Barcode Document Tracking System

Soon Jian Cheng[1], Abd Kadir Mahamad[1*], Sharifah Saon[1], Mohd Anuaruddin Ahmadon[2] and Shingo Yamaguchi[2]

[1]Faculty of Electrical and Electronic
Engineering,
Universiti Tun Hussein Onn Malaysia,
Batu Pahat, 86400, Johor,
MALAYSIA

[2]Graduate School of Science and
Technology for Innovation,
Yamaguchi University, JAPAN
kadir@uthm.edu.my

1.   Introduction

In the era of bombastic technology, our world is occupied with electronic devices. Most of the manual system has been replaced by electronic systems. This can reduce the usage of time, cost and increase the efficiency of the system. Barcode technology is one of the automatic identification and data collection (AIDC) technology that introduce to reduce human error, and reduce time and labor by replacing manual method of data entry and data collection. Barcode technology is allowed to collect real time data with more accurate and faster. Barcode technology consist of the barcode and barcode reader. The combination of barcode technology with computer, database and some of the application software can increase the performance, efficiency and the productivity [1].

Documents are knows as the information carriers of a company. It is the important assets for a company. Therefore a good document management system is required implement in a company. By using the traditional method and physical standard way to manage, keep and transfer their document file may cause energy and time wasting, misplacing of file and sometime even loss of them. This is because the employee needs to move from one department to another department in order to find their file. This will influence the efficiency of the company. Electronic document management system is one of the popular document management system recently use in most organizer. It purposes is to store document, track document and reduce paper. According to Bo-Christer Björk (2002) [2] the electronic document management system is using a server connect to the database system that able to store the information of the document. The drawbacks of this type of system are hard to get the current status of document, information of the document need to type manually in the database and easily get type wrong information into the system. Therefore a document tracking system is needed to improve the registered, retrieved, preserved, and tracing the path of the document [3].

The traditional document management system is recorded the information into the logbook manually. This method tend to waste time and have the probability error occur when record the information. This method is not efficient and not suitable for a large company which has many documents. Therefore the barcode document tracking system is introduce to solve the problem occur by using the manual system. For every new coming document, barcode with the information of the document such as document ID, subject name, and date receive, is generated by admin and recorded into the database. While the document is passing to other department, admin of the department only need to using Android apps to scan the barcode and insert department name in the space "Department received" and click submit, thus data automatic inserted into database [4].

The main purpose of this project is to improve the document management and tracking system. For manual systems, it takes quite long time to record the information of the document and get the current status of document. Therefore, this project aims to improve the efficient of the document management system and the users can obtain document flow information by checking information through the website.

The target of this project is to implement a suitable document tracking system that can help every company and organization manage their document. This project also target to use minimal cost to produce a suitable and efficiency system. By considering the security issues, users are compulsory to register before granted to access to the database. There are two types of users for this system which are administrator (admin) and users. Besides, this system also targets the barcode reader able work well with the database.

2.   System Development

This system is divided into two categories which are website application and android barcode scanner. Figure 1 shows the project development process flow.
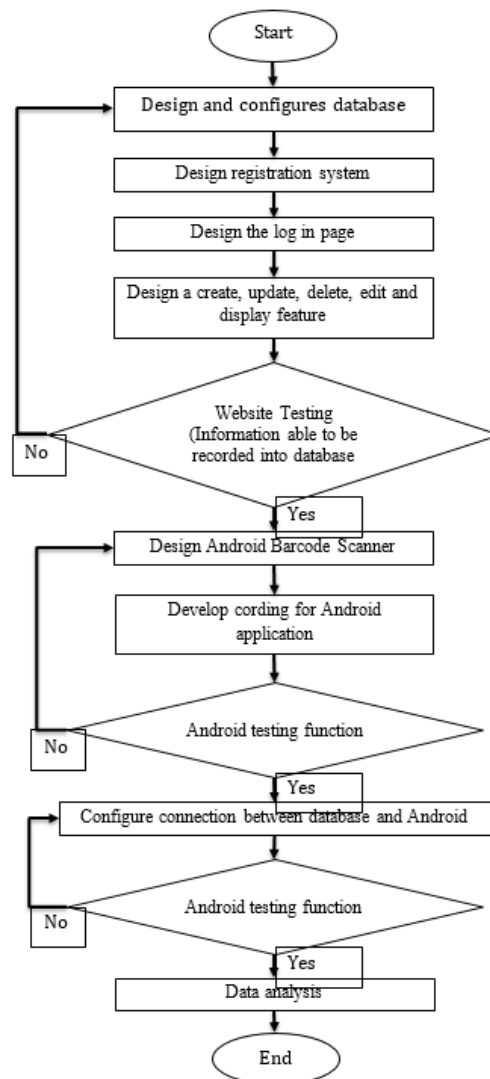

