

Intelligent disinfection temperature measuring elevator based on STM32 microcontroller

Fengrui Zhou, Feng Li, Chao Zhang

School of Physics and Electronic Engineering, Taishan University, 271000, China

Abstract

With the continuous development of urbanization and modernization, elevator as a convenient tool for people's life, began to appear in every corner of the city elevator shadow. As people were exposed to the virus due to the sudden outbreak of COVID-19 in 2020, disinfection became a focus of attention. During the epidemic, there are many cases of cross infection caused by taking the same elevator. Due to the closed space, high mobility of passengers, and insufficient safe distance between passengers, the elevator car will bring the risk of virus transmission, especially in hospitals, hotels, shopping malls and other places with large flow of people. Intelligent disinfection temperature measuring elevator is mainly controlled by STM32F103C8T6 single chip microcomputer of STM32 series. It is composed of infrared temperature measuring sensor, human infrared sensor electronic module, centrifugal jet atomizing nozzle and special disinfection water tank. Wireless transmission technology and Internet of Things technology are used for real-time monitoring to detect the temperature of elevator passengers and the situation of disinfectant and report it in time. There are corresponding web pages on the cloud of mobile phones for checking.

Keywords

COVID-19, STM32, sensor disinfection elevator.

1. Introduction

1.1. The function of the system is introduced:

Intelligent disinfection temperature measuring elevator based on STM32 single chip microcomputer is a comprehensive elevator disinfection temperature measuring device composed of modern sensor technology and wireless transmission technology. The device is mainly divided into five modules, MCU main control module, infrared temperature measurement module, human infrared sensor electronic module, automatic disinfection module, wireless transmission module. The device is installed in the elevator under the premise of minimal impact on the structure and appearance of the elevator. The device uses modular design, which is convenient for users to maintain the equipment and replace the module.

This project uses STM32F103C8T6 microcontroller as the main control. Due to the limited peripherals of this series of microcontroller, other sensors are connected in the device for operation. This device should be installed on the top of the elevator car. When someone enters the elevator, the infrared temperature measuring module will detect the temperature of the person first. If abnormal temperature is found, the system will give an alarm. Disinfection modules working principle is as follows: when the human body infrared induction electronic module there is no person in the induction to the elevator, PC tank with a specified disinfection disinfectant spray nozzle to the elevator, achieves the comprehensive function of disinfection, when one induction unit induction to the elevator ride, disinfection modules will not run, to prevent unnecessary influence on people. As for the selection of the main control module,

STM32F103 series MCU STM32F03C8T6, which is more developable and compatible, is used. On the one hand, the simplified main control can minimize the volume of the device, on the other hand, it can avoid the waste of internal resources and maximize the performance of the single chip microcomputer.

In product design, the product should be designed in accordance with the requirements of the Ministry of Health's Disinfection Technical Specifications and COVID-19 Public Protection Guidelines.

1.2. The overall structure and principle of the system:

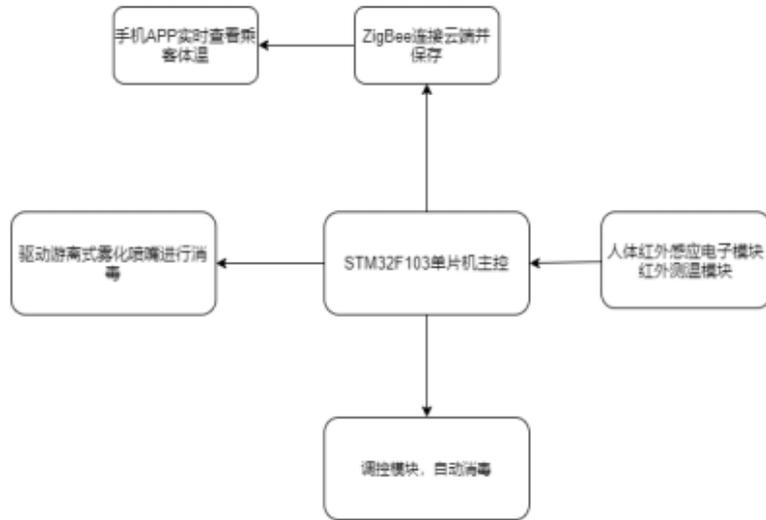


Fig.1. Technical diagram

Intelligent disinfection temperature measuring elevator based on STM32 microcontroller design, including the main control unit, disinfection unit, temperature measuring unit, wireless transmission unit three units.

1.MCU

In order to ensure the stability of the device and facilitate the later hardware maintenance and firmware upgrade, the main control unit is designed separately in a modular way. The main control unit adopts STM32F103 series common and powerful MCU to drive various sensors as the main purpose. The switch that controls the disinfection nozzle and receives data from the sensor serves as the brain of the whole device.

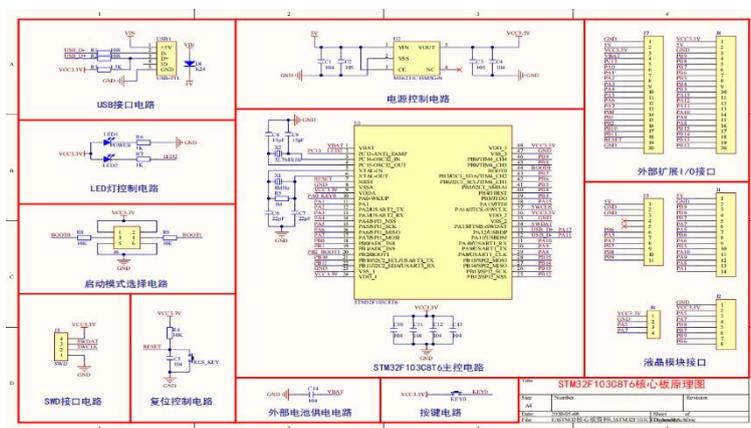


Fig.1. The principle diagram of the STM32F103C8T6

2. Disinfection unit

Disinfection unit is composed of human infrared sensor, centrifugal jet atomizing nozzle and special disinfection tank. The human body infrared sensor, which detects infrared radiation through temperature change, has better sensitivity and lower stability, so as to avoid misjudgment. When the elevator door induction of human body, this device should be closed at this time, when sensing elevator passengers left, sensor sends a signal to the main control unit, the master control unit drives the centrifugal jet atomization nozzle extract special disinfectant spray disinfectant to capsules in the interior, so as to achieve the goal of comprehensive disinfection.

3. Temperature measurement unit

Temperature measuring unit adopts serial port infrared non-contact temperature measuring module to measure the temperature of passengers before they enter the elevator. If abnormal temperature is found, the device will broadcast to the passengers in the elevator and passengers with fever through voice, and then take necessary measures.

4. Wireless transmission module

The emergence of intelligent devices is for the convenience of human beings, so the wireless transmission module is added in the device to record and upload data such as the use of disinfectant, the flow of people and the appearance time of passengers with abnormal body temperature to the cloud server, to ensure that the elevator can be timely disinfection.

2. Conclusion:

This design single-chip computer technology and sensor technology, on the basis of not changing the original structure of the lift to install the elevator, of course, this device is not limited to use in the elevator, through the sensor to determine the elevator for passengers, and can be done under the condition of total control of elevator no dead Angle of disinfection of all, The temperature data of passengers with abnormal body temperature can also be saved on the cloud. It improves the virus prevention and control ability in confined Spaces and avoids the risk of more virus infection in confined Spaces.

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