

Design Process Assignment – Library Assist System

This report presents the design of the Library Assist system – a technology which allows library staff to efficiently perform some of their routine tasks involving shelving and auditing books.

The Library Assist System increases efficiency by allowing users to perform three functions which reduce the use of manual work which is currently performed to reshelve and audit book selections. The intent is that Library Assist will significantly reduce the time and effort currently used by library staff to perform these processes while also reducing errors.

Problem Definition

Observation of processes in libraries and discussion with people who worked in libraries revealed that some of the jobs performed by library staff can be slow, tedious and inefficient.

These tasks include

- 1) Finding the correct shelf location of misplaced books throughout the library
- 2) Shelf-reading (auditing the order of books on shelves)
- 3) Shelving books (putting several books back in their correct shelf locations at the same time)

It was also discovered that student workers in a university's library had to be trained on the call number system in order to make sure that they could do their job correctly and that this training took some time.

Interviews

After thinking of the idea of the Library Assist system, I spoke to five individuals to get feedback about the proposed system and to find out if they thought the system would be a

feasible and useful technology. After receiving positive responses from all of the individuals as well specific ideas which they offered, I narrowed the three main uses of the system to the three tasks described in the Problem Definition section and drew rough sketches of each use on paper.

After sketching out the three uses of the technology, three people were interviewed to give their input on the proposed technology. One of them was previously a student worker in a public library. Another was previously a supervisor in a school library and the third is currently a materials coordinator for a university. Their comments, notes and suggestions were added to the sketch as we verbally discussed the sketches. The final sketches and notes were used for final storyboard sketches and prototyping.

Solution to Problem

The Library Assist system will use a combination of hardware and software in order to make the tasks of reshelving and shelf-reading books quicker and more efficient.

Software

The Library Assist System will utilize a library's electronic book catalog/database. The call number of each book must be recorded in the database. Since these numbering systems are already standardized most existing libraries would already have standardized call numbers in their database. School libraries use the Library of Congress classification system for book call numbers while public libraries use the Dewey Decimal Classification system for book call numbers. With Library Assist, any customized or off-the-shelf database product can be used to store call number information.

Hardware

Radio Frequency Identification Device (RFID) tags. Small RFID tags will be stuck to the bookend or inner cover of each book in the library. Each RFID tag will be associated with the call number of the book to which it is affixed. The association between the call ID and the RFID tag will be recorded in the library's database. Book RFID tags will begin with the letter B and numbered sequentially.

Book Name	Author	Call Number	Book RFID #
Project management : case studies	Harold Kerzner	HD69.P75 K472 2013	B25012

An RFID tag will be stuck to the end section of each bookcase in the library. The RFID on each bookcase will be associated with the book range found on the bookcase. This information will also be saved in a database. It may be the same database as the one used for books or it may be a separate database. An example of a bookcase record with RFID tag information is below. Shelf RFID tags will begin with the letter B and numbered sequentially.

RFID#	Shelf Tag	Shelf Location	Start of Book Range	End of Book Range
S124	HD69.P75 B87 2013 - HD69.P75 K472 2013	Fourth floor – Middle	HD69.P75 B87 2013	HD69.P75 K472 2013

Handheld sensor. A handheld sensor which can detect and scan RFID tags will be used by library staff for book scanning

A tablet with RFID sensor. A tablet with a sensor will be positioned on library's reshelving carts. The tablet's sensor will detect RFID information and display book information for library staff.

Uses of the Technology

Shelving a book

Sometimes library staff will find a book which is not in its correct location in the library. It may have been shelved incorrectly, left on a desk etc. The Library Assist technology will help staff to quickly identify the correct location of a book.

- 1.1 Member of library staff locates a book that is not shelved somewhere in the library
- 1.2 Staff member selects the 'Single-Book Reshelving' function on the Library Assist's handheld scanner display
- 1.3 Staff member uses Library Assist's handheld scanner to scan the RFID tag affixed to the book
- 1.4 The handheld scanner displays book information
 - Name of the book
 - Book #
 - Shelf tag (based on sequencing of call numbers)
 - Shelf location
 - The catalog book numbers of books which come directly before and after the scanned book's number. (This will help the staff member to find the exact

location of the book). The books listed as before and after will not be listed as checked out or missing.