Fig. 1 - Project development process flow

2.1   Database Configuration

Database for this system is developed using MySQL, for storing the users and document information. Figure 2 shows the database configuration.

Field	Type	Null	Extra	Links
Database Tables				
██████████████████████████████████████				
Users				
Id	Int	No	Auto increment	
Username	Varchar	No		
Password	Varchar	No		
User_type	Varchar	No		
██████████████████████████████████████				
Tbl_users				
Id	Int	No	Auto increment	
Code	Varchar	No		
Subject	Varchar	No		
Date	Varchar	No		
Department	Varchar	No		
Barcode picture	Varchar	No		

Fig. 2 - Database Configuration

2.2   Website Design

Adobe Dreamweaver is used to design the website of document tracking system. 000Webhost is a free web hosting that allows uploading PHP code file and containing a MySQL database. There are some limitations and features for the free hosting. For examples, the size of the disc space is 1GB; size of the bandwidth is 10GB, 2 MySQL database allowed, 5 email forwarders, 2 website, website builder, free domain hosting, sleep 1 hour per day, FTP support, and web file managers. Next, this system is designed with multiple login system that divided into two categories which are normal users and admin users. There are different feature between the users and admin account. Table 1 shows the different between normal and admin users.

Table 1 - Different between users and admin

Function	Users	Admin
Login into system to view document status	Able	Able
Create new admin user	Unable	Able
Insert new document	Unable	Able
Edit document	Unable	Able
Delete document	Unable	Able

2.3   Design Barcode Scanner with MIT Apps Inventor

MIT Apps inventor is a platform that allowed the user to design and develop Android application for Android phone using web browser and either connected phone and emulator. This project work with the MIT app inventor for barcode scanner app development, in order to scan barcode of the document and insert data into the database. Next, users also able to search document information from database by scanning the barcode of document through this app. While the barcode button is pressed, camera is activated to scan the barcode. Then, the apps allow users to key in the data and store the data into the database. The App Inventor serves to store work and helps developer to keep track of project as shown in Figure 3.
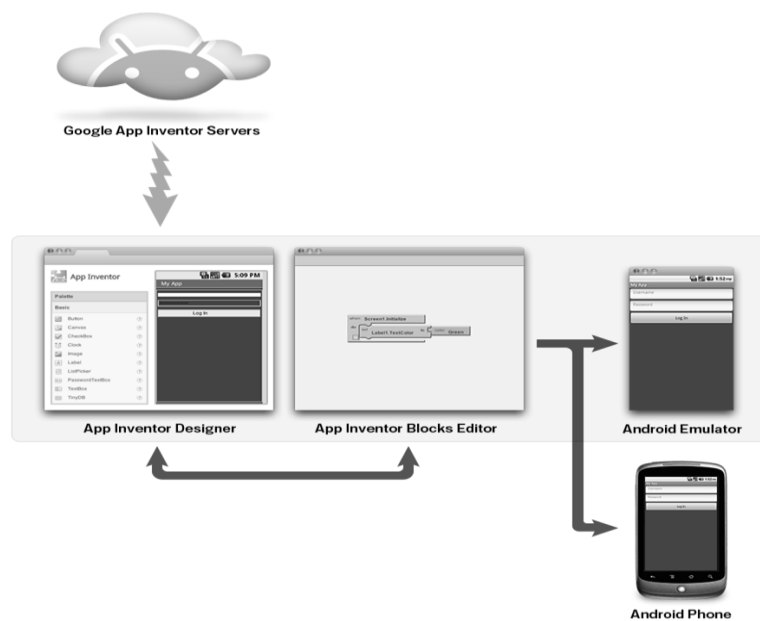
Fig. 3 - Process of MIT App Inventor

