Design and Implementation of the Remote Use of the Table Tennis Ball Recovery and Cleaning Machine Based on Wechat Mini Program

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Abstract: In the process of table tennis, table tennis is always unavoidable depressed and attached stains. So in order to solve this problem and improve the durability of table tennis, we developed a table tennis recovery cleaning all-in-one, in order to improve the service life of a single table tennis, at the same time we adopted the object-oriented development method and customized a remote connetion system for the device, based on WeChat Mini Program for table tennis recovery and cleaning all-in machine for remote use. The mini program can realize the remote connection and control of the table tennis machine to restore the cleaning machine, assist in the cleaning, repair, drying, disinfection and other functions, so as to enrich the user experience, expand the use distance of the device, and complete the implementation of "Internet +" thinking.

Keywords: WeChat applet, table tennis, remote use

1. Introduction

Table tennis is an essential part of this sport, Has played a vital role, But in the process of exercise is inevitably due to improper use and excessive use time, The table tennis ball appears depression and the surface of the table tennis ball will be accompanied by stains, So, in order to solve this problem very well, Improve the durability of table tennis, We are going to use the principle of the vacuum pump and the principle of the drum washing machine, Develop a table tennis recovery and cleaning integrated machine, To improve the service life of a single table tennis player, And design a small program to assist the all-in-one machine better operation, With considerable economic benefits, Can be heavily invested in various places for use[1].

The small program can realize the remote connection and control of the table tennis machine to restore the cleaning machine, and promote the realization of cleaning, repair, drying, disinfection and other functions. It not only enriches the user experience, but also expands the use distance of the device, and completes the implementation of the "Internet +" thinking.

1.1. Foreign research status

As early as 2015, designer FrancisBeriman and GoogleChrome engineer AlexRussell put forward the concept of "PWA (progressive network application)". The core pursuit of PWA has two: one is to improve the performance of network applications, the other is to improve user experience and improve users' experience. It not only matches the smooth experience of Native, but also organically combines the advantages of Web applications with [4]. According to the Google Developer support page, PWA's technologies are still being upgraded and optimized, improving both users and retention.

So far, the Chrome-based Chrome, Safari, Firefox, Windows Edge, Opera, and QQ browsers all fully support PWA technology. At the same time, many domestic enterprises, such as Taobao, Weibo, Douban, Ele. me, etc., have begun to use PWA technology, but there are more foreign enterprises using PWA technology. PWA is another light app of Google that can turn a web APP, AndroidInstantApps is a lean version of the app. It is worth noting that although Google's project is relatively close to WeChat applet in form, its purpose is fundamentally different from WeChat applet. The WeChat applet is designed to provide a complete user experience, and it is an alternative. While AndroidInstantApps developers hope to provide an opportunity to let application developers hope through the Internet advertising, social,

stores, to provide users with a can quickly try early version of the application, when the user experience, then according to the experience to decide whether to install the full version, and this is just a supplement, different from WeChat small program.

1.2. Domestic research status

Small program development process: On January 9th, 2017, wechat mini program was officially launched. In early 2018, the WeChat small program ecosystem was gradually improved by jumping and exploding in social circles. Subsequently, the major giants compete for the layout, several major mobile phone manufacturers, Alipay, Baidu, Toutiao and other head enterprises have launched their own small program products. By the end of 2018, wechat Mini Program had covered more than 200 subindustries and served more than 100 billion users. Urban services cover 362 prefecture-level cities, with an annual transaction growth rate of more than 600% and a commercial value of more than 50 billion yuan.

Overview: By the end of 2018, the WeChat mini program users have exceeded 600 million, the average daily activity reaches 230 million; the users in third and fourth tier cities account for 22% and 30% respectively; 76% have university degree or above, 58% are male, 42% are female, and users under 40 account for 70% [2]. Games, daily life, services, information provision platforms and online shopping are the four most commonly used types of small programs. Whether it is an online small game jump, e-commerce shopping platform or offline various convenience services, it is undeniable that small programs have been integrated into everyone's daily life.

2. Research methods and research content

2.1. Study Methods

2.1.1. Literature research method

This study reviews and analyzes domestic and foreign literature on physics, mechanical engineering, materials science and engineering, information and communication engineering, control science and engineering, computer science and technology, and provides academic background and scientific basis for research.

2.1.2. Access method

In order to study the necessary materials and circumstantial evidence, this paper investigates the retired table tennis players, table tennis teachers, table tennis enthusiasts and beginners, a total of more than 50 people, understand their view of table tennis sag and attached stains, comprehensive adopt their remote connection of table tennis cleaning all-in-one using the perception and Suggestions, and targeted analysis and research.

