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Automated Attendance System using RFID and Fingerprint Reader

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Abstract:- The automated attendance system is the managing of attendance or presence in a classroom to reduce the work load. The designed system has database that contains student information and it was able to help the lecturer to manipulate student's data, update data, alert teachers and easy to interface with the users. By using RFID technology and fingerprint reader, it is easier and faster to collect students' data to enable the process of identifying of student with high security level management. The C# programming language is applied, it can make calculation and displaying data, and Microsoft Structure Query Language 2012 is used as a database file (data container) for storing data. Microsoft Visual Studio 2012 is necessary as a connection tool between programming language and database. By applying this system, associated profiles and daily attendance and overall percentage can be recorded correctly and effectively.

Keywords:- *RFID, Fingerprint Reader, Database, SQL Server, Automated Attendance System.*

I. INTRODUCTION

The system consists of some collection of persistent data that is used by application system of some given enterprise. Student attendance is recorded by using RFID and fingerprint technologies. Individual student is uniquely identified based on their unique tag identifiers and fingerprint identifiers. In admin/teacher section, registered admin/teacher of that attendance management system must login with the assigned name and password and then admin/teacher can see the registered students' details and attendances via GUI themselves easily.

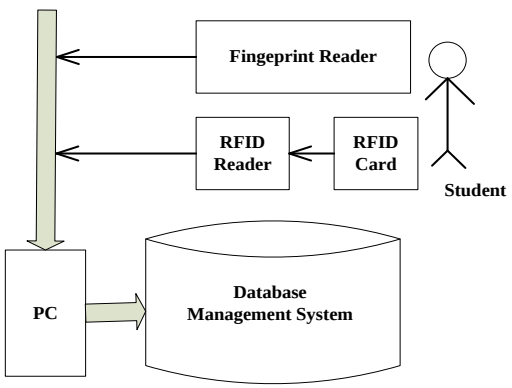

Fig 1:- Attendance Management System

For student section, when a student attends the class and the tag included in student ID card is read by the RFID reader. And then, fingerprint reader will take his or her fingerprint and sends it to the database on PC. The system will compare their information pre stored on the DBMS that the admin or teacher has assigned to them with the inputted ID.

II. HARDWARE COMPONENTS OF THE SYSTEM

A. RFID Reader and Tag

A pulse of radio energy is sent by RFID reader to tag and listens for the tag's response. The tag detects this radio energy and a response is sent back that contains the tag's serial number and other information as well. The RFID tag is embedded in students ID card and which is read by a reader. This RFID system is interfaced with a computer or some electronic circuits within which a database is created.

Fig 2:- CR10M RFID Reader and Tag

B. Fingerprint Reader

Fig 3:- ZK4500 Fingerprint Reader

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A fingerprint reader based on biometric technology includes an optical scanner that creates the template database using finger samples of different users. Fingerprint processing includes fingerprint enrolling and matching. When enrolling process, it is needed to enter the user's finger three times. This system will process the entered finger images and generate a template of the finger based on processing results and store the result template. When matching process, user enters the finger through optical sensor and system will generate a template of the finger and compare it with templates of the finger stored in library. The fingerprint scanner is connected to the PC with USB interface. Using the ZK4500 fingerprint reader, the ZK finger Software Development Kit (SDK) toolbox is useful as an interface between the fingerprint reader and the attendance software.

III. SOFTWARE DEVELOPMENT

A. Database Agent (DBA)

Database provides access to data and so within the boundaries of the system is maintained. Database agent contains all available information presentations with respond to the presentation request by providing list of those available.

B. Microsoft SQL Sever

SQL, an industry-standard language specifically is designed to enable people to create databases, add new data to database, maintain the data, and retrieve selected parts of the data. SQL was developed to operate on data in database, originally that follow the relational model. The international SQL standard has incorporated part of the object model, resulting in hybrid structures called object-relational database. Microsoft SQL Server is a relational database management system developed by Microsoft. It allows the new user registering and removes the unused user.

