**Indonesian Journal of Electrical Engineering and Computer Science**
Vol. 9, No. 3, March 2018, pp. 673~679
ISSN: 2502-4752, DOI: 10.11591/ijeecs.v9.i3.pp673-679 

# Development of Graphical User Interface (GUI) for University Student Health Monitoring

**Fadzliana Saad, Ismarani Ismail, Muhd Syamir Mohamad**
Faculty of Electrical Engineering, Universiti Teknologi MARA (UiTM), 40450 Shah Alam, Selangor, Malaysia

**Article Info**

***Article history:***

Received Oct 12, 2017
Revised Dec 27, 2017
Accepted Jan 16, 2018

***Keywords:***

Graphical user interface (GUI)
Health condition
Medical information
Radio frequency identification (RFID)

**ABSTRACT**

This paper presents the development of GUI to monitor health condition of university students of Universiti Teknologi MARA (UiTM) Shah Alam. The objectives of this work are to design and develop the GUI, to create the database according to the students' identification (ID) card, and to update and verify the students' medical information supported by the Radio Frequency Identification (RFID) system. Based on the issue of high frequency of class absence and cases of fake medical certificates submission, this work is highly motivated to improvise the situation for the university students in order to validate the medical leave certificate provided by the students if missing from a class. Microsoft Visual Basic Express 2010 and Microsoft Office Access 2007 are utilized for the software part, which is then integrated with the RFID system. This work is tested to the students of Faculty of Electrical Engineering, UiTM. When a student ID card is scanned by the RFID reader, a GUI displaying student's information can be viewed on a host computer by the medical practitioner and can be updated with the current state of health information. The medical information given at the health center can be verified and accessed by the faculty. At the end of this work, the GUI displays are successfully developed for the medical practitioner at the health center and the lecturer at the faculty. This system facilitates lecturer to easily verify and validate on medical leave or the student's absence, since medical information can be viewed directly by the lecturer.



***Corresponding Author:***

Fadzliana Saad,
Faculty of Electrical Engineering,
Universiti Teknologi MARA (UiTM),
40450 Shah Alam, Selangor, Malaysia.
Email: fadzlianas@salam.uitm.edu.my

## 1. INTRODUCTION

Being healthy is very essential for the university students to have a good learning environment and most effective session for study. Therefore, health monitoring for university students is becoming important in order to avoid any absence from the class due to weak condition. There are cases of poor attendance especially at the end of the semester when deadlines for assignments and mini-projects are approaching and students are not having enough rest. To have special consideration for being absence, students may become unethical in falsifying medical certificates or being absent from classes for no reason. The worst case happened when there are students being absent on the day of final examination. Hence, this issue increases the attention of the faculty administration in monitoring the students' health condition. This is because the cases of fake medical certificates in Malaysia are commonly highlighted by few online news sites [1-3].

Currently, students seek for medical check-up at any health center and provided with medical leave certificate if their health condition is weak and approved by the medical practitioner. With collaboration to the UiTM Health Center, the medical information of every student can be updated and verified effectively.

However, with a large number of university students, the conventional method of recording manually on paper all the information including medical leave certificate given, can be considered as a labor-intensive work especially in getting back the information later.

In order to simplify this task, the Database Management System (DBMS) is used. DBMS is a collection of program that facilitates to store, modify and extract information from a database. There are numerous dissimilar types of database management systems, ranging from small systems that run on personal computers to huge systems that run on mainframes [4]. In this work, the process development of GUI is using Visual Basic Express 2010 and the development of database is accomplished using Microsoft Access 2007. GUI, as the program interface will ease the system operation when human interaction is done directly to the computer.

The system is then integrated with an RFID system. It consists of three components, which are the transponders (tag), the interrogator (reader) and the computer (host). The RFID tag has three different types of tags; passive tag, semi-active tag and active tag [5]. The RFID reader has a transmitter and a receiver, working in a full duplex manner. The classification of reader can be divided into two, which are Read; read only data from the tags and Read/Write; read and write data from/on the tags. The passive tag and Read type reader are used for this health condition monitoring project. RFID is chosen to simplify and reduce errors that might occur due to human mistakes in recording and tracking the data manually [6], which is the best support to this system. Additionally, all UiTM students have a student ID card, and the card is already attached with an RFID tag consists all the related information to the student. Therefore, the system only requires for an RFID reader in order to read the information.

