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Coin Operated Students' Grade Inquiry through Coin Slot Machine

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Abstract: ***This study aimed to develop an application software to retrieve and print students' grades, class schedule and student's account balance by inserting five peso coin in a coin slot machine. The developmental research method was utilized and underwent through the process of Software Development Life Cycle (SDLC) model. The software output was evaluated by 30 evaluators to determine its usability and functionality through the use of a modified ISO 9126 instrument for software quality assurance. The study showed that the architectural design, features and functions evidently satisfied the end user requirements with easy to use interface leading to its simplicity and usability. It also performs high degree of effectiveness in performing quick data retrieval and printing of reports generated.***

Keywords: Student Grades Inquiry, Coin Slot Machine, Grades Retrieval, Electronic Grades Inquiry, Automated Students' Grade Information

I. INTRODUCTION

Innovation is made possible for the operations in processing record systems such as: creation of data records, storing, filing and retrieval of data. Some schools domestic and abroad are implementing online grades retrieval and some other schools are also adopting grades inquiry through the use of mobile phones.

The Caraga State University is currently adopting a Short Message Service - SMS-based grade inquiry software for a convenient and faster means of transactions. The system is focused in providing service to students residing in remote areas where internet connection is not available. Since the text based technology is one of the popular ways to access information, it provides the opportunity to save time and money and improving ways of communication. It also helps the students access the information at anytime-anywhere basis on their own convenience. Thus, it also enables student to save money, time and effort by just typing a keyword together with their ID number and password in their respective phone. Furthermore, the system provides a convenient way of inquiring grade in an easier way [1].

San Mateo Municipal College has implemented Online Grade Encoding and Inquiry System via SMS technology. Students used the online grade encoding and Inquiry System via SmS Technology that helps them inquire grades via text messages or via internet. While instructors encode students' grade using the web browser connected to the internet and submit it automatically to the main database server located at the registrar's office. Furthermore, staff of registrar's office are benefited since they can gain less effort in encoding the grades of the students [2].

On the other hand, Jose Rizal Memorial State University, Main Campus, Dapitan City, Philippines has also increased its students' population and at the same time, a number of jobs of the registrar including students' grades to be processed also increased. One of the responsibilities of the registrars' office is to keep the students' grades data secured for their academic records and any other purposes. To minimize and avoid lines of students inquiring their grades at the Registrar's Office, a unique automated system of inquiry for students' grades should be provided in the University.

Based on the above citations that some schools are currently implementing online student grades retrieval and through the use of mobile phones, the researchers proposed a new unique system for grades inquiry that uses a coin slot machine, which is an external peripheral device connected to the parallel communication port. It is conceptualized on the PISONET computer rental system that promotes affordability in terms of rental payment. It comes in a form of styled / customized box containing electronic circuitry that controls the timing usage of customers. It has been designed to operate by itself with a complete set of desktop computer and source of electricity. Customer has to drop one peso coin using the coin slot of the Pisonet unit to start the timer. Once loaded with credits, the PISONET computer unit will automatically open by itself. Normally, the default timing rate of Pisonet is Php1.00 / 4 minutes but it has a customized designed to suit on the market needs so that owners can change the number of minutes allotted for every credit. Once the time is up, the PISONET computer unit will automatically turn-off by itself without any supervision from the in-charge [3].

The coin operated students' grade inquiry through a coin slot machine is an application system with hardware interface that provides students' information using touch screen technology specifically students' grades, class schedules and students account balance by means of inserting 5-peso coin through a coin slot machine in order to minimize and avoid delay in getting all the required students related information queuing at the registrar's office.

II. METHODS

This study utilized the developmental research method, which is the systematic study of designing, developing and evaluating computer programs, processes and products in order to meet the criteria of internal consistency and effectiveness in which the final output is evaluated. It followed the processes of Software Development Life City (SDLC) model in developing the software project. The software and hardware requirements needed in the study were considered, reviewed and analysed thoroughly based on the requirements of the proposed system. The system was tested through a thorough dry-run by letting selected users to use and operate the software output interface. Right after the testing process, the users are asked to evaluate the software using the evaluation sheets prepared by the researchers.

