Implementation of Interactive Classroom Design based on WI-FI Service

CHEN Shuai1,a, ZHANG Shuifeng2,b, WU Tianfang3,c
1Huainan normal university
school of electronic engineering,
Huainan, China
0086-0554-6863698
2Huainan normal university
school of electronic engineering,
Huainan, China
3Huainan normal university
school of electronic engineering,
Huainan, China
achen232001@126.com, b1565458403@qq.com, c1433624596@qq.com

ABSTRACT: In order to realize the teaching interactive classroom in the local area network, the WI-FI router is used to set up the virtual server, and the web service system is established by using the Apache TOMCAT service software. The chat room was designed using Java Server Pages (JSP). Through the chat room, teachers and students can interact. First the WIFI network architecture was introduced, then the interactive classroom chat room design was proposed, finally the experiment was carried out. The results show that the interactive classroom design based on Wi-Fi service can achieve the effect of teaching interaction. The system can save network traffic without accessing the Internet, while increasing classroom interaction.

1. INTRODUCTION
According to the survey [1], the mobile phone dependence in the classroom is more serious, which has affected the normal classroom learning for the current college students. College students who rely on mobile phones may have different levels of health problems, suggesting that correct guidance should be given to reduce the dependence of college students on mobile phones [2]. Colleges and universities have set off a wave of activities to promote "no mobile phone classroom"[3]. Some schools have launched a series of study styles such as “no mobile class” and “fingerprint attendance”, aiming to prevent students from playing mobile phones and skipping classes [4]. This classroom activity is contrary to the modern educational concept and the development of the times. Although it is considered that mobile phone dependence has become a pathological [5], if you take advantage of the benefits of mobile phones, you can help improve teaching functions, increase classroom atmosphere, and make the classroom more and more intelligent.
2. RELATED WORK
The paper [6] applies the same screen display technology and the teacher's personal smart phone, builds a mobile teaching platform, solves the shortcomings of the multimedia system itself, and exerts the functions of the smart phone, the interaction is strong, and the mobile is convenient, but the special screen device and its supporting device and software are needed. The article [7] in the ordinary classroom, through the wireless network and teaching interaction system, builds a smart electronic classroom based on student smart phone, realizes the information interaction between the teacher computer and the student mobile phone, but the system needs to use the mobile Internet and generate traffic cost. Reference [8] suggests an immersive, simulated learning environment built using virtual reality technology, but at a high cost. The intelligent classroom information platform [9] is a classroom information environment consisting of three parts: “cloud”, “net” and “end”, and the cloud platform provides cloud infrastructure, support platform, resource service, data processing, teaching services, etc., such as building a complete teaching resource management platform. In view of the practical problems of college students playing mobile phones, sleeping, and less interaction between teachers and students, this project[10] is based on the Android platform, using client/server mode, based on the campus wireless Wi-Fi network, developed a university intelligent classroom interactive teaching system.

For the sake of cost, most teachers and schools need cheap smart interactive courses. In order to realize low-cost interactive courses, this paper studies a smart classroom interactive implementation that is cheap and convenient and does not require the Internet, as long as a router and a service computer are used.

3. WI-FI NETWORK ARCHITECTURE
The network architecture is shown in Figure 1. The hardware consists of a web server and a wireless router.

The web server accesses the router, and the web server is provided by a virtual server configured by the router. The terminal device such as the user's mobile phone can access the web server content by wirelessly accessing the WIFI and connecting to the router by the router SSID and password.

