

## Development of Classroom Assistant Software Based on Mini Program

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**Abstract—** This paper introduces a classroom assistant application based on mini program which provides classroom teaching interaction, attendance checking, mobile phone management and other functions. Through this application, teachers can interact with students in class and ask them questions to know how well they have mastered the knowledge; they can initiate attendance check to understand students' attendance in an efficient and time-saving way; they can release assignments and notifications to students in the form of push messages; the application has developed a software activity management function. This function can monitor whether students play with their cell phones in class and thus can avoid student distractions improving the quality of teaching.

*Classroom assistant; mini program; WeChat; phone status monitoring;*

### I. INTRODUCTION

Currently, many university courses are taught in large groups, with more than 100 students in 3 or 4 classes at a time. In this case, how to manage the class effectively becomes a headache. First of all, it is too costly to use valuable classroom teaching time if roll call is done frequently, and it is not conducive to managing students' attendance if it is not done; secondly, due to the large number of students, classroom teaching generally lacks interaction, and there are often appearing the situations which the students are keeping silence when the teacher asks questions; at the same time, due to the popularity of cell phones, tablets and other smart devices, students often use these devices to read novels, chat with friend or even play games in class, which seriously affects the teaching effectiveness. At the same time, due to the popularity of smart devices such as mobile phones and tablets, students often use these devices to read novels, chat or even play games in class, which seriously affects the teaching effect. In an era when smart devices are so popular, it is worth exploring how to not let these devices affect the quality of teaching, but to use them as an effective aid to classroom teaching [1].

### II. MINI PROGRAM OF THE WECHAT

This paper introduces a classroom assistant application based on mini program which uses smart phones as teaching aids thus avoiding the problems mentioned above. Mini program is a functional component of WeChat. WeChat is one of the most used mobile apps in China, with a huge market of over 350 million daily active users and over 1.2 billion monthly active users. In 2017, WeChat officially launched mini program, allowing external

developers to run their own code and conduct business inside WeChat. This sparked an overwhelming response, and as of June 2021, the number of mini programs has exceeded 6.5 million. A mini program is an application inside WeChat, where external code runs inside WeChat, a mobile app, through a form called mini program. However, it is more accurate to say that mini program can be considered a website that can only be opened and browsed with WeChat. The technical model for mini program and web pages is the same, and the JavaScript language and CSS styles used are the same, except that the HTML tags for web pages have been slightly modified to WXML tags. Mini program pages are essentially web pages. The special thing about mini program is that although they are web pages, they do not support browsers, and all browser APIs are not available, only those provided by WeChat [2].

The biggest advantage of the mini program is that it is based on WeChat. And WeChat is cross-platform, so mini program can run under different hardware environments. Most of the functions of WeChat App, such as taking photos, scanning, payment, etc., can be used by mini program. WeChat provides a variety of packaged APIs for developers to use. Developers don't have to implement them themselves, and they don't have to consider the platform differences between iOS and Android. Therefore, in this paper, we choose to use mini program for development [3].

### III. THE KEY CONTENT OF THE APPLICATION DESIGN

This paper introduces a mini program-based classroom assistant application. The application provides functions such as classroom teaching interaction, quick attendance checking, and classroom cell phone management. First of all, the application allows teachers to post questions in class through a simple method, so that students can quickly answer with their smartphones, avoiding the situation that the teacher asks questions and students are all keeping silent; at the same time, students can also provide timely feedback to the teacher through this system on whether the lecture progress is too fast, whether a certain point of knowledge is understood, etc., so that teachers and students can interact well and effectively in class, thus can improve the quality of teaching. Secondly, teachers can call the roll easily and quickly by using this application. The roll call is initiated by the teacher and completed by students in a limited time using their cell phones or other smart devices. By using AGPS technology, cell phone geolocation information is added to verify whether students are within the specified range when the roll calling, thus ensuring the accuracy of attendance checking. Finally, the application has developed a software activity

monitor function. This function asks students to open this classroom assistant application in class to assist in classroom teaching; it sends alerts to the server when students switch this software to the background and displays it on the teacher's client, which allows teachers to know whether students are paying attention to class and facilitates teaching management. The classroom assistant application makes full use of the latest achievements in the development of modern technology, digs deeper and gives full play to the functions of smart devices such as smart phones, so that student's the smart devices are no longer the distracting toys, but the powerful tools to aid learning and work. Using the system well will further enhance the level of teaching information management and is of great significance to effectively improve the quality of teaching services.

