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An IoT-Based Monitoring System using Fingerprint

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Abstract: *In this study, an IoT-Based Monitoring System using Finger print was developed and implemented. These systems can be used for security monitoring of an environment so that only the authorized persons are allowed to pass or also for attendance measuring purposes. Biometric authentication is the best among security systems because it's unique and personal. These technologies can be used for monitoring of an environment of various organizations so that only the authorized persons are allowed to pass to ensure the security of belongings, switching automation of devices and also for attendance monitoring purposes.*
Key Words: *Biometrics, IoT, Fingerprint, Short Message System (SMS), Global System for Mobile (GSM*

I.INTRODUCTION

In today's modern societies, accepting and meeting the needs of expanded diversity in lifestyles and living conditions has become a quintessential necessity[1].

As technology evolved, everyone has been well exposed in living alongside some state of the art control system especially in securing the general dwelling, remote supervision and mobility. The management of classrooms, halls, offices, and public spaces in any organization and the efficient use of these resources when they are needed are challenging problems. With the rise of IoT, the management of these resources can be automated[2].

A fingerprint identification is used to record the fingerprint of each employee for its attendance and payroll purposes[3]

Smart campus is an integral part of smart connected communities (S&CC) in the global cyber-physical system (CPS). They evolve and interact with their surroundings, optimize efficiency, comfort, safety and more by deeply coupled embedded sensing and networked information processing. Smart campus begins by building automation systems to integrate the facility's core systems, such as HVAC (heating, ventilating, and air conditioning), lighting, power meters, water meters, pumps, etc[4].

Smart homes and assistive technology are become more and more important as the general population ages and as people live longer there will be more need for this kinds of technologies. However with these new complex systems the maintenance and security aspects become more prevalent aspects which can be incorporated into autonomous and biometric systems[5].

As our society becomes electronically connected to form one big global community, it has become necessary to carry out reliable person identification often remotely and through automatic means. Surrogate representations of identity such as passwords (prevalent in electronic access control) and cards (prevalent in banking and government applications) no longer suffice[6].

Home automation is an emerging requirement by common man and commercial users for the reasons of ease of use and security. In countries like India, home automation is slowly paving its way. This paper demonstrates the architecture of home automation using a widely accepted technology – NFC. [7].

Monitoring of establishments is an undeniably global concern everywhere. The elegance of technology solution to a problem (particularly in the area of Security) lies in the fact that it can be applied to provide pre-emptive action rather than a reactionary after the action. The switching of lights and air-conditioning units are also manual and done by the authorized personnel[8].

That is why an IoT-Based Monitoring System using Fingerprint is proposed which helped to improve monitoring system in such establishment. Specifically, it aimed to develop a device that has the following features: a) to record the fingerprint data of the employee b) to operate door lock c) to activates lights d) to monitor through database access and sends SMS notifications to administrators.

The design will significantly improve the way of monitoring the establishment and help the company to progress and to be updated in the world of automation[3].

II.MATERIAL AND METHODS

This chapter presents the methodology to achieve the researcher objectives. More specifically, it discusses the design procedures and the data. Several methodologies will be performing to base from the established objectives. To attain the objectives of the study, the researcher will use the block diagram in developing the IoT-Based Monitoring System using

Fingerprint. Generally, the research focused on the automation of security monitoring system. In the process of implementing the system, various steps including knowledge gathering, circuit designing and coding were done. In this monitoring system initially all the users need to enroll themselves in the system.

Hardware development

The block diagram of the system is shown in figure 1. The fingerprint will be captured through the use of fingerprint sensor which served as the input to the Arduino Microcontroller. If the captured fingerprint is a registered user, the servo motor unlocked the door, the relay turned on the lights and GSM module will send SMS notification to the database administrator containing the name of the user who entered or used the room. Bypass button will served as an exit button and a remote to turn on/off the lights.