1.5 When done, the user will hit 'End' on the handheld scanner.

Shelf-reading or Auditing Section of books

Library staff has to manually check the ordering of books on shelves to make sure that they are in the correct order and that no books are missing which should be in the library. This is a manual, by sight process which can be very tedious and therefore can be prone to errors. The Library Assist system will help to remove much of the manual nature of shelf-reading therefore decreasing the tediousness of the task and reducing errors. It will also increase the speed of auditing the order of books on shelves.

1.1 Member of library staff selects the section of books to be audited

1.2 Staff member selects the 'Audit' function on the Library Assist's handheld scanner display

1.3 After the Audit function has been selected, the user holds down the 'Scan' button on the handheld scanner while pointing the sensor end towards the first book in the book sequence.

1.4 The user then moves the scanner along the row of books to be audited.

1.5 The user releases the 'Scan button when the last book is reached.

1.6 The display on the scanner will show

- The name and call number of the first book in the sequence
- The name and call number of the last book in the sequence

- The list of books which are missing in the sequence. (These will be books that are not currently checked out or marked as 'Missing' or 'Lost' in the database).
- The list of books which are out of order in the sequence.

1.7 When done, the user will hit 'End' on the handheld scanner.

Re-shelving stacks of books

Library staff need to shelf books which are returned, are new to the library etc. They order the books manually and then put a number of books on a cart. Then, they go through the library and find the location of the books to shelf them. This can be a tedious task because the books have to be ordered manually and then the locations of the books have to be sought out manually. The Library Assist system will remove the need to order piles of book before putting them back on shelves and will also make it easier for staff to find the location of books.

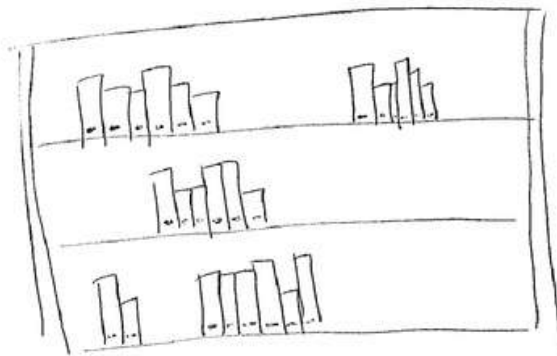
- 1.1 Member of the library staff selects 'Multi-book Reshelving' on the Library Assist handheld scanner display.
- 1.2 Member of library staff uses the Library Assist handheld scanner to scan the RFID tags of all of the books to be re-shelved.
- 1.3 The information about books to be reshelved is transmitted to the tablet on the front of the reshelving cart.
- 1.4 Member of library staff puts books to be reshelved on cart. Order does not matter.
- 1.5 The library staff member walks along the end of book cases.
- 1.6 The RFID scanner on the tablet at the front of the cart is positioned to read the RFID tags of the shelves.

- 1.7 When the scanner detects that that a book in the scanned selection is on a scanned shelf, the display will show the
- Name of the book
 - A miniature photo of the front of the book (for users to locate the book on the cart)
 - Book #
 - Shelf tag (based on sequencing of call numbers)
 - Shelf location
 - Catalog book numbers of books which are not checked out or missing which come directly before and after the scanned book's number. (This will help the staff member to find the exact location of the book)
- 1.8 When done reshelving, the user will hit 'End' on the handheld scanner.

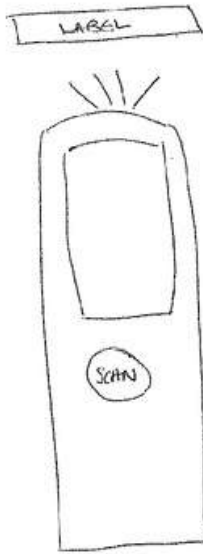
Conclusion

The Library Assist system can be used in school and public libraries to make tasks which library staff performs easier. The feasibility and usefulness of the Library Assist system was discovered by conducting interviews. Interviews were also used to refine the design and features of the system after initial sketches. The feedback for the Library Assist system was very positive and the design of the product was well-received.

