**Mobile Library – Mobile Library Management System**

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*Abstract*—As technology evolves, people are increasingly looking for convenience, making their lives easier. This project aims to develop a library management system based on Android operating system, including two platforms of background data management personal computer (PC) and mobile client, to realize the function of two-way management of users and administrators. Background data management The PC terminal is logged in from the browser, and the background realizes functions such as registered user inquiry, book inquiry, borrowing and returning, book reservation, suicide note, book viewing, and comment. The mobile client implements functions such as user registration, login, book query, loan query, book access, personal information query, etc. The advantage of this system is that users can access the library management system anytime, anywhere. In addition, the system has also introduced a book review function, where teachers and students can share their understanding and comments on books on the platform. And through the book review function, users can give feedback on the relevant situation of the book, such as damage, missing pages, etc. At the same time, the relevant situation of the library can also be fed back to the management through this channel. Users can rate books to make good books more widely known. The project takes place in the UCSI University Libraries.

*Keywords—*Library Management System*,* Mobile*,* Book Review

# Introduction

Mobile technology development originated in communications [1]. The development of technology has changed the way we live and work, such as the emergence of mobile phones. Mobile phones are becoming more and more important in all countries of the world [2]. Mobile phones are becoming more and more popular among young people, and it is essential to motivate students to learn and use them [3]. Mobile phones are easy to carry, allowing students to use them for efficient reference and research [4]. Almost every college student owns a cell phone connected to the Internet [5]. The number of people who own smartphones and use them to access the Internet has increased [6]. There are many applications for storing, receiving, and accessing files.

Mobile technology is the technology used for cellular communications. Generally speaking, mobile technology is any technology, such as laptops, PERSONAL digital assistants, mobile phones, and other technology areas. Mobile technology devices combine operating systems, networks, hardware, and software [5].

With the rapid development of mobile Internet technology and the continuous updating and improvement of mobile phones, the use of mobile phones has completely surpassed the use of computers. This is because people have more convenient ways to obtain information through mobile phones, and the information content they understand is more comprehensive and extensive.

In Malaysia, mobile gadgets are also widely used. According to a Statista Research study report, there are already 30.41 million smartphone users in Malaysia, even though the country's population is only projected to reach 32.7 million by 2020 (representing 92 percent of Malaysian mobile users) [7]. According to this data study, Malaysians spend over half of their day using their mobile phones and the internet, or 7.5 hours total every day, including 2.45 hours on social media.

Wireless Internet is also widely used, and more and more Android-based applications are available. According to data provided by Google, Android has 2.8 billion active users in more than 190 countries around the world, accounting for 75% of the global market share [8]. Android phones have become a trend that modern people choose and use.

The popularization of smart devices has laid a hardware foundation for mobile libraries.

* 1. Problem Statement:

Problem 1: **Few libraries use mobile management systems. It is the first choice for libraries in Malaysia to use a computer-based management system.**

Most Malaysian libraries do not use mobile management systems, and they are more used to using computer-based management systems [9]. Because the computer-based management system has a long history, people are more familiar with its operation and skills. Faced with a new mobile library management system, they feel strange and dare not try it easily. The disadvantages of the computer-based library management system are also very obvious, it can only operate on the computer, and the operation is more complicated. This can be a massive waste of users' time and energy.

However, according to Gartner data, global smartphone sales are still on the rise, and Android market share has surpassed IOS to become the most extensive smartphone system in the world [10]. And Android is rapidly gaining market share. Android phones have become the trend for modern people to choose and use. People also began to think about how to realize mobile phone reading. People are no longer limited by the specified time and place, can enter the library management system through different mobile devices at any time, and realize the operation of reading books [11]. This way will be more convenient and fast, can save us a lot of energy.

Problem 2: **Few mobile library management systems provide users with book-related book review plans.**

One of the incentives to encourage users to use mobile library management systems is the provision of book review program services. According to the library systems shown in Table 1, these systems do not provide book review services to users. Research shows that book reviews positively affect sales and that the effect is significantly more significant for positive reviews than for negative ones [12]. So we want to develop a book review planning service so that all users can participate and enjoy it. A good book review can be an eye-opener. Let the system and users form positive feedback.

## *B.Aim:*

This project aims to design and develop a mobile library management system based on Android, which can view and borrow books in real-time and update all kinds of relevant data. In addition, the system through book review service enhances the system and user intimacy and improves user engagement.

The purpose of this study is to improve the operational efficiency of the library by developing a mobile library management system so that students and administrators can conveniently borrow and manage it.

## C.Objectives:

**Objective 1:** To identify the strengths and differences of mobile library management system functionality.

**Objective 2:** To discuss and gather user requirements for mobile library management systems.

**Objective 3:** To design a mobile library management system to replace the traditional management method (only supports computers).

**Objective 4:** To evaluate the performance of the book review program in the UCSI mobile library management system.

## D.Hypothesis

**H1:** Performance expectations have a positive impact on user behavior in adopting a mobile library management system.

**H2:** Efforts are expected to have a positive impact on user adoption of mobile library management systems.

**H3:** Facilitation conditions have a positive impact on users' behavior in adopting mobile library management systems.

# Literature review

## A.The evolution of library management

In the early days, library management methods relied on manual picking. The borrowing and returning of books are registered with pen and paper, which is cumbersome and easy to lose data. As a result, books in the library are lost and management is chaotic [13].

