

Research Facing Interface Design of Android System Industrial Control System

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Abstract. This paper focuses on the UI interface in various forms of android system application. Based on comparative analysis for display interface of several typical industrial control system, summarizes the display design requirements for industrial control systems in industrial environments, with a view to the future industrial control system in android system how to carry on display design and interface design. Finally, based on the author's ongoing research project as an example, stage achievements as the research target, this paper analyzes the advantages and disadvantages of existing system interface design, and give the solutions of existing problems.

Keywords: Android, Industrial control system, Interface design.

1 Introduction

Android is the name of open source operating system which is announced by Google in November of 2007 based on Linux platform. With the feature of completely free open source code, it is sprung up in embedded field (1). Initially it is mainly used in mobile phones, and then gradually spread to tablet PC, and now in the field of industrial control system is get preliminary application which make requirements of users on the system interface design get more satisfy.

In the field of industrial control, a wide range of industry determines the high difference degree of industrial software type. Especially the software used in high technology and automation, must have more and more complex functions to meet the needs of the industry because of the particularity of the object dealing with and the complexity of the problems, so in the design of industrial software interface, its characteristics of software should be taken into consideration.

2 Main Principles of the Interface Design

System interface is the main bridge of man-machine interactive information. Industrial area, complicated operation, inconsistent layout and inappropriate information display will make the user frustrated. How to smooth completion of the human-computer interaction, let users through the simple operation, easy to complete the task, and feel a modern industrial equipment for quick and comfortable become the new proposition of interface design (2).

2.1 Concision

The most important principles of interface design is simple and straightforward. Program looks more complicated if application interface is very difficult, and a little depth to consider in the design, it helps to create the interface which is simple both in look and using. From an aesthetic point of view, the clean and simple design is more desirable.

2.2 Consistency

The coordination of the application will be reflected by the consistent appearance. The interface will be confusing and chaotic in the lack of consistency so that the application is also confusing rather than strict, failing to reflect the proper value. Then the user will feel inconvenient by operating the application even feel that the application is not reliable. Therefore, the design of the interface should be consistent with the current style of popular applications as much as possible. In Android system, you can unify screen and UI elements according to the style and themes, so that the entire application interface style will be consistent.

2.3 Focused

In the vast majority of the program interface design, not all content has the same importance. A good interface should be clear and tightly focused, with the more important and frequently used content placed in a conspicuous place and the secondary content in a secondary position. Putting content similar controls in a group is also very important. The controls which are put together in the light of the function or relationship, in the visual effect, is much better than dispersed throughout the screen. It makes the interface structured and clear.

3 Interface Design of Industrial Control System

In industrial control field, all data on the display and the distribution of function commands are achieved through the system interface. The interface design is good or bad is not only to take the aesthetic of information display into consider, convenience of its information to identify, interpret and understand is a prime consideration (3). Information can't be effectively displayed to the user if the interface design is unreasonable. This article focuses on interface color coding, shape coding, graphics coding based on the experimental analysis.

3.1 Different Color-Coded Visual Differences in Study

Today, people are accustomed to colorful software environment, but the requirements of industrial control system display interface is very different, on the contrary, gorgeous colors and dazzling graphics design will distract the attention of the operator.

Different colors, different reactions on the background of same color. This paper makes a comparative study of cognitive responses to different colors in the context of

the same color. Due to the existence of individual differences, some react more quickly and some react slowly to the same color in the same color as the background.

Through comparative experiments, it is obvious that people react significantly faster to yellow, red, white and green as the subject than the reaction of the other six colors as the subject. Thus, in the industrial control system interface design, such as the flag of tips and warnings should be used in bright colors of red, yellow, grass green which easier identified by users. In addition, all equipment, pipeline, character and static picture elements can be used in gray which make sufficient contrast to background color so as not be too eye-catching (3).

3.2 Different Graphics Coding

Graphics and icons can convey the information vividly that the text can't achieve the desired effect. Console man-machine interface converts a variety of data into graphics displayed in the graphics area through visualization technology, so we should select the icon which is Simple, standard and the preferred graphics and icons which is generally recognized by the public.

Figure 1 presents a monitoring interface of a dust removal system, but too much visual information confuse users when it is presented in front of the user. Display a lot of information on the page, you can let the page more detailed, but not appropriate layout and information presentation will cause visual confusion. We can categorize and integrate the information, display the information in several stages of page based on primary and secondary distribution of the information; We can also use the pop-up window to operate information (1); Additionally we can make the title of the similar information in the form of a list which is clarity, it will pop up the corresponding detailed information when we click on a title, avoiding visual confusion caused by too much information.

