UTHM STUDENT DATACARD SYSTEM WITH QR CODE

Liew Wui Foon, Pn. Ruhaya bt Abd Aziz
Faculty of Computer Science and Information Technology,
University Tun Hussein Onn Malaysia, 86400 Batu Pahat, Johor, Malaysia.
ci140057@siswa.uthm.edu.my, ruhaya@uthm.edu.my

Abstract — Ever since the emergence of QR Code back then, industries has apply its usage into a wide range of application and not to exclude the management system as well. This paper proposed a system to make use of the said technology into UTHM student registration system. As part of the current registration process in UTHM still adheres to paper documents in terms of student's background information, the proposed system shall instead allow new student to save it unto the system, and thereafter, PPA staff shall able to retrieve from the system through the student identification accessed by QR Code. Thus, the proposed system shall make sure each successfully registered new student have their own QR Code and allow PPA staff to view report of successful enrolled students into the university. This project is significance in terms of workload management whereby PPA staff is credited to view the current status for numbers of successful enrolled students through the produced report. Apart from that, the tendency of misplaced or loss of student's background documents can be eliminated as the files are now being saved into the system instead. Henceforth, there will be a significance reduction of paper-based support system that was once used as supporting documents in UTHM student registration process.

Keywords *– QR Code; UTHM; UTHM Student Registration System.*

I. INTRODUCTION

UTHM Student DataCard System using QR Code Technology is built to store complete information about a student on the database prior to his enrolment into UTHM. The information said is the required documents that are previously needed to be brought during enrollment day. Student DataCard System using QR Code Technology is aimed to make a complete information detail of each individual student which is stored on the university's database. It shall include all the documents that are needed by the university for enrollment purposes such as student's profile form, examination result scripts from primary, secondary up to higher education level, copies of other family members details and etc. The documents are scanned to their own computer or laptop and then uploaded into the database system before they enter UTHM on the registration day. Thereafter, PPA staff will utilize the QR code as student identification method to retrieve their information from the system includes the stored documents during the university's registration day. Furthermore, the system may provide reports to the UTHM staff based on the data collected by the system.

II. LITERATURE REVIEW

This section will analyze on the concept of management information system which is the most common complication relating to the system along with reviews on QR technology. Moreover, in this section as well will review and examine on the current system that is being implemented in local university and some other existing system in the market. Furthermore, some comparison on the features among the existing systems also will be discussed

A. Definition of Management Information System

Sophisticated management information system that been adopted by organizations managed to feed top managers with adequate collections of information to accomplish multiple strategic performance. Nonetheless, organizations are still differing from each other in the extent of how they wish to improve their performance (Naranjo, 2009). It cannot be denied that each organization needs a functional system that can manage their data properly where before this they are prone in using conventional way to manage and store their data.

Management system is an orderly documented management and evaluated phase-by-phase with the aimed to smooth the work flows through standard practiced. The management system of a university not only mainly focuses on how to run the organization of people itself but as well concerning about managing all the students information it has.

B. Introduction to QR Code Technology

QR Code – abbreviated from Quick Respond Code is the monogram for a type of matrix barcode or also known as two-dimensional barcode. It was originally designed for the use in automotive industry in Japan. It was initially patented under Denso Wave but it is now become freely available as the patent holder decided not to exercise the rights (Masalha, 2014). This is because Denso Wave wants the QR Code to be used by as many people as possible.

In barcodes, the data is encoded in one dimension or one direction only thus allowing it to be read in horizontal pattern only. In contrast with QR code technology which is designed in two-dimensional barcodes, the information is encoded in two directions; horizontal and vertical thus enabling it to be read in any direction regardless of its position presented on the scanner (Chang, 2014). The QR code technology has recently become favored by many industries not just particular for automotive field anymore due to its greater capacity and fast readability as compared to the standard UPC barcodes (Masalha, 2014). This QR Code is made up of black-squared dots module and been arranged in a square grid on a white background.

Figure 2.1 QR Code

(Source from en.wikipedia.org)

QR Code is also included with error correction information where there is some redundant data contained inside the code to enable a QR reader to accurately interpret the code even if some part of it is damaged or unreadable. The error correction is divided into four levels: L, M, Q, H. The lowest level is the L level which means that this level of error correction allows the QR code to be read even if 7% of the code is damaged. Different level of error correction provides different level of reading ability where M level gives 15% followed by Q level that provides 25% and lastly is the H level which allows 30% error correction (Brain, *nd*) & (Eby, 2015).

C. Studys on Related Existing System

Study on related existing system is done in order to produce a quality system. Their strengths and weaknesses are examined to produce a comparison among them and later can be used as guidelines to develop proposed system. The comparison table among related existing system is shown as in Table 2.1.

