



# Design and Implementation of Online Translation Software for Higher Vocational English Based on Android Platform

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## ABSTRACT

Based on the Android platform, adopting the MVC development mode with front-end and back-end separation design, aiming at the application requirements of English translation software in the actual education and teaching process of students in higher vocational colleges, the mobile model under the C/S structure is completed. Design and construction of online translation software (App) for higher vocational English. Vocational English online translation software has multiple functions such as real-time translation, voice translation, word grammatical analysis, and comprehensive English learning. With high coverage, it provides convenient, efficient and accurate multilingual translation services for current higher vocational college students in their daily study, work and life. It further promotes the comprehensive improvement of the five basic skills of "listening, speaking, reading, writing and translation" among vocational students, and forms good study habits, so as to stimulate students' interest in learning and improve the effect of English teaching in higher vocational colleges. It has promoted the innovative reform of English education and teaching in higher vocational colleges.

**Keywords:** *Android platform; MVC model; vocational English; online translation software*

## 1. INTRODUCTION

At the current stage, my country has entered a new era of socialist development, and the overall development trend has shifted from high-speed growth in the past to high-quality development. Especially after the building of a moderately prosperous society in an all-round way, social demands will continue to increase, and various leading industries will follow suit. Upgrade. Obviously, the iterative transformation of such a vast industry requires not only the overall national policy planning and highly consistent execution, but also a large and stable team of professional and technical personnel to meet the needs of future comprehensive national competition and fully meet domestic employment needs. Vigorously developing vocational education and cultivating high-quality comprehensive professionals has become a key link in promoting entrepreneurial innovation and industrial transformation. [3] As an important part of my country's professional and technical personnel training system, higher vocational and technical colleges should not only focus

on the education and teaching of professional and technical knowledge, but also need to take into account the re-learning and re-improvement of higher vocational students in terms of humanities and ideas. In today's economic globalization, English is not only an important way of international communication, but also an indispensable part of education and teaching in current higher vocational colleges with the characteristics of tool and humanity. The "English Curriculum Standards for Higher Vocational Education Colleges" promulgated by the Ministry of Education in 2021 more clearly requires that students have the necessary English listening, speaking, reading, reading, writing and translation skills, and use appropriate body language and multimedia means to effectively complete the Communication and communication tasks in everyday life and workplace situations.

With the rapid development of network information technology, the reform of education informatization has become an important way to improve the teaching effect and reshape the education system. In the "Internet +" environment, the widespread popularization of intelligent mobile terminals has led to the emergence of

educational informatization means, which has a direct impact on the development of higher vocational English education and teaching activities. In daily life, English translation software based on mobile terminals has gradually become an important tool to assist English learning. With its convenient, efficient and intelligent application effect, it plays a very important role in the understanding and mastery of words and phrases. The translation software has also become one of the mobile terminal applications that college students are keen on, completely replacing the traditional English dictionary or English-Chinese translation dictionary. According to statistics, nearly 96% of students have used mobile translation software to varying degrees, and more than 57% of college students in higher vocational colleges use it frequently. In a specific usage scenario, looking up the meaning and pronunciation of a word, and learning the meaning of a sentence are ranked in the top two positions, while those who choose to cultivate interest in learning or other needs are less, as shown in Figure 1. Through data analysis and survey results, it is not difficult to find the problems and deficiencies faced by the current mobile phone translation software. If the software functions are not enough to meet the diverse needs, the application scenarios need to be further expanded; the professional vocabulary is not covered enough to meet the learning and use of different majors at the same time; translation accuracy and usage dependencies. In view of this, this paper believes that, based on the Android platform, the C/S architecture is used to complete the design and development of the English online translation software for vocational colleges. Aiming at the practical problems in the English education and teaching process in higher vocational colleges, the software can improve the current mobile translation software from the aspects of overall structure planning, software function design and user experience effects. Transforming translation software from a single efficiency tool to a comprehensive English learning tool can achieve the following goals: improve the translation ability of vocational students, improve learning efficiency, enhance the proficiency of five basic English skills, stimulate learning interest, and cultivate the correct concept of English learning.