C. Microsoft Visual Studio

Microsoft Visual Studio is an IDE from Microsoft. It is used to develop computer programs for Microsoft Windows. The Visual Studio is used to design the GUI. Many of the application forms are contained in Visual Studio. By using C# language type, the easy window form design can choose family of operation systems, as well as web sites, web applications and web services.

The flowchart of the user registration is shown in Fig.4. There are two types of users, one for teacher or admin and others for students. The users need to register their respective information such as unique RFID tag number and their fingerprint in database. The registered data are stored the database.

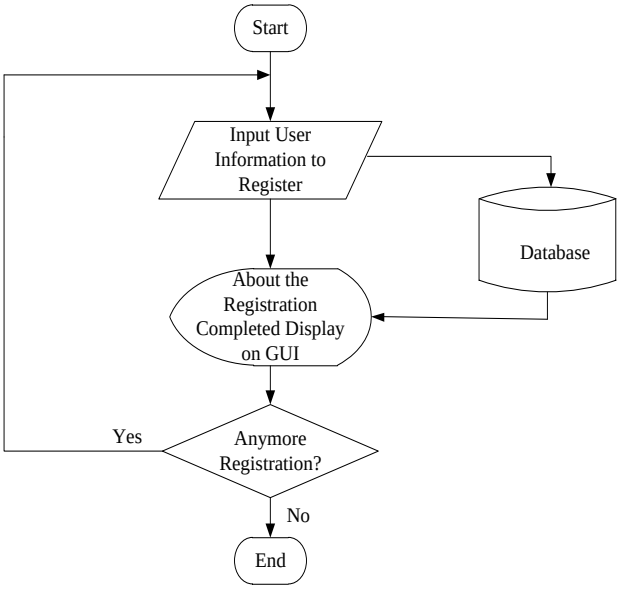

Fig 4:- Flowchart for Registration System

Student's RFID tags number and fingerprints are inputted and if it coincides with the database, the roll call will be automatically added their respective subjects and then calculated for monthly roll call percentages. The flowchart for the roll call attendant system is shown in Fig.5.

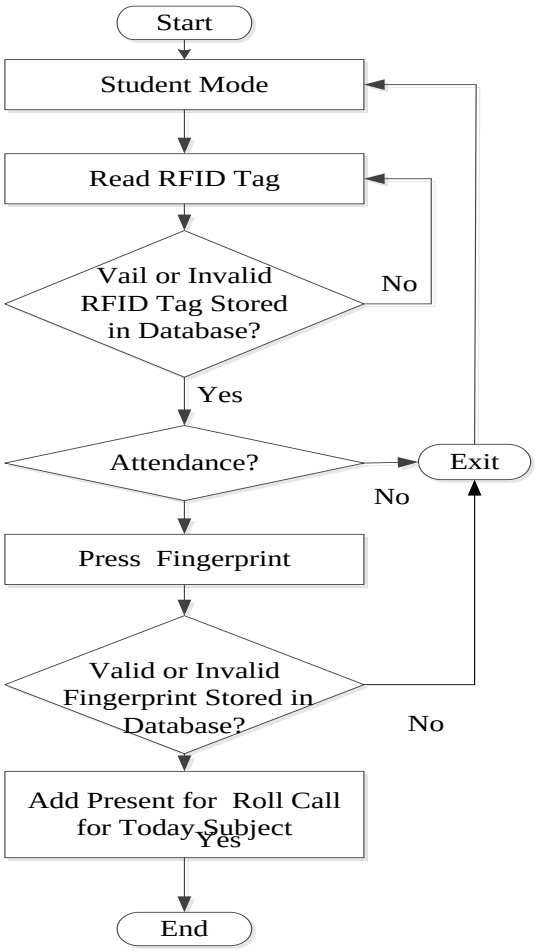

Fig 5:- Flowchart for Student Attendance System

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IV. RESULTS

Fig.6 shows the students' data saved after the registration process. Fig 7 also shows teachers' data register in the database.