A. Validation of the Instrument

The evaluation sheet is based and modified from International Organization for Standards / International Electrotechnical Commission (ISO/IEC 9126-1) [4][5] for the software quality assurance in terms of usability and functionality and was carefully scrutinized by the IT experts together with the statistician. It was subjected to a reliability test to determine its adequacy. Pretesting was made utilizing 10 users that includes I.T. faculty members, students and personnel of the registrar's office who are not included from the actual sample. The output of the developed system was used as pilot sample to test the reliability of the evaluation sheet. Cronbach's Alpha was utilized to measure its validity and reliability through SPSS Statistics version 17.0. The results were 0.749 and 0.749 for usability and functionality respectively. The Cronbach's alpha reliability index for the overall scale was 0.737 for the present sample indicating the adequacy of the tool used in the study.

III. RESULTS AND DISCUSSIONS

A coin slot for a mechanical coin-acceptor unit with a coin slot opening integrated in the front plate, coin slot chamber and coin channel. The shoulder is build-up to vibrate as a coin reflector/membrane so that an impact to the inserted coin in the slot is generated. In the coin slot chamber, there is a renewed reversal of direction in the direction of the coin channel [6]. The whole device is then connected to the parallel communication port and interface using inpout32.dll library for Windows 7 Application Programming Interface (API), which is a collection of commands/instructions, protocols, objects and functions used by advanced programmers to create software or interact with external system. It also provides software developers with standard and ready-to-use commands in performing essential operations.

Fig. 1 General System Architecture

Figure 1 shows the processes involved of the developed software with hardware interface. The first transaction to be done by the user is to sign-up or login. After successfully access the user's account interface, related information will be viewed such as grades, class schedules and account balance. If the user may opt to print the records displayed in the touch screen monitor, it will then proceed to the next process, which is inserting the 5-Peso coin to the coin slot machine in order to generate a hardcopy or print-out using the Point of Sales (POS) printer.

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A. Steps to Operate the Program

1) How to Sign-up: All students are required to sign-up to make their own password at the computer laboratory. Figure 1 is the "sign-up form" which illustrates the different fields namely: ID number, name, home Address, course and major, mobile number, password and its password verification.

A.1. Enter ID number then click the "Open Button" to display student information
A.2. Then enter contact number
A.3. Enter desired password
A.4. Then verify password
A.5. Touch "Update Button" to save the information
A.6. Touch "X button" to close the program

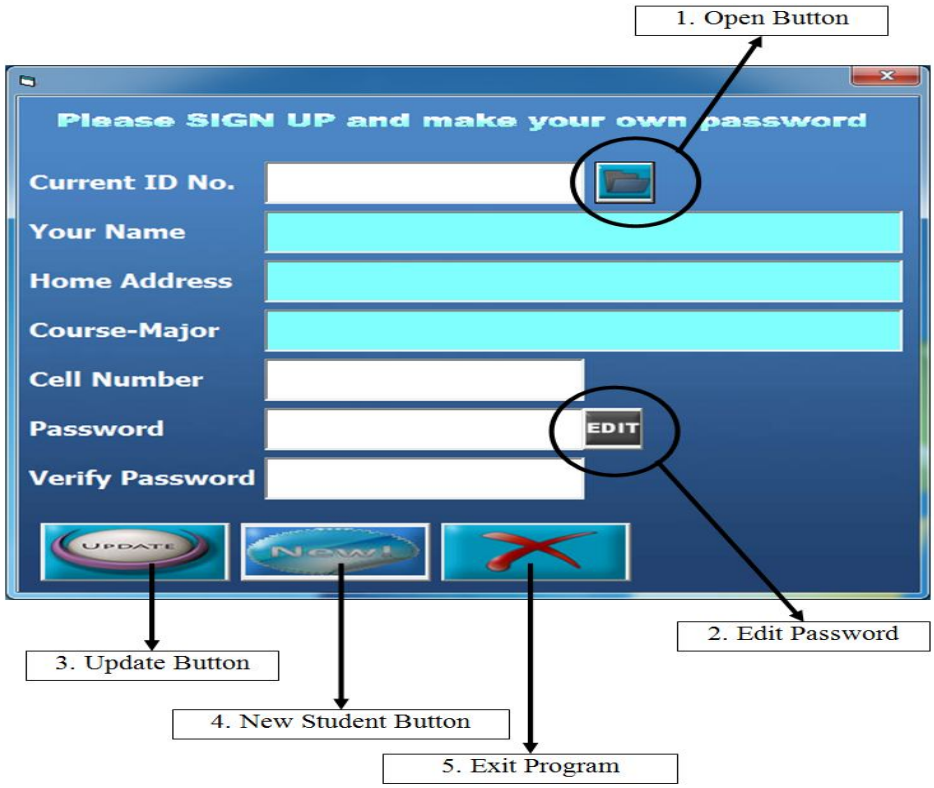

Fig. 2 Student's Sign-up Form

B. Grades Inquiry

B.1. Touch the monitor to display the login form below.