From the end of the 19th century to the beginning of the 20th century, the form of libraries in the world changed from a closed to a modern library model [14]. With the rapid development of science and technology, just working on a computer can no longer meet people's needs. Coupled with the rapid growth of Android, there are more and more mobile devices and their frequency of use is also increasing. People can no longer resist using mobile devices. The main reason is that mobile devices are very convenient and fast [15]. It saves people time and can be used anytime, anywhere.

In the 20th century, the idea of ​​electronic library was proposed [16]. After that, some people also put digital libraries and web applications on the library. But over time, the concepts were refined and mobile libraries emerged.

However, according to the survey, most traditional library management systems are still only available on computers [17]. This doesn't satisfy people's desire to use it anytime and anywhere, and it also leaves many people who don't have time to go to the library or wait in line for a lot of time to read their favorite books. Therefore, the library management system developed by Android is an important method to solve the problem.

According to the "Library Journal", 44% of school libraries and 34% of public libraries worldwide already offer some kind of mobile service to users, and 40% of these two types of libraries plan to do so soon[18] .

People are also constantly thinking about how to realize the possibility of reading on mobile phones, so that people are no longer limited by the prescribed place and time, they can enter the library management system at any time by using different mobile devices, check and borrow books, and update various related data. This can be used anytime, anywhere.

## B. The influence of mobile library on the current library management mode under the background of Internet

Under the management mode of the combination of PC and mobile terminal in the mobile library, readers can keep abreast of the status of some related library collections through mobile terminals, and can also refer to information and supporting reader services through such customer service ports, and extend to some networks. High-quality training for gaming and information readers. Virtualized management and services save a lot of resources, especially time and space resources, in the process of library management [19]. In this way, readers can break the constraints of time and space, check the specific collection status of the library at any time, and communicate with some online network service personnel of the library, relying on the mobile Internet to improve the connection between readers and the library, and promote books Interaction between library and readers.

## C.Discussion & Comparison

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.NO | Title of the Paper (System) | PROS | CONS | Remakes |
| 1 | Developing a QR Code-based Library Management System with Case Study of Private School in Surakarta City Indonesia. | It reduces the lengthy borrowing process, membership, and collection checks[20]. | It needs good camera quality to protect from scratches. | Scanning each QR code is difficult when there are many users present. |
| 2 | The university library management system is based on radio frequency identification. | This system studies the label conversion and self-service borrowing subsystem[21]. | Authentication and authorization are required. | It's more of a QR code system, but not for more users. |
| 3 | Design and realization of network-oriented library management system (LMS). | It is a network LMS that works on its private network[22]. | It can only be operated from a computer. | The library cannot be used when the system is out of power. |
| 4 | Designing Android User Interface for University Mobile Library. | Users can perform actions anywhere[23]. | Only users can do it anywhere, while librarians need it on a computer. | Need to allow administrators to manage the application as well. |
| 5 | The Building of Library Management System Based on Hibernate Model. | Using Flex as the presentation layer, hibernate as the persistence layer, and Spring as the business layer, an efficient library management system is realized[24]. | Only suitable for web applications. | The cross-platform compatible framework is recommended. |
| 6 | VESIT Library -An android-based application. | Android app with SQL database server helps students view all library collections[25]. | When the library is down, the application server is unavailable. | It needs to be implemented to run anytime and anywhere. |

Table 1: Comparison of existing mobile library systems

## D.Library Book Review Program

According to the mobile library management systems in the comparison table, they do not introduce a book review program into their system to enhance the user experience. Therefore, this project introduces the book review scheme. Most mobile library management systems only focus on the functions of the library itself and research book loss prevention. They all ignore the crucial importance of interactive management of the library [26].

The mobile Internet management of the library is an interactive management method. In fact, the mobile management of the library needs to be considered comprehensively, especially in the development of mobile APPs, which should be actively explored, arouse the enthusiasm of readers in various ways, and encourage readers and the library to communicate with each other, to make the library truly able to serve readers [27]. The Book Review Plan can do just that, allowing users to exchange their thoughts on books through book reviews. Users can also use this channel to report the relevant situation of the book to the librarian, such as missing pages, damage, etc., so that the books can be better maintained and updated. Users can also communicate with the management through book reviews to reflect the situation of the library, so that everyone can better maintain the library.

Library services play an important role in user satisfaction [28]. If the service of the library is good, it will form a virtuous circle. In the Book Review Program, users express praise and compliments for the good service the librarian has done. Librarians will see his compliments directly through book reviews, which will motivate librarians to work more seriously and bring a better experience to the library and users. This will form a positive cycle, which is conducive to the healthy development of the library.

The library management in the mobile Internet era should have some new thinking. Only by using new thinking can some practical problems be solved. Therefore, it is necessary to innovate the management thinking and management mode. Realize the overall improvement of library management.

