Library Management System with SMS Auto Reply

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Abstract: The Library Management System is a system which manages the flow of all books, the information regarding the books available in the library as well as the records of them. All this work when done manually requires time and efforts since this is a complex task. With all the modern techniques available in the 21st century it is important for humans and computers to be co-ordinated. The Library management system is designed in such a manner, that it completely computerizes the whole traditional library process. It will help in keeping the information about the members, books and all other operations. It will also help in the maintenance at any instance, which reduces almost all the human workload which is required for management of traditional library. The findings also indicates that 74% of the respondents want a notification system for library so they are updates as soon as a book is available or when their return dates is approaching in turn saving them from some penalties. 100% of the respondents agreed that there should be an app for library which should also contain the library contents in electronic media format as all of them like to study on their electronic devices which includes mobile phones, laptops and computers. Respondents were receptive towards implementing a system that can improve the traditional library process via mobile technology by the use of a notification system, as the evaluation from the respondents indicates a positive reaction.

Keywords: *Android, Library, Management, Dataset, Database, Short Message Service (SMS), Library Management System, Digital Library, Electronic Library, Mobile Phone*

Introduction:

The modern organizations are automatic and every work done by the computer is as per the instructions provided to it, so it becomes very much essential for human beings and computers to be co-ordinated. The Covid-19 pandemic made physically visiting libraries difficult thus hindering education and research activities of various individuals, it was concluded that electronic media forums will be the solution to the problems faced by the traditional libraries. SMS communication which is increasing day by day for various businesses and personal uses, whereas libraries in developed countries have already shifted to SMS communication to communicate with their members, sending them timely alerts and notifications.

A Library Management software for monitoring and controlling the flow of books in a library. It is designed and coded in Android Studio and the database will be made with the help of Firebase. It encompasses two different type of users namely administrator and students. The operations done by the administrator are adding new books, removing some books, editing information about the book and viewing member. The Students can perform the following operations: registration, borrow books, return books, view books and searching. The software is easy to use for both beginners and advanced users. The database will consist of information about the books issued and the available books. The is a web based application. This system can further be build for some hard-fought tasks under librarian; thus can be subdivided under – sub distributors, penalty, new issue, book yearly projection, an online library system guide and many others to ease human labour. There is also a need of verification of users which is done in order to check that only authorised person is accessing the library. This project proposes SMS communication for various library purposes, the library notification systems helps students as a reminder and reduces time and effort. Making An online forum was the need of the hour as everything now is done online (cue COVID-19 pandemic).

Literature Survey:

Many kinds of mobile web based applications are developed. The number of libraries are increasing day by day that have adopted the existing mobile technologies to provide innovated services. Reference [1] conducted a case study for design and evaluation of library SMS services at Oriental Institute of Technology Library in Taiwan. They concluded that about 75% of the respondents got to know about the SMS services from the librarian and most of the respondents favourite feature was the due-day reminder and renewal feature.

The Digital Library Management System is available for the students to access 24x7, but it requires an authorised system for handling and admin setup. According to the paper published in International Journal of Scientific and Research Publications with the title “Design and Implementation of Digital Library Management System” Reference [2] it concluded that to make a database with every book available can make the dataset large and it can be troublesome, having a system that is up for 24x7 can be an ease in users lives.

29th International Business Management Association Conference, Reference [3] had concluded that having remote access to library and having allowed to search for information when and where needed can be really beneficial to readers. For this feature you require an adequate internet connection and for that case you will rely too much on the internet connection. The system which will communicate with all the library departments.

International Journal of Applied Engineering Research published a paper with the title

"Utilization of Short Message Services (SMS) for Library Notification System", Reference [4] conducted a case study at University of Malaya Library with a total of 110 respondents in which 38% Strongly agreed while 37% agreed that they should have an SMS system for overdue books, new books arrival and book reservations. It concluded that findings reveal that 58% concur that integrating SMS in the proposed notification system would facilitate to resolve the problem of notifying students on overdue books, arrival of new books and operating Schedule more efficiently.