The concern on health monitoring was documented by Pan Chuan Di [7] regarding the cloud computing technology for electronic medical record system. This shows that medical information is very much important for easy management to improvise on working efficiency and medical quality. Shih et al. [8] propose an RFID-based self-healthcare management system which allows user to identify his/her identification and record the physiology conditions automatically. The system actually accessed the RFID tag and stored measured data onto the tag, however our work tracks on the students' information from the RFID tag and update the information only onto the database of the system. If looking into research related to health monitoring of university students, the work of Cooke et al. [9] only focused for the well-being of first year university student. This work was analyzed based on survey questions provided to the students. Therefore, the need for monitoring health condition especially for university students in relation to class attendance is highly motivated for our work. This work is currently developed to focus for the students in Faculty of Electrical Engineering (FKE) as the early stage of development. With the regards on issues related to absence or missing from classes, the system is aimed to enable the faculty level in overcoming the issues. At the same time, the system facilitates the UiTM Health Center in dealing with huge data of tracking and recording the students' medical information. With the accomplishment, both parties UiTM Health Center and the faculty are beneficial from the system specifically on monitoring the students' health condition along with managing their attendance in a proper and organized manner.

## 2. RESEARCH METHOD

In this section, the methods used in developing the system are explained. The conceptual system design for this work is illustrated in Figure 1. This is actually the basic idea of the whole project where a student in a weak condition seeks for medical examination from a medical practitioner or a doctor. The medical practitioner will then update on the health information of the student. If the student is considered for a medical leave, the information regarding medical leave is also included into the system. Therefore, there is no paper written medical certificate given to the student. The database is then updated with the latest health information.

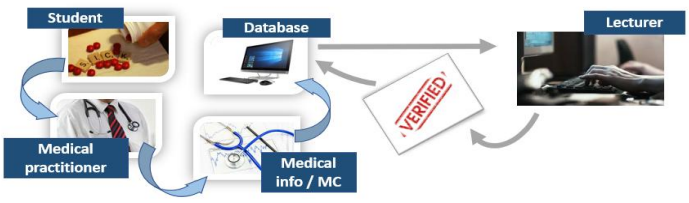


Figure 1. Diagram for conceptual system design

The student who is given a medical leave is going to be absent from a class. With this system, the lecturer or faculty administration just have to access the system and view on the student ID numbers that are missing from the class. He/she can view the health condition status and verify it if the absence is supported with a medical leave from the medical practitioner. The system development can be categorized into two parts that are software and hardware requirements. Figure 2 shows the processes involved in completing this project. The development starts with creation of student database and GUI. The final stage is where the system is tested using an RFID reader and a computer as a host.

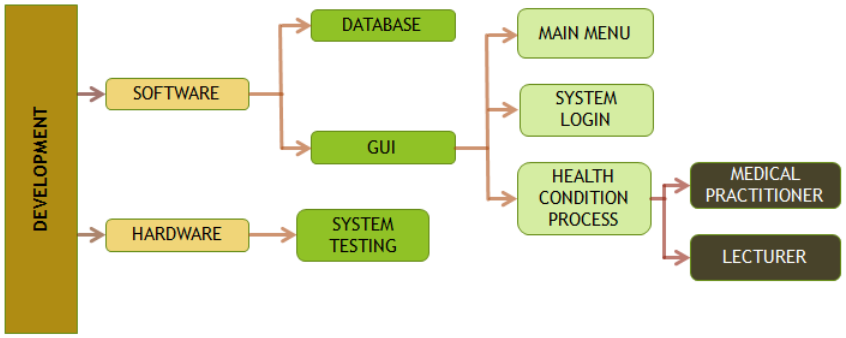


Figure 2. Processes involved in system development

### 2.1. Software Requirement

The software requirement for this system is distributed into development of database and development of GUI.