![Figure 1. Service network architecture.](image)

3.1 Router settings
Log in to the router through the router IP address (for example, 192.168.8.1) and password.

Assume that the IP address assigned by the router to the web server (PC) is 192.168.8.101. Set the virtual server in the router. The common server selects HTTP, the port selects 80, the IP address is set
to the IP address 192.168.8.101 assigned by the router to the web server (PC), and the protocol type selects TCP. As shown in table 1.

| Server | External Port | Inner Port | IP Address | Protocol Type |
|--------|---------------|------------|------------|---------------|
| HTTP   | 80            | 80         | 192.168.1.101 | TCP           |

3.2 WEB server software

Install Apache TOMCAT on the web server, and modify the TOMCAT port configuration to 80. Start the TOMCAT service, and then open the web server of port 80, as shown in Figure 2.

3.3 Connect to the virtual server and test

Enter the IP address and port through the browser of the terminal that accesses the router. That is, enter: http://192.168.8.101/
Then you can access the http service content set by the web server (Personal computer). As shown in Figure 3.

Please use a 9-point Times Roman font, or other Roman font with serifs, as close as possible in appearance to Times Roman in which these guidelines have been set.

4. INTERACTIVE CHAT ROOM DESIGN
A simple chat room was designed for the wireless communication between the teacher and the students. The chat room consists of three parts: an interactive content area, a personal speaking area, and a speaking button. As shown in Figure 4.

The interactive content area displays the date, time, and IP address of each registered speaker who is speaking in the local area network, and has already spoken, and can only output the display. The personal speaking area is the conversation content that a single user is prepared to issue and needs to be entered. The speaking button is used to control the content of the individual speaking area, and when the button is clicked, the content of the speaking is sent.

![Chat room interface](Image)

**Figure 4. Chat room interface.**

4.1 Index.jsp file
A web document consists of three files.

The contents of the Index.jsp file are as follows:

```html
<%@ page language="java" import="java.util.*" pageEncoding="UTF-8" %>
<%@ page language="java" contentType="text/html;charset=GB2312" %>
<html>
<!-- frameset rows="*,150" -->
<frameset rows="20,20">
<frame src="show.jsp">
<frame src="send.jsp">
</frameset>
</html>
```

4.2 Show.jsp file
The contents of the show.jsp file are as follows:

```html
<%@ page language="java" import="java.util.*" pageEncoding="UTF-8" %>
<%@ page language="java" contentType="text/html;charset=GB2312" %>
<html>
<meta http-equiv="refresh" content="3;url=show.jsp">
<body>
```
4.3 Send.jsp file

The contents of the send.jsp file are as follows:

```
<%@ page language="java" import="java.util.*" pageEncoding="UTF-8"%>
<%@ page language="java" contentType="text/html;charset=GB2312"%>
<html>
<body>
<%try{
    request.setCharacterEncoding("GB2312");
    String mywords = request.getParameter("message");
    String t = "";
    if (application.getAttribute("words") == null &
     & mywords != null) {
        t = ":\n        + mywords + ":\n    application.setAttribute("words", (Object) t);
    } else if (mywords != null) {
        t = (String) application.getAttribute("words");
        t += ":\n + mywords + "<br/>";
    application.setAttribute("words", (Object) t);
    }
    catch (Exception e) {} %>
    <div style="text-align: center; background-color: #F8D8A9;width:100%;height:100%">
        <form method="post" action="send.jsp">
            <textarea name="message" style="width: 500px; height: 80px"></textarea><br>
            <input type="submit" value="I say" style="width: 500px; height: 50px" />
        </form>
    </div>
</body>
</html>
```

5. EXPERIMENT

Assume that the IP address of Apache TOMCAT is: 192.168.1.102. Two terminals connected to the same local area network, such as a mobile phone or a PC, have IP addresses of 192.168.1.100 and 192.168.1.102, respectively. The two terminals enter the web server address: 192.168.1.102 through the browser, and the chat interface of FIG. 4 appears. In this way, the two terminals can chat and teach interaction. The experiment result is shown in figure 5.
6. ANALYSIS