Findings and Discussion:

Background information of respondents

Table 1 describes the sample of 50 respondents used for data analysis. The sample comprised of 56% males and 44% females, it reflects that both the male and female respondents are more or less balanced. The responses revealed that 32% of the respondents are Post Graduates and 64% are Under Graduates while 4% belong to others category, that includes students from diploma or foundation year. It also revealed that majority of the respondents were from Engineering discipline (32%) and second majority were from Science Discipline 28%. The rest of the discipline were in this particular order Commerce, Business and Arts and Social Sciences respectively.

Current Awareness about e-Library

Table 2 describes the sample of 50 respondents used for data analysis. The 50 respondents are with backgrounds as depicted in Table 1. The responses revealed that 80% of the respondents were aware of e-Library, 10% had a slight clue whereas 10% had no clue about e-Library. Even though a huge number of respondents were aware of e-Library the number of people that were aware of notification system used by Libraries were drastically low as compared to familiarity with e-Library. The responses revealed that 30% were familiar with Notification system and 70% were not.

Categories of User	Count	Percentage
Gender		
Female	22	44%
Male	28	56%
Total	**50**	**100%**
User group		
Post Graduate	16	32%
Under Graduate	32	64%
Others	2	4%
Total	**50**	**100%**
Disciplines		
Engineering	16	32%
Science	14	28%
Commerce	5	10%
Business	8	16%
Arts and Social Sciences	7	14%
Total	**50**	**100%**

Table 1: Demographic information of respondents **[N=50]**

Category	Count	Percentage
Familiar with e-Library		
Yes	40	80%
No	5	10%
Maybe	5	10%
Total	**50**	**100%**
Familiar with Notification System		
Yes	15	30%
No	35	70%
Total	**50**	**100%**

Table 2: Current Awareness about e-Library **[N=50]**

Purpose of e-Library Systems

Figure 1 reveals how the respondents want to upgrade their library experiences when asked some suggestions on a scale of Strongly Agree, Agree, Disagree and Strongly Disagree. The figure reveals that 62% of the respondents strongly agree that the library contents should be made available in electronic media format, 38% agree on the same whereas 0% respondents Disagree or Strongly Disagree on electronic media forum. Respondents also elaborated that they want the content in these formats PDFs, audio and video, since 75% of the respondents like to study on their electronic devices like Mobile phones, Laptop, PC.

Figure 1 reveals that 62% of the respondents Strongly Agree, 38% of the respondents Agree that there should be an Android based App for library, there were none that Disagree or Strongly Disagree on the same.They were clear and heavy on the opinion that having an app might ease their lives regarding not having to physically visit a library everytime inorder to check if the books are available for issuing or not.

In addition, they suggested certain features for the betterment of the app like checking the availability of a book, return date of the book, suggestion box for requesting books that are not available in the library.

Figure 1 reveals that 74% of the respondents strongly agree that a notification system should be there to serve as a reminder for due dates and when the book becomes available in the library to save them some penalty and getting the book as soon as it is available. 26% agree on the same whereas 0% disagree or strongly disagree. Respondents also reveal that an SMS notification system is good since it would work regardless of an internet connection so they don't have to rely on an internet connection as such. Some of them want both email and SMS communication system since two is better than one and the audience were of the view that a lot of people don't read SMS as much as they check their mails. It was concluded that having a communication system with both SMS and emails would be a better option since it would work even if one of the two(incase of either network or internet failure) fails.

