown in Fig.1, the acquisition card communicates with the computer through the USB data bus.
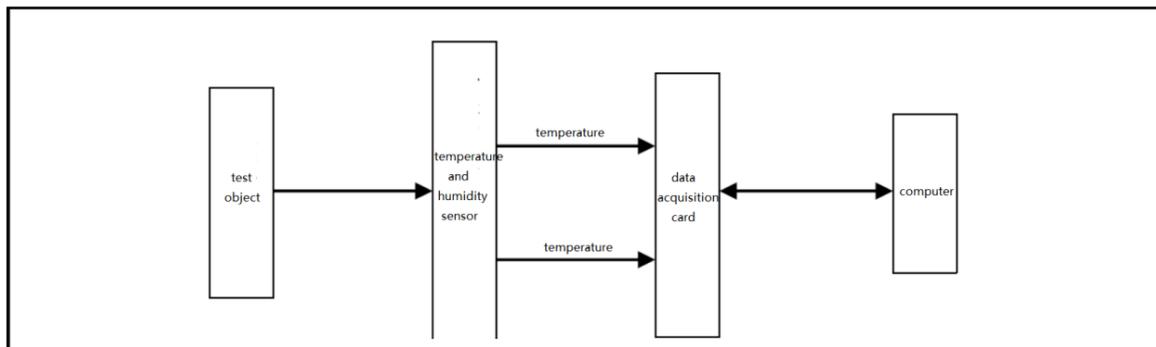

Fig.1 overall design block diagram of temperature and humidity monitoring system

The design of the slave computer utilizes the DHTM-02S type temperature and humidity sensor, which can convert the temperature and humidity signal into 0~5V analog voltage signal, and then use my DAQ acquisition card to collect the analog voltage signal, and connect to the computer through the serial port, the identification of the hardware is completed with the support of the driver.

The DHTM-02S sensor converts the temperature and humidity raw data into the stable 0~5V analog voltage signal through linear conversion; and the data acquisition card sends the signal through the signal output of the sensor with the support of the driver NI-DAQmx, use LabVIEW to write the host computer interface and data processing program, thereby conducting data display, processing or storage.

4. Design Ideas

4.1 Hardware Design Idea

Because the selected DHTM-02S type temperature and humidity sensor can directly convert the temperature and humidity signal into the stable linear voltage signal,

therefore, the temperature and humidity voltage signals can be separately collected into the analog input channel port of the my DAQ acquisition card, then the USB communication of the acquisition card is used to connect the computer identifiable voltage signal to the computer software.

4.2 Software Design Idea

Based on the expected goals, we can divide the whole system into the following three modules, these modules are designed based on LabVIEW software, as shown below:

(1) Data acquisition value display and real-time waveform display module

(2) Data storage module
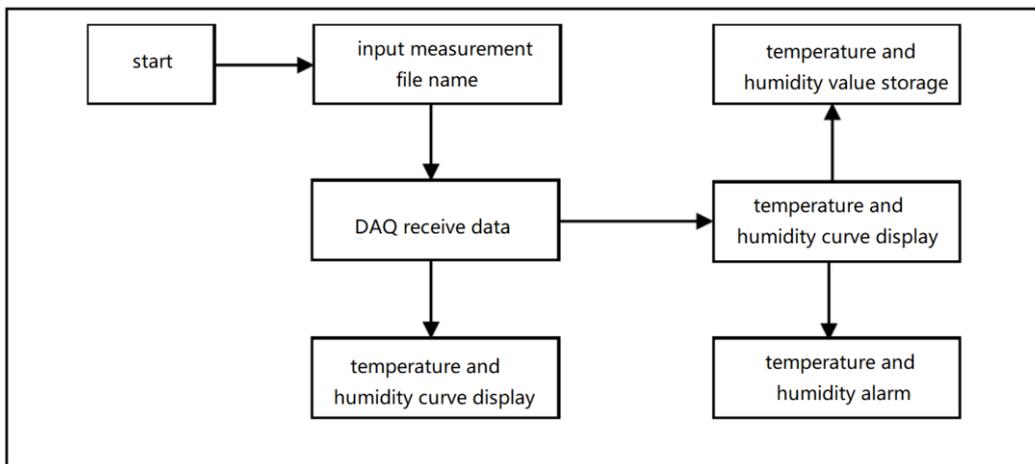
(3) Temperature and humidity over line alarm module

Fig.2 software design block diagram of temperature and humidity monitoring system

Three modules are designed separately, so that each can be run alone. After completion, the data receiving end of each module is integrated, and the data acquisition value display module is connected. When click and start running, the user can complete the naming of the stored file by inputting the name of the measurement file, and then start the operation of each module.

