International Journal of Computer Applications Technology and Research
Volume 11–Issue 07, 296-300, 2022, ISSN:-2319–8656
DOI:10.7753/IJCATR1107.1007

An RFID-Based Students Security Model Using IoT

Bulama H. James
Department of Computer Science
Adamawa State Polytechnic
Yola, Adamawa State. Nigeria

Moses Doka
Department of Computer Science
Adamawa State Polytechnic
Yola, Adamawa State. Nigeria

James Afrifa
Department of Computer Science
Adamawa State Polytechnic
Yola, Adamawa State. Nigeria

Daniel Peter
Department of Computer Science
Adamawa State Polytechnic
Yola, Adamawa State. Nigeria

Abstract: The abduction of school children has increased over the last few years particularly in northern Nigeria, for various reasons such as child labor, ransom, forceful marriages, and suicide bombers. Due to this reason, parents are cautious about sending their children to school. Security issue is a major challenge in secondary school education in north west and north east Nigeria. and it is worrisome that most of the schools do not have adequate security for effective teaching and learning. This study is aimed at improving the security challenges in secondary schools with the use of Radio-Frequency Identification (RFID) reader at all entrances. Security based system using RFID technology for use in Federal Government Girls College, Yola has been proposed for efficient and effective school security to curb the security challenges faced by schools in northern Nigeria.

Keywords: RFID, Security, secondary school, Surveillance, Authentication. Internet of thing

1. INTRODUCTION

Security in secondary schools in north east and north west Nigeria is a growing concern, most especially with the current threat the country is facing owing to insurgency, kidnaping of school children and suicide bombing. School environment is given little or no attention when it comes to security and safety as compare to places like airport, hospitals and national buildings where different level of security are put in place to ensure safety of lives and property. The heartless, incessant attacks on Schools should serve as a tipping point for school security policy restructuring. Squelch (2001) defines a safe school as one that is free from danger and possible harm, where non-educators, educators and learners can work, teach and learn without fear or ridicule, intimidation, harassment, humiliation or violence. A safe school is therefore a healthy school, in that it is physically and psycho-socially safe. The instance of Chibok school girls on the 14th of April, 2014 where book haram took away 250 (Hassan,2014). The Adoption of Dapchi school girls in Yobe state and the kidnapping of FGC school children Yauri in Kebbi state in 2021 make parents uncomfortable sending their children to school.

Over the past few years, an innovative idea “Internet of Things (IoT)” which was first introduced by Kelvin Ashton in the year 1998, has gained huge attention in the academic and industrial sector. In recent years, scientists severely used the term “Internet of Things” to introduce to the general idea of things, especially the objects that are readable, recognizable, locatable, addressable, and controllable via the Internet-whether via RFID, wireless LAN, wide-area network, or other means (Salma et al.,2019).

There are many technologies that support to solve this issue of security. But best among them is RFID (Radio Frequency Identification) as the names suggest it uses the radio waves to identify and track the object or individual. The communication with respect to RFID is wireless using an electromagnetic and electrostatic coupling, where a radio frequency of spectrum is used to communicate. The system is built using RFID card reader and RFID cards/tags. The RFID system consists of RFID tag (or card) and RFID reader. The tag (or card) has a unique ID which is initially stored in the database before assigning it to the user. The user has to place the tag at a specific distance from the RFID reader so as to be identified. The tag consists of a microchip that helps to store unique sequence number that is useful in identifying objects. The microchip includes micro circuitry and an embedded silicon chip. The tag has a rewritable and permanent memory which can be repeatedly programmed by multiple times. RFID tag (or card) is used to exchange data with the RFID reader using the radio waves where the tag is made up of the antenna which receives the radio waves and the other component is an integrated circuit which is mainly to process and store the data. It reads the raw data from the tag and transmits it to the middle-ware for processing. Tags at varying frequencies are interrogated by the reader. The reader is further connected to the computer for processing the data this can be done via a USB connector or any wireless connection.

RFID access control and security based system is one of the solution to address the problem of insecurity in secondary schools in northern Nigeria. This system can also be used to control the movement of authorized users and grant access to valid users only. The ability to uniquely identify each person based on tagged on their ID card make the process easier, faster and secure as compare to conventional method. Students and workers only need to place their ID card on the RFID reader and the system grants them access to the school premises. Whenever an invalid card is use, the alarm turns on and such person is arrested.