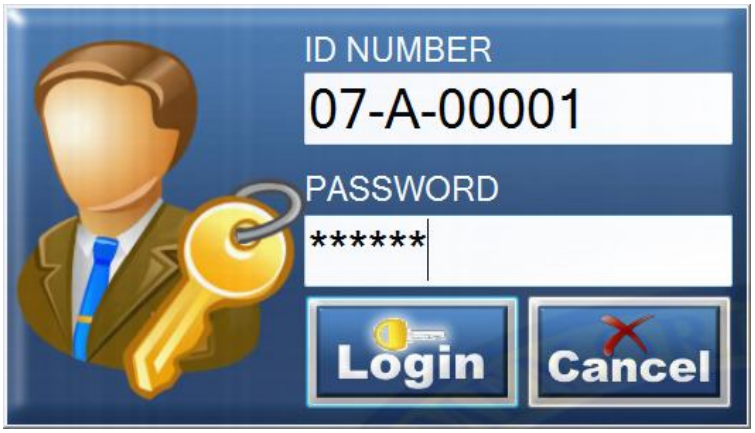

Fig 2. Log-in Form - Program Interface

B.2. Enter your ID number and Password then touch the "Login" Button to display student information as presented below.

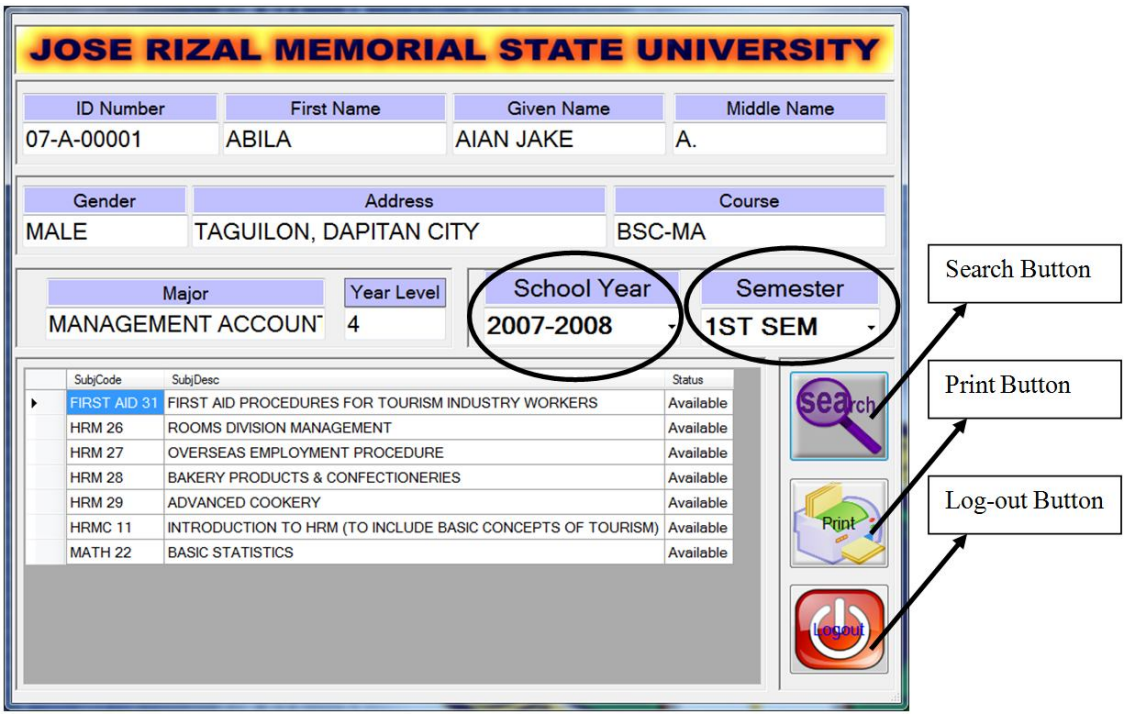

Fig 3. Log-in Form - Program Interface

B.3. Select School Year and Semester by touching the combo boxes as indicated in the figure and press "Search" button to display the enrolled subjects.