The main contents of The Classroom Assistant application development include: database server, backend management system, student version mini program, teacher version mini program. Same as other web applications, the general idea is that the user sends a response operation request, the server receives the request, then performs the relevant operation on the database, and finally feeds back the response operation result to mini program clients. But all of this are doing in mini program of WeChat. So, here is a little different from the previous process. In this paper, we introduce the three functions of the classroom assistant application: silent registration, roll call with locating, and cell phone status monitoring.

#### A. Silent Registration

There are several common ways to register and login to general software.

- Customized account and password registration
- Email address registration
- Mobile phone number registration

Since this software is based on WeChat mini program, we use WeChat account login and access token method. By using this method, we can reduce the registration and login process, and finish the registration and login in a more senseless way to achieve a "silent" effect. For further access to user nicknames, cell phone numbers and other information, for user privacy reasons, users need to actively agree to authorize. Only then can this information be obtained. In WeChat, due to the different sensitivity of different users, the system provides "authorization" in different ways for different user information.

- Call the specific API way, pop-up authorization: if the user is not authorized, the address authorization interface will pop up; if rejected, it will not pop up again, directly return to failure.
- Explicit buttons: just like `<button open-type="xxx" />`. Only Suitable for user sensitive information, user cell phone number etc., need to cooperate with back-end symmetric encryption and decryption to get the data. If the user has rejected, click the button next time, it will still pop-up window.
- via `wx.authorize()` API: Ask for authorization in advance, and then don't need to pop up again when you need to get relevant information. So, you can get something in 'silence' when user get in your mini program.

The classroom assistant application adopts the third authorization mode in registration and login, and the first mode was adopted in the roll call part. The specific implementation flow is as figure 1.

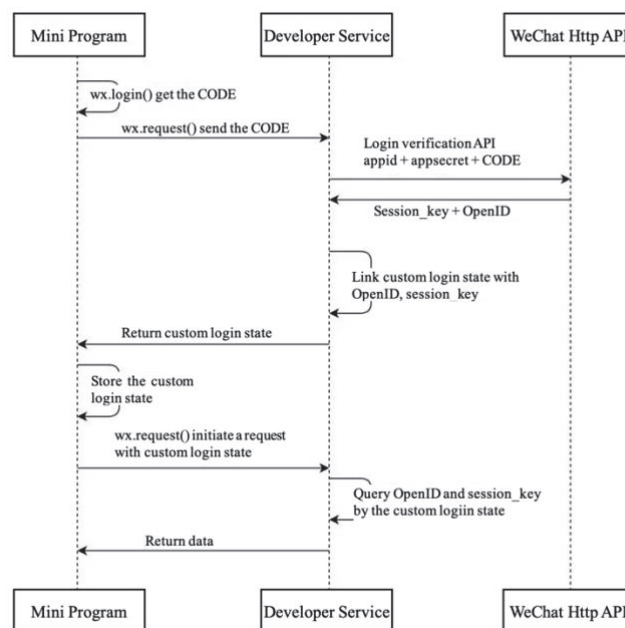


Figure 1. The registration process in mini program

The steps are divided into three parts. First, the front-end obtains the one-time encrypted credential CODE via `wx.login()` and gives it to the back-end. Then, the back-end transfers the CODE to the WeChat server in exchange for the unique user identifier OpenID and the authorization credential session\_key. Session\_key is used for subsequent special API calls between the server and the WeChat server. Finally, the backend transmits the user credentials obtained from the WeChat server to the front-end with the access token generated by the backend. The front-end saves it and brings it to the back-end when next requested to identify the specific user.

