

Research and Design of Campus Water Intelligent Control System

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Abstract

With the continuous consumption of water resources, how to save water resources has become an important research direction. As a large educational country, China has a large number of campuses, and campus water use has its law uniquely. The design of reasonable campus water use system is of great significance to achieve the goal of water saving. This paper first introduces the background and significance of the analyzing and studying campus water resources intelligent control system. Then, the existing campus water control system is investigated and analyzed. Finally, introduces the design characteristics, design ideas and significance of campus water intelligent control system.

Keywords

Campus Water Intelligent Control System; Intelligent Control; Design.

1. Introduction

Water resource is not only an important material resource in natural ecosystem, but also an important basic supporting material resource for human economic and social development. The campus uses a lot of water as a large public place, especially water for public toilets and campus greening. At present, the public toilet flushing device of domestic has a poor intelligence and low energy efficiency. The phenomenon of untimely flushing, missing flushing and mis flushing is serious, which not only can not ensure environmental sanitation, but also leads to the waste of water resources. The campus greening irrigation still relies on manual opening of the valve, and can not carry out intelligent irrigation according to external environmental factors such as temperature and soil humidity. This not only wastes human and material resources, but also wastes a lot of water resources.

In view of this situation, the use of intelligent flushing strategy to control the water consumption of public toilets and intelligent irrigation of campus greening can save water resources to a great extent. Therefore, it is imperative to strengthen water conservation in campus public toilets and develop intelligent campus irrigation. At the same time, it is of great practical significance to study the campus water intelligent control system with the functions of toilet intelligent flushing and intelligent irrigation with good water-saving performance, high reliability, low cost and high intelligence, so as to solve the problems of insufficient flushing of the existing flushing controller, low intelligence of the irrigation system and waste of water resources.

2. Existing Campus Water Control System

Figure 1 shows the overall topology of campus water intelligent control system. It can be seen from the figure that based on WIFI technology, the intelligent water system completes data transmission through Ethernet, while the greening irrigation water in the design is difficult to deploy with WIFI because some control nodes exceed the coverage of campus WIFI.

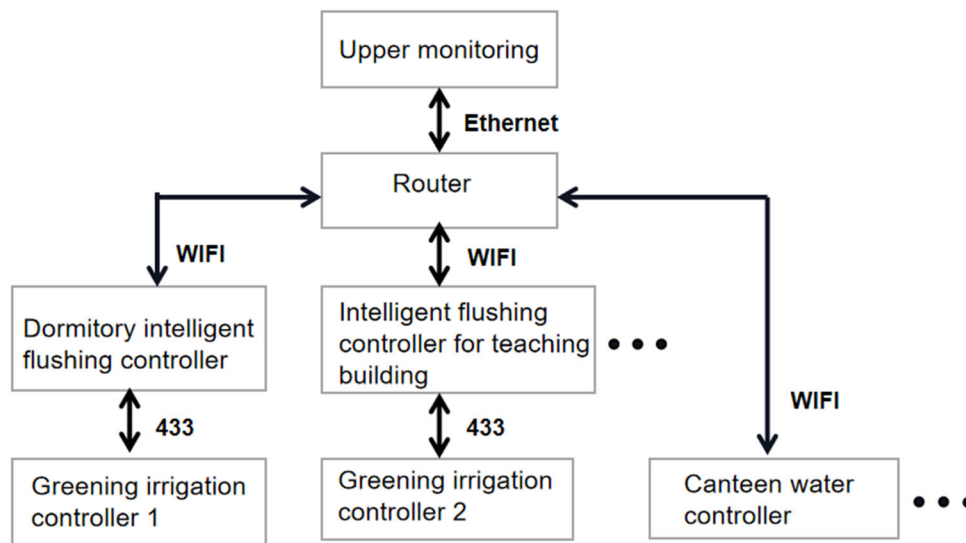


Figure 1. Structure diagram of campus water control system

From figure 2, for each teaching building or dormitory building, each flushing controller in the toilet adopts WIFI communication network to transmit data, due to the coverage of campus wireless WIFI network. The data is transmitted to the upper remote monitoring system through Ethernet after passing through the router. for the flushing controller, it needs to adjust the flushing duration according to different conditions. In addition, the system is an electromagnetic valve, which is not convenient for maintenance personnel to operate and control directly manually.