2.1.3. Logical analysis method

Logic research is to establish hypothesis and scientific theory system is very important method, can say no logic, no science, whether in the early research put forward some hypothesis, or in the process of research scientific abstract problems, establish a concept, reveal law, validation hypothesis, to summarize the results of the research, and thinking method provided by logic is inseparable. We make reasonable assumptions, analyze user needs, design the structure and hierarchy of small programs, realize functions, and meet user needs.

2.2. Wechat small program development

WeChat applet is an emerging application, is a cross-platform application, does not distinguish between Android and iOS versions, therefore, it is highly portable, high development efficiency. Nowadays, some less frequently used applications always occupy the storage space of the user's mobile phone, resulting in a waste of mobile phone memory [2]. Therefore, in order to avoid this kind of memory waste, some users download the software that uses less frequently when needed, and then delete it after use. This method reduces the waste of mobile memory, but it inevitably consumes time and traffic during app downloads, which creates a new waste.

So, is there a better solution to this problem? The answer is: use small programs. Small program has the characteristics of no installation, immediately, do not occupy the extra memory of the user's mobile phone. They can perfectly solve the memory use problem of low-frequency software in their daily life.

It is a cross-platform application based on the wechat environment. Users do not need to download and install the corresponding mini program, just click to exit, without uninstalling, and will not take up the memory of the phone [3].

2.3. Advantage and characteristics

The design of this small program is completely based on the practical purpose, focusing on the use range and use experience of the integrated cleaning machine, and overcoming the limitations of traditional instrument operation with modern computer technology. Not only that, the online use based on WeChat small program greatly simplifies the operation of the device, making it easier for people to accept this new thing, which is conducive to the promotion and dissemination of our project, and expands the use channels of table tennis recovery cleaning all-in-one machine.

This project in promoting table tennis recovery cleaning all-in-one machine at the same time, is also in awakening people's awareness of waste, damaged table tennis can recover, dirty table tennis can glow, the implementation of the function greatly reduces the loss of table tennis, let a table tennis can use a longer time, reduce the production of polymer polymerization plastic, which is to reduce the impact of plastic on the environment. In today's global call for environmental protection, we can provide our answer to reducing pollution.

Based on WeChat small program scan function,we can use or book devices anytime and anywhere, using a lightweight app to achieve functions that only native apps can achieve.And the use of WeChat small program will not be affected by the mobile phone model and version differences, can perfectly compatible with all users, realize the powerful features of retain users[5].

2.4. Study content

The system has three key components: server, wechat small program client and data management terminal: [4]. I am mainly involved in the design, development and testing of the clients, servers and databases. During the design and implementation of the system, we conducted global MVC mode design control over all the code of the client, and used templates to increase the reusability of the code.

Small program is mainly for table tennis fans and athletes. Combined with the current situation of great loss of table tennis, it provides remote use function expansion for table tennis recovery and cleaning all-in-one machine. It consists of three parts: background server, wechat small program client, and data management system. The main work of this paper focuses on the front end of small programs, namely the page and its rendering. It includes the main page and the setting page, and the main functions focus on the main page, so it is set as the research focus.

2.5. System framework analysis

In terms of the overall system architecture, Wechat small program is divided into customer front-end and WEB server back-end, The customer front end mainly uses wechat small program developer tool combined with some external module load development implementation, The core function is to connect the all-in-one machine and remotely control it, Meet the recovery and cleaning of table tennis through mobile phone operation; The Web server backend uses the PHP language and the MySQL database to build a development system through the Apache for the purpose of remote connection, and open the API and the interface files simultaneously,to ensure smooth data exchange and communication between the front-end and back-end servers of WeChat mini programs[2].

The front end of wechat small program customers adopts MINA architecture, which is divided into three parts: logic layer, view layer and system layer. The logical layer is central to the MINA framework service level, while the view layer is responsible for displaying the page style. The system layer mainly includes temporary data or cache, file storage and call.

The remote connection system is based on the overall architecture of wechat small program, as shown in Figure 1.
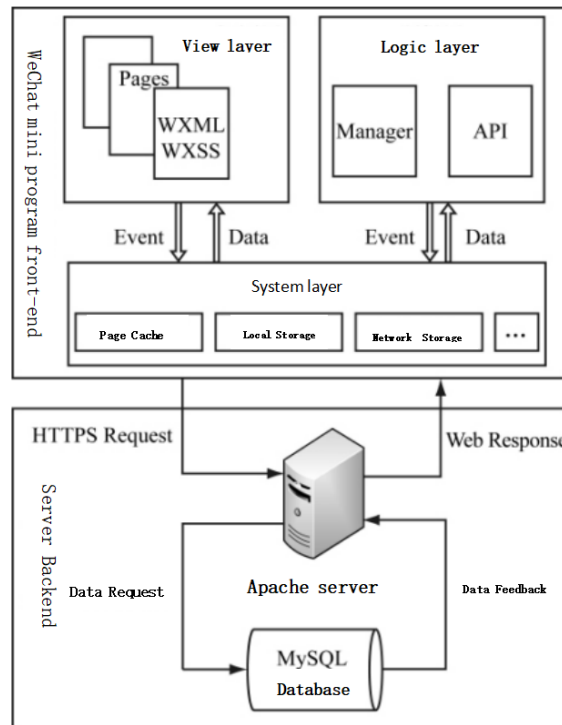
Figure 1: Overall system framework design (from reference [2])

