

The Design of Campus Lost and Found Platform Based on Digital Map Data

Luquan Jiang^{1,a}, Hanyu Mao^{2,b} and Zhiliang Kang^{2,c,*}

¹Ya'an Polytechnic College Ya'an, Sichuan Province, China

²School of Mechatronical Engineering, Sichuan Agricultural University, Ya'an, Sichuan Province, China

^a314550502@qq.com; ^b1271004623@qq.com; ^ckangzhiliang96@163.com

*Corresponding author

Keywords: Lost and found; Map data; Map API; Campus network platform; Android

Abstract. Aiming at the inefficiency of the existing lost and found system on campus and the inability to meet people's needs, this paper proposes a platform for online lost and found network based on digital map data. The platform uses API of online map data service to process lost and found information, and adds a push and reward module to increase people's enthusiasm for returning the picked items. After testing, the platform is capable of the functions of users' registration and logging in, releasing the loss of material information, as well as pushing lost and found messages automatically and so on. According to the statistics, the application of digital map data in lost and found platform has improved the success rate of lost and found.

Introduction

In the university campus, there are always some students inadvertently lost something, such as campus card, wallet, mobile phone and other electronic valuables. The loss of these items, more or less will make students feel heavy, to leave a shadow of the beautiful university life. Regardless of those who find it as their own exception, there are still a large number of students are willing to return the lost property to its owner. However, according to the current situation, students usually release information through QQ group, QQ space, post bar and other platforms when they encounter lost or found other people's articles. However, according to the current situation, students usually release information through QQ group, QQ space, post bar and other platforms when they encounter lost or found other people's articles.^[1] Nevertheless, these platforms have significant limitations. Despite the existence of the "Six Degrees of Separation theory", the reality is that a lot of information simply can not successfully cross the right destination to achieve its value, more is as junk information end up with nothing definite.^[1]

In order to set up a convenient and efficient lost and found network platform for those who have found and lost things to upload their information and publish their information. This article designs and implements a campus lost and found network platform based on map data. That is to take Android as the development platform, access to the existing map API, organize users' published information, and push messages to users in a certain area near the location of lost property. And add reward mechanism, by the platform and the owner of the user who returned the lost property for a certain reward.^[2] This platform can improve the low efficiency and poor dissemination of the original lost and found mode, and at the same time improve the initiative of the owners to return the lost and found, and promote the standardized development of the school's lost and found system.

Analysis and Design the Platform

This platform is based on the server database of Android system. Users can publish and obtain the lost and found information on the platform through the Android mobile client anytime and anywhere. Compared with the traditional mode, it is more flexible and practical.

According to the actual needs of campus lost and found, according to the function, the whole

platform is mainly divided into six functional modules: registration/login system, lost and found release system, lost and found release system, information acquisition system, online chat system and background management system. Each functional module is composed of several sub-modules.

Software Desk Implementation

The campus lost and found platform based on map data adopts the development form of Android APP, and uses JAVA HTML5 CSS3 and other programming language development platform, which is applicable to Android4.4 and above. [3-5]

UI Design and Implementation. User interface is the user to use this platform portal, should bring a good user experience for the user. So, the UI design must be beautiful and simple operation is simple to understand. [6] The map data based on the development of the lost and found platform, through the Android Studio to write user interface as shown in figure 1. It is mainly including the login interface (a), home page (b), personal center page (c), publishing interface (d) and so on. [7]



(a) Login page (b) Home page (c) Personal center page (d) the published pages

Fig.1 User interface

Map Data Access Implementation. In order to realize map data access, this platform adopts the domestic relatively mature Baidu map API usage method referring to the development documents provided by Baidu map. This platform mainly uses two major services, namely, location service and map service.

The main steps to obtain location service include: a. open Android project, b. add SDK, c. configure build gradle file, d. add AK, and e. add location permission.

Push Function Implementation. Push refers to the active message push of a software operator through a product or a third-party tool to a user's mobile device. [8] Users can see push messages on the mobile device's lock screen and notification bar, and click on the notification bar to evoke the app and go to the page. The QQ messages and WeChat messages that are seen on the lock screen interface are all in the rank of message push.

News push can be developed by itself, but the cost of such development is relatively high. Most mobile application developers choose to use third-party tools. The more common ones in China are: Xiaomi, Push, Union, Baidu, Tencent, Aurora, Huawei cloud push and so on.

The platform uses the third-party tool Tencent homing pigeons to implement the push function. The push function implementation process is as follows [9]:

- When the platform client app starts, it will start a pigeon main service, the pigeon main service is globally unique, and one device shares a pigeon main service;
- The homing pigeon main service randomly starts a backup service in the application of the access pigeon, and the two services pull each other and are mutually backup;
- The homing main service establishes a Socket long connection of the homing server and maintains a long connection through a heartbeat mechanism;

- d. The client main service requests a token from the pigeon server through the Socket long connection request;
- e. The homing pigeon server pushes the message to the client main service via the Socket long connection^[10];
- f. The main Service forwards the Push message to the client APP of the platform.