3.   Results

There are two types of account which are admin and user with different function and features. The admin users able to insert new document information, edit and delete document information, and create new admin user while the normal users are only able to view the document information. Figure 4 and 5 shows the interaction diagram of login system and registration system flow.

The different between the users page and the admin page are, user page only allowed to view the document information in system while for admin page it is allowed to add new document, edit document, and delete document information. Figure 6 and Figure 7 show the user page and admin page.
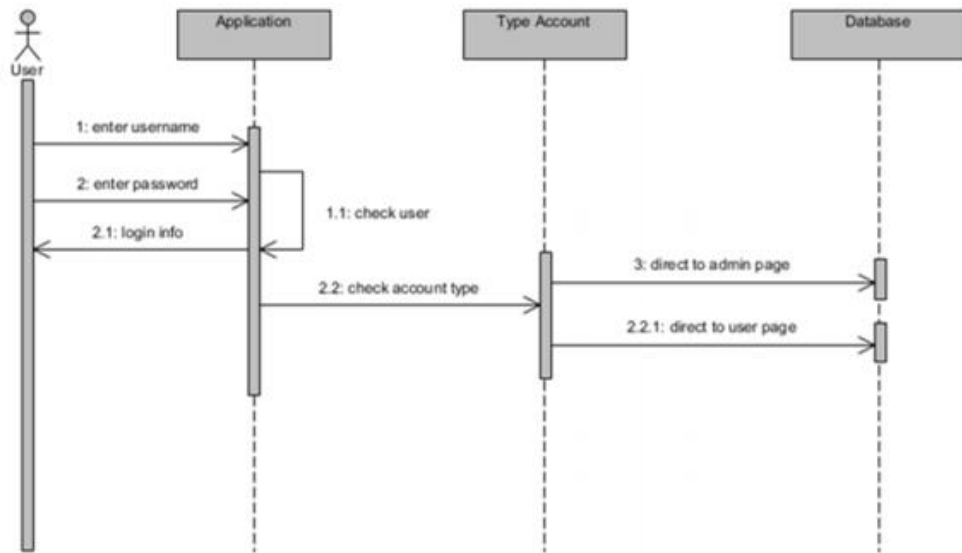
Login System Flow
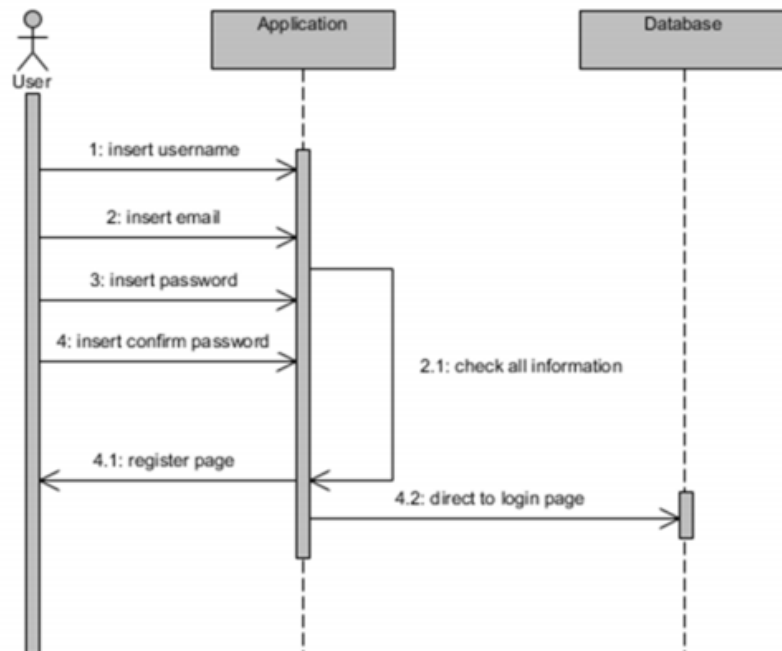