B.4. Touch the "Print" button and the user is prompted to insert 5-Peso coin with the time allotment of 10 seconds before it expires.

B.5. After inserting the coin, wait for a few seconds to finish printing the hardcopy of grades. Then click "Logout" button to change another user.

TABLE I
RESULT OF EVALUATION OF SOFTWARE QUALITY FACTOR AS TO USABILITY

Criteria	AWV	Description
User friendly program	4.43	Very Much Usable
Quick driven program	4.40	Very Much Usable
Simple manipulation features	4.33	Very Much Usable
Learn ability of the software	4.30	Very Much Usable
Attractiveness	4.17	Much Usable
Total Mean	4.33	Very Much Usable

Shown in table 1 is the result of evaluation on the software quality as to the usability of the developed software and hardware interface. It showed that the software is user friendly that gives users a graphical user interface dashboard, which provides usable attributes namely users' registration/sign-up, grades retrieval and generates a visual representation of students grades using 5-Peso coin inserted to the coin slot machine in order to print the given data retrieved by the user. It has a descriptive rating of "Very Much Usable" on its user friendliness showing a higher degree on the level of performance on its readable buttons for searching and printing student grades. It also offers quick-driven options in viewing and searching particular student including grades information since all records of active enrolees are loaded to the local machine from the main server during program initialization. It has a very simple design interface in operating the entire dashboard with the use of touch screen monitor that leads the whole program easy to manage. The software prototype allows the user to learn how to manipulate its interface quickly and very easy to understand even to

those who are first time users. The software is also noticeable and a well designed system environment that catches the interest of users that leads to an optimistic impression with the design.

The total mean has a descriptive rating of "Very Much Usable", which implies that the total usability of designed software interface is highly regarded since almost all of the system features and functions are evidently understood to all users. Thus, the system's structural design has the best quality characteristics that made it very simple and usable through the use of enlarged buttons and good color combinations.

Software quality factor for usability assessment verifies how simple the system's functions be understood to the user, which transmits to the mental models of users in working together with the software or any device. It reduces the learning time consumed for the users to be trained. Thus, the evaluated software has a capability to be easily operated and managed by the user at any given interface [7][8].

TABLE II
RESULTS OF EVALUATION OF THE SOFTWARE QUALITY FACTOR AS TO FUNCTIONALITY

Criteria	AWV	Description
Functional textboxes, action buttons in sign-up form and displays appropriate information	4.27	Very Much Functional
Functional textboxes, options buttons(*Semester and School Year drop-down boxes*), actions buttons (*Search, Print and Log-out Buttons*) and print student grades accurately using the coin slot machine driven by a 5-Peso coin.	4.30	Very Much Functional
The software complies the end-user needs	4.33	Very Much Functional
The software meets the desired design specification	4.50	Very Much Functional
Total Mean	**4.35**	**Very Much Functional**

The result of evaluation on software quality assurance in terms of functionality is shown in Table 2. The developed software is a well designed software with functional objects in the design interfaces like textboxes, combo boxes and action buttons that provides appropriate students' record including grades information, which has a rating of 4.27 and 4.30 respectively or described as "very much functional". It emphasizes that the system provides functional tools to perform accurate delivery of information to the user. The designed hardware and software interface certainly acts in accordance with the end-users' requirements since it carry outs all tasks as anticipating to the needs of the software evaluators during project testing. The system evidently satisfies the desired design and the required specification is realized since the software has successfully interfaced the coin slot machine by means of inserting a 5-Peso coin in an appropriate slot and operates within a local area networks environment.

The overall descriptive rating is "Very Much Functional" or 4.35, which implies that the overall level of functionality of the system highly fulfils the requirements of the end users and performs related functions precisely based on the design specifications specifically in providing efficient delivery of students' grade reports with higher level of accuracy.

Functionality testing in the software quality assurance assessed the designed computer application to validate the degree of correctness according to the desired design specification. It also validates the ability of software to provide features that satisfies the desired user's requirements during implementation under certain condition [7][8].