## 2. INTRODUCTION OF KEY TECHNOLOGIES

### 2.1. *Android Technology*

Android technology is a high-efficiency and intelligent mobile device-specific operating system platform based on Linux system and developed by Java language. Since the launch of the first Android-based smartphone in 2008, prominent features such as "intelligence" and "touch screen operation" have greatly improved the user experience. Its open-source and compatible features have laid a solid foundation for the subsequent development of smart mobile devices such as watches, tablet computers, and glasses. Up to now, the proportion of Android operating system in all smartphones in my country still ranks first, reaching 90.4%, far exceeding other operating systems such as IOS and Windows. It occupies a mainstream position in the mobile operating system market and further promotes mobile The development of terminal equipment in the direction of intelligence and the continuous growth of mobile communication Internet technology.

The strength of Android technology lies in the integration of applications, middleware, and operating platforms, and the use of software stacking architecture to complete the design and construction of the entire underlying Android operating system. The Android operating system framework is shown in Figure 2. The overall framework structure can be roughly divided into four layers, from top to bottom, the application layer (Applications), the application framework layer (Application Framework), the system library and the Android operating environment layer (Libraries and Android Runtime) and the Linux kernel layer (Linux kernel). Among them, the application layer can directly provide the user with an application program, which can be an application program written by calling the interface of the application framework layer through the Java language. The application framework layer will provide API interfaces and various management tools used in developing programs. The system library and Android operating environment layer includes two parts: the system library and the Android operating environment. The system library can provide services and support for developers to use Android components; the Android operating environment can provide the application framework layer with an interface to call the system program library And to complete the compilation of the application code. The lowest Linux kernel layer can provide necessary drivers for various hardware devices that need to be used during the overall operation of the system. [1]

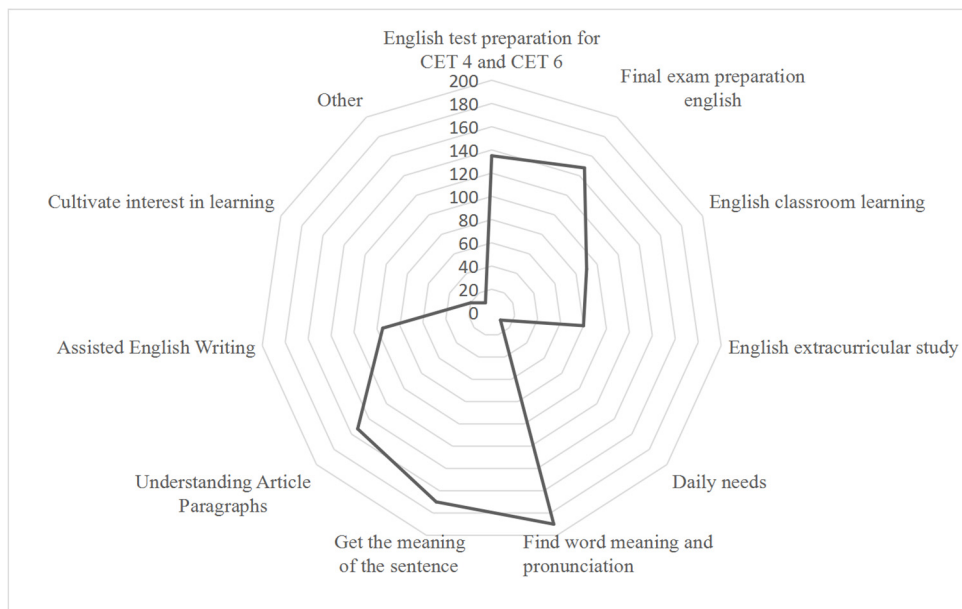


Figure 1: The usage scenarios of mobile translation software by vocational college students