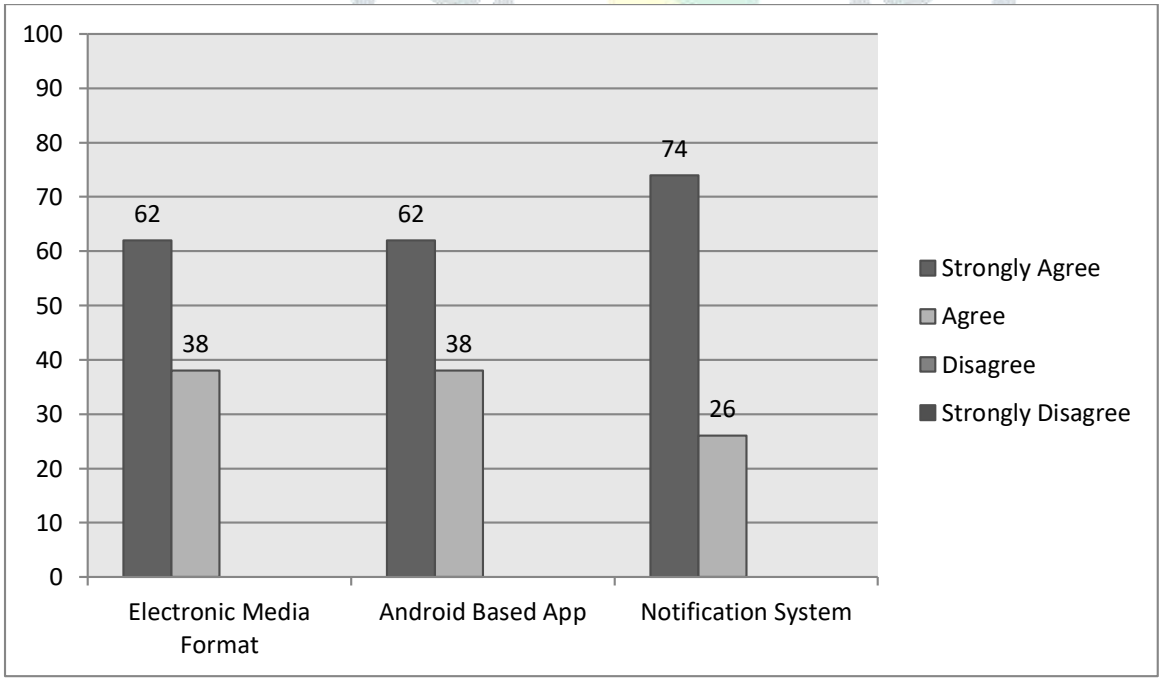

Figure 1: Usage of e-Library [Scale: 1-Strongly Agree, 2-Agree, 3-Disagree, 4-Strongly Disagree] (In percentage)

Objectives:

An android based app to handle the activities and also the services of the library in a comprehensive way that lessens physical work, reduces human error and grants access to information materials with ease (anywhere, anytime). It aims to design and implement an Android based Mobile Library Management System that University Libraries can use to overcome the challenges faced by the traditional library systems.

Methodology:

The android based library management system is designed and implemented using android studio; java and JSON (JavaScript Object Notation) also known as dictionaries. At the back-end database services are used. This system was tested and run under various problematic situations and corrected to make a more thorough and robust competent application based service for varied institutions and management platforms/forums (industrial and/or otherwise). It has the capacity to add integrity to the library and decrease manpower thereby reducing chances of human error.

Proposed system:

Analysis:

System design is the art of defining architecture, components, modules, interfaces and data for a system. One could see it as the application of the systems theory to product development. There is an overlap and synergy with the branches of system analysis, systems architecture and systems engineering. The performance is measured as per the output provided by the application. The specification of the requirements plays an important part in the analysis of the system. Only when requirement specifications are properly given, it is possible to design a full-proof system, which will fit into desired environment. It rests largely with users of the existing system to effectively convey the requirement specifications of the system since they would be the end users.

Structure:

The design of this system is a back-end database integrated with the software application based service. The database is where all the information and details of the books and users are stored. The application on the android OS is used for registration, user login and admin login. This application is integrated with the back-end database to fetch the information as and when required.