#### 2.1.1. Development of Database

The student database is developed using Microsoft Office Access 2007. This system has two databases to facilitate the medical practitioners and lecturers since they are at two different places to provide easy accessibility. In the database of monitoring health condition, a table is constructed. The table contains student ID, student name, course, faculty and health condition. Figure 3 shows the content of the table for the students' information. The details of student's ID, name, course and faculty are extracted from the information available on the student ID card. Only the information of health condition is filled in by the medical practitioner after a medical check-up.

| ID | NAMES | COURSE | FACULTY | HEALTH_CONDITION |
|---|---|---|---|---|
| 0001487947 | MUHD SYAMIR BIN MOHAMAD | EE241 | FKE | |
| 0003670192 | MOHD ISMAHISHAM BIN ISMAIL | EE241 | FKE | |
| 0003666066 | MUHAMMAD SYAFIQ BIN RAMI | EE241 | FKE | |
| 0003667836 | MOHAMAD IKHWAN BIN MOHD. ZUKI | EE241 | FKE | |
| 0003670740 | MOHD HARIZ ZAKWAN BIN MOHD NOOR | EE241 | FKE | |
| 0003683667 | MUHD KHAIRUL IKHWAN BIN RAMLAN | EE241 | FKE | |
| 0003668477 | AHMAD ALIFF BIN ANUAR | EE241 | FKE | |
| 0003665099 | MUHAMMAD AIMAN BIN MOHAMAD | EE241 | FKE | |

Figure 3. Database of student information

#### 2.1.2. Development of GUI

The GUI is developed using Visual Basic Express 2010 to provide a front-end user interface for the main menu, system login and the process involved in updating and verifying the students' health condition as shown in Figure 4.

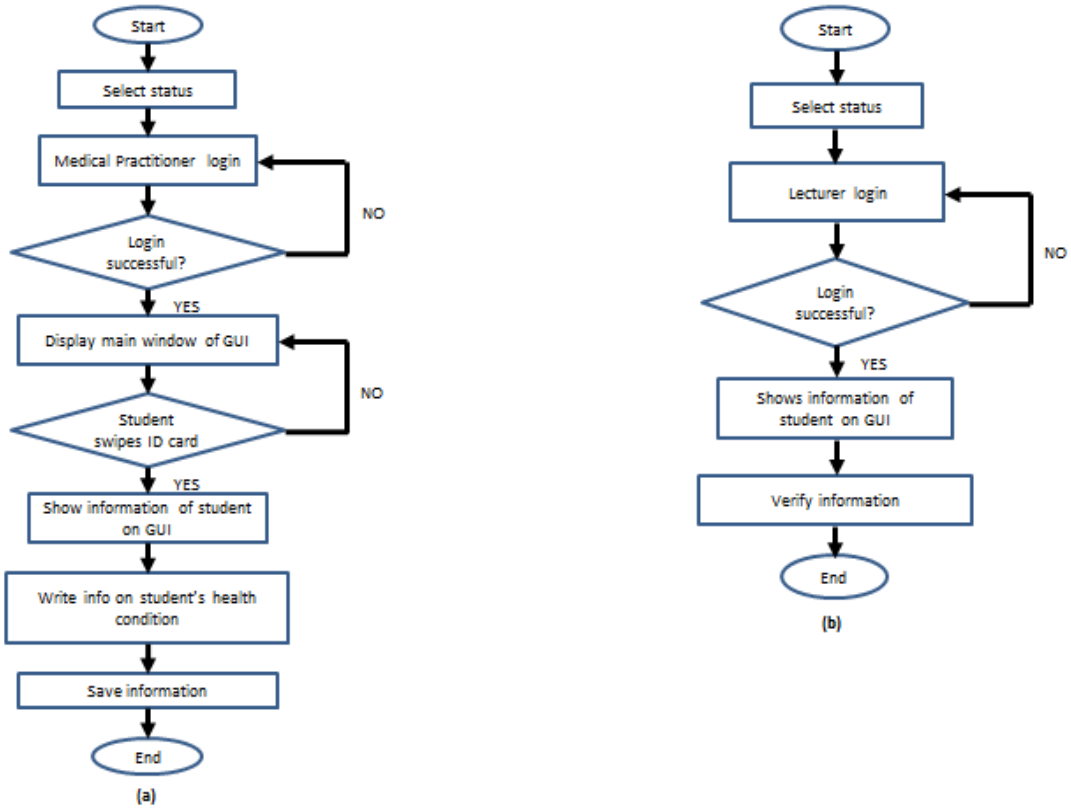


Figure 4. Flowchart for GUI development of (a) Medical Practitioner (b) Lecturer

#### 2.1.2.1. Main Menu

The system is started with a GUI display for Main Menu. The user can select the status either for a medical practitioner or a lecturer.