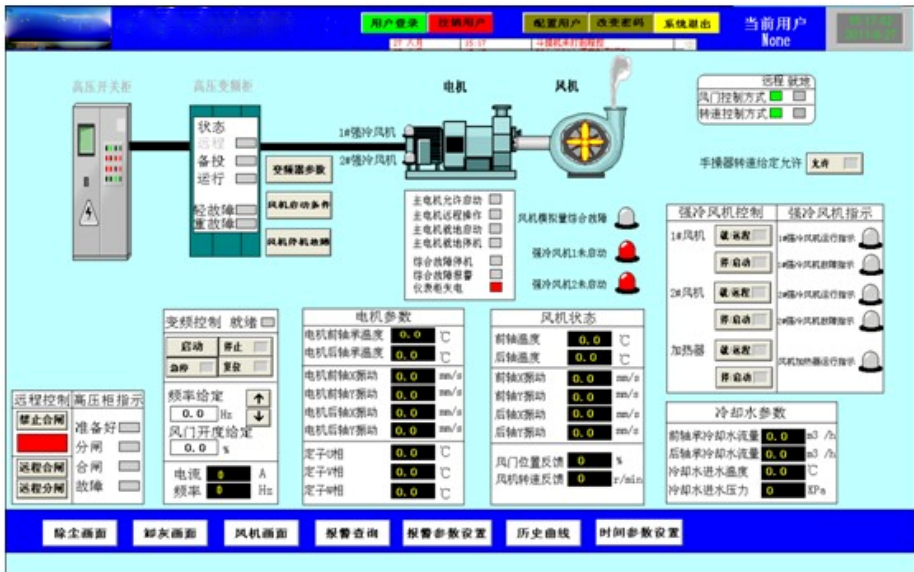


Fig. 1. A dust removal system monitoring interface

4 Introducing of Android Interface Development

Android can generate a screen in three ways: XML configuration generated; interfaces generated by the user interface; direct code generation. According to the MVC principles, the UI should be separated with the program logic, therefore, defining in the XML UI structure is highly recommended (1). In addition, a program adjust from one screen plan to another is also much easier. The basic functional unit of the Android application is Activity. Activity can do many things, but it not be shown on the screen, so we need to use the View and Viewgroup.

On the Android platform, you can use the View and ViewGroup hierarchical graph to define Activity UI.

The level of the tree can be simple or complicated as you wish. To show a view hierarchy tree on the screen, your Activity must call setContentView () method and pass it a reference of a root node. The Android system will accept this reference, and use it for the interface measurement. The root of the levels will require its child nodes to self-drawn, and each ViewGroup node is responsible for calling its subview for self-drawing (4).

5 Case Study

The author is conducting the development of a Android client relevant with teaching system, pre-interface design jobs have just been completed. The client consists of 3 main functions that each of the main functions correspond to several sub-functions shown in Figure 2. Taking into account the characteristics of the client hardware, the main interface uses TabHost layout which is user-defined, and puts the tab at the bottom of the page to switch on the interface, as shown in Figure 3. In addition, we use ListView at the top of the main menu to display the main function above the tab. Flexible use of the various controls in the Android system, we can easily solve the confusing interface layout problems mentioned above.

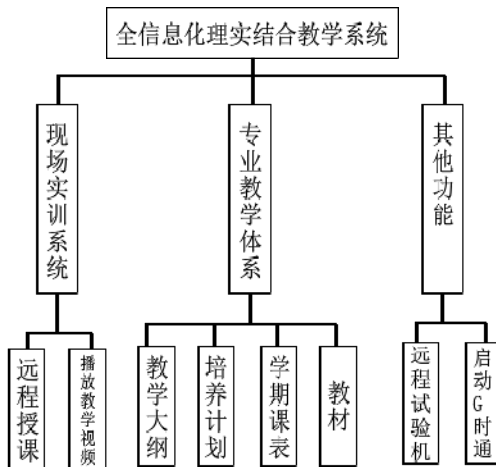


Fig. 2. Block diagram



Fig. 3. Case interface design

But there is an inevitable problem in the android system interface development, interface layout errors with different screen resolution. It is important to notice how to make the application to adapt to a variety of resolution as much as possible, how to be compatible of different platforms, and different screen in the development.

First of all, it should be sure how many resolution devices that the application will support; Secondly, it is need to be clear which resource files is wrong in the presence of different resolution devices; For the wrong resource files, we need to re-prepare the resource file and layout file which are adapted to the corresponding resolution device.

6 Conclusion

As is proved by the experimental research, Android system interface has some kinds of uncoordination, and the application interface is short of unified standard. Although the openness of Android provides the most possibility for applications free play, but it is not necessarily a bad thing that if system itself can provide the standard example. After all, there is no need for applications to create the interface originality. Under the Android system, in addition, the existing function controls provide little supports for industry control system interface development at present. It is necessary to do much secondary development to satisfy the needs of design.

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