**Report 1 – Introduction**

1. **Project Information**

* Project name: **Just Walk Out Library**
* Abbreviation: **JWL**
* Product Type: **Web Admin & Mobile App**
* Start Date: **January 5, 2017**
* End Date:

1. **Introduction**

For a long time, library has been a reliable place for people to study and borrow books. However, almost every library system nowadays still uses a traditional way for their borrowers to obtain books: a borrower has to carry all the books that he/she wants to the librarian, so that the librarian can record which books that the borrower will borrow; after that, the borrower signs in each form to commit that he/she is borrowing those books. Only after these steps, the borrower can take back his/her library card and bring the books home. Because one librarian can only manage one borrower at a time, these traditional steps can be very painful if the library is currently crowded with borrowers.

Therefore, we build a system to help libraries and their borrowers to solve those problems. Applying this system, they can not only save a huge amount of time in book-borrowing process, but they can also have a way to manage books better.

1. **Current Situation**

In order to have a more thorough view on our current situation, we will look into the book-borrowing procedure in the libraries of Ho Chi Minh City University of Social Sciences and Humanities, and FPT University.

* 1. **Ho Chi Minh City University of Social Sciences and Humanities library\***
* The borrower gives the library’s card/student’s card to the librarian.
* The borrower receives the locker’s key to put the bag in.
* The borrower walks into the room.
* The borrower finds wanted books.
* The borrower takes wanted books.
* The borrower fills in the book-borrowing form.
* The borrower brings the books and the form to the librarian’s desk.
* The librarian checks the form and records the books.
* The librarian gives the books to the borrower.
* The borrower re-checks the books, takes back the bag, and returns the locker’s key.
* The librarian arranges the book-borrowing forms in a specific order.

\* Reference: <http://hcmussh.edu.vn/Resources/Docs/SubDomain/lib/TV.QT10.01%20-%20Quy%20trinh%20phuc%20vu%20muon%20tai%20lieu%20ve%20nha.pdf>

* 1. **FPT University library**
* The borrower gives the borrower’s card at the librarian.
* The borrower receives the locker’s key to put the bag in.
* The borrower walks into the reading room.
* The borrower finds and/or takes wanted books.
* The borrower goes to the librarian’s desk to check out.
* With each book, the student has to fill in a form with the book’s code, and his/her signature.
* The librarian scans each book’s barcode to record the student’s borrow list. The alarm is turned off for each scanned book.
* The librarian returns the student’s card to the student.
* The process finishes. The student can take the books home.

1. **Problem Definition**

Because of current situation, we found that the traditional process has many advantages and disadvantages below:

* Advantages:
* No technical skills needed.
* Disadvantages:
* Borrowing books need to go through complicated steps, thus on the rush hour, it might take too much time to wait for checking out for both borrowers and librarians.
* The librarian should work very hard when having many borrowers.
* Paper records are hard to manage and easy to be damaged.
* Librarians may forget to remind borrowers about their deadline.
* It is hard for borrowers to know when a book is available.

1. **Proposed Solution**

Our proposed solution is to build a system named Just Walk out Library (JWL), which use NFC, QR Code, RFID technologies to borrow book easily and efficiently. In addition, our solution also helps librarian manage book smoothly. For borrowers, they only need to use smartphone to check in and out when borrowing book, the system will detect automatically and notify librarian. Furthermore, borrowers can manage their borrowed books. For librarian, no need spend time to serve borrower when they come to borrow book, just manage the computer.

