Based on Microcontroller Can Only Car Design

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Abstract. At present, most disinfection methods in indoor scenes use manual spraying and sweeping. The disinfection workers hold watering cans or pesticide sprayers to spray disinfection solutions, which is very inconvenient to use. In this paper, an automatic disinfection car is designed to be used in indoor places such as hospitals, shops, banks, etc., without manual cleaning. Especially during the current COVID-19 epidemic, it effectively realizes the timely disinfection of the public indoor environment, reduces the waste of human resources, protects the cleaning and disinfection staff, and reduces further cross-infection.

Keywords: Automatic car, Disinfection, Covid-19.

1. Design background
During the COVID-19 epidemic, disinfection water became a must. Hospitals, shops, banks and other places need to be disinfected regularly.

The commonly used disinfection method is only the disinfectant spraying disinfectant water with a pesticide sprayer or a hand-held watering can. In this case, the safety of the disinfectant cannot be guaranteed, and because it is sprayed manually, the spray coverage cannot be guaranteed.

At present, there are many large-scale engineering spraying vehicles on the market, such as road sprinklers, mining sprinklers, spray dust suppression vehicles, etc., among which the models are 2 tons, 5 tons, 8 tons, 10 tons, 12 tons, etc., it can be seen that the market the common sprinkler vehicles above are large in size and are only suitable for highways or other engineering sites, and are not suitable for use in indoor environments such as hospitals, shops, and banks.[1]

Figure. 1 Spray dust suppression vehicle
Based on the above situation, the project team designed a small automatic disinfection car. Compared with the spray dust suppression car often seen on the road, the car is smaller and suitable for shops, classrooms, shopping malls and other places.[2]

2. Main structure design
The car body designed by the project team is mainly composed of four parts: body, end cover, walking and anti-water structure, as shown in Figure 2.

![Figure 2 Overall body design](image)

(1) Body: The body is mainly divided into two parts. A water tank is placed on the back to store the prepared disinfection water, and the motor, water pump, circuit board, etc. are placed in the front, as shown in Figure 3. The dry and wet separation has been achieved to protect the circuit mechanical structure such as circuit boards, and avoid water in the circuit due to disinfection water, etc., and the trolley cannot be used.[3]

![Figure 3 Body design](image)

(2) Top cover: The top cover is the most important water outlet design, which needs to be connected to the water tank, water pump and water level detection module of the vehicle body, as shown in Figure 4.
(3) Walking: In terms of the selection of trolley wheels, the project team estimated the overall weight, load and ease of use of the trolley. Mecanum wheels were selected, and the wheat wheel model was 75mm, as shown in Figure 5.

(4) Water accumulation prevention structure: The water accumulation prevention structure is mainly composed of motors, couplings, and brushes. The brushes treat the water sprayed from the disinfection trolley to prevent the sprayed water from accumulating on the ground. The structure is shown in Figure 6.
3. Car circuit design

The overall design block diagram of the circuit function is shown in Figure 7. The disinfection cart uses a Bluetooth module to connect to the mobile phone, and the mobile phone remotely controls the movement of the cart.

![Circuit functional block diagram](image)

**Figure. 7 Circuit functional block diagram**

1. **MCU selection**: Choose stm32F104 series board.
2. **Water level display**: Select the water level sensor, transmit information through the serial port and the MCU, and the MCU will transmit the received information to the upper computer.
3. **Bluetooth remote control**
   1. **Water pump control**
      Through the circuit diagram shown in Figure 8, the control relay then controls the water pump switch.

![Schematic diagram of water pump control](image)

**Figure. 8 Schematic diagram of water pump control**

2. **Advance and retreat control**
   The Bluetooth module transmits the button information obtained by the mobile phone to the single-chip microcomputer, and the single-chip microcomputer issues instructions to the lower computer.
3. **Automatic control**
   The difficulty of automatic control lies in automatic tracking. This mechanism adopts the method of eight gray-scale sensors evenly distributed to the front and rear of the vehicle body to realize positioning movement.
4. Conclusions
The automatic disinfection trolley can realize the remote control of the traveling direction of the trolley through mobile phone Bluetooth in an indoor environment, and display the relevant water level, and can also automatically track through ground markings to realize automatic disinfection spraying. This technical solution has certain guiding significance for the automation of disinfection water spraying and other liquid spraying scenarios such as pesticide irrigation spraying.

References
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