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Research on Intelligent Sterilization Robot Webview Solution

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Abstract

The direction of much attention during the epidemic when environmental health safety, and to ensure environmental health safety disinfection and sterilization become indispensable. For different environments with different needs environmental disinfection sterilization work has become very diverse. Using the simple development principle of Android and making the product small and flexible, we use the Android platform development module as the main control to control various activities of the intelligent disinfection and sterilization robot. We use webview to make the interface more beautiful and easy to use.

Keywords

Intelligent Disinfection and Sterilization Robot; Webview; Android.

1. Introduction

The new crown pneumonia sweeping the world in early 2020 is accompanied by environmental health safety issues in the public environment. Disinfection staff safety is also a concern, in public places throughout the disinfection and sterilization work is mostly manual, disinfection and sterilization staff safety issues also come with it. At the same time we can not therefore reduce the frequency of disinfection and disinfection, reduce the quality of disinfection to ensure the safety of disinfection workers. Therefore, the development of intelligent sterilization robot becomes indispensable.[1].

At the end of 2019, a new coronavirus pneumonia (Corona Virus Disease 2019,COVID-19) outbreak, after a long and arduous struggle, until today, the domestic epidemic situation has been basically stable, in the fight against the new coronavirus pneumonia, automated intelligent disinfection sterilization robot is widely used. [2].

We also built an intelligent disinfection and sterilization robot system, and used the simple and small Android system to achieve the functions and beautify the interface using webview on the Android platform.

2. Technical Feasibility and Advantages

2.1 Technical Feasibility

Considering the complexity of the environment in the development of public places like high-speed railway stations and airports, we installed the Android central control directly on the intelligent disinfection robot. Since network quality is an uncertainty in high speed rail stations and airports, we installed the control system offline on the robot to ensure the stability of the control system. The websocket communication protocol is used between the control and the chassis to ensure real-time data interaction. This disinfection robot system is therefore technically feasible.

2.2 Advantages

HTML5 has a unique advantage over the native APP interface in terms of interface aesthetics and interface flexibility, compared to the native APP interface that uses xml to write interface logic. And

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if you want to embed HTML5 pages into the system, the solution is to use webview to achieve the use of the page to present the system UI.

The chassis manufacturers provide us with chassis operations in JavaScript format, so it becomes easier and more convenient to use HTML5 to present the front-end UI.

The webview approach also reflects the principle of separate development, we only provide the required API to complete the corresponding tasks with the front-end page. webview supports both Android and front-end page interaction, and can support the front-end page to call the back-end api back-end call the front-end JavaScript function definition, so it can save the chassis company to provide interface to translate.

2.3 Core Technology

HTML5 page embedding technology in hybrid development, embedding and displaying HTML5 page normally in Android application needs to be realized by webview control. As the web display control provided by Android development platform, it is supported by the underlying kernel of Android system and can realize the complete display of HTML5 page content [3].

The basic interaction steps are initializing the webview, initializing the function for the webview properties, enabling the interaction permissions, and loading the web page.Set the permission to interact with JavaScript.Set to allow JavaScript popups.HTML5 front-end page calls back-end interface needs to be declared in Java.[4] [5].

It is worth noting that we first create the asset folder under app/src/main and copy our prepared web pages to that location. This completes our webview space.

In order to ensure real-time information and accuracy, we transfer information between the two at fixed intervals to confirm the connection status, and we use a multi-threaded approach for task assignment, with the main thread in charge of logic execution and sub-threads in charge of information reception, and data splitting and data updating according to a predefined data structure.

We have created a number of static classes to store the status of the machine as a whole. We create a number of static classes for the host machine status to supervise the storage of the overall machine status information of each component. We consider all the received command status class information packets as spam packets and are rejected except for the active change of host status and the boot-up reading of machine indicators.