* 1. **Technologies**
  + **NFC (abbreviated from Near Field Communication):** is a form of contactless communication between devices like smartphones or tablets. Contactless communication allows a user to wave the smartphone over an NFC compatible device to send information without needing to touch the devices together or go through multiple steps to set up a connection. NFC utilizes electromagnetic radio fields while technologies such as Bluetooth and Wi-Fi focus on radio transmissions instead. NFC is supported in card or the smartphone (<http://nearfieldcommunication.org/>).
  + **QR code (abbreviated from Quick Response Code):** is the trademark for a type of [matrix barcode](https://en.wikipedia.org/wiki/Matrix_barcode) (or two-dimensional [barcode](https://en.wikipedia.org/wiki/Barcode)) first designed for the [automotive industry in Japan](https://en.wikipedia.org/wiki/Automotive_industry_in_Japan). A barcode is a machine-readable optical label that contains information about the item to which it is attached. A QR code uses four standardized encoding modes (numeric, alphanumeric, byte/binary, and [kanji](https://en.wikipedia.org/wiki/Kanji)) to efficiently store data; extensions may also be used.
  + **RFID (abbreviated from Radio-Frequency Identification):** The acronym refers to small electronic devices that consist of a small chip and an antenna. The chip typically is capable of carrying 2,000 bytes of data or less. The RFID device serves the same purpose as a bar code or a magnetic strip on the back of a credit card or ATM card; it provides a unique identifier for that object. And, just as a bar code or magnetic strip must be scanned to get the information, the RFID device must be scanned to retrieve the identifying information (<http://www.technovelgy.com/ct/technology-article.asp)>.
  + **iBeacon:** They are essentially tiny, low power computers attached to walls or objects in the physical world. Using proximity technologies, they detect human presence and behavior and trigger pre-programmed actions delivering contextual and personalized experiences (<http://estimote.com>).
  1. **Feature Functions**
* **Check in:** JWL application supports both NFC and QR Code. When walking in the library, the borrower only needs to open the application on his/her phone, and scan it on our emulator. He/she will be checked in automatically.
* **Borrow books and check out:** the borrower finds all the books he/she needs on the shelves, and carries them out. The emulator and the iBeacon at the gate will automatically recognize that borrower and record the list of books he/she borrows.
* **Ring the alarm:** the alarm will go off if someone
  + - Takes the books out without checking in before hand;
    - Exceeds the book limit that they can borrow;
    - Checks in, or borrows the books with invalid account.
* **Search:** the borrower can search for the books they want by title, category, or topic. The search result will show the book’s detail, along with its availability and its whereabouts.
* **Make wish list:** a borrower can mark a book to his/her wish list, so that he/she can receive notification about when the book is available again.
* **Manage books:** the librarian can manage books painlessly. Furthermore, they can easily view a borrower’s book list and his/her deadline for each book.
  1. **Advantages and Disadvantages**
  + **Advantages:**
    - Reduce the management time.
    - Make the book-borrowing process faster and easier.
    - Store the borrower’s record at ease and safely.
    - Quickly search for wanted books.
    - Notify borrower when a wanted book is available.
  + **Disadvantages:**
    - Scanning issues: there maybe cases that make the RFID reader to scan books incorrectly.

1. **Functional Requirements**

Borrower component:

* Edit information/password.
* View borrowing/borrowed books.
* Borrow books.
* Get notifications when borrowing books are about to be returned.
* Make wish list about an unavailable book, so that borrower can receive notification when the wanted book is back on shelf.
* Search for books (by name, author, category, topic).

Librarian component:

* Manage books’ information: insert, update and delete information.
* Manage borrowers: insert, update, activate, deactivate accounts.
* Tracking which books a borrower are borrowing.
* Search for books (by name, author, category, topic).

1. **Role and Responsibility**

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| --- | --- | --- | --- | --- |
| **No** | **Full Name** | **Role** | **Position** | **Contact** |
| 1 | Kiều Trọng Khánh | Project Librarian | Supervisor | [khanhkt@fpt.edu.vn](mailto:khanhkt@fpt.edu.vn) |
| 2 | Võ Hồng Hà | Developer | Leader | [Havhse61394@fpt.edu.vn](mailto:Havhse61394@fpt.edu.vn) |
| 3 | Nguyễn Tuấn Anh | Developer | Member | [Anhntse61476@fpt.edu.vn](mailto:Anhntse61476@fpt.edu.vn) |
| 4 | Đặng Nhật Thiên | Developer | Member | [Thiendnse61357@fpt.edu.vn](mailto:Thiendnse61357@fpt.edu.vn) |

*Table 1: Roles and Responsibilities*