IV. CONCLUSIONS

The coin operated students' grade inquiry through a coin slot machine provides students' information specifically students grades, class schedules and students' account balances using touch screen technology through inserting 5-peso coin in the coin slot machine. This new technology contributes a lot in the field of computing and information technology. The overall level of usability of the designed software interface is very high in view of the fact that almost all of the system features and functions are evident with the best quality characteristics in architectural design, very simple and usable. The system has a high rating as to the level of functionality that fulfills all the requirements of the end users requirements that performs related functions precisely based on the specifications of the design. It also provides efficient delivery of students' grade reports with higher level of accuracy.

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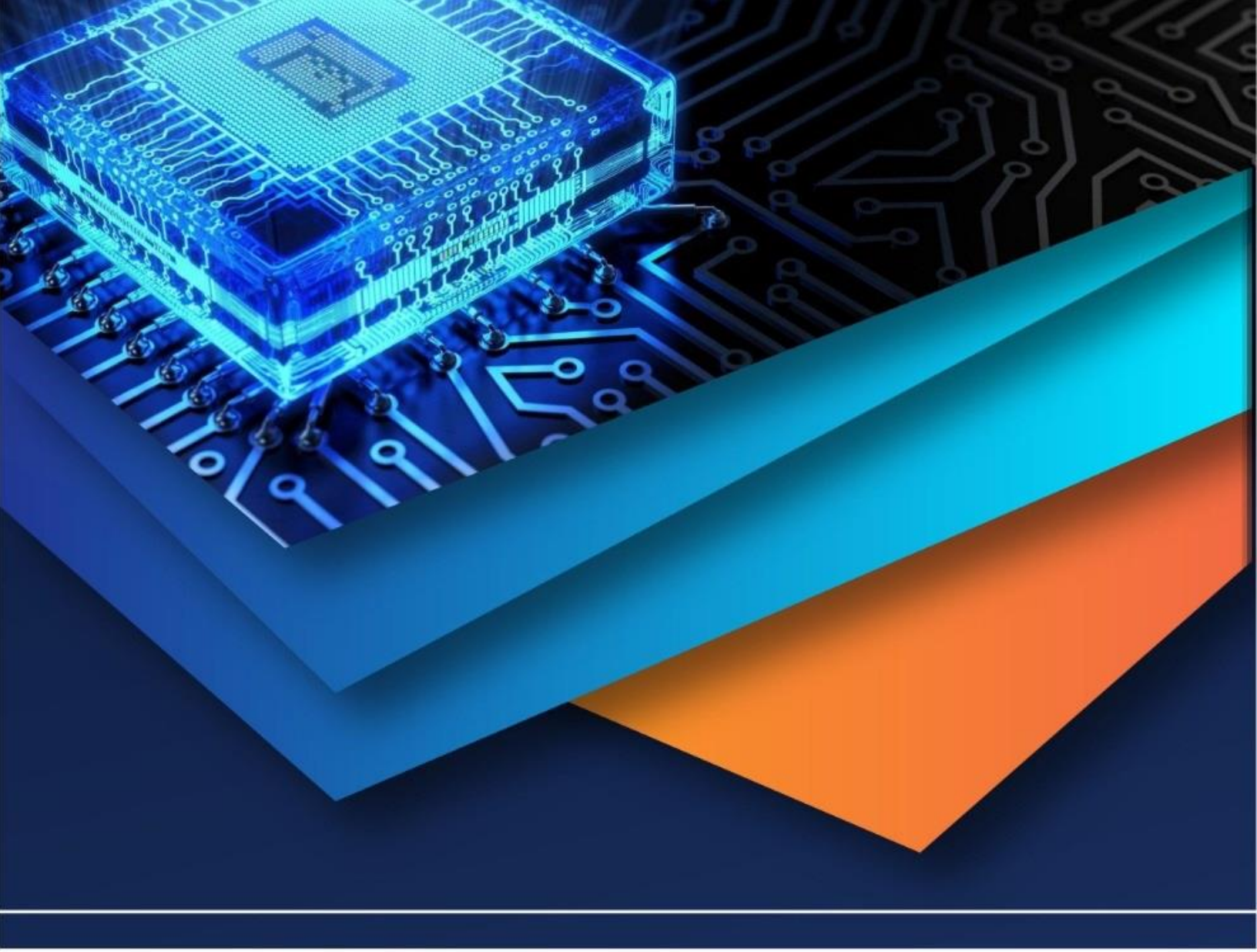

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