3. Functional Requirements

3.1 Sterilization Module

The smart sterilization robot has multiple sterilization modes. There are three manual operations for the components in the operator interface, which also has a disinfection count option. To control the switching of the components, we use the serial port for communication.

The specific steps to implement serial communication are getting the output stream from the serial port object, writing data, sending packets by sending them to the serial port, where the received packets can be parsed at the helm, dividing the work according to the type, turning on and off the device according to the status of the transmitted device, and other operations.

The chassis provides an API to operate the chassis when performing cruising tasks, which we implement through Android calls to JavaScript code.[6].

3.2 Voice Alarm Module

The smart sterilization robot has a fault self-test and machine status monitoring function before equipment operation. The main control part of the smart sterilization robot is placed on the Android module, and the sterilization equipment helm does a self-check of the physical sterilization equipment before running. The problematic devices are transmitted to the Android module through the serial port, and the Android module will always monitor the received information stored in the local static

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class, send it to the front-end page for display, and broadcast it through the voice module to notify the user of the equipment inspection work.

At the same time, we will process the information. Firstly, the information received is temporarily stored in the local static class and sent to the front-end. The front-end page feedback back to the information packet is received successfully after the stored information is deleted. Otherwise, the information package will be sent back to the front-end again until the information is received and then the local information is deleted. Such a storage structure can guarantee the real-time information and validity. At the same time, in order to guarantee the real-time and validity of information transmission when receiving fault information, it also receives feedback verification by way of receiving information packet feedback.

3.3 Message Reception Module

Divided into the following steps first define the receive stream, receive data from the input stream of the serial port [7].

When receiving the buffer you need to wait for the data transfer to complete usually use the thread sleep to wait for the data receiving thread after the data reception is complete, we unpack the information according to the received buffer against the protocol and write the data to a static class for reading the data.

Offline debugging we also provide an interactive debugging interface for device maintainers to be able to debug a component. We also restrict the user from touching or other unnecessary operations, and we add administrator authentication to the debugging interface, so that the administrator interface can be accessed only when the correct administrative password is entered.

Before using the equipment first use the chassis for sterilization environment for the full map scan, after the completion of the scan we can carry out sterilization work.

4. Conclusion

The whole intelligent disinfection sterilization robot consists of three major parts: Android, navigation motion chassis, and sterilization equipment helm. At the same time, the sterilization equipment helm is divided into voice module, spray sterilization module, UV sterilization module, fan sterilization module, and so on. In many modules whether the module starts or closes, moves or stops, the main control part relies on Android to send instructions to parse and execute the instructions. When users use the sterilization robot, we use the webview to embed a free and variable HTML5 page, which has certain advantages over the native page in terms of beauty and comfort of human-computer interaction. On the page, we have designed the switch button for each control, so that the user only needs to click a button of a component to complete the configuration operation when he gets the machine. When the user completes the configuration operation according to the environment and clicks run, the device can start running sterilization tasks. At the same time in the Android also has alarm receiving information module, the helm machine received physical disinfection sterilization parts failure or sterilization water level detected insufficient will also feedback to our alarm information module, so the user can through voice prompts, the equipment to refill the disinfectant and other operations.

The intelligent disinfection and sterilization robot can realize the task of disinfection and sterilization for large public places (airports, train stations, restaurants, shopping malls), effectively guaranteeing the environmental health and safety of public places, whether it is a strong guarantee for the prevention and control of epidemics in the domestic environment or in the international environment.

Robot instead of manual to complete the high precision work has been the trend, especially this kind of dangerous and have to perform the task is indispensable.

Android development is now generally mature technology, development is in the bottleneck, many mature technologies have emerged, this paper is the mature webview technology architecture in the project, so that the mature technology applied to the field environment. At the same time, we also

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realize the division development in the architecture logic, the front-end page just write the page logic, and the rest of the business logic is delivered to Android to complete.

At present, Android development is in the bottleneck period, which has both advantages and disadvantages compared with online development, and the security also needs to be improved.

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