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Table of Contents

Computer

<u>Models Of Sustainable Quality To Improve Implementation Of Quality System Of Qualified Enterprise</u> Fitria -, Yulmaini -, Elida Purba, Murhadi -	<u>PDF</u> 1-4
<u>Information Location Of Elementary School With Certified Teachers At Lampung Province Based Android</u> Septilia Arfida, Amnah -, Hariyanto Wibowo	<u>PDF</u> 5-8
<u>Strategy Development Of Human Source Competitiveness Strengthening With Learning Media System Analisis Model</u> Fitria -, Hendra Kurniawan, M Ariza Eka Y	<u>PDF</u> 9-12
<u>NOSQL Ontology Storage for Indonesian Regional Folk Songs</u> Mohammad Nazir Arifin, Fauzan Prasetyo Eka Putra, Riyanarto Sarno, Nurul Fajrin Ariyani, Leonard Peter Gelu	<u>PDF</u> 13-19
<u>Development Of Mobile Applications For Healthcare Consultation</u> Ratih Ayuninghemi, Atma Deharja	<u>PDF</u> 20-23
<u>The Development Of E-learning System Application Based On Cloud</u> M Budi Hartanto	<u>PDF</u> 24-30
<u>Information System Design Activities Of Kuliah Kerja Nyata Using Single Linkage Method</u> Sugiarto -, Chrystia Aji Putra	<u>PDF</u> 44-49
<u>Strategic Planning Of Sytem And Information Technology Based On Ward And Peppard(Case Study : State Junior High School 1 Waru Sidoarjo)</u> Ronggo Alit, Mohammad Idhom	<u>PDF</u> 50-54
<u>Comparison Of Streaming Performance Using Htlm5 And Flash Player Version 23</u> Chystia Aji Putra, Henni Endah Wahanani	<u>PDF</u> 55-58
<u>Use Of Edmodo As A Virtual Class Learning Model In Smk Bakti Utama Merbau Mataram Regency Of Southern Lampung</u> Eka Ridhawati, Ahmad Khumadi, Ponidi -	<u>PDF</u> 65-71

<u>Assessment Of Environmentally Friendly Building Criteria By Using Sample Fuzzy Additive Weighting (Fsaw) Method To Support Energy-Saving Movement(Study: Office Building Pringsewu District)</u> Danang Kusnadi, Pamuji Setiawan, Ida Ayu Putu Anggie Sinthiya	<u>PDF</u> 72-74
<u>Design Answer Agent And Knowledge Repository For IQA (Interactive Question Answering) On Swamedikasi Mild Illness</u> Agus Mulyanto, Yeni Agus Nurhuda, Tony Reza Apriyanto	<u>PDF</u> 75-81
<u>Smearing Algorithm and MSER To Detect Indonesian Private Lisence Plate Detection In Image</u> Wahyu Saifullah Jauharis Saputra, Yisti Vita Via	<u>PDF</u> 82-87
<u>Performance Analysis Of Failover Cluster For System Recovery</u> Henni Endah Wahanani, Sugiarto -	<u>PDF</u> 88-92
<u>Implementation of Wireless DataCommunicationon Unmanned Aerial Vehicles (UAV) Technology forDetecting Damage of Building Roof (Case Study:Campus Building Institute of Informatics andBusiness Darmajaya)</u> Sabam Parjuangan	<u>PDF</u> 93-98
<u>Fuzzy Application In Decision Support System In The Senior High School Selection In Bandar Lampung</u> Robin Wijaya	<u>PDF</u> 99-103
<u>The Development Of Parenting Information System For Kindergarten Based On SMS-Gateway</u> Anggi Andriyadi, Halimah -	<u>PDF</u> 104-108
<u>Face Recognition of Robust Regression With Pre-processing Technique using CLAHE technique</u> Budi Nugroho	<u>PDF</u> 109-112
<u>Relief Feature Selection and Bayesian Network Model for Hepatitis Diagnosis</u> Fetty Tri Anggraeny, Intan Yuniar Purbasari, Evi Suryaningsih	<u>PDF</u> 113-118
<u>Information System Design Of Goods Stock Using Framework For The Application Of System Thinking (FAST) Method (Case Study CV. Aneka Mandiri Lestari)</u> Melda Agarina, Sutedi Sutedi	<u>PDF</u> 125-128
<u>Image Processing Using Correlation Base With Genetic Algorithm (GA) For Determining Rice Disease</u> Rian Nurhikmah, Bayu Alimuddin Sany, Deni Kurniawan	<u>PDF</u> 129-132
<u>Disease Diagnosis Using Tongue Image Analysis</u> Yogi Zulfadli, Arry Verdian, Muhammad Mamur	<u>PDF</u> 133-136