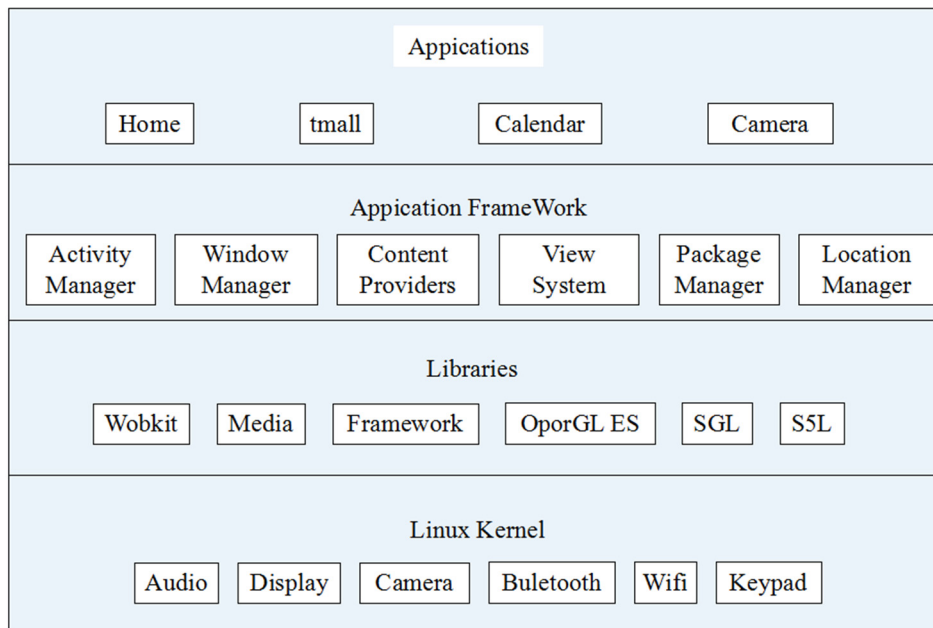


Figure 2: Android OS Framework Diagram

ation of various functions of the application. The ContentProvider component mainly implements the data sharing function between different applications under the same device, and the BroadcastReceiver component is the only mechanism for transferring data and information between applications. The development process of Android application includes steps such as requirement analysis, UI visual design, database construction, server-side development, Android software-side development, and test release. [5]

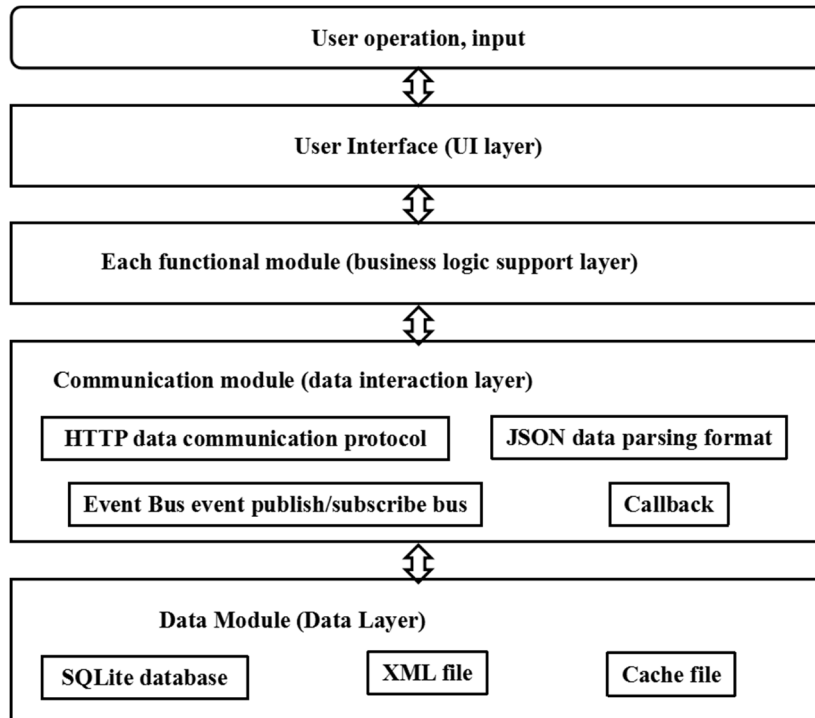
2.2. Android Front-end Development

Application development based on the Android operating system, the overall structure is more complex.

