

Report of Project 3

【Group Members】

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【Experimental Objectives】

1. Understanding the programming process of digital input/output and achieve required functions;
2. Implementing various functions of graphical user interface (GUI);

【Experimental Apparatus】

1. USB-4704;
2. DAQNav Driver for USB-4704;
3. ELVIS II+;
4. Qt creator

【Experimental Procedures and Requirements】

Part 1. Select a language for programming using DAQ Navi SDK and write the user interface for display and user interaction. The program needs to realize the following functions:

- Write the graphical user interface (GUI) for display and user interaction;
- Use digital output (DO) to realize the output of square wave in a specific frequency range (less than 50Hz), which can be output at a single fixed time or without interruption;
- The frequency of the output square waveform can be changed in real time;
- Start, stop and continue the output square wave can be achieved;
- Digital input (DI) is used to display the square wave (or sinusoidal wave) waveform of the set frequency in real time on the user interface, where 1 channel represents the start/stop output, 2 channels represent the amplitude (0~3V), and 5 channels represent the frequency (0~31Hz).

After the program coding, test and debug the program, record the problems encountered and how to deal with them; After passing the test, publish

the executable file and display the function on another PC.

【Results and discussion】

Part 1. Select a language for programming using DAQ Navi SDK and write the graphical user interface (GUI) for display and user interaction.

2.1 The logic of program development

The program is mainly divided into two parts which respectively are “configuredialog.cpp” “staticdi/do.cpp”. We will introduce the two modules respectively as following.

The first part is the “configuredialog.cpp”, which is responsible for the hardware selection and some parameter settings. For this part, the digital input/output are the same.

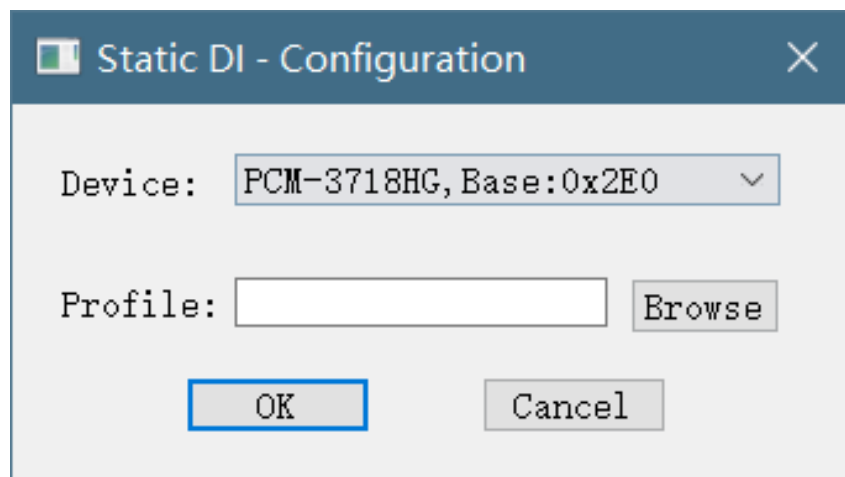
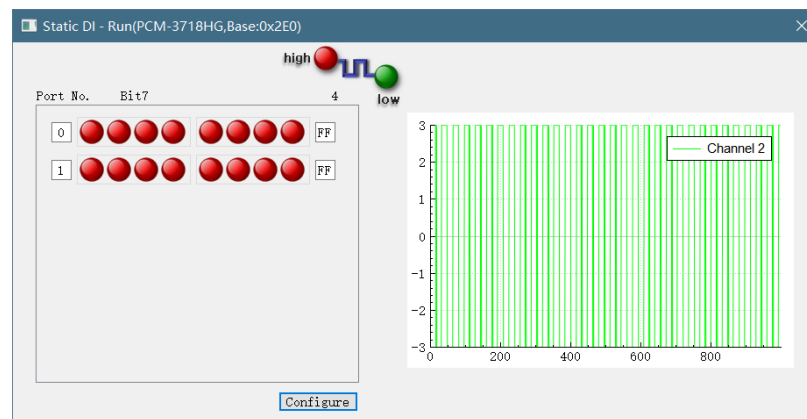


Figure. 1

Figure. 1 is the Graphical User Interface (GUI) of the “configuredialog.cpp” part. As we can see from the figure, we must select a specific equipment and its profile. If we have confirmed all information of the configuration dialog and press the OK button, then we will enter into the main part of the program which is “staticdi/do.cpp”.

The second part which is also **the most important part** is the “staticdi/do.cpp”.



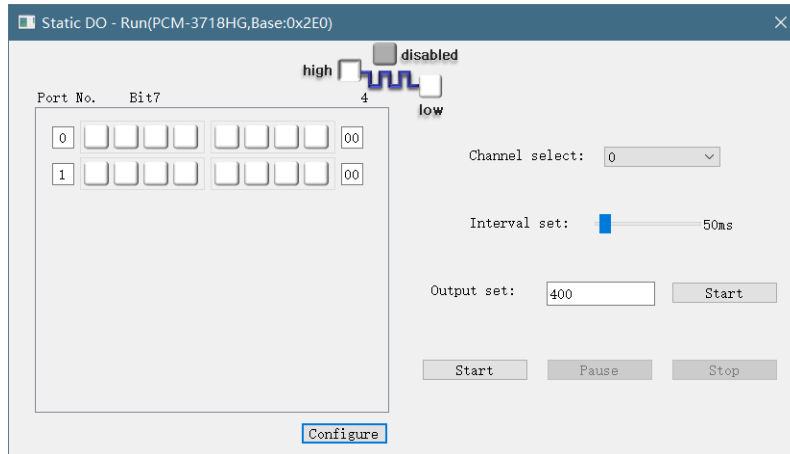


Figure. 2

The Figure. 2 above is the corresponding GUI interface for digital input/output respectively. We will enter into the interface after we confirm the information in the configuration dialog.

Besides, we can switch to the configure dialog by clicking “Configure” button and reselect the device or channels.

For the “staticdi”, we set the channel 0 as the switch to control the condition which determines signal input or not, channel 1 and 2 to control the amplitude of the input signal, and channel 3~7 to control the frequency range of the input signal. Besides, we can show the decoded waveform in the GUI.

For the digital output (DO), we realized the output of square wave in a specific frequency range (less than 50Hz), which can be output at a single fixed time or without interruption;

【Analysis and discussion】

Part 1. Periodic output point analysis

1.1 Determine the frequency range of the output square wave using DO, and give the corresponding data;

Waveforms whose frequencies are below 500Hz can be realized

Part 2. Problems and solutions

Problems: There are a lot of unknown reasons for Qt development using VS, and a lot of time is wasted.

Solutions: Qt Designer is directly used for development with better compatibility.