Database Implementation. The platform database is mainly used to store the basic information of the user and the information and location of the item. The basic information of the user mainly includes the user's mobile phone number, user name, password, and the like. The item information mainly includes the item name, lost/picked location, lost/picked time, returned status, and other descriptive information.

This platform uses Oracle database to store data and uses JDBC to connect to the database.^[11,12] The database E-R diagram design of this system is shown in Figure 2.^[13] In the lost and found system, the owner, the lost object, the picker, and the pick-up are four entities, which themselves have multiple character attributes, which are respectively published relationships.

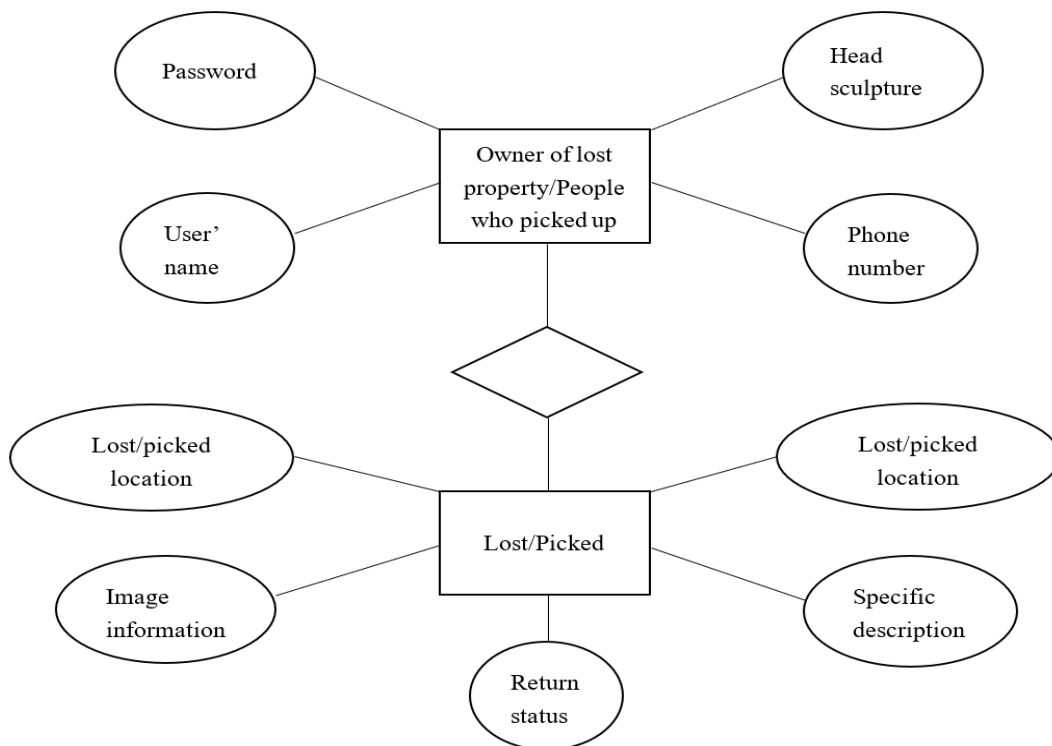


Fig.2 System overall E-R diagram

System Test

Function Test. Functional testing is to verify the various functions of the lost and found platform, according to the functional test cases, item by item test, to check whether the platform meets the design requirements. This article starts from the login APP to gradually test whether the requirements are completed, to determine whether the data is consistent and can be received and returned normally. For example: whether the user registration function is perfect, whether the lost and picked-up information can be released and shared after the registration is successful. Secondly, test the logic of the software, whether the page conversion is completed normally according to requirements, etc. For example, when clicking "Publish", the information will jump to the page where the information is presented. When the amount of information is large, the scroll bar works. Finally, test the software's flashback and system startup time and network request time. The following is an example of the registration/login function, as shown in Table 1. □ □

Table. 1 Login function tests

Project name		Design and Implementation of Campus Lost and Found Platform Based on Map Data				
Test environment		Android8.0.0				
tester		Tester				
Test module		Registration/login function				
Numbering	Scenes	Precondition	Test procedure	Expected results	Test Results	Remarks
1	Initial page display	Install APP users	Click to enter APP	Present registration/login interface	Present registration/login interface	Unregistered users cannot log in
2	Account entry verification	Install APP users	Click to enter an account	Show input account	Show input account	The account number is 11 mobile phone number
3	Account fault tolerance verification	Account entered	Click to enter your password	Show account verification succeeded	Show account verification succeeded	Enter the account ID that does not exist X
4	Password input	Account entered	Click to enter your password	Show input password	Show input password	The password is 8-13 letters plus numbers
5	System login	Account and password have been entered	Click to Login	Display homepage	Display homepage	Get user location information
7	Password check	Account and password have been entered	Click to Login	Log in system	Log in system	Password verification did not successfully display the password error

Performance Test. The goal of software performance testing is to verify whether the performance of software can meet the performance indicators when it is reused under normal environment and system conditions, to find the shortcomings and defects of the system, and to repair them in time, so as to make the winding have better fluency and stability. ^[14] The system uses the built-in fluency test function in Android's developer mode to test the fluency of the system.

