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Discussion on Interdisciplinary Teaching Innovation Based on Labview

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Abstract. In the current teaching process, we find that there are some problems in traditional virtual instrument teaching which cannot meet the teaching requirements of some learning situations. Therefore, we have set up an interdisciplinary, multi-disciplinary teaching team, adhering to an innovative attitude and using information-based teaching methods to develop new curriculum content so as to enable students to learn more effectively and lay a good beginning for their own career path. This paper takes the example of communication between Lab view and PLC in electrical automation specialty teaching to show our innovation. It also briefly introduces PPI communication protocol, program structure and other professional knowledge.

Keywords: Lab view, PLC, Interdisciplinary Teaching, Creative Teaching.

1. Introduction

This teaching idea is to provide students with an innovative environment that allows students to penetrate the knowledge they have learned in different courses [1]. For example, students majoring in applied electronics can use Lab VIEW serial communication technology to communicate with MCU. Students studying detection technology can further expand their study by using Lab VIEW to use new technologies such as DSP and FPGA. Students majoring in electrical automation can communicate with PLC using Lab VIEW which not only enables students to understand the concept of communication protocol, but also enables students to understand the application situation of the lower computer on the upper computer [2]. This kind of new knowledge and new content come into the classroom, which can not only enable students to learn more about different subject knowledge, but also cultivate students' creative thinking ability [3].

2. Course Import

During the course introduction, we started from the actual engineering project.

The original intention of teaching task design starts with the simplest example, but it is realized in three different ways: PLC, Lab view and PPI [4]. The specific tasks are as follows: write a program to realize communication between PLC and PC (Lab view) to realize that function of running watt lamp.

Mission requirements.

(1) Digital input: I 0.0 is the start signal and I 0.1 is the stop signal.

(2) Digital output: according to the program, Q 0.0 ~ Q 0.7 will be lit in sequence.

Use such concise and clear language to make students understand the task requirements. The teaching results are shown in figure 1.

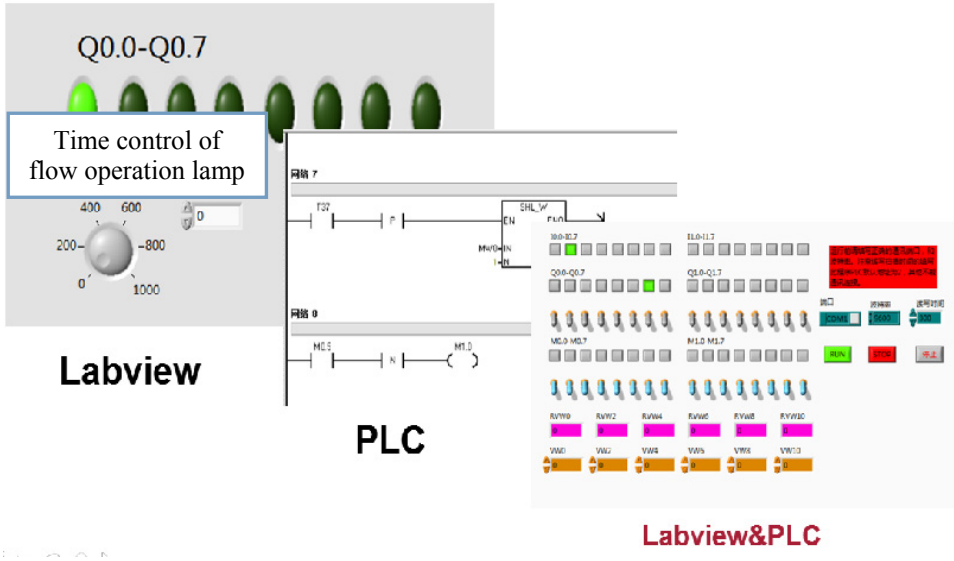

Fig 1. Schematic diagram of teaching results

3. Brief Introduction of Communication Procedures

3.1 Program Structure

The quality of the program structure determines the efficiency of the overall operation of the program to affect the operation of the entire system. A good program structure is the key to our program design, we are continuously exploring a universal, modifiable, readable and normative program structure [5]. The VI program structure of this program is shown in figure 2. It can be seen from the figure that the program adopts a three-layer progressive structure with main program layer, communication layer (PPI) and communication port configuration [6].