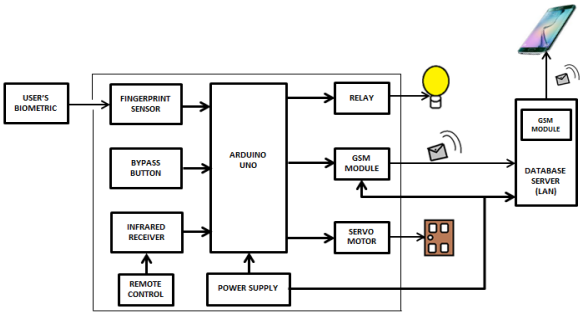

Fig. 1 Block diagram

Software Development

Figure 2 shows the flowchart of the design project presenting the step by step process on how it works. Enrollment or registration comprises of fingerprint capture, character file generation, template file generation, template number generation and storing the template file in device flash memory and then uploads the registered user's character file to MCU which then sends it to database server through SIM900 GSM module. We need to match the new fingerprint with the stored fingerprint templates present in FLASH. Once the users have enrolled themselves then they can access the room when needed. Then system returns with the users registered name, stores the date and time of entry in centralized database server for monitoring. The fingerprint of the user will captured and stored with assigned code and name through the use of a fingerprint sensor. If the captured fingerprint is a registered user, the relay turned on the lights and the servo motor unlocked the door. Bypass button was also included that served as an exit button and a remote to turn on/off the lights.

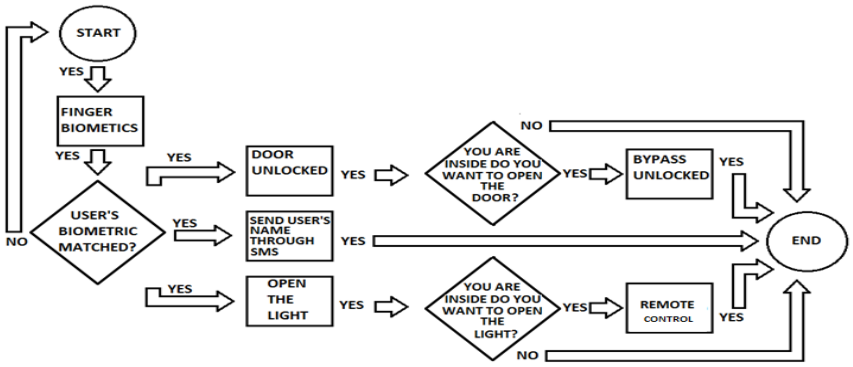

Fig. 2 Flow chart

III.RESULTS AND DISCUSSION

This section focuses on the testing of the objectives: to record the fingerprint data of the employee into the database, to transmit the data through GSM module and to monitor and use the information in the database for management.

A. Recording of fingerprint data of the employee into the microcontroller

Figure 3 shows the fingerprint registration process. The purpose of this test is to register the fingerprints of the employee to the microcontroller of the system. Once the employee is registered, the device can now control its door access and send to the database.

The Employee ID and fingerprint Number determines the order of the employee in the system.