Table 2.5 Comparative Table of Similar Existing System and Proposed System

Properties	ProMis College Information System	Raawee OSRS	Registrar Online Student Registration System for Parents	Proposed System

Registration	Provided	Provided	Provided	Provided
Login	No	Yes	Yes	Yes
Multiuser	No	Yes	Yes	Yes
Web-based Interface	No	Yes	Yes	Yes
Technology Used	No	Barcode	No	QR Code
Notification	No	Yes	Yes	Yes
Access Control	Yes	Yes	Yes	Yes
Document Upload	No	Yes	Yes	Yes

III. METHODOLOGY

Since web-based system is best suited with prototyping model, therefore this project would propose evolutionary prototyping as the system development methodology. As business and system requirements often change over time, hence evolutionary prototyping is the best fit to develop this Student DataCard System. Apart from that, since evolutionary prototyping is a software process model that always corresponds to customer feedback, hence, by prototyping, the quality and performance of the prototype can be improved throughout the software development life cycle. Based on the current registration process in UTHM, the system requirements can be well understood for the sake of this proposed system. Evolutionary prototyping allows developer to add-on new features for the system in the next iteration. Hence, each iteration shall be sent to user to identify any new opportunity for new features and changes request to be added into the system and thereafter it shall be retest again. The process model for evolutionary prototyping model is depicted in Figure 3.1.

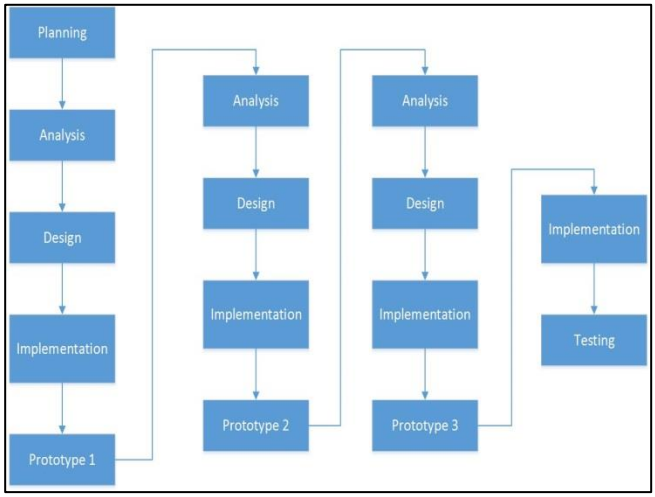

Figure 3.1 System Prototyping Model for UTHM Student DataCard System

Adapted from *System Analysis and Design* (p. 11), by Dennis, Wixom and Roth, 2012, New Jersey, NJ: John Wiley & Sons, Inc.

By using evolutionary prototyping model as the project methodology, there are five main phases involved known as planning, analysis, design, implementation and testing phase. Thus, each of the activity carried out are further summarized as shown in Table 3.4.

Table 3.4 Phase Overview

Main Stages	Tasks	Work Products	Tool
Planning	• Determining the problems of chosen project • Identify the problem statement, objectives and scope of the project • Selecting approach methods with targeted users • Conducting interview and observation • Reviewing books,	Interview questionnaire System Proposal Gantt Chart	Microsoft Project Microsoft Word

	journals, thesis and internet references • Plan the work schedule		
Analysis	• Analyze the requirements gathered from interview and observation • Elicit and prioritize the requirements • Interpreting system into use case diagram • Identify requirements definition statements • Determine system specification in terms of hardware and software specifications	Use Case diagrams Use Case Specification Activity Diagram Sequence Diagram Requirement Traceability Matrix	Microsoft Visio Microsoft Word ArgoUML
Design	• Designing system interfaces • Designing database	Class Diagram System interfaces Relational database schema	Microsoft Visio NotepadPlus for PHP scripting and HTML ScanHome 2D (QR Code) Scanner Xamppp
Implementation	• Source code development • Web-based system prototype development • Domain server development	Web pages Database	NotepadPlus for PHP scripting and HTML Xampp ScanHome 2D (QR Code) Scanner
Testing	• Unit testing • Integration testing • System testing • Regression testing • User acceptance testing	Testing reports	Microsoft Word

IV. ANALYSIS AND SYSTEM DESIGN

This section shall discuss about the analysis and design for the UTHM Student DataCard System thoroughly. A comprehensive analysis was done upon the tools and techniques used to design the proposed system in which the process models are being presented in object-oriented fashion. Such models are Use Case Diagram, Sequence Diagrams, Activity Diagrams as well as Class Diagram. Furthermore, this chapter also will discuss on the system interfaces designs and the database design.

A. System Requirement Analysis

In system requirement analysis, the requirements that had been gathered from planning phase through several means are elicited and interpreted into a Use Case Diagram and each of the related use cases has its own Use Case Specification, Activity Diagram and Sequence Diagram respectively. Moreover, the requirement definition statements that consist of functional, constraints and quality requirements are identified in order to document them into a Requirement Traceability Matrix. The Use Case Diagram, Requirement Traceability Matrix, Sequence Diagram, Activity Diagram and Use Case Specification are attached in Appendix A.

B. Schema Table Design

The schema table design for UTHM Student DataCard System has total of ten data tables which consist of `Admin` table, `Added_Student` table, `Added_Staff` table, `Student` table, `Working_Experience` table, `Parents/Guardians` table, `Academic` table,

`Uploaded_Documents` table, `Download_Documents` table and `Student_Registration_Status` table. The explanation for each table with its corresponding data is depicted as in Appendix B which consists of attribute, data types and description of each data.

C. Interface Design

<<to be updated>>

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