#### B. roll-call with location

In order to ensure the accuracy of roll call, it is required to open GPS positioning. In order to successfully and accurately acquire geographic locations, The mini program need require three steps of authorization verification.

- System level, system switch for geolocation , whether system GPS switch is on
- WeChat App side, switch to allow WeChat to use location , whether WeChat has permission to obtain system location
- Mini program side, whether the mini program is authorized by the user to use geolocation , whether the mini program side requests permission from WeChat

Specifically in the coding, we need modify `app.json` of mini program project fist, add code at the same level as pages, and use the `wx.getLocation` method just like below.

```

onShow: function() {
  let sInfo = wx.getSystemInfoSync();
  this.setData({
    locationEnabled: sInfo.locationEnabled + "",
  })
}
  
```

```

locationAuthorized: sInfo.locationAuthorized + ""
})
let that = this;
wx.getLocation({
  type: 'wgs84',
  success(res) {
    that.setData({
      locationMini: "true",
      location: JSON.stringify(res)})
  },
  fail(err) {
    that.setData({
      locationMini: "false",
      location: "Mini program is not authorized."
    })
  }
})
},
});

```

call `wx.getSystemInfoSync()` to determine whether system positioning is open and whether WeChat is authorized, if both have been opened and then determine whether the mini program has obtained the location permission, and then you can get a more accurate location. After getting the precise location, compare the student check-in location with the teacher's location. If it is within the specified range, in this application the range is set to 300 meters according to the accuracy of WeChat positioning, then the roll call is successful, otherwise it is not successful.

### C. smart phone status monitoring

In order to avoid students playing with their smart phones during classes, it is necessary to manage the behavior of students' smart phones. Cell phone status monitor is a difficult problem, and many developers have used accelerometer and gyroscope listening methods to solve it. However, this method is slightly complicated and prone to misjudgment. For this reason, instead of using accelerometer and gyroscope, this paper adopts the method of listening to whether the user leaves this program or not to determine whether the student's cell phone leaves this program to do other things. In mini program there is an `onHide()` function which provides similar functionality [4,5,6].

This function is easy to use but the disadvantage is also very obvious. According to WeChat official API manual, The condition for the `onHide()` function to be triggered is "when the mini program enters into the background from the foreground ", that is, as long as the user cannot see the application, including leaving the mini program, leaving this page, leaving WeChat, extinguishing the screen and etc., the `onHide()` will be called. So how do you tell if `onHide` is called when you leave the page, or if it just turns off the screen. This is a very critical question. Through research we found that that the mini program also provides another function to get the screen brightness, that is `wx.getScreenBrightness()`, as its name this function can get the brightness value of the device screen. Therefore, we only need to call the `getScreenBrightness()` function in the `onHide` function to determine whether the students' cell phones has left the application, thereby achieving the

capture of cell phone cut away from the application events and give hints. By use this method the smart phone status monitoring is achieved which solves the problem of students playing with cell phones in class in certain extent and makes classroom management easier. Pseudo code for the smart phone status monitoring as below.

```

onHide: function() {
  wx.getScreenBrightness({
    success: function(res) {
      if (res.value !== 0) {
        $wxDialog().alert({
          resetOnClose: true,
          maskClosable: false,
          closable: false,
          title: 'Error',
          content: "This task failed because you
exited the page during the task.",
          onConfirm(e) {
            wx.switchTab({url: "../today/results"})
          },
        });
      }
    }
  });
}
}

```

## IV. CONCLUSION

The classroom assistant application introduced in this paper is developed based on mini program which combining mobile computing technology with teaching, solving the current teaching purely on the large classroom class roll call takes too much time, classroom teaching lacks interaction, and students' cell phones are difficult to manage in class. Taking full advantage of WeChat's market share and the ease of use of small programs, the classroom assistant application can be easily used cross-platform, instead of downloading the application, users can simply tap on the applet link and use it. So it is easy to use and very attractive.

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