

# The design principle and architecture design of micro electrical safety training learning system

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**Abstract.** Electrical safety training is one of the important parts of securing the grid operators' health and lives. Microlearning system provides a new way for electrical safety training anytime and anywhere. This paper analyses the design principle of micro electrical safety training system, and then details the technology and function architecture design of the system. The key techniques of the function architecture design of the system are described with an emphasis. Which provides a preliminary exploration for mobile terminals applied to electrical safety training.

## 1. Introduction

Power grid has the particularity of high risk and not easily power outages. Therefore, electrical safety relates to each worker's power. With the continuous expansion of grid, all kinds of advanced technology has been widely used and the requirements of electrical operation level are increasingly high [1]. The majority of our country's electrical safety training are given priority to on-site training and examinations. There are certain problems of this kind of training and the effect is not ideal.

With the rapid development of computer technology, microlearning becomes a new mode of learning form started to pay close attention to the field of learning and training field in recent years. The mobile terminal device becomes a kind of ideal platform for the study because of its strong mobility, carried easily, and the high penetration rate of crowd, making it an ideal learning platform. Using it, we can achieve knowledge anytime and anywhere to a certain extent. The mobile terminal with operating system typically supports Wi-Fi, 4G, GPRS wireless communication modes, richer user interaction and data storage, etc [2]. With the popularity of mobile networks, mobile phone, PSP, PDA, IPAD and other forms of mobile terminals provide various services for micro learning, also provide a new way for electricity operators to conduct safety training [3].

## 2. The technology architecture design of the system

To design a practical micro electrical safety training learning system, the following principles should be abided by: strong personality, easy manipulation, good scalability and reliability. WAP site system is not limited by the client device, and can do it anytime, anywhere access to the built-in browser. Therefore, micro learning system based on WAP is developed. A complete micro electrical safety training learning system should include management and function module [4, 5]. Due to the characteristics of portable devices and for security, management module and a large amount of accessing data operation should be conducted by the micro training provider in the non-mobile devices. Training students learn on the mobile terminals, and the technology architecture design of the micro system is shown in Fig. 1. The micro learning system is divided into three layers: data layer, service support layer and user layer. User layer is located in the client, service support and data layer located on the server side [6].

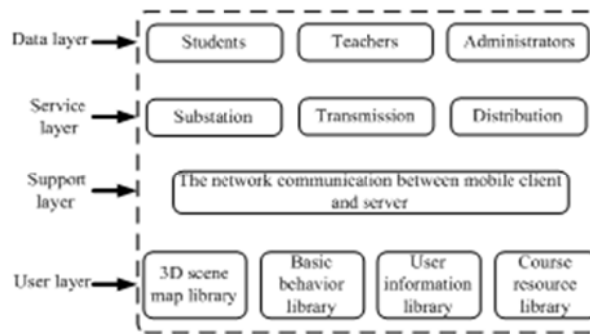


Fig. 1 The technology architecture design of the micro system

### 3. The function architecture design of the system

The microlearning system based on mobile terminal is suitable for learning system based on mobile terminal device. It is primarily designed for mobile learning, so it is different from other learning system. Its learning time is relatively fragmented and course is short. There is no strict learning evaluation system and more practicality should be paid attention to. Based on the previous system design principle, the preliminary function architecture design of the microlearning system is carried on.

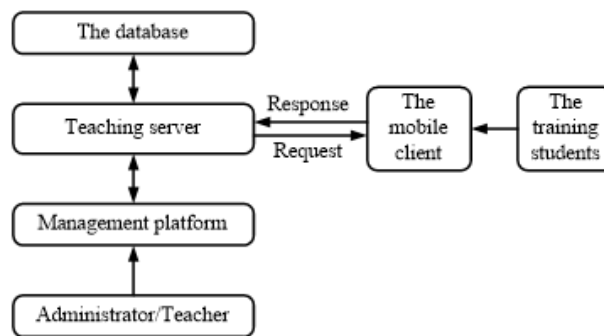


Fig. 2 The preliminary function architecture of micro learning system

#### 3.1 The front desk function module

The front desk function module which includes interface controlling, the structure of layer, rendering interface and the realization of binding data, is the mainly interface displaying module. Students and teachers access the micro system through mobile terminal equipment and the following function modules are accessed to:

