

# IKiS Self Service Kiosk for Library Service

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## ABSTRACT

Institutional Repository (IR) Digital Collections in Unila Library is a restricted access collection, it is not directly accessible for users. Transactions such as whole collection information retrieval, printing and payment can be made only through librarians. Sometimes it leads to slow services due to the number of transaction requests queues from users. There were no system or device such as Kiosk that can be used independently for such purposes to minimize or even eliminate queue for librarians. Purpose of this research is to develop a Kiosk self-contained system called Interactive Kiosk System (IKiS). IKiS serves for searching, accessing information as well as for self-printing transactions in Unila Library. IKiS hardware development uses hardware interface for input (barcode reader) and output (printer). IKiS casing made in accordance with the size and layout of the device as well as considering user ergonomics. Prototype method used for software development which focuses on functionality and user ergonomic. Data source retrieved from existing system data library which are IR collection on Eprints, ebook collection and ejournal collection on SLiMS. API (Application Programming Interface) is developed for transaction between data source to IKiS software. Testing is done on hardware, software, and both as a whole unit. Based on the test results, IKiS Print Mandiri can work well and meet the functionality required by Unila library. The research succeeded in realizing Kiosk's self-service printing system tested on IR Library collection users of Unila Library. Use of the Web Service API and common computer tools make IKiS Independent Print agnostic against the IR Digital Collection system. This provides an opportunity for adoption on a wider scale as an improvement of services in the Library in general.

**Keyword: Index Terms—e-Kiosk, Institutional Repository, Library Services, Self-service Printing.**

## 1. Introduction

The management of Institutional Repository (IR) collections in libraries, generally, is still manual. Transactions such as information retrieval, printing and payment must still be made through officers. And, there are also obstacles in the Unila Library on IR collection services. This occurs because of the limitation of access rights on IR Collection, ebook collection, and ejournal that are closed / special (private) in connection with the existence of copyright. For such collections, users are only allowed access through the Library's intranet network and or print through officers. No Kiosk device is interactive and can be used independently for that purpose.

Kiosk is a combination of hardware and software such as PC (Personal Computer), but with fewer specific functions and tasks. Kiosk has a body casing like ATM (Automatic Teller Machine). Kiosk is built to provide information services or transactions, so that can be obtained convenience, speed, security, and convenience for its users. Kiosk devices are now widely used and placed in public spaces such as malls, hotels, airports, government offices, and so forth. However, Kiosk systems that can perform self-service for IR collection access at a university or library have not been widely used. If any, Kiosk hardware and software that are interactive and in accordance with the needs of the library, currently, only exist in commercial form and with a relatively expensive price.

The main purpose of this research is to develop an interactive Kiosk independent printing system called Interactive Kiosk System (IKiS). IKiS serves to search, access information and transactions independent printing in the Library. IKiS is developed using common computer hardware available in the market in the hope of facilitating the production process without having to wait for the availability of exclusive devices. And, software development uses prototyping software engineering methods to facilitate iterations of user touch screen interface improvements as well as flexible web technologies for ease and open up greater opportunities in integration of other technologies. IKiS is expected to meet the demands and needs of interactive self-service for library users. Self-service in the library is in line with the modern concept of digital library and enhances the library's image.

## 2. Research Method

The development of IKiS system starts from determining system requirement and user requirement by listening to customer [Pressman, 2010]. Then analyze and design the prototype of hardware used and Kiosk software. The next step is to implement using the

design results in the previous stage. Next do hardware testing and software testing.

## 3. Result And Discussion

### Design

#### 1) Hardware

Kiosk need to use hardware to support ease of interaction with user. Interaction should be simple, fast, informative, and responsive. Hardware requirement list can be seen in Table 1.

**Table 1. Kiosk Hardware**

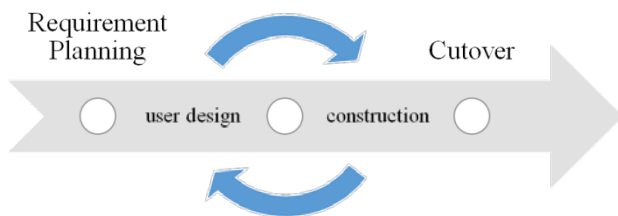
| No | Hardware         | Specification                         | Remark                   |
|----|------------------|---------------------------------------|--------------------------|
| 1  | Monitor          | LED Monitor 20"                       | GUI                      |
| 2  | Touchscreen      | Glass panel touchscreen 20"           | Input directly on screen |
| 3  | Computer         | Mini ATX                              | Logic processing         |
| 4  | Keyboard + Mouse | Standard                              | Testing                  |
| 5  | Printer          | Laser Printer A4                      | Journal Printing         |
| 6  | Barcode Reader   | Continuous Single line Barcode Reader | Read Patron Card Barcode |
| 7  | Kiosk Casing     | Casing, Electronic Component, Cabling | Casing Kiosk             |

Mini ATX is used as data processing because of its support for barcode reader devices and laser printers. Raspberry Pi is considered to be used but it is not possible because it does not support some devices such as barcode reader and common laser printer. The task to build Raspberry Pi driver for those devices for require a lot of time and resource which is not feasible. Touchscreen used LED Monitor with Glass touch panel touchscreen 20". Glass panel touchscreen chosen for the durability. Barcode reader and glass panel touchscreen is accessible from the outside. Computer and printer in placed in the inside. The printer is given a thin chute just enough for printed paper to pass through tside. The case is built using steel frame and inside a colored acrylic fiber panel. Acrylic fiber panel is chosen because it is lightweight, has an easy tomold material, it's glossy without the need to paint because the color can be chosen from the selection of fiber panel. Figure 2 shows the Kiosk hardware design created.