2.6. System function analysis

2.6.1. Status bar at the bottom (see Figure 2)

Figure 2: The bottom status bar (self-made)

The specific implementation uses tabBar page configuration, with two new pages, and four ICONS to reflect the activation state. See Figure 3 for the specific process

```
"tabBar": {
  "list": [{
    "pagePath": "pages/home/home",
    "text": "Home Page",
    "iconPath": "/images/home.jpg",
    "selectedIconPath": "/images/home-active.jpg"
  },
  {
    "pagePath": "pages/setting/setting",
    "text": "Setting",
    "iconPath": "/images/setting.jpg",
    "selectedIconPath": "/images/setting-active.jpg"
  }
```

Figure 3: TabBar Page configuration (self-made)

2.6.2. Round map (see Figure 4)

Figure 4: Round cast rendering (from the applet screenshot)

The swiper component is used to start the autoplay circular automatic rotation, and the rotation speed is controlled through the interval, see Figure 5.

```
<swiper autoplay circular indicator-dots indicator-active-color="white" indicator-color="gray" interval="3000">
  <swiper-item><image class="con1" src="/images/picture1.jpg"></image></swiper-item>
  <swiper-item><image class="con2" src="/images/picture2.jpeg"></image></swiper-item>
  <swiper-item><image class="con3" src="/images/picture3.jpeg"></image></swiper-item>
</swiper>
```
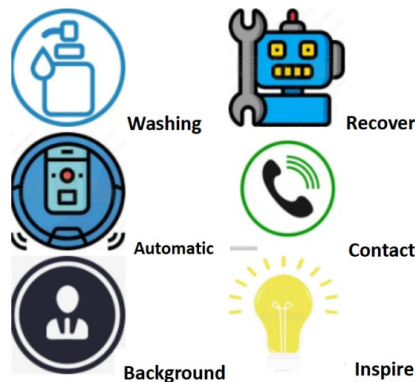
Figure 5: Swiper components (self-made)

2.6.3. Function buttons (see Figure 6)

Figure 6: Six functional buttons (self-made)

Including six parts (Washing, Recover, Automatic, Contact, Background and Inspire), the implementation process is roughly shown in Figure 7.

```
<navigator class="a1" url="/pages/clean/clean">
  <image class="b1" src="/images/clean.jpg"></image>
  <text class="c1"> Wash </text>
</navigator>
```

Figure 7: Navigator components (homemade)

Figure 8 shows the creation of the icon and its corresponding buttons, and the icon and caption parameters should be adjusted to make the icon symmetrical. The font-size, width and height functions are used. At the same time, the image is image and displayed through navigator, and the content is named by class,then it will be referenced in .wxss to adjust the parameters. See Figure 8.

```
.a1{                .b1{                  .c1{
  width: 50%;         width: 200rpx;        font-size: 40rpx;
}                     height: 200rpx;     }
                    }
```

Figure 8: Adjust the picture parameters (self-made)

3. Conclusions and Outlook

3.1. Conclusion

By analyzing the difficulties and challenges in the current use of table tennis, this paper completes the remote use function of the table tennis recovery and cleaning machine based on WeChat small program. In the process of the design and implementation of the project, we follow the object-oriented idea of software development. We completed the function test of the system from demand analysis, usage scenarios, architecture construction and design, and coding. In this process, we not only learned the process of software development, but also deepened the understanding and application of basic knowledge of WXML, WXSS, JSON and so on. In the process of development, my WeChat small program development ability, coding knowledge integration ability, the server overall knowledge application ability was further improved, further understand the MVC design mode in the use of small programs, clearly understand the advantages of small program template and the deployment of MySQL database construction and use, from the global Angle of each system and module in the project and rendering effect.

3.2. Outlook

Of course, this small program still has a lot to improve, which needs to be improved in the future study:

(1) The functions of the system are expanded and enriched, such as regular reminder and advance appointment.

(2) We should optimize the system interface and further carry out rendering work to present a simple and beautiful UI design

(3)We should simplify the use of code and modules, eliminate unnecessary inefficient work, and improve and upgrade them.

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