2. RELATED WORK

Baha et al. (2016) developed a RFID gate control system to streamline the process of identifying students and other persons wanting to enter into the university campus. The system employed the used of RFID in verifying the identity of staff, students and others seeking access into the university. Kalyani et al. (2016) designed an RFID hostel based security system to provide security in the students hostel, each student have tag cards whose information is stored in a microcontroller, the tag card whose information is not in microcontroller is not allowed to enter in the hostel. If the code get matched with the information that already present in the microcontroller ,the gate open automatically and after few seconds it automatically get closed. RFID is also use in tracking vehicles for security reasons, Archie and Dhaves (2017) proposed a way to locate the current location of the vehicle, Capture the thief's image and shutdown the engine. This system is built upon a mobile application that is used to control the entire system. Additionally Sruthi et al. (2016) has proposed a microcontroller system that informs the owner about the theft. This system is reliable and is cost efficient but does not deal with biometric access. Ravi et al. (2013) developed an RFID based security system that will identify only authorized persons. This security system gives information about the authorized and unauthorized persons. Primarily, the two main components involved are a Radio Frequency Identification system is the Transponder (tags that are attached to the object) and the Interrogator (RFID reader). In this project, when the card is brought near to the RFID module it reads the data in the card and displays on the LCD. The data in the card is compared with the data in the program memory and displays authorized or unauthorized message. The door opens for an authorized person, closes for an unauthorized person; it alerts the persons through a buzzer. The RFID module indicates a buzzer whenever it reads the data from the RFID card.

Automatic Access Control Using Student ID Card Based on RFID Technology was designed by Geoffren (2012), In his study, the automatic access control system evolves to prevent illegal entry of people into a building and preventing unauthorized people from gaining access to certain organization resources. The door locking system functions in real time, the door open as soon as the user scans the tag. The system also stores the login and logout information of the user. Mojares (2013) developed Inotified an SMS and RFID Based Notification System enables parents to monitor the presence of their children at a specific time. The time in and out of every student is generated through scanning of their ID card at the gate followed by sending the SMS notification of the attendance to their parents. Limitation of the system is that there is no acknowledgement between the sender and the receiver.

Alphale. Chaudhari and Bansod (2014) did a study on Automated Toll plaza using RFID and GSM to eliminate wastage of time, fuel, and enhance vehicle security. In their study, the system provided a set of features such as sending a text message to the registered mobile number of the owner, displaying the information about the vehicle on screen, and automatic opening and closing of the barricade. The system reduces time and fuel wastage.

Geofrey (2012) developed an Automatic Access Control Based on RFID technology, the door locking system functions in real time and the door opens automatically any time a valid card is placed on the RFID reader.

DRAWBACKS OF EXISTING SYSTEM:

I. Authentication of students, staff, visitors and parent is done using human efforts.

II. Human guards provide physical security to protect valuables from threats.

III. The present system is vulnerable to attack

IV. There is a possibility that sensitive data could be leaked to untrusted environment.

International Journal of Computer Applications Technology and Research
Volume 11–Issue 07, 296-300, 2022, ISSN:-2319–8656
DOI:10.7753/IJCATR1107.1007

