

The Control System of Cell Telescopic Door Based on PLC

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Abstract

The expansion door of the community is seen everywhere in today's urban district, but the traditional expansion door has some danger, unintelligence and environmental protection. This paper introduces a small gate control system based on PLC, the structure and working principle of intelligent gate in detail, illustrates the working process of the intelligent community gate control system and the PLC address of the detailed distribution, completed the design of control wiring diagram, PLC and to residential intelligent control purpose telescopic door.

Keywords

PLC; cell expansion door; control system.

1. Introduction

At present, the expansion doors of various communities are operated by people. There are often vehicles or personnel entering the area, which pose a threat to the safety of personal and property of residents in this district. Often people flow and cell gate open in proportion to the size is not coordinated, sometimes just one person to enter the area, but the large open area gate, this caused the waste of power; sometimes many people need to enter the residential district gate opens is very small, thus affecting the lives of the residents. And often found that the residential community has not yet fully entered, the expansion door closed, which has brought a great threat to the personal safety of the residents. For the district gate above shortcomings, this paper introduces a kind of intelligent gate, the control gate through the detection function of the detection system to open the size, in order to achieve energy saving and environmental protection on the telescopic door; the switch control gate through the detection function of the detection system on or off, to protect residents of the district people personal safety and property safety.

2. The Structure and Working Principle Of the Intelligent Cell Expansion Door Control System

The expansion door of the intelligent community is mainly composed of the power device, the detection device, the execution device and the control system. The power device is controlled by the

stepper motor, PLC controller sends the number of pulses determines the number of ring stepping motor rotation direction, pulse sending PLC controller determines the stepper motor; detecting device uses an infrared sensor, fingerprint identification device, license plate recognition device, infrared sensor is used to detect when to shut down in the goalkeeper if there is no expansion through the gate, the fingerprint identification device is used to detect whether the district residents, the license plate recognition device used to identify whether the district residents have reached Taiwan vehicles; control system PLC, sends a signal detection device detects the PLC to PLC, and then drive stepper motor positive inversion and control the rotation angle. The structure of the expansion door of the intelligent community is shown in Figure 1.

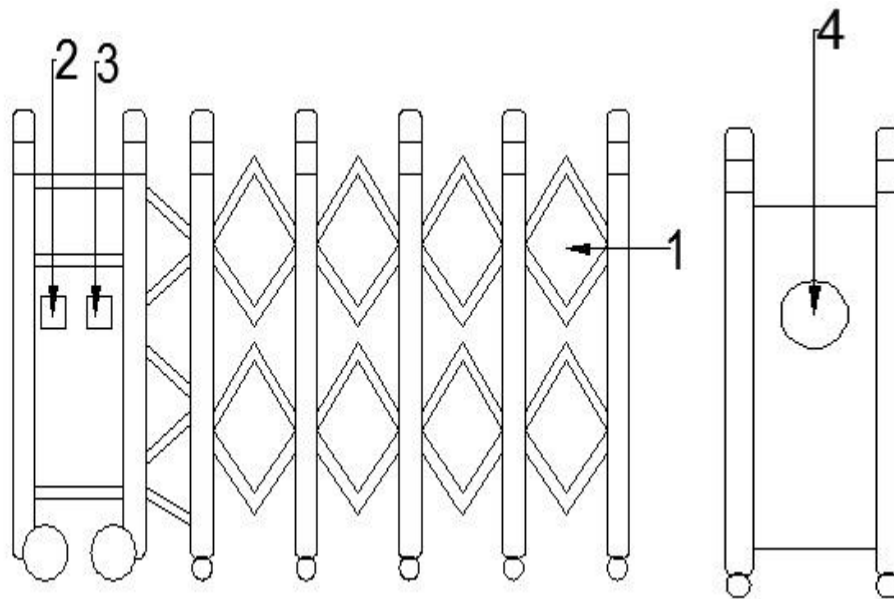


Figure 1

Figure 2

1- expansion door, 2- license plate automatic recognition, 3- resident fingerprint identification, and 4- infrared detection device

The working principle of intelligent gate :the infrared detection device, license plate recognition system and resident fingerprint identification device to detect the signal sent to PLC; then PLC to process the signal sent by the control system to control the execution device; finally the telescopic door action area.