**Figure 1. Hardware Kiosk Case Design**

Software development follows Rapid Application Development (RAD) method. There are four phase in RAD: user requirements, user design, construction, and cutover.



**Figure 2. Rapid Application Development (RAD) Method**

### B. Implementation

Implementation done in two part. First, IKiS as a unity of hardware. Second, IKiS as a software for content provide and hardware controller.

#### 1) Hardware

Before making the Kiosk, all the required part is tested for defect and operational capability. The test used as the based for design and/or hardware change consideration. Figure below show stages of kiosk creation.

2) *Software*  
Software development focused on user interface and data communication to library automation system. CASE tools used is HTML5, CSS3 with bootstrap 3, Javascript with jQuery library, PHP5, XAMPP 1.7x, Brackets IDE 1.7, GIT Windows 2.5, Google Chrome 55.x, e-Prints 3.3.x and SLiMS.

System functionality consist of:

1. Searching for collection.
2. View Collection.
3. Printing Collection.



(a)

(b)



(c)

(d)



(e)

(f)



(g)

(h)

**Figure 3. (a) Frame Construction Figure (b) Hardware placement (c) casing molding(d) monitor placement (e) light installation (f) back door installation (g) front door instalation (h) IKiS final adjustment**

The barcode reader is used as an input device to authorize the number of pages that can be printed. The barcode card is set up by the operator in accordance with the request of the page sheet to be printed by the user.

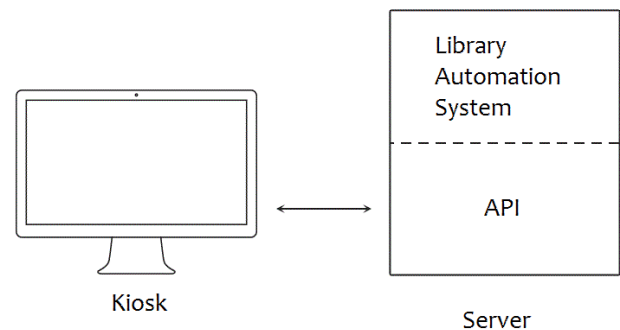
The printer is used as an output device that receives instructions on the number and number of pages printed by the system.

The tilt of the table is intentional so as not to be used as a place to put stuff but still gives the discretion to put the book or note for the user.

The keyboard and mouse are discarded because they can encourage users to use Kiosk outside of the main destination. All devices are integrated into a single IKiS that provides print services to library service users.

### 2) Software

User Interface is web-based, designed to be simple and easy to use with touch screen. Display and data services are made to commemorate with others. The purpose of the separation of both components is for the development of both can run independently. The service provided by API also opens up development opportunities in other platforms without having to build data structures to be processed. Figure 4 shows how the API interact with IKiS.



**Figure 4. API from the server interact with IKiS**

Implementation of features based on functional system can be seen in figure 8 and described as follows:

- (a) Searching for Collections. Finding collections is done through a search input box that can be inserted with virtual keyboard. The search results will be displayed in tabular form providing information such as Title, Author, Year, Publisher, ISBN / ISSN number and Place of Publication. Accessible buttons are Detailed, Abstract, and Print.
- (b) View Collections. The selected collection can be read by pressing the Details button on the search results and will open the PDF document reader that displays the Collection. Pages can be replaced by sliding down with a touch. The Print button (printer icon) can be pressed to print.
- (c) Printing Collections. The selected collection can be printed either directly through the search results list or via the printer icon located in the Reading Collection. Collection Printing displays enough information, ie: Number of copies, orientation, and pages to print. If you want to print can press the Print button.



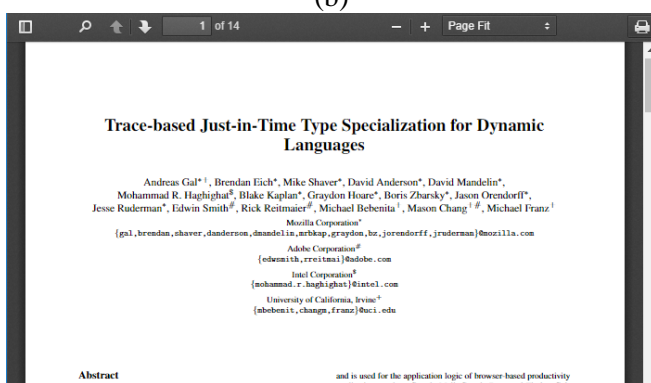
(a)(1)



(a)(2)



(b)



(c)

**Figure 5. (a) Searching for Collections (b) View Collections (c) Printing Collections**

#### 4. Conclusion

IKiS has been designed taking into account the beneficial, ergonomic, and repeated usage aspects of users of IR Library collection services. In the implementation and testing phase, measurements and adjustments have been made considering the high use of the system by the users. Hardware and Software IkiS based on gradual testing has been in accordance with the test scenario and meet the functional requirements. The further development of IKiS is the application of fingerprint devices for more intuitive user identity recognition and the use of gestures in navigating library searches for printing. In addition, downsizing and the use of new technologies may be considered for later iterations.

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