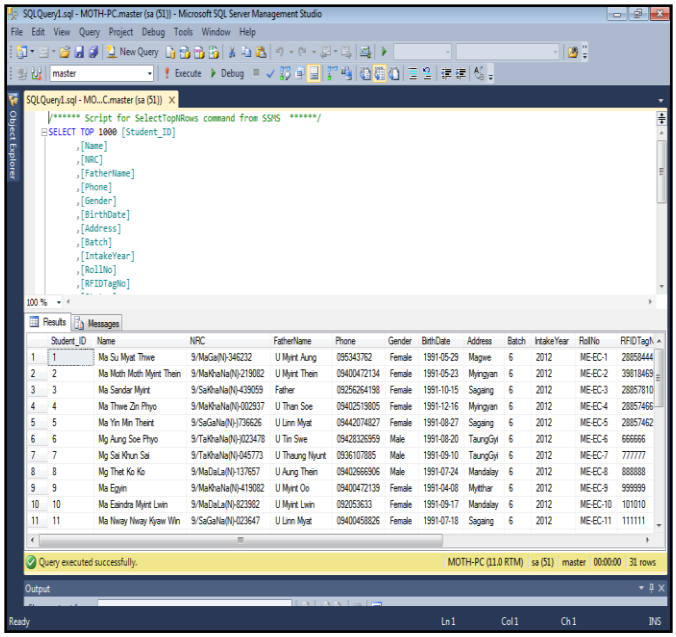
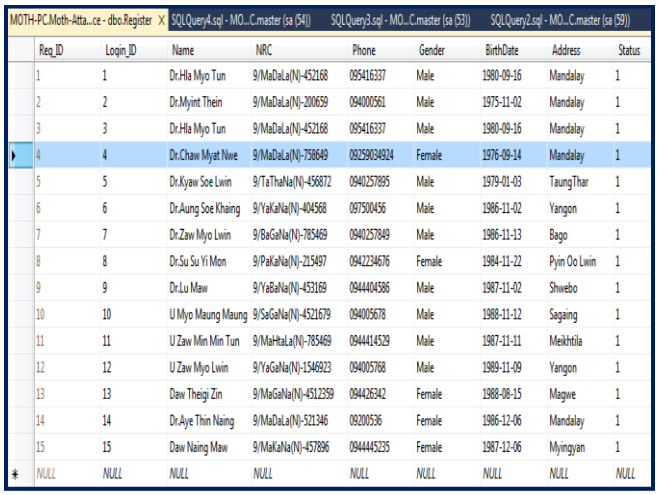


Fig 6:- Student Data Saving in the Database Server



Reg_ID	Login_ID	Name	NRC	Phone	Gender	BirthDate	Address	Status
1	1	Dr.Hla Myo Tun	9/MaDaLa(N)-452168	095416337	Male	1980-09-16	Mandalay	1
2	2	Dr.Myint Thein	9/MaDaLa(N)-200659	094000561	Male	1975-11-02	Mandalay	1
3	3	Dr.Hla Myo Tun	9/MaDaLa(N)-452168	095416337	Male	1980-09-16	Mandalay	1
4	4	Dr.Chaw Myat Nwe	9/MaDaLa(N)-758649	09259034924	Female	1976-09-14	Mandalay	1
5	5	Dr.Kyaw Soe Lwin	9/TaThaNa(N)-456872	0940257895	Male	1979-01-03	TaungThar	1
6	6	Dr.Aung Soe Khaing	9/YaKaNa(N)-404568	097500456	Male	1986-11-02	Yangon	1
7	7	Dr.Zaw Myo Lwin	9/BaGaNa(N)-785469	0940257849	Male	1986-11-13	Bago	1
8	8	Dr.Su Su Yi Mon	9/PaKaNa(N)-215497	0942234676	Female	1984-11-22	Pyin Oo Lwin	1
9	9	Dr.Lu Maw	9/YaBaNa(N)-453169	0944404586	Male	1987-11-02	Shwebo	1
10	10	U Myo Maung Maung	9/SaGaNa(N)-4521679	094005678	Male	1988-11-12	Sagaing	1
11	11	U Zaw Min Min Tun	9/MaHtaLa(N)-785469	0944414529	Male	1987-11-11	Meikhtila	1
12	12	U Zaw Myo Lwin	9/YaGaNa(N)-1546923	094005768	Male	1989-11-09	Yangon	1
13	13	Daw Theigi Zin	9/MaGaNa(N)-4512359	094426942	Female	1988-08-15	Magwe	1
14	14	Dr.Aye Thin Naing	9/MaDaLa(N)-521346	09200536	Female	1986-12-06	Mandalay	1
15	15	Daw Naing Maw	9/MaKaNa(N)-457896	0944445235	Female	1987-12-06	Myingyan	1
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Fig 7:- Registered Teacher Database in SQL Server