Fig. 4 - Login system flow

Register System Flow

Fig. 5 - Registration system flows

Document list

ID	code	subject	date	department	barcode	Action
1	01/6-4/4/4J1(01)	PERTANDINGAN ZON SELATAN INNOVATE MALAYSIA DESIGN	11/9/2017	FKEE	01/6-4/4/4J1(01)	
2	01/6-12/3/7J3(2)	Zero Draft Resmue	15 Mac 2018	FKEE	01/6-12/3/7J3(2)	
3	01/6-12/3/7J4(1)	Ace Your Interview	4/19/2018	FKEE	02/6-12/14J21(33)	
4	01/6-12/3/7J2(5)	Makan Malam Final Batch	5/4/2018	FKEE	01/6-12/3/7J2(5)	
5	01/6-12/3/2J4(5)	Mock Interview	12/4/2018	FKEE	01/6-12/3/2J4(5)	

Fig. 6 - Users page

Document list + Add New + add user

ID	code	subject	date	department	barcode	Action
1	01/6-4/4/4J1(01)	PERTANDINGAN ZON SELATAN INNOVATE MALAYSIA DESIGN	11/9/2017	FKEE	01/6-4/4/4J1(01)	Edit Delete
2	01/6-12/3/7J3(2)	Zero Draft Resmue	15 Mac 2018	FKEE	01/6-12/3/7J3(2)	Edit Delete
3	01/6-12/3/7J4(1)	Ace Your Interview	4/19/2018	FKEE	02/6-12/14J21(33)	Edit Delete
4	01/6-12/3/7J2(5)	Makan Malam Final Batch	5/4/2018	FKEE	01/6-12/3/7J2(5)	Edit Delete
5	01/6-12/3/2J4(5)	Mock Interview	12/4/2018	FKEE	01/6-12/3/2J4(5)	Edit Delete

Fig. 7 - Admin page

Admin pages of document tracking system contains few features that are able to make system more efficient. The first feature is inserting new document information into the system. Admin are able to add the new document information by click on add new button on the top of insert page, as shown as in Figure 8. It will redirect to the index page once all the information inserted. Information that able to add into database are document ID, subject name, and date of document. Each involved department receives document and picture of barcode document. The maximum size of picture upload into database is 5MB while the maximum character is set to 50 characters.

Fig. 8 - Add page system

Second feature is to create a new admin users by clicking the add users button, and admin user is directed to the admin registration for future action. The information of users are recorded into the database users table and the user type is mentioned as admin. While, edit button in the action column is allowing the users to update information of document. By clicking the edit button, admin is directed to the edit page and admin able to change and update information. Figure 9 shows the edit page of the system. Next the delete button is used to delete the unwanted document and log out button is return back to the login page.

Fig. 9 - Edit page system

Comply with this system, mobile application is developed to ease the used of the system known as ScanTrack. ScanTrack is an Android app that design for the document tracking system. It is provided with three main features, which are barcode scanner, update current information of document and search or track the document information. The design of application icon is shown as in Figure 10. This icon appeared in the Android device once the apk file is installed. Figure 11 shows the initial start-up screen and login screen of this application. MIT App Inventor was used for designing this application [5].