- 1) Personal Center gives learners' personal information management, including basic personal information, modifying the system password, choosing online courses, searching course information, and other functions.
- 2) Students can select courses online in the course module, or download the corresponding courseware to learn it offline.
- 3) Students can search for training courses they want to learn according to the key words, job category, the title, etc in the course search module.
- 4) Various classified curriculum discussion area is set up in the micro study BBS.
- 5) Students can create blogs and write learning logs in mobile blog of the microlearning system

#### 3.2 The background function module

Administrators and teachers can achieve the following functions by logging background management platform through the normal desktop computer. We can view the current information of the system, including the server version, database usage, situation of the upload files and modifying account passwords in general setting module. Teachers can add and manage curriculum categories and subcategories in the course management module. The specific course information includes online reading content, curriculum courseware, curriculum keywords whether recommended to home and other information. After the addition course added is audited by teachers,

it will be displayed at the front page. Teachers can add and manage courseware library in courseware management module which makes the courseware classification management easily to be found. Administrator you can add and delete users in the account management module[7].

### 3.3 The data processing module

The mobile terminal needs to request REST service which has the characteristics of cross-platform of forwarding center during data processing, So the forwarding center treat common platform and good portability XML documents as requested data back to the client. This section selects analytical way of Pull to parse the returned XML documents and then designs reasonable software architecture for parsing module and supplements it by relevant code. Because REST services are invoked via standard HTTP protocol, so you can observe XML data returned by REST service through the browser.

The data storage system of micro learning system based on miniature mobile terminal includes two levels. The low level is the actual data storage means, which is private by various application. The top level accesses data in a unified way and makes the ContentProvider standard data storage interface fetching or storing data to mask the differences between the various storage methods. ContentProvider separates the abstract definition and implementation of the API phase, the access is as shown below:

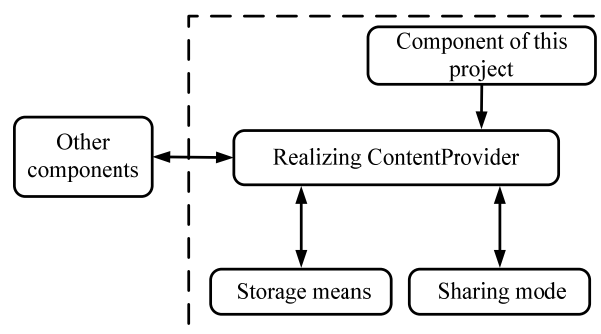


Fig. 3 The data storage and sharing mode of micro learning system

### 3.4 The Network Communication Module

GPRS and Wi-Fi wireless module of mobile terminal are adopted for network communication with the server. Direct interface interaction with students must be in the UI thread which belongs to the main thread. If requesting data to server in the main UI thread synchronously, the mobile client will always be blocked until the server returns data to the main thread interface. This paper sends HTTP requests to the server in an asynchronous manner[8].

Asynchronous requesting to the UI thread provides a way of return data in the mobile client application development, including Handler and Message mechanism. Each thread holds a thread-safe Message queue, a message Handling class, and a Looper associated with the Handler whose role is to manage the message queue. All child threads and the UI thread communicate through adding message to the Message queue of the UI thread in the application development. The client designed here has to request data to client or display data removed from the database. Asynchronous operation AsyncTask is used as a communication way of the UI thread and data requesting.

## 4. Conclusion

This paper describes the application status of the electrical safety training and micro learning system, and how can the mobile learning system be applied to electrical safety training are preliminarily discussed. The characteristics of the micro learning mobile are analyzed and four design principles for micro learning system based on mobile terminal devices are put forward. And then the technology and function architecture designing of multi-angle is studied, the key technology of data processing and network communication system is focused on. This article applies to the preliminary design of micro electrical safety training system and plays a valuable role for popular large-scale micro training system in the future.

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