Appendix A
Initial Sketches



Each book has an
electronic tag with
~~book~~^{call} number



Scan Single book

Used for misplaced books



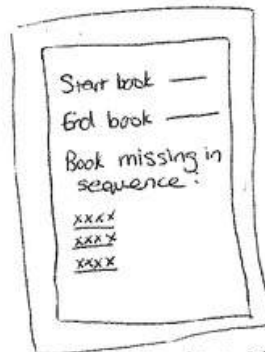
"Shelf-reading" "Auditing" Shelves of books

- Hold down Scan button to start the scan selection
- Release the Scan button end the scan selection

Audit mode

* Any books that should not be in the sequence

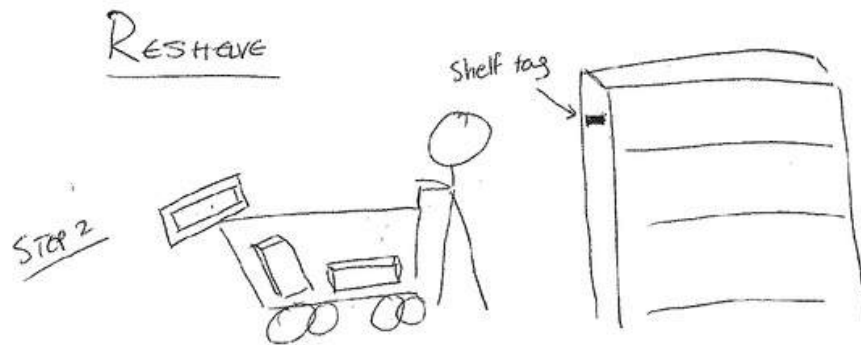
according to the catalog #



- Books in missing sequence should be books that are not checked out or missing/lost

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don't know where it is

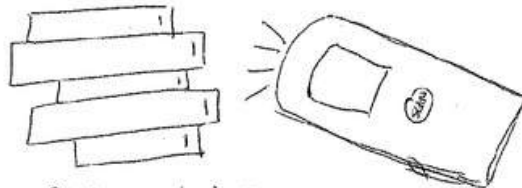
↓
know missing someone changed it.



Cart has sensor for shelf tag and displays books that need to be reshelved in that aisle.

STEP 1


A Sensor



- Pick reshelve option on scanner
- Use scanner to scan books to be reshelved
- (Book list will be transmitted device on cart)

Appendix B

Storyboard

 A cartoon illustration of a library staff member, a woman with dark hair in pigtails, wearing a yellow shirt and a dark skirt. She is standing behind a wooden table. On the table, there is a handheld scanner and a stack of books. The background shows a library setting with bookshelves and a desk with a computer monitor.	<ol style="list-style-type: none">1. Shelving a book<ol style="list-style-type: none">1.1 Member of library staff locates a book that is not shelved somewhere in the library1.2 Staff member selects the 'Single-Book Reshelving' function on the Library Assist's handheld scanner display1.3 Staff member uses Library Assist's handheld scanner to scan the RFID tag affixed to the book1.4 The handheld scanner displays book information<ul style="list-style-type: none">- Name of the book- Book #- Shelf tag (based on sequencing of call numbers)- Shelf location- The catalog book numbers of books which come directly before and after the scanned book's number. (This will help the staff member to find the exact location of the book). The books listed as before and after will not be listed as checked out or missing.1.5 When done, the user will hit 'End' on the handheld scanner.
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2. Shelf-reading or Auditing Section of books

- 2.1 Member of library staff selects the section of books to be audited
- 2.2 Staff member selects the 'Audit' function on the Library Assist's handheld scanner display
- 2.3 After the Audit function has been selected, the user holds down the 'Scan' button on the handheld scanner while pointing the sensor end towards the first book in the book sequence.
- 2.4 The user then moves the scanner along the row of books to be audited.
- 2.5 The user releases the 'Scan button when the last book is reached.
- 2.6 The display on the scanner will show
 - The name and call number of the first book in the sequence
 - The name and call number of the last book in the sequence
 - The list of books which are missing in the sequence.
(These will be books that are not currently checked out or marked as 'Missing' or 'Lost' in the database).
 - The list of books which are out of order in the sequence.
- 2.7 When done, the user will hit 'End' on the handheld scanner.