16

The credentials of this application are register from the register page of this application. This system will compare the user's information with the database in the system. If the information is match then users are able access to this application, otherwise an error message will appear to alert the users. Internet connection is important in this page because it need to communicate with database. PHP file that connect between this application and system database is "lognew.php". There are two type of notification to alert the users. Table 2 shows the explanation of alert system.
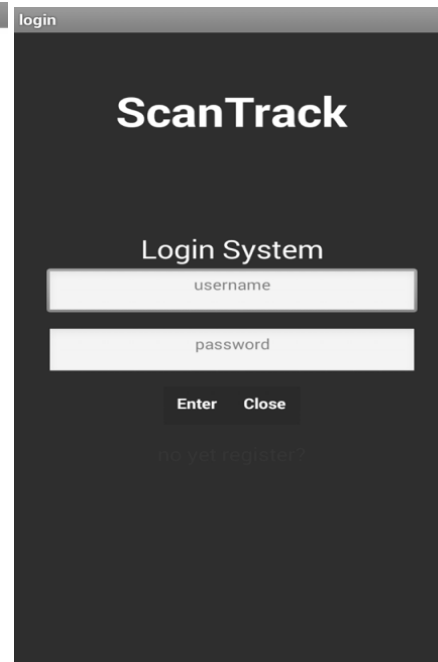

Fig. 10 - Application icon

Fig. 11 - Initial start-up application and login system

Table 2 - Notification and explanation error of login page

Alert Notification	Explanation
Please fill	This alert when the username and password is empty
Wrong	This alert when the username or password is wrong

ScanTrack registration page used to register the user's information into database. Users who wish to access in this app need register by filling their information. The information required to register is their department name (use for username), email address, and password. All the information is recorded into the database users table. The PHP file that connects to this application with the system database is "registnew.php". Figure 12 shows the registration page of this application. There are four notifications in this system in order to alert users. The explanation of notification explained in Table 3.

Fig. 12 - Registration System

Table 3 - Notification and explain error of registration system

Notification	Explanation
Please fill in	Department name is empty
Please write email	Email is empty
Password dint match	Password do not match between two text box
Register success	Register success

Updating document information page used by users to update the information of document. This application is design for the admin of every department to inform the document tracking system when they received document by scanning the barcode of document and update to the system. This system include barcode scanner that able to scan the document barcode and insert the code into the code text box. Next, the department text box is auto fill with the username that the user use to login into system. The date received document text box is able to set by the date picker. When the date is pick it is write into the date text box. After all the information required is fill the button update is responsible update the information to the database. PHP file use to control this function to "submit.php". Search button is direct to the search page. There are four alert notification shows in Table 4 and Figure 13 shows the step updating document information page.