This system uses millet 5, click on more settings in Settings, enter the developer's option, you can see the "GPU rendering mode analysis" option. After opening, you can display the interface response speed of the system by bar and line graphs, so as to observe the fluency of the system. ^[15] This curve shows that the system runs smoothly as long as it does not exceed the green line. As shown in Figure 3, open the GPU rendering pattern analysis diagram.



Fig.3 Opens the GPU rendering pattern analysis diagram

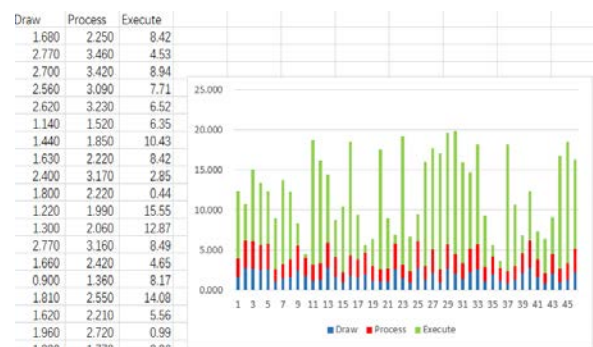


Fig. 4 System fluency

Restart the lost and found APP application, start the application, slide the page accordingly, enter

the corresponding instructions under the command line, find the required fluency data, put it in the Excel table, and view its fluency in the form of its chart, as shown in Figure 4.

Conclusion

Through repeated tests of the platform on Android4.4 and above on the actual situation of various functions such as user registration, login, release of lost property information and push of lost property information, the test results show that the platform can smoothly run the above functions and meet the design requirements.

In the future, the platform will be maintained and optimized to further improve the visual effect, fluency and practicability of the platform, and to increase the probability of lost property recovery and user experience truly and effectively.

With the rapid development of Internet technology, Internet technology has penetrated into every field of people's life. Reasonable use of Internet technology can effectively improve people's quality of life. This network platform is dedicated to the application of Internet in the field of lost and found in schools. When the platform becomes more mature, it will be further promoted to a wider area to provide more people with high-quality lost and found services.

References

- [1] Zhang qiang, zhong yong, zhou weibo. A new association rule mining algorithm based on six degrees of separation theory [J]. Computer applications,2017,37(S2):210-213.
- [2] Kuang jianbo, ren yuguo, huang xiaoyang. A travel assistant based on Android platform and baidu map API [J]. Science and technology wind,2018(21):89.
- [3] Tan Yiyu. A Hardware-oriented Object Model for Java in an Embedded Processor[J]. Microprocessors and Microsystems,2018.
- [4] Shuguang Yuan,H.C. Stephen Chan,Zhenquan Hu. Implementing WebGL and HTML5 in Macromolecular Visualization and Modern Computer-Aided Drug Design[J]. Trends in Biotechnology,2017,35(6).
- [5] MAO chong. Characteristics of CSS3 in web development [J]. Journal of jiangxi radio and television university,2014(01):92-94.
- [6] Ren yingying. Research on humanized design of smartphone UI interactive interface [J]. Journal of packaging,2016,8(03):83-86.
- [7] new features of Android 8.1 preview and new functions of Android Studio 3.0 [J]. Computer programming skills and maintenance,2017(21):4.
- [8] the mobile advertising market is exploding [J]. Securities guide,2014(44):44-51..
- [9] Su yufeng. Measurement and analysis of behavior characteristics of Android APP message push [D]. Hunan university,2017.
- [10] Wu tianlong. Research and implementation of personalized recommendation system for distributed heterogeneous data sources [D]. Harbin Institute of Technology, 2013.
- [11] Seyed Reza Shahamiri,Wan Mohd Nasir Wan Kadir,Suhaimi Ibrahim,Siti Zaiton Mohd Hashim. An automated framework for software test oracle[J]. Information and Software Technology,2011,53(7).
- [12] Li jingjing. Research based on JDBC memory data management technology [D]. North China university of technology,2018.
- [13] Shao chao, wan chunhong. Detailed design of e-r diagram [J]. Computer education, 2015(08):78-81.
- [14] Zhang yun. Design and implementation of material auxiliary management system [D]. Northeastern University, 2013.
- [15] Huang tian. Testing and analysis of GUI running fluency of Android application [D]. University of Chinese academy of sciences, 2016.