3. WORKING OF THE SYSTEM

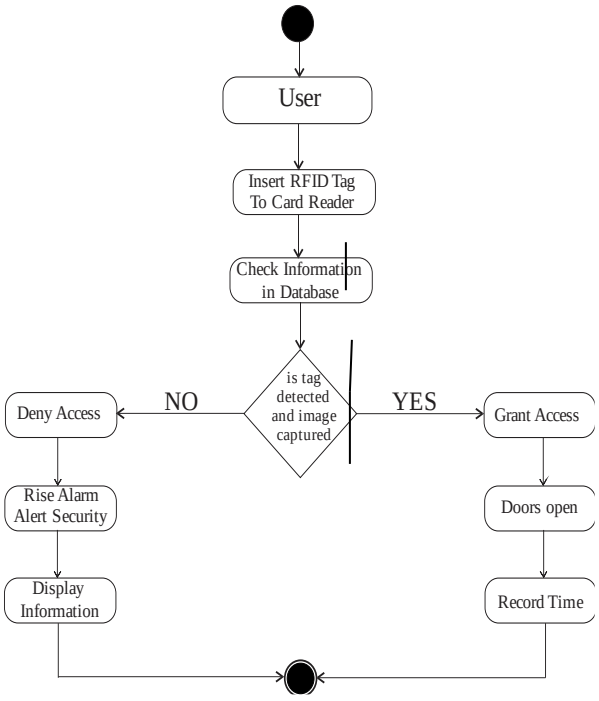

Figure1. Authentication and Surveillance

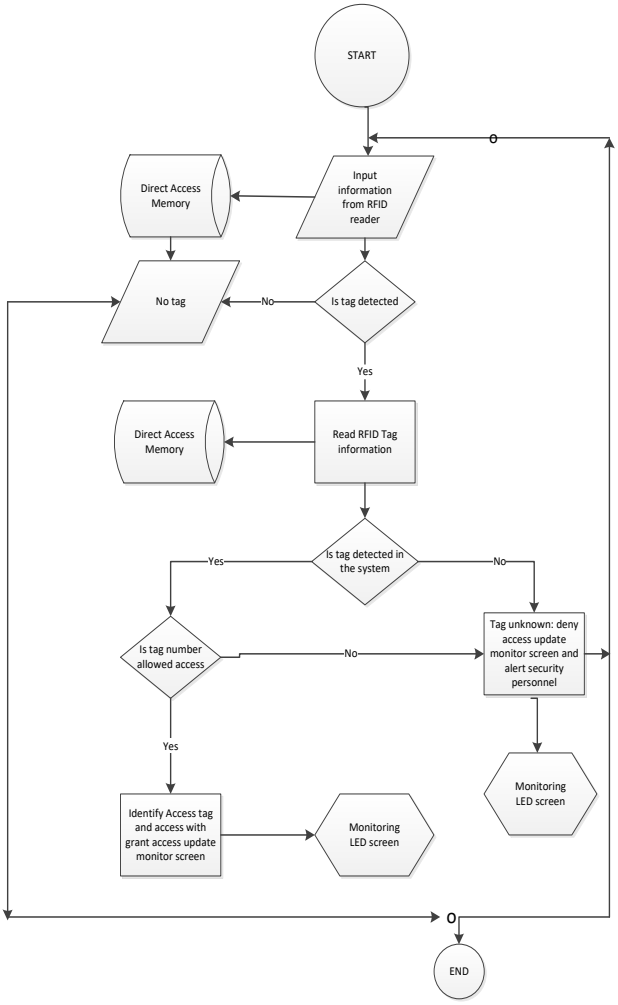

Figure 2. System Security Authentication

4. IMPLANTATION

Figure 3.Admiration log in

International Journal of Computer Applications Technology and Research
Volume 11–Issue 07, 296-300, 2022, ISSN:-2319–8656
DOI:10.7753/IJCATR1107.1007

