Control System of Fancy fountain based on PLC

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Abstract

Relied on control functions of PLC , through the control of inverter , pump and lights, this design can realize the function of the fancy fountain . Through the control of PLC , fountain can time synchronization with the music.

Keywords

PLC, fancy fountain, control system.

1. Introduction

As a unique landscape, fancy fountain has great appreciation value. Fancy fountain can along with the music, its control part is decisive. In this paper, the control system of fancy fountain is mainly introduced.

2. Fancy fountain control requirements

Fancy fountain requires the height of the fountain, the color and intensity of the light change with the music. In general, fancy fountain has the following functions:

①.In the state without music, the fountain can automatically complete a variety of spray pattern combination and lights, the control schema is designed by the user and stored in a data format.

②.In the state with music, according to audio signal which is digital processed, the controller drive pump change the pressure of the nozzle to get dancing water.

③When the music changed, the lights would be changed with the music.

3. Design of the control system

The most popular control mode is programmable water type program. This control method can well satisfy the water type, and can be applied to different music. In this control mode , several basic water type is designed by the designer, and then an interface is provided to the user to design a fountain modeling according to the need. The fountain control system includes music playing music, water type and synchronization, water type of demo application demonstration, coloured lights, the rhythm of the water type servo control, etc.

Music can be played by broadcasting from CD, VCD, or DVD player. Through the power amplifier, the audio signal can be divided into two lines of output, one to output to the speaker equipment, the other to output to the A/D conversion module for audio signal sampling. When the music began to play, water type will sync demonstration.

Fountain submersible pump motor is controlled by the controller inside the program, each a piece of music can be found from the controller in the corresponding fixed program data, and it can be corresponding to the output.

Colored lights are controlled by controller system program. By using the fountain pump control procedures, control the colored lights underwater, change color along with the change of the fountain. For different music, the water type leaps and swing is synchronous with the rhythm of the music. The Change of water type is made by the corresponding program transformed from A/D for the audio signal. Acceleration and deceleration of submersible pump is controlled By converter for such as, in order to achieve different viewing of different music signal.

4. Working process of the control system

For the audience, what they hear is the sound of music which is playing in the square, and what they see is height of the water column of the fountain. The water flow does not have a linear relationship with the intensity of the sound, but has a linear relationship with the speed of the pump. The rotation speed of the pump is proportional to the frequency of the inverter output. So in this control system, the music signal should be sampled by A/D module and send to the PLC. The digital quantity is Segmented, converted and compared by PLC to after the sample section. Then it is transferred to the converter to control the water pump rotation speed.

First of all, the audio signal is divided into two parts, part directly output to the external speaker equipment through the power amplifier; The other part is used for sampling and pretreatment such as A/D conversion. The digital quantity Audio signal (binary) is transformed into real by PLC. and then compared with a fixed value set up within the PLC .so the output sampling value range can be determined; By changing the input combination of the input port of converter, multiple frequencies can be outputted. So the pump can be run on multiple speed. In this way, The height of water column reflect the range of the audio signal in linear proportion . The height of the water column will be changed along with the music.

5. Conclusion

In this paper the control system of fancy fountain is mainly introduced. In this control system the PLC is used to control the whole system, and converter is used to change the height of the water column of the fountain. PLC is a kind of high reliability control device, and The frequency converter speed control is a very efficient speed control system. This kind of control mode, can very good control system for the pattern fountain, and it can achieve good control effect.

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