

UTHM STUDENT DATACARD SYSTEM WITH QR CODE TECHNOLOGY

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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 will be developed 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. Thus, the objectives of this project are:

- i. To analyze on students and UTHM staff requirements on UTHM Student DataCard System using QR Code Technology.
- ii. To design and develop UTHM Student DataCard System
- iii. To test UTHM Student DataCard System that has been developed as in objective (ii)

This report is divided into 4 sections where section 1.0 is the introduction as explained in this section, followed by subsequent sections that is 2.0 the literature review, 3.0

methodology and 4.0 analysis and design which shall be explains on later sections.

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 [1]. 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 information 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 [2]. 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 [3]. 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 [2]. 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 [4]

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 [5].

C. Study on as-is system

C1. *Sistem Pengambilan Pelajar UTHM*

In UTHM, every new student that are about to enroll into this institute are required to register into this system prior the registration day start. This system consists of several parts that a new student needs to fill in. After they had done completing the system, students are instructed to print out certain documents that can be obtained on the system and bring it along during registration day.

Currently, during the enrollment day in UTHM, academic staff is divided into numbers of counters to collect and verify all the documents and information that a new student had brought. They will make sure each new student submitted the right documents and all of the submitted forms are completed as what the enrollment requirements had stated. Collecting and verifying all these documents are done manually by the academic staff until today as they have familiarized themselves with this kind of process and thus, they have get use with it although this process is insufficient as they are only few numbers of them and there is so much of the numbers of new students that have to be taken care of. The flowchart of current business process is attached as Appendix A.

D. Studies 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
Multiuuser	No	Yes	Yes	Yes
Web-based Interface	No	Yes	Yes	Yes
Technolog y Used	No	Barcode	No	QR Code
Notificatio n	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 model. 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.

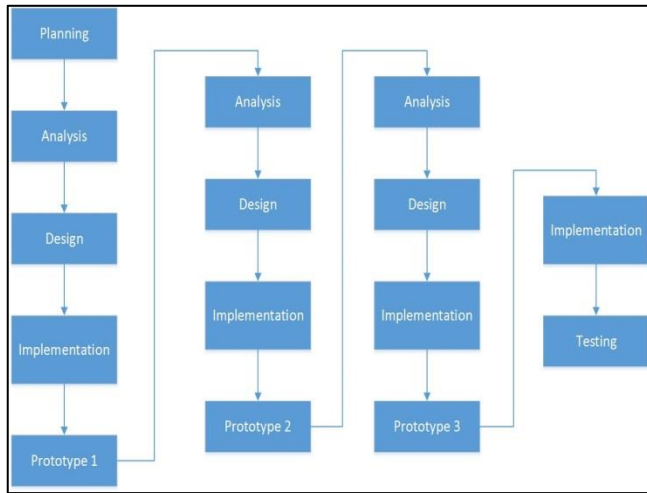


Figure 3.1 System Prototyping Model for UTHM Student DataCard System [6]

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	<ul style="list-style-type: none"> 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 	Interview questionnaire	Microsoft Project
		System Proposal	Microsoft Word
		Gantt Chart	

	<ul style="list-style-type: none"> Reviewing books, journals, thesis and internet references Plan the work schedule 		
Analysis	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 Xampp
Implementation	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> • Unit testing • Integration testing • System testing • Regression testing • User acceptance testing 	Testing reports	Microsoft Word
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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.

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,

C. Interface Design

This section discussed on the user interface that concerns with the design of the main function involved in the proposed system. The main page of the proposed system is shown as in Figure 4.1 while the rest of the interface design are shown as in Appendix C.

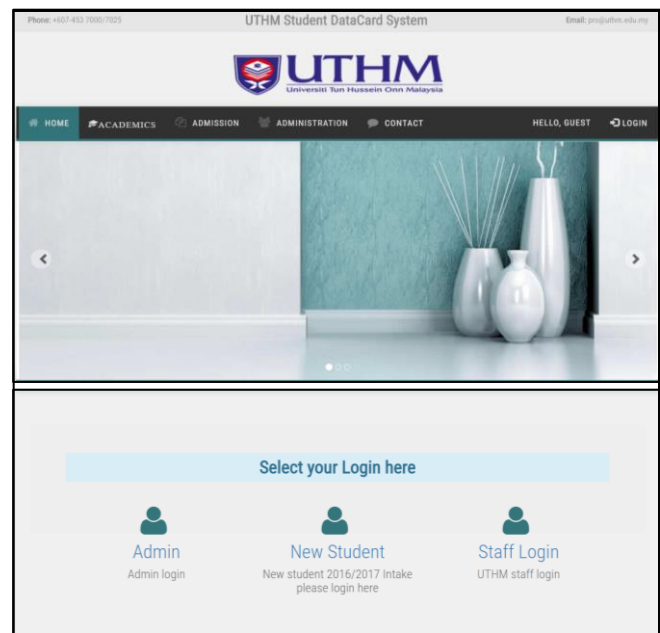


Figure 4.1 Main Page

V. SUMMARY

This paper has introduced the UTHM Student DataCard System using QR Code Technology. This system is developed not only to cope with the current trend in Information Technology Age that leading towards paperless

environment, but as well to manipulate the needs of improving the service and facility provided by UTHM as one of the well-known technical university in Malaysia. This system will store all the data or documents of a particular student in UTHM prior to their enrolment into this university. 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. Meanwhile in literature review, the facts and findings that are related with this project have been studied and depicted as in section 2.0. Those current systems that are available in the market have been analyzed thoroughly in order to identify their strength as well as weaknesses and compared in a comparative table. In section 3.0, a suitable process model has been studied and chosen for this project that is the Evolutionary Prototyping process model. Hence in section 4.0, the gathering of the system requirement is done in this section. The system requirements such as functional and non-functional requirements and as well the constraints are listed as in the attached appendices.

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