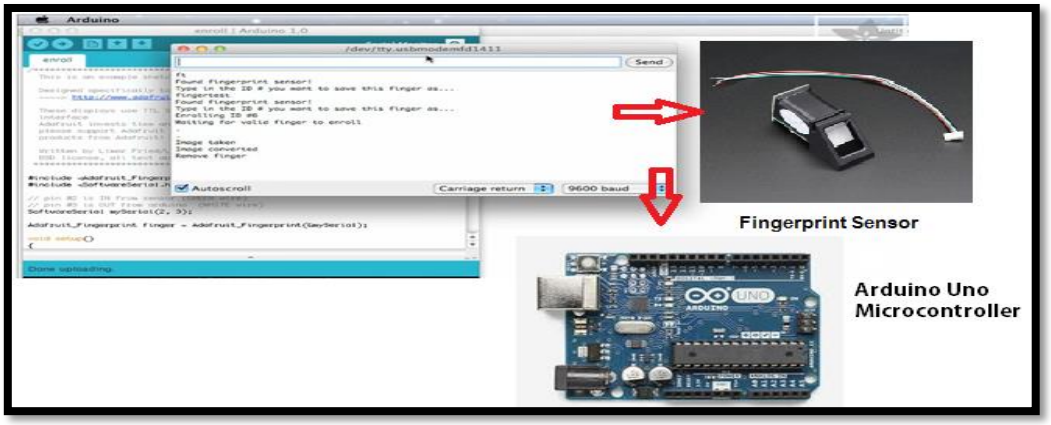

Fig. 3 Fingerprint Registration

B. Transmission of data through GSM technology

The purpose of this test is to transmit the fingerprint data of the employee to the GSM module. The receiver module is connected to the PC in which the program of the design project is installed. The ID determines the order of the employee in the system.

My SQL Database Server

Figure 4 is the program of a An IoT-Based Monitoring System using Fingerprint. The software was designed and developed using VB scripts and My SQL database. *Front line SMS* is a free open source*s oftware* used to distribute and collect information via text messages (SMS). Once the data reaches the database server, that values are received by a VB script. This is provided using a GET request, which will pass the value to the variables present in the VB script. VB script will have four variables, employee_ID, room_ID, date and time. The information will be forwarded to the administrator or any recipient set to the front lines ms software for monitoring. Furthermore, this data were stored in the database and reports can be generated for whatever purposes that the management set too.

Fig. 4 Database and receive message

IV.CONCLUSION

Based on the results of the testing, the monitoring system was implemented on the classroom. The system was able to capture and store fingerprints using Arduino Uno microcontroller of an employee. The servo motor was able to operate the door lock of the room were the device being implemented. It activates lightings using the power relay through remote control when the captured fingerprint matched with the employee and the GSM module transmitted wirelessly. The information was link to the database and used it for monitoring. SMS notification was receive by the administrator/s when an authorized user entered the premises to monitor the classrooms and its electricity usage.

The overall result of the research conducted showed that the developed system improved monitoring through database that store access to such premises and SMS notification.

Therefore, the research conducted affirms that the development of the system may soon help to monitor room usage especially its peripherals inside and for decision-making of the management to improved saving of energy consumption to promote cost cutting especially in government offices.

REFERENCES

[1] *A. P. Esmita Gupta ME Student, "Process Mining A Comparative Study,"Int. J. Adv. Res. Comput. Commun. Eng., vol. 3, no. 11, pp. 17–23, 2014.*

[2] *A. Atabekov, "Internet of things-based smart classroom environment,"Proc. 31st Annu. ACM Symp. Appl. Comput. - SAC '16, pp. 746–747, 2016.*

[3] *J. D. A. Villarama, J. Paul, R. O. Gernale, D. A. N. Ocampo, and J. F. Villaverde, "Wireless Biometric Attendance Management and Payroll System," no. 1, pp. 3–7, 2017.*

[4] *Y. Wang et al., "A Smart Campus Internet of Things Framework," pp. 498–503, 2017.*

[5] *P. W. Matthew, "Biometric implementation in autonomous systems with an emphasis on smart home applicability,"Int. Conf. Inf. Soc. (i-Society 2011), pp. 382–387, 2011.*

[6] *A. K. Jain, S. Pankanti, S. Prabhakar, L. Hong, and A. Ross, "Biometrics : A Grand Challenge."*

[7] *P. Vagdevi and D. Nagaraj, "Home : IOT Based Home Automation Using NFC," pp. 861–865, 2017.*

[8] *D. D. Geralde, M. M. Manaloto, D. E. D. Loresca, J. D. Reynoso, E. T. Gabion, and G. R. M. Geslani, "Microcontroller-based room access control system with professor attendance monitoring using fingerprint biometrics technology with backup keypad access system,"2017IEEE 9th Int. Conf. Humanoid, Nanotechnology, Inf. Technol. Commun. Control. Environ. Manag., pp. 1–7, 2017.*