4.3 Introductions to my DAQ student data acquisition card

my DAQ student data acquisition device is connected to the computer interface by USB interface configuration, there are many test instruments for students to carry out experiments or innovative practices, it can design various instruments through software panels, including oscilloscopes, function signal generators, and signal analysis meter and so on. Moreover, the collection equipment is light, convenient, and low-cost, and meets the basic requirements of students for various extracurricular developments; learning and innovative practices can be carried out anytime and anywhere, which makes them popular among students and entry-level developers.

When the programming is completed, the front panel is often messy. At this time, the

user or the designer needs to design, organize, and improve the front panel, thereby generating an operation panel with clear interface or convenient operation. The display and operation panel of the temperature and humidity monitoring system are shown in Fig.3, on the panel, we can intuitively see the temperature and humidity waveform display curve frame, real-time temperature and humidity display instrument panel, temperature and humidity threshold setting input box and alarm lamp and test file storage path display box. In the initial state, each value is 0, and the upper and lower limits of temperature are 50 ° C and 20 ° C, respectively, and the upper and lower limits of humidity are 60% rh and 30% rh, respectively. The initial value can be changed by right-clicking on the threshold input box and selecting the data operation option.
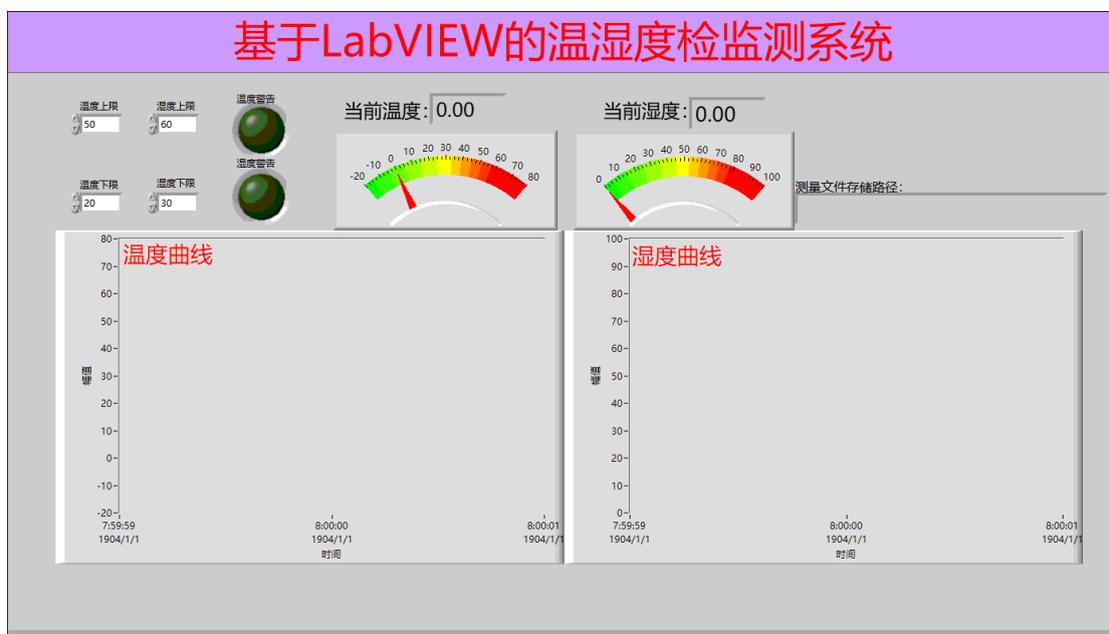

Fig.3 front panel block diagram of temperature and humidity monitoring system

The block diagram of total program of the temperature and humidity monitoring system is shown in Fig.3. First, the user is prompted to input the function into the first frame of the sequence structure, which is used to prompt the user to write a text file name each time it starts. The second frame is placed in the conditional structure, and the judgment condition is to prompt the user in the user block diagram to click the enter key. When the enter key is clicked, the program under the true branch in the condition box is started. If the user clicks the cancel button, the program stops running. There are data waveform display module, data storage module and over-threshold alarm module in the true branch of conditional structure. Since the external operation of each module is dominated by the While loop, and the data output is only after the While loop ends, local variables are used to transmit data to other modules in real time.

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