#### 2.1.2.2. System Login

System login is the next window to be accessed by the user. The system requests for username and password to ensure security and authorized access to the system.

#### 2.1.2.3. Health Condition Process

Health condition process interface appears when the user login is successful. The GUI screen displays the student's information such as ID number, name, course and faculty based on the developed database. The medical practitioner can update on the current health condition of the student and save the information into the database. While for the lecturer, the information can be accessed and viewed only in order to verify on the student's absence.

### 2.2. Hardware Requirement

The system testing is done using a computer as a host and an RFID reader. The computer is utilized for storing the student database, while the RFID reader reads the data and sends the information to the computer for GUI display.

Figure 5 shows the process flow to develop the integration between the hardware and software in order to process the health condition information for the medical practitioner. The hardware is only required for the medical practitioner part since the RFID tag is accessed to retrieve the student's information before medical examination. For the lecturer part, he/she just have to use the GUI system and verify based on the available information updated by the medical practitioner. The connection between the reader and the computer is done via USB serial converter adaptor (RS-232). Initially, the COM port should be identified to have a successful interfacing connection for the reader and the computer. Once connected, the GUI system can be used.

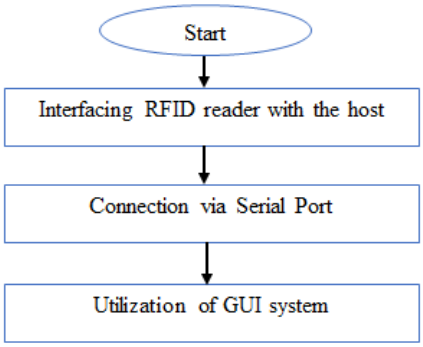


Figure 5. Flowchart on software and hardware integration for Medical Practitioner

## 3. RESULTS AND ANALYSIS

### 3.1. Development of Database

The student's health condition statement written on GUI by a medical practitioner is saved to the Microsoft Office Access 2007. Figure 6 below shows the student's health condition information table in the database.

| ID | NAMES | COURSE | FACULTY | HEALTH_CONDITION |
|---|---|---|---|---|
| 0001487947 | MUHD SYAMIR BIN MOHAMAD | EE241 | FKE | The student suspected dengue and detained for a month |
| 0003670192 | MOHD ISMAHISHAM BIN ISMAIL | EE241 | FKE | This student has a heavy fever and is entitled MC 1 week |
| 0003666066 | MUHAMMAD SYAFIQ BIN RAMI | EE241 | FKE | This student has an asma and is entitled MC 1 week |
| 0003667836 | MOHAMAD IKHWAN BIN MOHD. ZUKI | EE241 | FKE | This student has a fever and is entitled MC 2 days |
| 0003670740 | MOHD HARIZ ZAKWAN BIN MOHD NOOR | EE241 | FKE | The student suspected dengue and detained for a month |
| 0003683667 | MUHD KHAIRUL IKHWAN BIN RAMLAN | EE241 | FKE | This student has an asma and is entitled MC 1 week |
| 0003668477 | AHMAD ALIFF BIN ANUAR | EE241 | FKE | The student has an accident and could MC for a month |
| 0003665099 | MUHAMMAD AIMAN BIN MOHAMAD | EE241 | FKE | The student has an accident and could MC for a month |

Figure 6. Health condition information updated by the medical practitioner

### 3.2. Development of GUI

#### 3.2.1. Main Menu

The Main menu form shown in Figure 7 is built for user to select their status before using the system. The user can choose either for a medical practitioner or lecturer status.


Figure 7. Main menu to select status

### 3.2.2. System Login

GUI screen for the system login is created for medical practitioner and lecturer as shown in Figure 8. The user has to provide a username and password in order to enter the system.


Figure 8. System Login (a) Medical Practitioner (b) Lecturer

### 3.2.3. Health Condition Process

When the RFID reader and computer are interfaced, and the login is successful, the health condition GUI screen appears. With this screen, the medical practitioner should select on the related port to ensure good communication between the GUI and the reader. Then, the student is requested to swipe his student ID card to get the details of that particular student. Figure 9 shows the health condition GUI screen for the medical practitioner when the serial port is detected. It shows that the COM port detected is com3. Figure 10 shows the information of that particular student. After the ID card is swiped, the information of the student with date and time are shown in the textboxes.