The front-end development includes UI interface design, network access design, functional component design, underlying data management design, etc., involving a large number of classes, methods, data transmission and reception processes, and data interfaces. The MVC model can be used to complete application front-end design and development. . Among them, View mainly includes various controls including Button and Layout.xml. Model is mainly multiple methods for various network requests or data processing. Controller mainly refers to business processing controls such as Activity and Fragment. [8] In the MVC mode, front-end development can be divided into UI layer, business logic support layer, data interaction layer and data layer to separate the user interface, business logic and controller

to reduce the coupling between levels and improve Development speed, reduce development difficulty. Figure 3 shows the front-end development function module diagram, in which the UI layer is the key to realize user interactive operation, and is also an important indicator to evaluate the quality of an Android application. Under the Android native development

framework, there are a variety of View view spaces, such as TextView controls, Button controls, ImageView controls, and so on. At the same time, there are also ViewGroup controls for designing and processing control layouts, which can greatly improve the rationality and development efficiency of interface layouts.



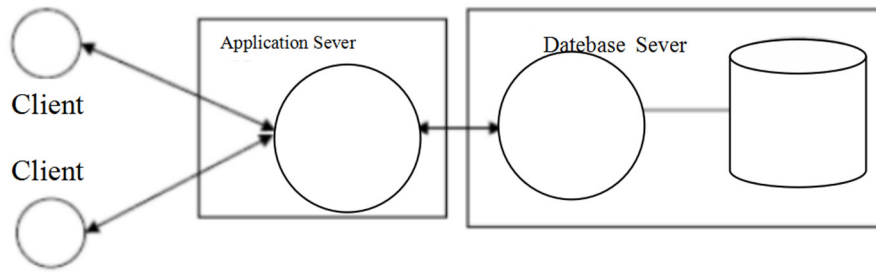
**Figure 3:** Android front-end development function module diagram

In the business logic support layer, developers will use Java language to complete the design and code writing of various functions in the Android development environment. In the data interaction layer, it mainly refers to the communication module, including the Intent responsible for the communication between the four components, the event publishing/subscription framework EventBus in the observer mode, and the callback mechanism to realize the event delivery and complete the communication Callback, responsible for the communication between the front end and the back end Okhttp, a network communication framework for data transfer. The bottom-level data module includes the SQLite database, xml files, and Cache files that partially process the cache.

### 2.3. Android Backend Development

The key role of the Android application backend is to respond to the network request initiated by the user

from the client, and to provide data storage support for large data resources, which is an important component of the entire Android application. The development and design of the server will introduce the CSS architecture system, as shown in Figure 4, that is, the client accepts the user's request, the client makes a request to the application service, the application service obtains data from the database service, and the application service calculates the data and outputs the result. Submitted to the client, the client presents the result to the user. [4] This design can effectively improve the function richness of Android applications, and also provide guarantees for the stability and response speed of the entire application. The server side can be implemented by a variety of development languages and development frameworks based on MVC mode, such as SSH or SSM framework in Java language environment, ThinkPHP or Yii framework in PHP language, and Django or Flask framework in Python language.



**Figure 4:** Schematic Diagram of CSS architecture system

## 2.4. Development Environment

Complete the configuration and deployment of the development environment according to the system development requirements and the use requirements of the above-mentioned key technologies. The design and development environment of Android application is divided into Android front-end development environment and back-end server development environment.

The Android front-end development environment mainly depends on the Android Studio 3.4 software, and the version selects Windows 64-bit. The JDK version used is above 1.8, and the SDK that matches the Android version is installed under the Android SDK Manager. The system selects Android 9.0 and SDK version 28. Create a basic development environment by creating a new project under the Android Studio software, selecting a project template, and setting the file name, package name, project storage path, development language, and API version. [7]