<u>IKiS Self Service Kiosk for Library Service</u> Mardiana -, Meizano Ardhi Muhammad	<u>PDF</u> 137-142
<u>Introduction of Face Image as Identifier of Using in Principal Component Analysis Method (PCA)</u> Wawan Krisdiyanto, Ika Irwanto, Lepi Astra Yudiansyah, Suhendro Yusuf Irianto	<u>PDF</u> 143-146
<u>Current Issues and Challenges of Fingerprint Recognition</u> Amirah Hanani Binti Mohamad Jamil	<u>PDF</u> 147-152
<u>Plant Disease Detection Using CBIR</u> Nur Farah Afiqah Binti Mohd Yusof	<u>PDF</u> 153-156
<u>Diagnosis of Kidney Disease Through the Image of the Iris Eye Using the Method of Segmentation Edge Detection Techniques</u> Sony Teguh M, Laras Niti M, Rizky Febri S	<u>PDF</u> 157-159
<u>DEVELOPMENT OF INFORMATION SYSTEM VR 360PoP TOUR TOURISM OF LAMPUNG</u> Ovi Dyantina, Davit Kurniawan, Firdaus Chaniago	<u>PDF</u> 160-162
<u>The Future of Face Recognition</u> Muhammad Syafiq Asyraff Bin Ahmad	<u>PDF</u> 163-166
<u>Learning Model Development Using Moodle E-Learning Software By Implementing Borg And Gall Method</u> Muhardi Yudie, Syafri Anwar, Kasman Rukun, Jasrial -	<u>PDF</u> 167-176
<u>Implementation of Data Mining Using Association Rules for Transactional Data Analysis</u> Muhamad Brilliant, Dwi Handoko, Sriyanto -	<u>PDF</u> 177-180
<u>Knowledge Management Online Application in PDAM Lampung Province</u> Arie Setya Putra, Ochi Marshella Febriani	<u>PDF</u> 181-187
<u>RAINFALL PREDICTION USING DATA MINING TECHNIQUES</u> Riko Herwanto, Rosyana Fitria Purnomo, Sriyanto -	<u>PDF</u> 188-193
<u>An Analysis of theComparative Method of Classificationin Determining Characteristics of Non-Active Students</u> Fitra Luthfie Averroes, Jaka Fitra, Sriyanto -	<u>PDF</u> 194-199
<u>Performance Analysis for 3x3 multiple-input multiple-output communication networks</u> Charnia Iradat Rapa'	<u>PDF</u> 200-202
<u>Investigation Minimal Mean-Squared-Error Algorithm For MIMO In Terms Of Bit-Error-Rate Communication Networks</u>	<u>PDF</u> 203-206

Rismawaty Arungla'bi

Comparison Of Data Mining Methods For Recipient Prediction
Poor Student Assistance (BSM) In MAN 2 North Lampung [PDF](#)
207-213
Ovi Naeni, Resy Anggun Sari, Sriyanto -

Prediction Of Student Performance Using Decision Tree C 4.5
Algorithm [PDF](#)
214-219
Rames Krisnan Kuntoro, Rukin Sudarwanto, Sriyanto -

CUSTOMER RELATIONSHIP MANAGEMENT
APPLICATION SERVICES (CRM) FOR STUDENT
ACTIVITY INFORMATION ON UNIVERSITIES (Case study :
IBI DARMAJAYA) [PDF](#)
220-224
Sri Karnila, Muhamad Galih Ramaputra, RZ Abdul Aziz

SOLAR FUEL'S ENERGY EFFICIENCY ESTIMATION OF
RICE MILLING FACTORY WITH LEVEL VARIATIONS [PDF](#)
225-228
Indriyani -, M Yunus, Wisnaningsih -, Ruslan Dalimunthe

Rule Based Reasoning for Student Learning Styles Identification [PDF](#)
229-237
Adi Putra Sugiarto, Rio Kurniawan

Role and Challenges of Information Technology Increasing
Business Competitiveness of Siger Tower Reviewed Aspects of
Business Economics on E-Business and E-Commerce [PDF](#)
238-242
Raden Arum Setia Priadi, Meizano Ardhi Muhammad, Gita
Paramita Djausal

Autonomous Robot Path Planning Using Ant Colony
Optimization and Evolutionary Programming [PDF](#)
243-247
Yisti Vita Via, Sugiarto -, Salamun Rohman Nudin

Economic

Effect of Profitability, Size And Debt Policy To Company Value
(Study on Business-27 Company Listed On BEI) [PDF](#)
1-8
Ary Meizari, Tri Okta Viani

Analysis of the Effect of Remuneration on Performance of Civil
Servants at Lampung Agriculture Training Center [PDF](#)
9-15
Firmansyah Yunialfi Alfian, Ario Pratama

Perceptions Of Selected Heterogeneous Primary School Heads
Toward Continuous Quality Improvement (CQI) In The School
Strategic Planning [PDF](#)
16-20
Wan Suraya Binti Wan Nik

Healthy and Smart Generation Program in Poverty Eradication [PDF](#)
21-27
Sabinus Beni, Blasius Manggu, Yosua Damas Sadewo