Figure 9. Health condition GUI for medical practitioner when serial port is detected


Figure 10. Information of student after ID card is swiped


Figure 11. Health condition status updated by the medical practitioner


Figure 12. Health Condition GUI Screen for lecturer with selected student's information

After a medical check-up, the health condition status is updated and saved by the medical practitioner. This can be seen in Figure 11 in the health condition field. The information is stored in the database and also submitted to lecturer's database. For the lecturer, the hardware part is not required. This is because a lecturer only accesses the system to view and verify if a student is missing from a class due to medical reason. The lecturer starts the system with the same GUI of main menu in Figure 7 and system login in Figure 8(b) such as a medical practitioner. However, the next screen for GUI display is as shown in Figure 12 after the login is successful. The lecturer can validate if a student is missing or absence from a class and verify the information supplied by the medical practitioner.

A list of students ID number is available in the Tag ID Log in relation to the number of students missing the class. As in Figure 12, an ID number of "0001487947" is selected, and the details of that particular student are shown in the GUI screen. With the information provided by the medical practitioner for the health condition, the lecturer can verify the student's absence. If the student had a medical check-up and given a medical leave by a medical practitioner, all the information can be viewed by the lecturer. Therefore, a verification of this health condition status can be made by the lecturer and kept onto the database according to date and time.

## 4. CONCLUSION

The database was successfully developed to display the student's health condition in the GUI according to the student's ID card. Besides that, the GUI development facilitates the health center mainly the medical practitioner to track and update on students' medical information faster with RFID technology. On the other hand, the faculty especially the lecturers are also updated with the current health condition of absence students. Hence, there is no need for the paper medical certificate from the medical practitioner since all data of medical leave and health condition are kept on the system. At the same time, the system can be accessed directly and verified by the faculty admin/lecturers.

For future development, this system can be enhanced with the internet of thing (IoT feature since RFID is the IoT key technology [10,11] to establish the IoT applications with a real-time health monitoring for the university students. The host can be replaced with a smartphone by developing an android application. Development of the android application provides for advancement to the RFID technology since the smartphone is now developed with Near Field Communication (NFC) technology [12]. Therefore, with NFC technology the system can be more efficient and easy access only through smartphone.

## ACKNOWLEDGEMENTS

The authors would like to thank Universiti Teknologi MARA (UiTM) in providing the fund of Lestari Grant (600-IRMI/MyRA 5/3/LESTARI (0159/2016)) for this research work. The appreciation also goes to Faculty of Electrical Engineering UiTM for giving us the opportunity on completing the work.

## REFERENCES

[1] Saaid MF, Noor MZH, Ismail I. *The studies of tags detection performances for different tags type in RFIWS system*. Proceedings of the 2012 IEEE 8th International Colloquium on Signal Processing and its Applications (CSPA). Melaka. 2012.
[2] Ismail R, Ismail I. *Development of Graphical User Interface (GUI) for Livestock Management System*. Proceedings of the 2013 IEEE 4th Control and System Graduate Research Colloquium. Selangor. 2013.
[3] Di PC. Design of Electronic Medical Record System Based on Cloud Computing Technology. *TELKOMNIKA Indonesian Journal of Electrical Engineering*. 2014; 12(5):4010-4017.
[4] Shih ST, Hsu CM, Chao CY. *Self healthcare management system based on RFID technology*. Proceedings of the 7th International Conference on Networked Computing and Advanced Information Management. Gyeongju. 2011.
[5] Cooke R, Bewick BM, Barkham M, Bradley M, Audin K. Measuring, monitoring and managing phychological well-being of first year university students. *British Journal of Guidance & Counselling*. 2006; 34(4): 505-517.
[6] Bing X. Key Internet of Things Technology and Application. *TELKOMNIKA Indonesian Journal of Electrical Engineering*. 2014; 12(7): 5599-5602.
[7] Rghioui A, Oumnad A. Internet of Things: Surveys for Measuring Human Activities from Everywhere. *International Journal of Electrical and Computer Engineering (IJECE)*. 2017; 7(5): 2474-2482.
[8] Juntunen A, Luukkainen S, and Tuunainen VK. *Deploying NFC Technology for Mobile Ticketing Services – Identification of Critical Business Model Issues*. Proceedings of the 2010 Ninth International Conference on Mobile Business and 2010 Ninth Global Mobility Roundtable (ICMB-GMR). Athens. 2010.