The key to the development environment of the back-end server lies in the integration and construction of the SSM framework under the Java language environment. The server-side operating system selects Windows 10.0. The development kit JDK version selects 1.8.0\_131, the web server selects Apache Tomcat 9.0, the Java integrated development tool selects IntelliJ IDEA 2019, and the database selects MySQL. Under IDEA, create a new Maven project, set it as a Web project, and add the whole project to Tomcat to complete the construction of the project development environment. Then configure maven dependencies and import related dependencies, including Spring related packages, MyBatis related packages, MySQL related packages, log related packages, and so on. After the import is completed, create a configuration file web.xml for the project, configure the MySQL database in the jdbc.properties file, configure the mybatis framework in the mybatis-config.xml file under resources, and create a new configuration file under the resource/spring

package: spring-dao.xml, spring-mvc.xml, spring-service.xml to complete the integration and construction of the SSM framework, the key code is shown in Figure 5. [2] Through the introduction of the above key technical theory, the overall environment of system development, the configuration of related software and tools are determined, and the technical feasibility of the overall project of vocational English online translation software is also clarified.

## 3. DEMAND ANALYSIS

### 3.1. System Requirements Analysis

Vocational English online translation software will be guided by software engineering ideas, with the goal of providing convenient, efficient and accurate multilingual translation services, and select appropriate development methods according to the design and development characteristics of Android applications. In the process of English teaching, a comprehensive application solution is proposed for the various needs of mobile translation software.

The software will support two user roles, one is a student user and the other is an administrator user. The software can support different user roles to complete account registration through application, and complete the login and use of the software with a unique account password. According to the actual application requirements of the role, complete the corresponding permission assignment and management. On the student side, the software can support students to perform real-time translation, voice translation, word grammar analysis, comprehensive English learning and other operations, effectively achieving the goal of transforming from a single translation tool to a multi-functional learning assistant. For administrator users, the system function settings focus on the management and maintenance of user information and data resources under the system, and ensure the normal and smooth operation of the software in all directions.

```
<?xml version="1.0" encoding="UTF-8" ?>
<!DOCTYPE configuration
PUBLIC "-//mybatis.org/DTD Config 3.0//EN"
"http://mybatis.org/dtd/mybatis-3-config.dtd">
<configuration>
  <settings>
    <setting name="useGeneratedKeys" value="true" />
    <setting name="useColumnLabel" value="true" />
    <setting name="mapUnderscoreToCamelCase" value="true" />
  </settings>
</configuration>
```

(a) Configure Mybatis framework

```
<?xml version="1.0" encoding="UTF-8" ?>
<beans xmlns="http://www.springframework.org/schema/beans"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:context="http://www.springframework.org/schema/context"
xmlns:tx="http://www.springframework.org/schema/tx"
xsi:schemaLocation="http://www.springframework.org/schema/beans
http://www.springframework.org/schema/beans/spring-beans.xsd
http://www.springframework.org/schema/context
http://www.springframework.org/schema/context/spring-context.xsd
http://www.springframework.org/schema/tx
http://www.springframework.org/schema/tx/spring-tx.xsd">
  <context:component-scan base-package="com.service" />
  <bean id="transactionManager"
class="org.springframework.jdbc.datasource.DataSourceTransactionManager">
    <property name="dataSource" ref="dataSource" />
  </bean>
  <tx:annotation-driven transaction-manager="transactionManager" />
</beans>
```

(b) Configure spring-service.xml

Figure 5: SSM framework integrates key code

### 3.2. Overall Design

The online translation software of vocational English will be designed based on Android system, adopt C/S structure, and complete the overall design and development in MVC mode in Java language environment. The software as a whole will be divided into five parts: support services, functional modules, data resource storage, standard specification system, and security assurance system. The overall architecture is shown in Figure 5. When the software design is

completed, the Android front-end design is compiled and packaged into an apk file with the Build Apk(s) function under Android Studio, and the software function test can be performed on the mobile device of the Android system. The test is divided into simulator test and real machine test. two kinds. After the simulator test is passed, after adding the Android icon, defining the version, and completing the application signature, the real machine test is carried out. When the test is passed, publish the application to the Google Play Store or other application websites.