After system must be reading RFID tag, student must connect finger print sensor by clicking checkbox for verification process in order to be successful attendance. Fig 8 and 9 shows the examining RFID tag no. for student and valid card no.

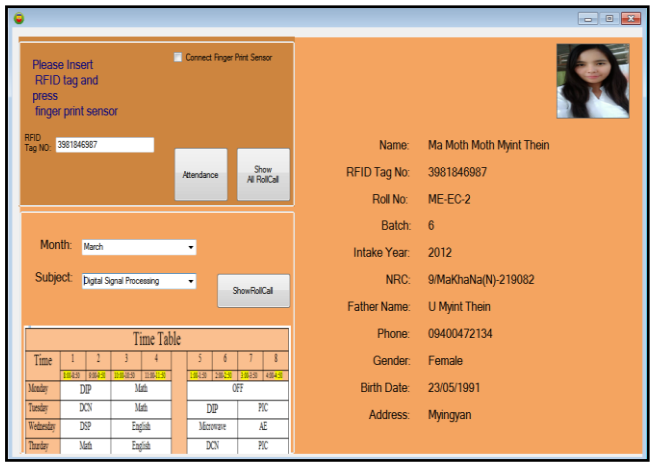


Fig 8:- Student Attendance Step1 by using RFID Tag

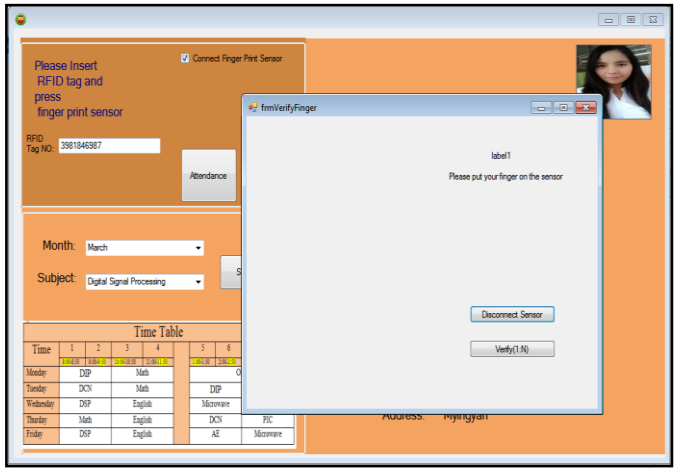


Fig 9:- Student Attendance Step2 by Using RFID Tag and Connect Fingerprint Sensor

Fig. 10 and 11 shows connecting fingerprint sensor for attendance. Connect sensor button will be displayed as blue color box while fingerprint reader and C# program connected. After connecting fingerprint sensor, student must verify his/her finger by clicking verify button. Then, system will automatically verify his/her finger by matching with Finger ID stored in finger database. If his/her finger ID is matched, system will show registered success together with student ID and their finger score. The finger score means that the capturing ranges of finger sensor. If user suddenly success once his/her finger, finger sensor will show full score mark or if user return verify finger after worse once, his/her finger score range will slightly decreased score mark from 100.