Table 4 - Notification and explain error of updating information page

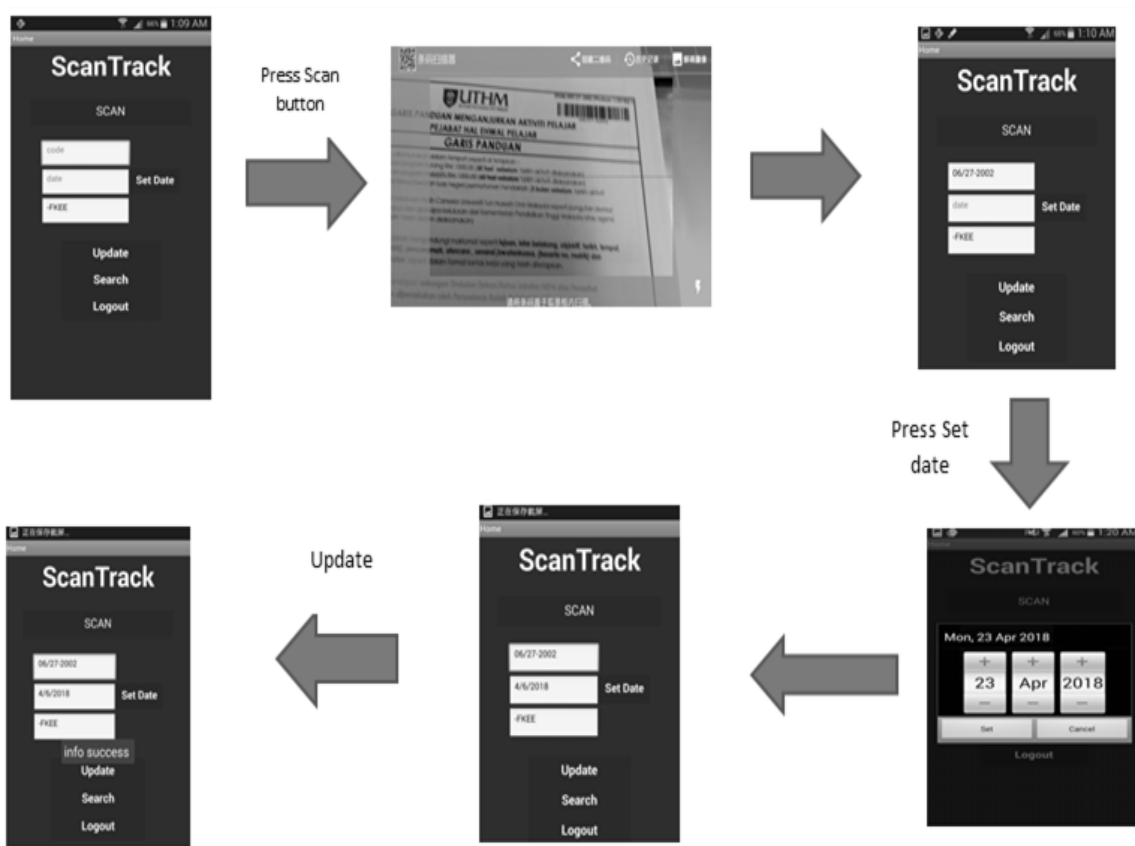| Notification	Explanation
Please scan your code	Code text box is empty
Please write date	Date text box is empty
Please write department	Department text box is empty
Info success	Data is upload successfully into database

Fig. 13 - Step to update information

Searching page used by user to track the current location and condition of document. The feature design to this page is barcode scanner and the list view. Barcode scanner is use to scan the code of document required to search and insert into the empty textbox. When the search button is clicked all of the document information with the same code is listing in the list view form. Therefore, users able to know the latest location of document and track the whole life cycle movement of the file. The PHP code that use to fetch the information from database to this application is "json.php". The alert notification "no result" will prompt out when the code search is not record in database. Figure 14 shows the steps of searching document.
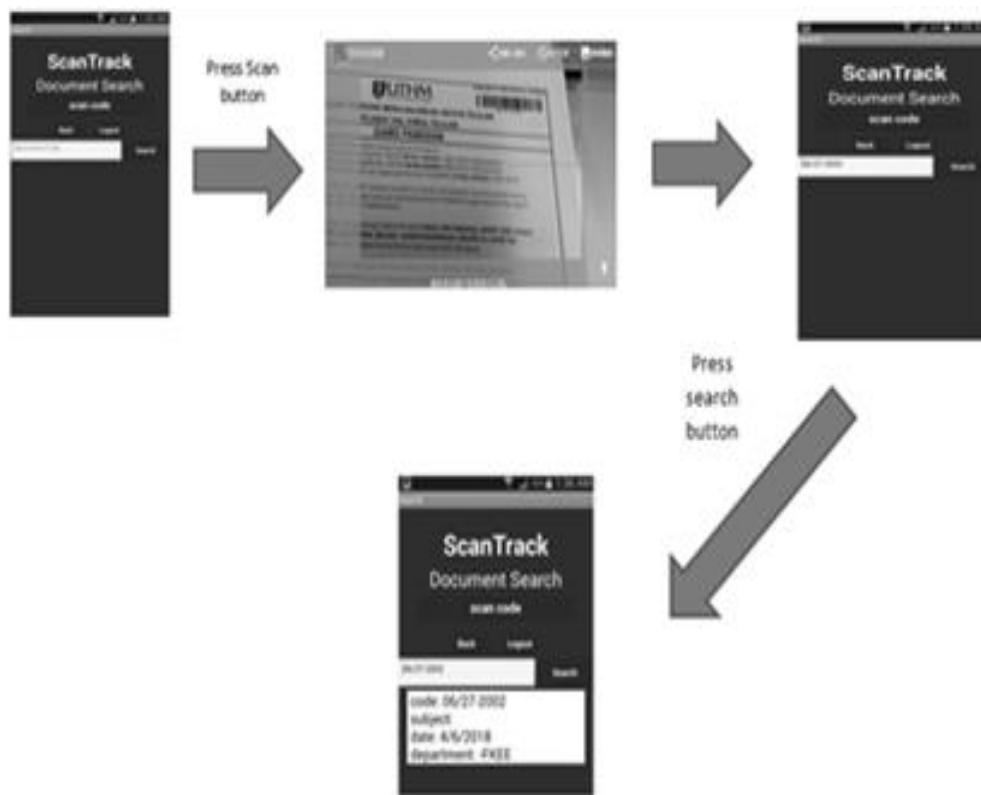
Fig. 14 - Steps of searching document