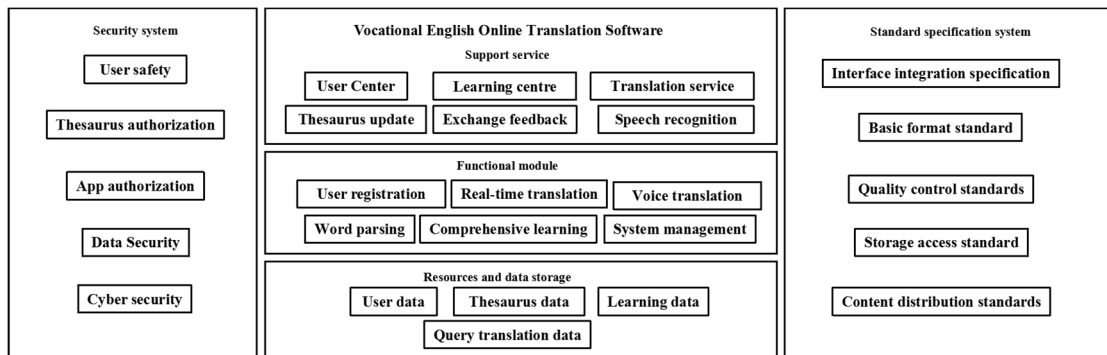


Figure 6: Overall system architecture diagram

## 4. DETAILED FUNCTION IMPLEMENTATION

### 4.1. Student Side

#### 4.1.1. Real-time Translation

Under the real-time translation function module, the main functions of the software are divided into two parts. The first is to pre-build various types of highly specialized thesaurus into the SQLite local database of the Android application, so that students can realize English language offline. query translation function. Secondly, by calling the API interfaces of open service platforms such as Google Translate, Baidu Translate, and Youdao Translation, the simplicity of the operation of the network module in the Android application is improved.

#### 4.1.2. Voice Translation

Under the speech translation module, the software can use the speech recognition STT (speech to text) and speech synthesis TTS (text to speech) components that come with the Android system to realize the speech input function, which greatly improves the user's input process. Convenience also provides more scenarios for the application of translation software. The speech recognition input function can be a separate class. When a student user enables this class, the whole process will go through steps such as initialization, parameter setting, start recognition, and recognition result processing, and control and pass parameters through various callback interfaces to ensure speech Identify the success rate and accuracy of the input. In this system, various APIs that have been disclosed can be used to complete the above functions, such as Google online voice service, iFLYTEK SDK. [6] For TTS, Android applications can rely on the TTS engine to cooperate with the corresponding corpus to complete the automatic pronunciation of the input text content, help student users to master standard pronunciation, and simultaneously improve students' listening and oral expression skills.

#### 4.1.3. Word Grammar Analysis

Under this function module, the online translation software will also provide word learning function. When student users obtain relevant words through the real-time translation function, the system will also design a cascade menu to display the phonetic symbols, definitions, example sentences, regular collocations, grammar and other contents of the words. It is convenient for students and users to query and translate while strengthening the learning of vocabulary.

#### 4.1.4. Comprehensive Learning

Under comprehensive learning, the system will obtain a large amount of data resources on the server side of the application program through network access, such as English learning consultation, English famous sentence appreciation, classic film and television dialogue, to promote the basic English of vocational college students from multiple perspectives Continuous improvement of skills. At the same time, this function module also supports functions such as word book, historical query records, which is convenient for students to consolidate and learn the words they have checked and learned in the past, and can also support the sharing and communication between students and users. Interactive and social applications.

### 4.2. Administrator Side

After the administrator user logs in to the system, he/she will have certain authority to manage the student user information in a unified manner, and can also upload, update and maintain various learning resources on the server side. In addition, the administrator user will also be responsible for the supervision of the operation of the entire online translation software, and the handling of faults.

## 5. CONCLUSIONS

Vocational English online translation software is specially designed and developed for the use of online translation software in the process of English education and teaching in higher vocational colleges. It has application advantages such as accurate translation, learning assistant and sharing interaction. Vocational English online translation software can effectively transform a traditional, single translation tool into a comprehensive English learning center. Its development can achieve the purpose of improving vocational students' translation ability, improving learning efficiency, enhancing the proficiency of five basic English skills, stimulating learning interest, and cultivating correct English learning concepts. While achieving the goal of cultivating high-quality comprehensive professional talents in higher vocational colleges, it also further promotes the innovative reform of English education and teaching in higher vocational colleges.

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