3. Re-shelving stacks of books

- 3.1 Member of the library staff selects 'Multi-book Reshelving' on the Library Assist handheld scanner display.
- 3.2 Member of library staff uses the Library Assist handheld scanner to scan the RFID tags of all of the books to be re-shelved.
- 3.3 The information about books to be reshelved is transmitted to the tablet on the front of the reshelving cart.
- 3.4 Member of library staff puts books to be reshelved on cart. Order does not matter.
- 3.5 The library staff member walks along the end of book cases.
- 3.6 The RFID scanner on the tablet at the front of the cart is positioned to read the RFID tags of the shelves.
- 3.7 When the scanner detects that that a book in the scanned selection is on a scanned shelf, the display will show the
 - Name of the book
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- 3.8 When done reshelving, the user will hit 'End' on the handheld scanner.

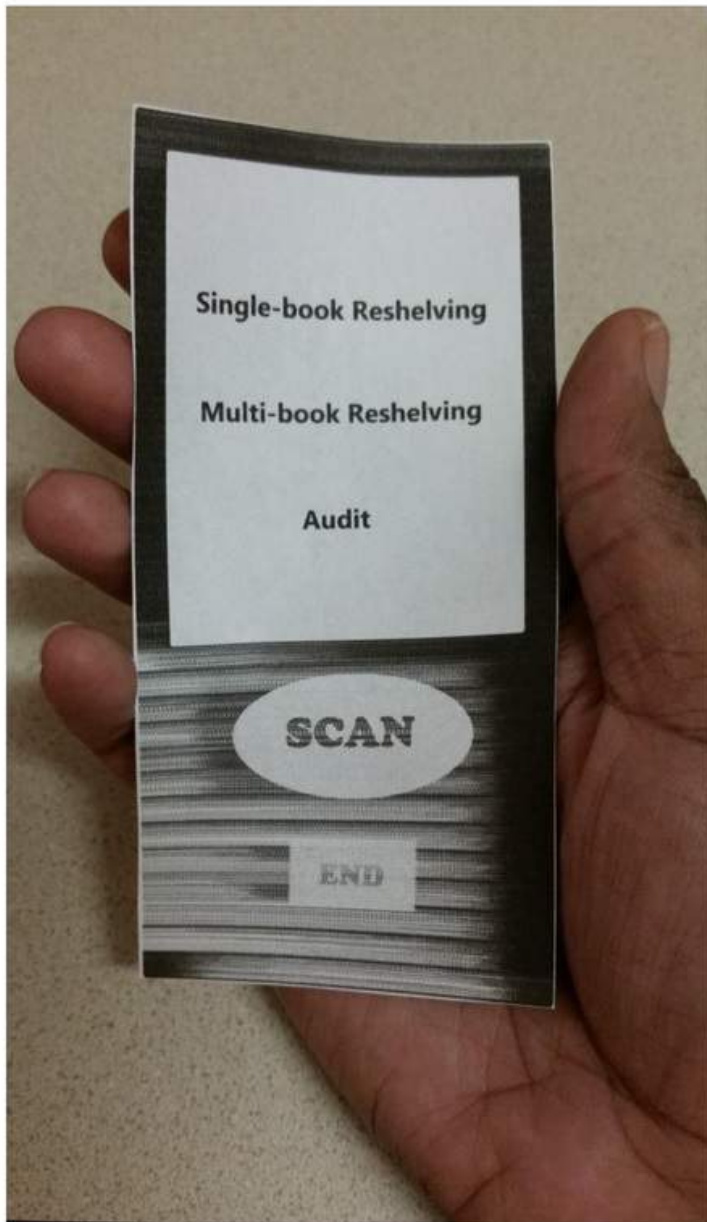
Appendix C

Prototypes

RFID Tag



Handheld Scanner



Tablet on cart