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Fig 10:- Student Attendance Step3 by Using RFID Tag and Verify Fingerprint Sensor

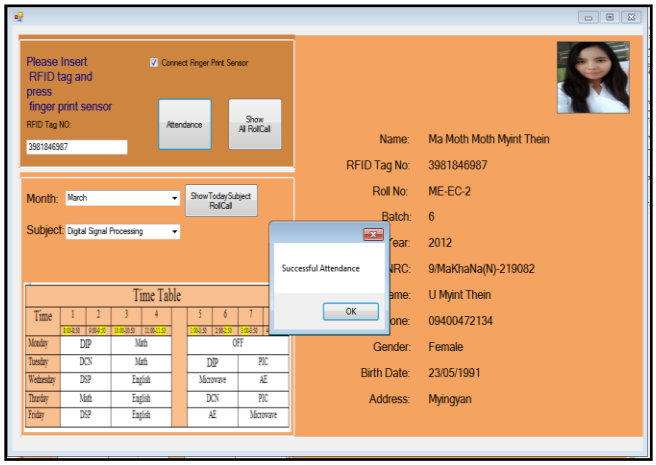


Fig 11:- Student Attendance Step4 after Verifying RFID and Fingerprint

Fig 12 through 14 shows the roll call percentage for individual subjects for daily and monthly. Fig 15 shows the printed form of monthly roll call percentage.

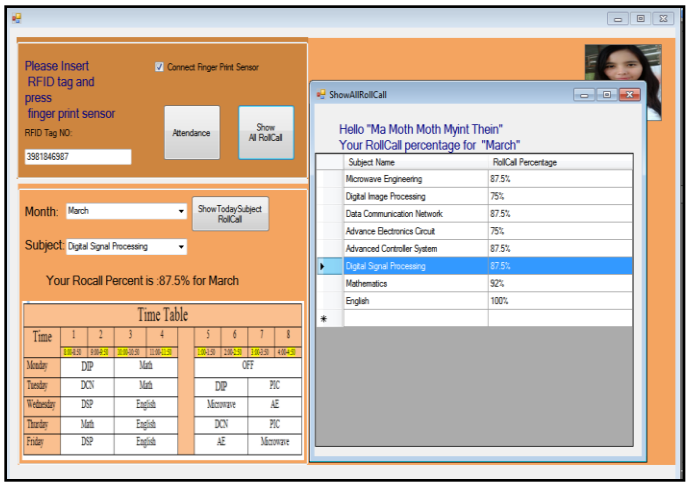
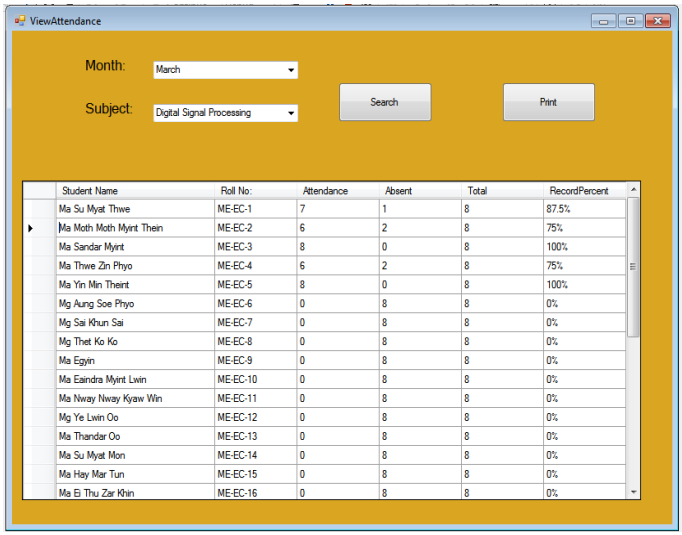
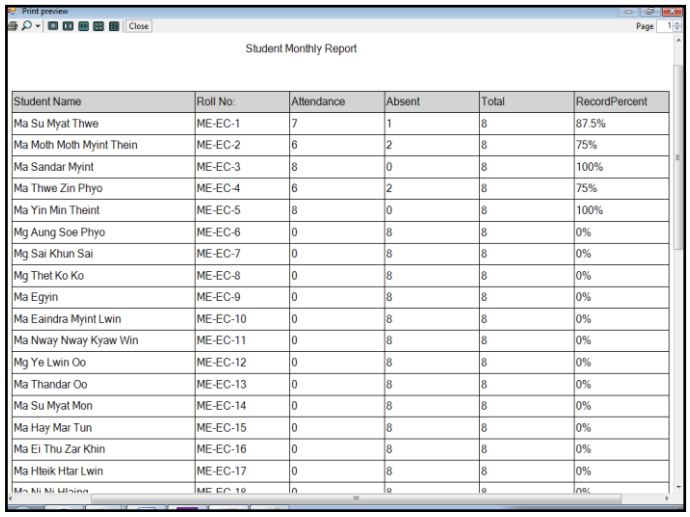