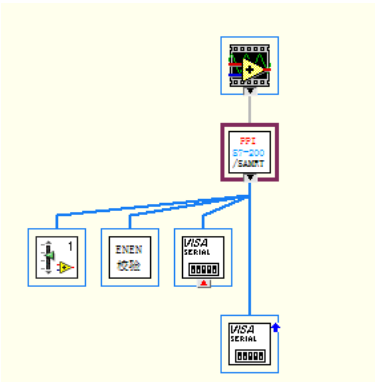

Fig 2. Schematic diagram of VI program structure

3.2 Communication Module

Figure 3 is a schematic diagram of the front panel of the communication module. The function of this part of the program is to set serial communication parameters and read and write serial data [7]. This function is mainly implemented in three sub – VI that is serial port configuration sub - VI, serial port reading sub - VI and serial port writing sub - VI. Through calling visa to configure the serial port function, the setting of serial port communication is completed including the selection of port number, baud rate, data bit, read-write time and check bit method [8].

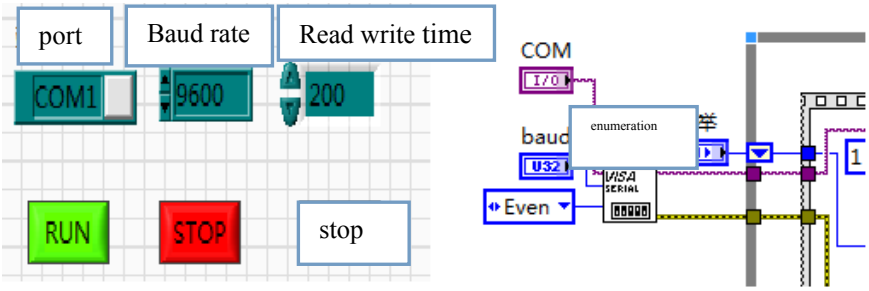

Fig 3. Schematic diagram of front and rear panels of communication module

4. Exploration in the Course of Automatic Control Principle

We found that in the course of learning the principle of automatic control for students majoring in electrical automation, we also found that the teaching effect of some parts of the principle chapters was not very good. Students felt that they could not learn from their senses when learning the partial theory. Therefore, teachers should guide and help them to overcome psychological barriers and learn knowledge smoothly. Based on this situation, we tried to combine Mat lab with Lab view such as transfer function, convolution, Fourier Transform, impulse response, PID adjustment and other concepts [9]. We all led students to make corresponding simulation programs, and to a greater extent to let students learn theoretical knowledge and actual debugging combined. This kind of learning has a very good auxiliary function for the later theoretical knowledge learning and understanding. The following figure 4 shows the parameter adjustment and output waveform diagram of simple PID and figure 5 shows the frequency response diagram of the first-order low-pass circuit.

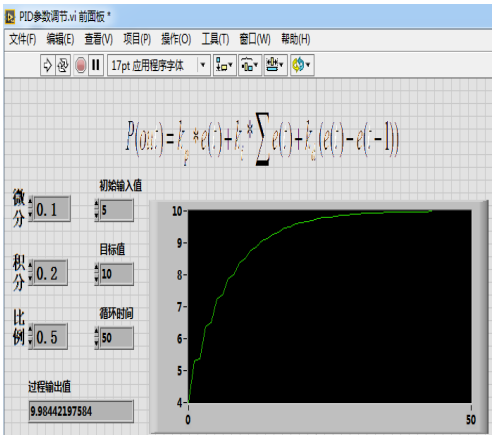

Figure 4. Parameter adjustment and output waveform diagram of PID

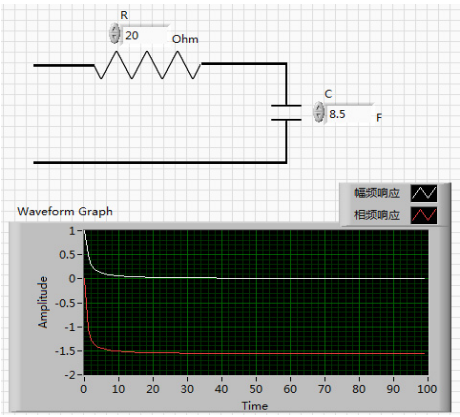

Figure 5. Schematic diagram of frequency response of first-order low-pass circuit

5. Summary

The above briefly introduces the combination of PLC courses with Lab view and the principle of self-control courses with Lab view courses. This is only our initial attempt to discuss the new ideas of Lab view courses. In this process, our department's teachers have formed a real team to express their own opinions and bring their own special fields into play. It is also a process in which teachers' personal academic level and professional ability are continuously improved. I think this is a very good beginning. I hope that we can continue to explore, continuously improve and continuously improve on the road of deepening the reform of vocational education with this innovative spirit to serve society, students and the future.

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