4.   Conclusion

There are two important part include in Barcode Document Tracking System which are website system and Android app with a brand name ScanTrack. The website system is designed with multiple login system. This means that this system have different main pages for different users type. There are two users type in this system which is users and admin. The purpose of this system is considered with the security issues. This is because; they have different right between the admin and users. Admin able to do everything on the system such as manage database, add new document into system database, edit document information, and delete document information whereas for the user type account they can only login into system for viewing purpose only. This feature is to prevent other users to change document Information from system. This feature able to protect the confidential and security of document information that only allows admin to manage information of document in the system.

   ScanTrack is an Android apps design for every department admin. Each department admin will receive an apk file to let them installed in their Android device. The function of this app is for every department to scan the barcode and update to the system to inform system that this file is already received by this department. This function able reduces time consuming for record the document information into log book. Besides, it able prevents and reduce human error mistake. This app improves the communication between the sender department and receiver department.

Sender department are easily to know the condition of document after they send to other department when the receiver company scan the barcode and update information into the system. Beside, this app also opens for students apply to track their document. This app has a searching feature by using barcode scanner. Searching page contain barcode scanner feature to scan the document code they want to search. After that, all information relates the code use for search is display on Android device. Hence, objective "to develop system that allow user track the whole life cycle of movement of the file" is successful achieve because users able to view the flow of document from this app.

This system also focuses on the safety and security issues. Users who wish to access into the system and Android app need to register their information first on the registration system. All the information of users is record into the database and manages by admin. For admin account it can only create by the previously admin users only. This is to prevent other user access to the system without authorisation and protect the information of document being exposing to the world. Next, password access to the system database only provides to database admin.

References

1. G. Singh, and M. Sharma, "Barcode technology and its application in libraries and Information centers," International Journal of Next Generation Library and Technologies, Vol. 1, No. 1, pp. 1-8.
2. Bo-Christer Björk. "The Impact of Electronic Document Management on Construction Information Management," Swedish School of Economics and Business Administration. 2002
3. R. Demong, L.F. Abu Hassan, T.B.H. Tuan Besar, and Z. Zulkifli, "Electronic Document Tracking System (EDTS): A Prototype," In the Lecture Notes in Computer Science book series, Springer-Verlag Berlin Heidelberg, Vol. 5617, pp. 375–383, 2009.
4. N. Wartenberg and S. Snyder, "Introduction to Bar Codes for the Automated Laboratory," Journal of Laboratory Automation, Vol. 8, No. 5, pp. 51-58, 2003
5. J. Benedict, L. Bernardo, and D.anica Pacana, "A Barcode Scanner Application Framework Using Android Phones for an Enhanced Shopping Experience," International Journal of Applied Engineering Research, Vol. 11, No. 23, pp. 11250-11258, 2016