Authentication module:

This Module is responsible for Authentication operations required in the app. The Authentication Module consists of three components. They are Login, Signup, Forgot Password components. These three components are developed using Fragments which are controlled by single Authentication Activity. This Activity controls these three Fragments with the help of Frame Layout Container. The Authentication Module becomes lightweight with the use of Fragments, instead of separate Activities for each Layout which consumes extra memory for every time we launch the application and it implicitly slows down the UI thread. When application is launched, the Authentication Activity lands us to Login Component as first page.

Login component

The Login Component is responsible for allowing access to authorized users and administrators into the application. Its layout is developed in card-view which fits into Container of Authentication Activity. This Layout contains two input fields which takes email and password as input, Login Button which gives access into the application's admin/user module, Forgot Password Button which gives access to Forgot Password Component, Click to Signup Button

which gives access to Signup Component. The input fields are validated well to perform proper actions. The Backend Logic of Login Component is implemented which is responsible for allowing access into admin/user module by checking their server, whether it matches the profile of any admin/user from database. It allows to login user/admin who verified their email for only those who signed up. This verification mail is to ensure the mail is related to the profile user and that the email account is active.

Signup component

The Signup Component is responsible for the creation of user/admin account. Its layout is developed in card-view which fits into Container of Authentication Activity. This Layout contains six input fields which takes name, password, confirm password(for security reasons), phone number, email and university identification number as input for registration of the account and this data is feeded as profile data into the system, and 2 radio group buttons which takes gender and college information.

Database component

Well the front-end consist of soft logic and design, the back-end structure works to feed the data the user is asking for, such as book name, number of books available and availability. This data is accessible for admin too to get to know the whole section of the books.

System Architecture

Figure 2 represents the system architecture. The system consist of two parts back-end and front-end. The back-end is the database which is at the very top of the architecture because that is where all the information about the books as well as the users and the administrators information is stored in the database. This back-end is integrated with the front-end which is an android based app. The use of this application is different for administrators and users as the flow chart indicates. The first page available to both categories of users is the login page.