# Research Method

## A.Data Collection

A randomized questionnaire was used in this study to obtain project requirements. For performance evaluation and user experience feedback, this study will use quantitative methods to obtain results. A quantitative approach is a method of taking the number of results from the question posed and analyzing the variables of the data to obtain the results. The study will randomly consider around 15 respondents selected around UCSI University for user feedback on the app.

## B.Research Data Gathering and Analysis

To evaluate the performance of this mobile book inventory management system, we will conduct a post-development survey that will help improve the overall acceptance rate of the application. The survey will be conducted through the UTAUT model. A total of 15 users will be invited to participate in the user experience survey. Questionnaires will be distributed via Google Forms to each participant who has used the system for a period of time, and users will be asked to fill out the form based on their own experience after testing and using the suggested app.

Diagram

Description automatically generated

Figure 1: UTAUT model

The UTAUT model identifies behavioral intentions and uses behaviors by observing and analyzing the effects of individual differences, including gender, age, experience, and perceived willingness to use.

Internal consistency reliability was determined using composite reliability (CR) and Cronbach's alpha. The measurement of various items on the same test is known as internal consistency reliability. It calculates Cronbach's alpha to check if the findings produce similar scores by measuring all item variance. It is advised that both CR and Cronbach's alpha values be higher than 0.7.

## C.Equations

Cronbach’s alpha (α)

The formula used to find Cronbach's alpha value is:

黑色的钟表

中度可信度描述已自动生成

Figure 2: Cronbach’s Alpha Formula

To find Cronbach's alpha value, first should find every question’s variance.

A picture containing text

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Figure 3: Variance formula

# Results

**Performance Expectancy section:**

|  |  |
| --- | --- |
| Question | Variance |
| 1 | 0.4028 |
| 2 | 0.8339 |
| 3 | 0.4028 |
| 4 | 1.1195 |
| 5 | 0.6952 |

Table 2: Performance Expectancy variance

**The variance of the Performance Expectancy Section is: 15.5536**

The Cronbach’s alpha value of the Performance Expectancy is:

a = ( 5 / 4) ( (15.5536 – 3.4542) / 15.5536),

a = 0.9724

Fulfill the minimum acceptance requirement.

**Effort Expectancy section:**

|  |  |
| --- | --- |
| Question | Variance |
| 1 | 0.2095 |
| 2 | 0.4 |
| 3 | 0.4094 |
| 4 | 1.1143 |

Table 3: Effort Expectancy variance

**The variance of the Effort Expectancy: 6.9238**

The Cronbach’s alpha value of the Performance Expectancy is:

a = ( 4 / 3) ( (6.9238 – 2.1332) / 6.9238),

a = 0.9225

Fulfill the minimum acceptance requirement.

**Facilitating Conditions section:**

|  |  |
| --- | --- |
| **Question** | **Variance** |
| **1** | **0.5524** |
| **2** | **0.8286** |
| **3** | **0.4095** |

Table 4: Facilitating Conditions Evaluation

**The variance of the Facilitating Conditions: 5.1143**

The Cronbach’s alpha value of the Performance Expectancy is:

a = ( 3 / 2) ( (5.1143– 1.7905) / 5.1143),

a = 0.9749

Fulfill the minimum acceptance requirement.

Based on the above results, this application has been accepted by the majority of UCSI students and it is believed that this application will help the library and users and bring closer relationships.

# Conclusion

Nowadays, mobile devices have become the devices that almost every modern person owns, and they are used in all aspects of life, including work, entertainment, and communication. I believe that mobile library will become the future trend of the world because it brings a lot of conveniences. By using the mobile library management system, users can easily perform operations such as borrowing, making reservations, and reporting book loss, and librarians can easily track book-related information and properly handle the management process. Through the book review program, let users and administrators form interactive management. The system establishes the connection between the user and the library through the mobile device, establishes the connection between the user and the user, and establishes the connection between the user and the librarian. The interaction will be beneficial to the development of the entire mobile library management system.

## A.The Limitations of The Study

Although most of the goals of this study have been achieved, there are still many deficiencies. The system design is somewhat simple. The book review function is not very perfect, and other users cannot directly participate in the discussion under a book review.

In addition, due to cost constraints, the development of this project uses a basic server, which causes some page jumps to be delayed. When entering book information, librarians cannot import and upload book information in batches. There is no forgot password function in the background management interface, which may cause some trouble.

## B.Future Works

Although the system has been satisfied by most people, it still

has a lot of room for improvement. The system will realize more and more perfect functions in the future. Its interface design will need to accommodate mobile devices of various sizes so that it can be more attractive to users. In the future, the language of the system may be multiple to suit the use of people in different countries and regions. In the future, librarians will be supported to upload book information in large quantities, and comments between users can be directly replied so that users can communicate directly.

## C.Contribution to Society

By using this system, users can borrow, reserve, return, report lost books and other operations using mobile devices at any place and at any time. They do not have to worry about the loss of relevant information, all data will be securely and quickly transferred to the database. In addition, users can track the information of favorite books through the system and check whether there are any more books. The administrator side can make changes to the system functions. For example, edit book categories, edit book information, edit announcements, etc. Administrators can perform all tasks of the system and save a lot of time.

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