3. Design of PLC Control System

Compared to the traditional residential expansion door is to hire manpower to look at the tube, but it is often the phenomenon of non residential staff entering the community, expansion door injury. Based on the advantages of PLC control system, it has the characteristics of strong versatility, convenient use, wide adaptability, high reliability, strong anti-interference ability and simple programming. This paper uses the delta PLC series to design the expansion door system of the district.

3.1 Control System I/O Allocation

In order to facilitate the selection of the PLC model, the I/O distribution of the input and output terminals is carried out. First, we design the electrical schematic diagram. We need to count the number of sensors, the number of executing components and the types of input and output signals of the expansion door control system in intelligent community. According to statistics, sensors include infrared sensors, fingerprint identification sensors, license plate recognition sensors, so the number of sensors is 3 and all NPN sensors are selected. Executive components are stepping motors, and need a pulse outlet and a direction pulse port. To sum up, we choose the delta DVP20EH PLC with a I/O point of 20. Figure three is the I/O port assignment map of the PLC control system. X0 is the signal end of the infrared sensor, X1 is the signal end of the fingerprint recognition sensor, X2 is the signal

end of the vehicle recognition sensor, Y0 is the pulse transmitter terminal of the stepper motor, and Y1 is the transmitter end of the step motor pulse.

3.2 Electric Control Realization

After completing the selection of the control system PLC and the distribution of I/O, it is necessary to design the schematic diagram of the system electrical control. Figure four is the PLC control system wiring diagram, first in the L/N end of 220V to PLC AC power supply, then the infrared sensor, fingerprint sensor and vehicle recognition sensor according to the NPN connection to access PLC, the stepper driver access PLC and stepper motor and stepper drive link.

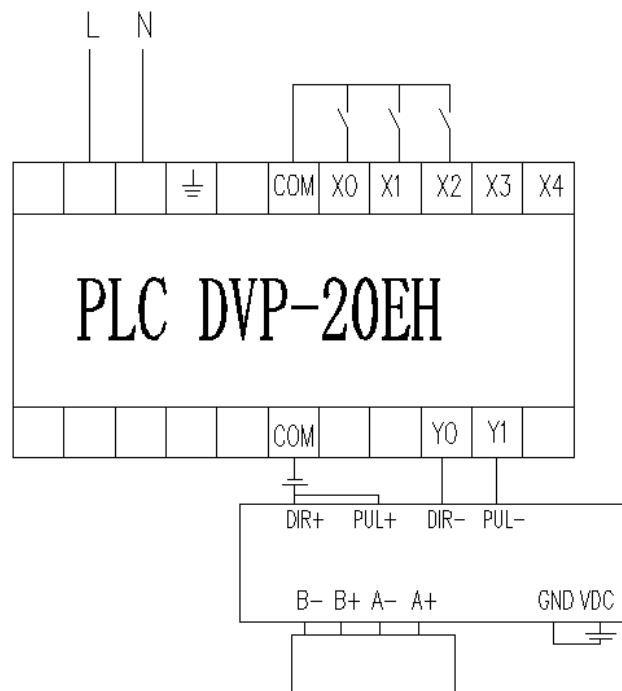


Figure 3

4. The Concrete Working Process of the Control System of the Expansion Door of the Intelligent Community

When a vehicle or people to enter the gate, installed on the telescopic door license plate automatic identification device and resident fingerprint identification device will automatically confirm whether it is residential, if not the residents of the community or vehicle detection device is to send the signal to the PLC control system, if the residents or vehicle area, will be the size of vehicle detection device how many people or the signal to the PLC control system, PLC control system according to the signal detection signal device over the driving cell gate and open the appropriate size, when the vehicle or flow completely into the infrared detection device, again sends the signal to the PLC control system and PLC control system will close the gate.

5. Summary

With the gradual concentration and localization of residential location, the demand for retractable door is also increasing. However, there is a potential danger in traditional cell expansion door, and it is still artificial operation, intelligence and environmental protection. In this paper, the application of PLC control system in residential expansion door not only makes the operation of the expansion gate system safe and stable, but also brings good economic benefits, which is in line with the new requirements of green and energy saving.

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