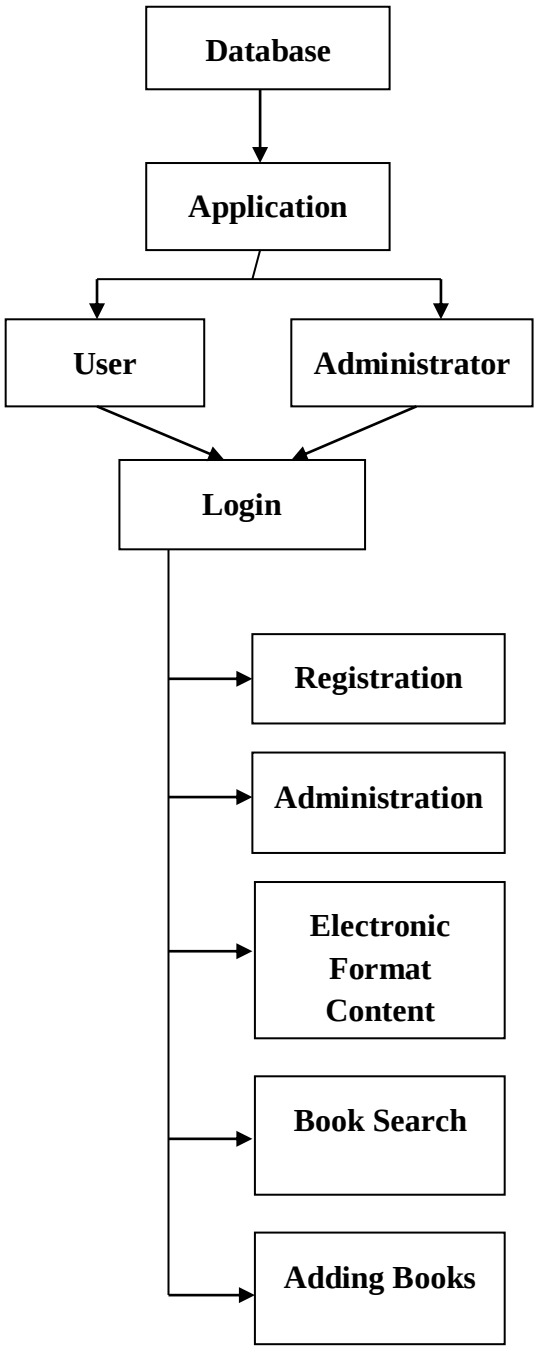

Figure 2: Flow Chart for System Architecture

After the registration process different features are available for different users. The administrator can access the database and add books , remove books or edit the information about the available books whereas the users can view the available books or read the library content in electronic media format. This is a short summary of the prototype of the system, in the actual system there might be additional features and can be altered according to the use.

User Interface:

Figure 3: Registration Page

Figure 4: Login Page

Figure 5: Reset Password

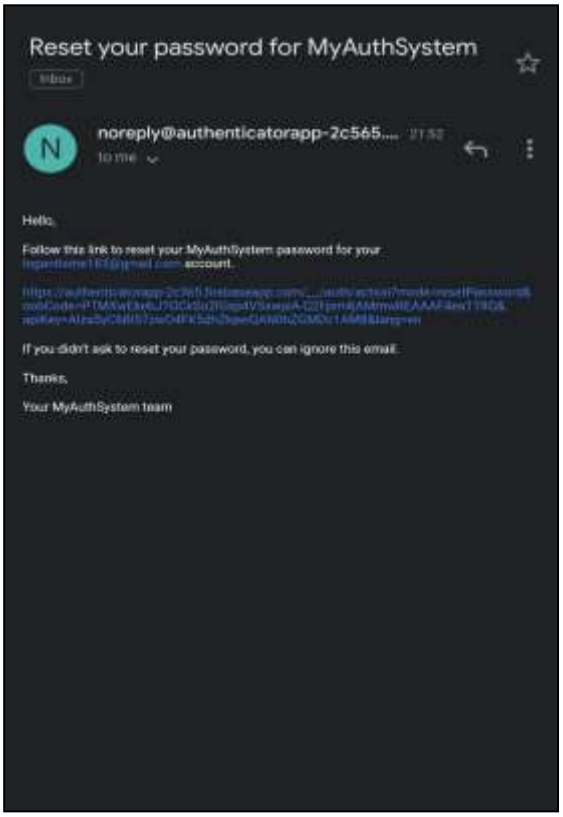

Figure 6: Verification Mail

The UI (User Interface) is the main aspect of any app, web page or software, since it is where the user interacts with the computer or mobile phones. So it is important to make it understandable, vibrant and captivating. Figure 3 shows the Registration page of the prototype where the User of the Administrator registers to use the app. Figure 4 shows the login page, after the registration process the user needs to login to access the library management system. The UI attracts clientele, hence it should be alluring as that is what makes an app or a web page a hit or miss.

Result and Future Direction:

This application tends to work on any organizational or institutional tasks at any level from remote locations for every unexpected situation that may occur in our day-to-day life and especially during a pandemic situation like now, it is a compulsive need to perform every task with minimal human interaction, which includes online classes, online chat rooms, online meeting rooms. The system also can be worked and made to support a tactile environment using automated SMS and email services or in-app based messaging system.

Conclusion:

A computerized system for a library will help everyone from students, teachers to librarians. A platform which can do every task of a traditional library. This Application is about the digitalization of traditional library process where from Staff to Professors to Students everyone will be benefited through using this application. A Librarian will be able to respond to their organization from anywhere through this application for his/her library tasks happening day-to-day. Similarly, staff, professors, students can save their time a lot in so many occasions when they need to go to a library. E-content can be added in the library system which will help them study with more ease and watch lectures at their own comfort (time and pace). There is still so much scope and improvement which can be done and it solves a lot of problems faced by the traditional libraries.

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