<u>The Contributions Allocations And The Village Fund To Improve The Economic Growth Of The Village Community In The District Of Ledo</u> Blasius Manggu, Sabinus Beni	PDF 28-33
<u>Customer Value And Customer Satisfaction As Mediation Of Mis And Service Quality To Brand Trust And Reputation Of Private Universities In Kepulauan Riau Province</u> Nur Elfi Husda	PDF 34-39
<u>A Simulation Study of Bulk Cement Product Maritime Transportation Considering Vessel's Maintenance</u> Nurhadi Siswanto, Elisabeth -, Effi Latiffianti	PDF 40-47
<u>HR Development And Compensation Development Strategy On The Satisfaction Of Work And Its Impact On Employee Performance</u> Nova Mardiana, Andi Desfiandi, Ardanta Istari	PDF 48-61
<u>The Effect Of Brand Equity On Customer's Retention Top White Coffee In Bandar Lampung</u> Susi Indriyani	PDF 62-69
<u>ANALYSIS OF BANK HEALTH AT INDONESIA STATE-OWNED BANK USING RGEC METHOD AT BRI, BNI, AND BANK MANDIRI FOR PERIODS 2011-2015</u> Azeharie -, Willis Marcellina, Wahjono -, Sentot Imam	PDF 70-76
<u>Improving Financial Performance to Social Disclosure of Sharia Bank Performance Based on Islamic Social Reporting Index</u> Delli Maria, Reva Meiliana	PDF 77-84
<u>The Effect of Leadership Styles and Organizational Culture to Employee Performance Through Job Satisfaction as Intervening Variables (Case Study in IIB Darmajaya)</u> Anik Irawati	PDF 85-89
<u>Effects of Procurement Planning on Organizational Growth and Development</u> Francis Mwau	PDF 90-95

Science

<u>Simulation of Activity Coefficient System Ternary in Acetone Buthanol Ethanol with Uniquac Equation</u> Sari Ni Ketut, Dira Ernawati	PDF 1-6
<u>Entrepreneurship Education in Border As the realization of National Development and National Security</u> Yosua Damas Sadewo	PDF 7-11

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 Monitor20"	GUI
2	Touchscreen	Glass panel touchscreen20"	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.

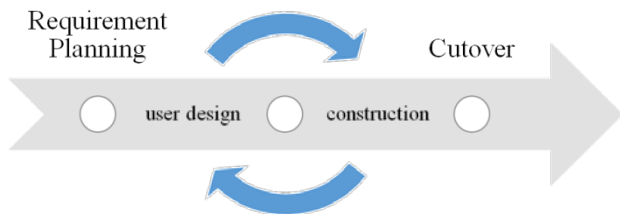


Figure 2. Rapid Application Development (RAD) Method

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.

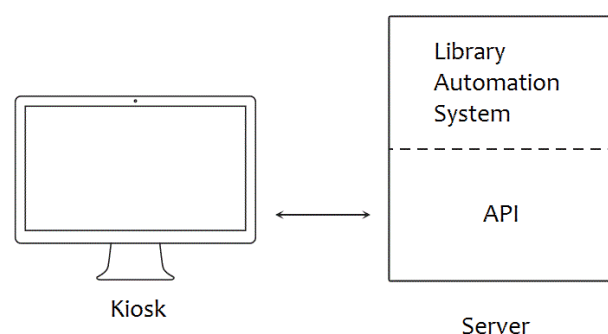


Figure 4. API from the server interact with IKiS

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

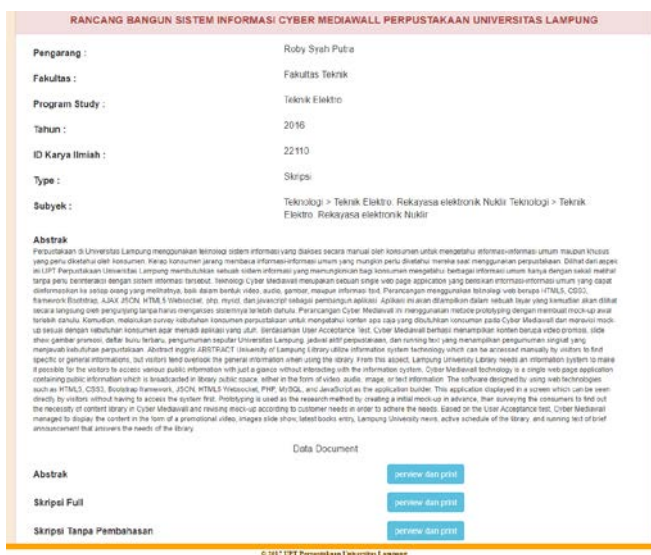
- (a) Searching for Collections. Finding collections is done through a search input box that can be inserted with virtual keyboard. The search results will be displayed in tabular form providing information such as Title, Author, Year, Publisher, ISBN / ISSN number and Place of Publication. Accessible 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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