Fig 12:- Roll Call Percent for Last Attendance Time and Overall Roll Call Percent in Each Subject at End Month



Student Name	Roll No:	Attendance	Absent	Total	RecordPercent
Ma Su Myat Thwe	ME-EC-1	7	1	8	87.5%
Ma Moth Moth Myint Thein	ME-EC-2	6	2	8	75%
Ma Sandar Myint	ME-EC-3	8	0	8	100%
Ma Thwe Zin Phyo	ME-EC-4	6	2	8	75%
Ma Yin Min Theint	ME-EC-5	8	0	8	100%
Mg Aung Soe Phyo	ME-EC-6	0	8	8	0%
Mg Sai Khun Sai	ME-EC-7	0	8	8	0%
Mg Thet Ko Ko	ME-EC-8	0	8	8	0%
Ma Egyin	ME-EC-9	0	8	8	0%
Ma Eaindra Myint Lwin	ME-EC-10	0	8	8	0%
Ma Nway Nway Kyaw Win	ME-EC-11	0	8	8	0%
Mg Ye Lwin Oo	ME-EC-12	0	8	8	0%
Ma Thandar Oo	ME-EC-13	0	8	8	0%
Ma Su Myat Mon	ME-EC-14	0	8	8	0%
Ma Hay Mar Tun	ME-EC-15	0	8	8	0%
Ma Ei Thu Zar Khin	ME-EC-16	0	8	8	0%

Fig 13:- Students' Monthly Report for Each Subject



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Ma Thwe Zin Phyo	ME-EC-4	6	2	8	75%
Ma Yin Min Theint	ME-EC-5	8	0	8	100%
Mg Aung Soe Phyo	ME-EC-6	0	8	8	0%
Mg Sai Khun Sai	ME-EC-7	0	8	8	0%
Mg Thet Ko Ko	ME-EC-8	0	8	8	0%
Ma Egyin	ME-EC-9	0	8	8	0%
Ma Eaindra Myint Lwin	ME-EC-10	0	8	8	0%
Ma Nway Nway Kyaw Win	ME-EC-11	0	8	8	0%
Mg Ye Lwin Oo	ME-EC-12	0	8	8	0%
Ma Thandar Oo	ME-EC-13	0	8	8	0%
Ma Su Myat Mon	ME-EC-14	0	8	8	0%
Ma Hay Mar Tun	ME-EC-15	0	8	8	0%
Ma Ei Thu Zar Khin	ME-EC-16	0	8	8	0%
Ma Hteik Htar Lwin	ME-EC-17	0	8	8	0%

Fig 14:- Printing Form for Students' Monthly Report for each Subject

V. CONCLUSION

This system was mainly designed for the research and development work with the help of passive RFID and ZK fingerprint reader. By utilizing this system, the experience of RFID and fingerprint reader system, the database construction, and GUI design using C# language are realized. This system has provided a time saving method of attendance marking compared to the traditional method of attendance system. By using databases, the data is more categorized. Thus, it can be employed in either an academic institution or in organizations. The Graphical User Interface results will be convinced that the system is effective. This application is acting properly and touching to all user requirements. This component can be easily promoted in many other systems. This system was mainly developed the research and development work with the use of passive RFID technology.

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