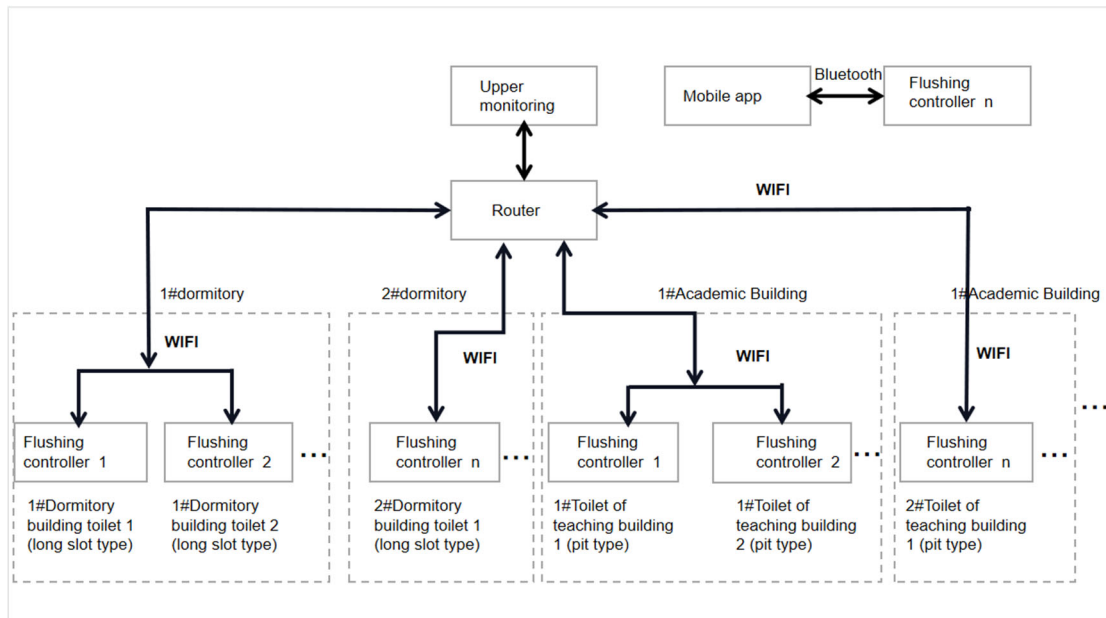


Figure 2. Network architecture of toilet flushing system

3. Campus Water Intelligent Control System

Design features of intelligent control system

- (1) It effectively solves the problem of outdoor local power supply of irrigation controller and its peripheral circuits (including valves), and adopts the idea of "Photovoltaic + energy storage" To design the power supply system ;
- (2) It realizes the real-time adjustment of flushing parameters of flushing controller and the on-site manual control of solenoid valve;
- (3) The design is not only simple, but also low power consumption and high performance .

3.1. Design Idea of Intelligent Control System

First of all, it determines the peripheral structures of long slot toilet flushing controller, pit toilet flushing controller and greening irrigation controller respectively in the hardware part. Secondly, the three types of control are divided into five modules through the functional modules: Core controller module, WIFI communication module, Bluetooth communication module, 433 communication module and green land irrigation controller charge and discharge control module. finally, the PCB design of the core controller is completed.

Software part: First of all, different communication modes are adopted according to the application scenarios of the controller in the campus water control system, such as WIFI, Bluetooth and 433 communication. And then, match the controller with the mobile application, and determine the development environment as needed. Finally, the software is realized through the interface design of remote monitoring system, background data processing and network communication.

3.2. Design Significance of Intelligent Control System

From a professional point of view, compared with the traditional campus water control system, the new design can carry out control strategies for different water use scenarios, so as to achieve the goal of water saving and clean or moderate irrigation. At the same time, the practicability has been significantly improved, such as reducing the maintenance cost and low intensity in actual operation .

Theoretically, on the one hand, the traditional campus water control system will cause a large waste of water resources due to poor intelligence and low energy efficiency, and the new intelligent control system can change this situation to a great extent .For example, using the intelligent flushing strategy based on the user's use law in the scenarios of long trough toilet and pit toilet ,to achieve the dual goals of water saving and cleanliness .Adopting dynamic strategy based on real-time humidity and optimizing irrigation period, in the scenario of green land irrigation to prevent the problems of over irrigation and untimely irrigation. At the same time, adopting the intelligent control strategy, not only the water consumption is obviously less, but also the cleanliness and appropriateness of toilet flushing and green space irrigation are ensured.

Acknowledgments

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