Table 2. Comparison of several methods

| No. | method                              | description                                                                 | cost | flexibility |
|-----|-------------------------------------|-----------------------------------------------------------------------------|------|-------------|
| 1   | the same screen display technology  | Dedicated equipment, single interaction, mobile phone with the same screen   | High | Low         |
| 2   | the wireless network                | Private server                                                              | High | High        |
| 3   | virtual reality technology,         | VR device                                                                   | High | Low         |
| 4   | the cloud platform                  | Cloud Server                                                                | High | High        |
| 5   | the campus wireless Wi-Fi network   | Campus wireless network, arranged in advance                               | High | High        |
| 6   | Method of this paper                | Low cost, flexible at any time                                               | Low  | High        |

The performance of several interactive classrooms is shown in Table 2. The several other methods are expensive due to the need for dedicated equipment and the use of billing traffic. The method proposed in this paper is inexpensive because it uses a WI-FI router and a personal computer and uses a local area network. In terms of flexibility of use, the wireless network method, the cloud classroom method, the campus wireless Wi-Fi network method, and the method herein are highly flexible.

7. CONCLUSIONS

Wireless interactive classrooms are implemented in the LAN using Wi-Fi and Apache web services. The teacher and the student can realize wireless conversation through the mobile computer, and carry out class discussion and answering questions. The simplicity of this design is that no network traffic is required. The hardware only needs one ordinary router and a PC (laptop) with network function.
The next step is to improve the web page, add functionality, and increase the flexibility of teaching interaction. By adding a database server, one-click sign-on can be achieved, and the attendance situation can be quickly counted; the quiz test supports single-choice, multi-selection, and subjective question-limited answers, and the answer status is displayed in real time, and the test score is automatically saved [11].

Through classroom data analysis, you can grasp the student's learning situation and teaching interaction emotions. Online testing is also available through this interactive system.

ACKNOWLEDGMENTS
This study was supported by the major fund of nature science for colleges and universities in Anhui province of China (KJ2014A239), the fund of nature science for colleges and universities in Anhui province of China (KJ2011Z342), Scientific research project of HUAINAN normal university (2018xj34, 2016xj01zd,2016xj46);Teaching research project of HUAINAN normal university(2017hsjyxm51); Provincial College Students Innovation and Entrepreneurship Training Program of ANHUI province (201710381087).

REFERENCES
[1] LUO Shao-ye, ZHUANG Mei-lian. The Status Quo and Cause Analysis of College Students’ Classroom Mobile Phone Dependency[J]. Journal of Zunyi Normal College, 2017,19(1):146-150.
[2] YANG Li. Research on the Status Quo of College Students' Mobile Phone Dependence and Its Impact on Health[J]. Western quality education, 2018(16): 78-79,81.
[3] LI li. Thoughts on the "No Mobile Classroom" Activities Tried by Colleges and Universities[J]. Journal of Campus Life & Mental Health,2017,15(5):383-385.
[4] Qi Yuanli, Chen Jianquan. "Fancy punch card" lived the classroom learning style[N]. China Education News, 3-28-2016.
[5] LIU Guo-sheng. Mobile phone dependence is also a disease[J]. Everyone's health, 2018(17):20-21.
[6] XUE Shenglan. The Construction and Application Base on Smart Phone's Teaching Support Platform[J]. China's electrification education, 2017,(3):127-131.
[7] XUE Shenglan. Research on the Application of Smartphones Integrating into Classroom Teaching[J]. China's electrification education, 2018,(1):86-91.
[8] WANG Yu-bo. Application and Design of Virtual Reality in Smart Classroom[J]. Electronic world, 2018(14):155.
[9] http://js.news.163.com/yz/16/1021/16/C3TR45EB04041DP8.html.2018-10-10.
[10] ZHU Jian, DU Xuan, MENG Qing-hui, et al. Constructing the Wisdom Class in the University——to Effectively Improve the Teaching Effect[J]. Computer knowledge and technology, 2016,12(15):187-189.
[11] http://www.caigou.com.cn/news/2017112715.shtml.2017-11-27.