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Design of water flow alarm based on fuzzy control

Paper CS309

Introduction

Most of the current flow monitoring devices only have automatic monitoring function, which has limitations.The addition of remote cooperative control on the basis of existing automatic detection adds a double guarantee for the monitoring and control function of the system, which also improves the efficiency of supervision.In industrial production, it is often necessary to detect the flow of liquid in the pipeline. Especially for some dangerous industrial production, it is often necessary to send an alarm signal while detecting the flow to remind people to deal with it in time, which reduces the occurrence of safety accidents.In addition to industrial and agricultural production, the continuous application of smart home not only brings convenience to people, but also the safety problem should be paid attention to.In life, the domestic water pipeline is equipped with water flow sensor and sends out sound signal to remind users, which can not only ensure the safety of users, but also reduce the waste of water resources, so as to achieve the purpose of saving water. Therefore, this system is a smart home design for domestic water.

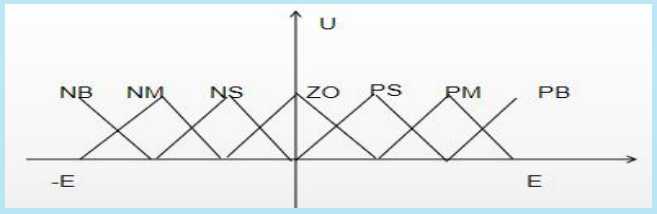
Composition of the system

The whole design includes power supply system, elliptical gear sensor, temperature sensor, MCU, relay, solenoid valve, buzzer, nixie tube display screen, cloud server and mobile terminal.In specific application, different types of components can be selected according to different systems and different application scenarios.

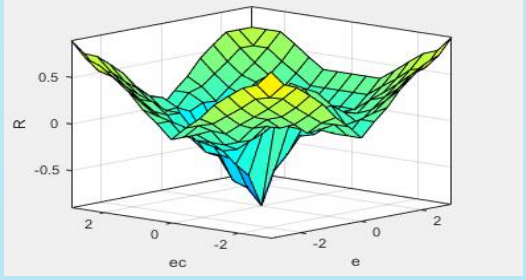
System function description

The water flow sensor detects the size of water flowing in the pipeline and the flow rate of water, and transmits it to the single chip microcomputer.During water injection, when the water flow reaches the set maximum flow threshold, the system controls the solenoid valve to close, and at the same time, the system controls the buzzer to send out an alarm signal.When the water volume of the system reaches the set minimum value after the user has used it for a period of time, the water level sensor detects that the water level is too low, and the single chip microcomputer also controls the buzzer to send out an alarm signal. At the same time, the system uses the fuzzy controller to control the water level within the range defined by the user, and controls the pipeline valve to open to start water injection.For the alarm function of the system, when the system needs to send an alarm signal, the single chip microcomputer transmits a level signal to the buzzer circuit to make the active buzzer send out continuous sound.When the single chip microcomputer controls the solenoid valve to open or close, the buzzer immediately stops making sound.

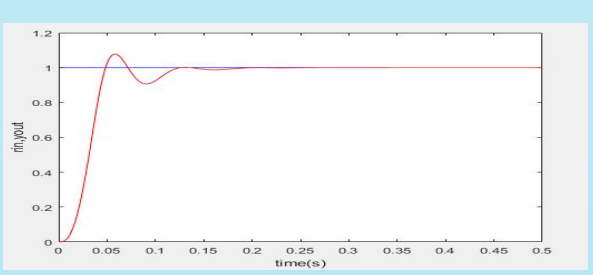
Simulation design of water flow monitoring



nitial universe and Fuzzy Division



scaling rule output



fuzzy simulation results

Conclusion

The advantage of this design is that the flow of the flow sensor is controlled by fuzzy control. The fuzzy control has the characteristics of high precision, fast response and alarm function.If the liquid flow sensor of this design is replaced by the gas flow sensor, the application range of this design can be further expanded, specifically to detect a certain gas concentration, so as to control it within a specific range.For example, the concentration control of a certain gas in natural gas transportation and industrial production.In addition, the follow-up research of this design can also add components to achieve more functions.For example, for industry, in addition to monitoring the water volume, multiple sensors can be added to monitor and control different parameters at the same time and send out alarms.For domestic water, in addition to the real-time flow monitoring and alarm function, it can also monitor and alarm the flow of natural gas.The mobile terminal provides users with functions such as querying the balance of water and gas charges and detailed running water bills.In addition to industrial and domestic water, this design can also be extended to agriculture, manufacturing and other fields to realize the functions of real-time monitoring, real-time control and real-time alarm for liquid and gas.The future intelligent control field will be the development direction of the combination of multiple industries and the intersection of multiple disciplines.This design will also have a wider range of applications.