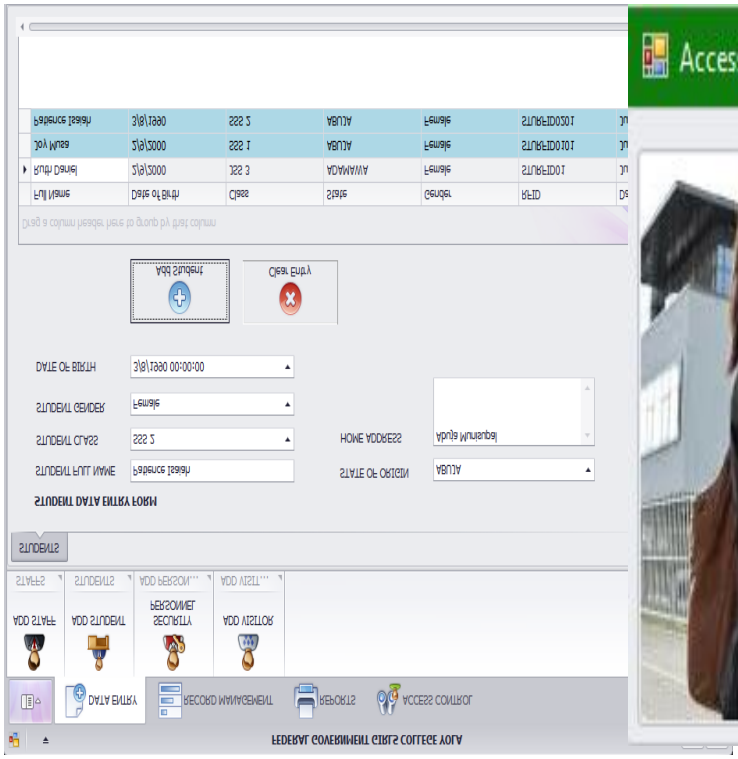

Figure 4. Student, staff, security personnel and visitors registration Form

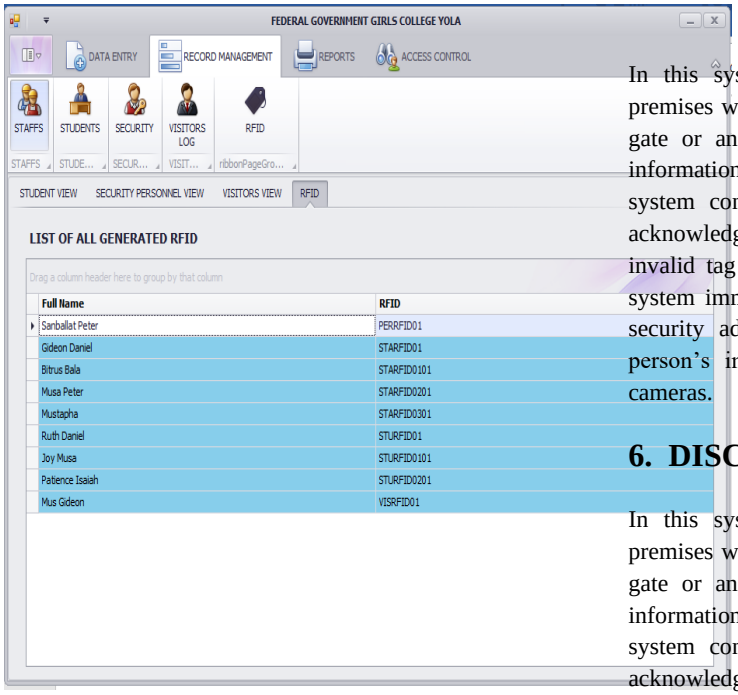

Figure 5. RFID View Registration Form

Figure 6. RFID entrance control and surveillance

5. WORKING

In this system, the user seeking access to the school premises will move the tag close to the RFID reader at the gate or any point of entry then the system checks the information to determine the validity of the tag. Once the system confirms that the tag holder is a valid user it acknowledge the user and grant access to the user. All invalid tag is rejected and the user is denied access, the system immediately sends a security alert message to the security administrator alerting him of an intruder. The person's image is already captured through the CCTV cameras.

6. DISCUSSION AND RESULT

In this system, the user seeking access to the school premises will move the tag close to the RFID reader at the gate or any point of entry, and the system checks the information to determine the validity of the tag. Once the system confirms that the tag holder is a valid user it acknowledge the user and grant access to the user, then the LED screen will be updated. All invalid tag is rejected and the user is denied access, the system immediately sends a security alert message to the security administrator alerting him of an intruder. The person's image is already captured through the CCTV cameras and will be displayed on the LED screen. Security based system for secondary is proposed to identify authorized students, staff, security personals, and visitors to grant them access into and within the school premises. The system was successfully

developed for Federal Government Girls College, Yola Adamawa State Nigeria. The major contribution of the study is the writing of a functional code for a microcontroller to communicate with the RFID device and store authorized person's data. The implementation of the system minimizes the technical human guard limitation and such enhances an improved and secured school environment.

7. CONCLUSION

The paper includes the interfacing of RFID module with PC for authentication, surveillance and intrusion detection using MYSQL database in conjunction with visual studio C# programming language, UML was used to model the design. In this when the user taps the RFID card on the readers, the reader matches information on the tag to that on the database to authenticate user. The system can be installed at the entrances of the school premises to prevent unauthorized persons.

8. ACKNOWLEDGEMENT

We wish to thank all those that have contributed one way or the other for the success of this paper. Our appreciation goes to the principal and staff of Federal Government Girl College Yola, Adamawa State Nigeria.

9. REFERENCES

1. Archie O. Pachica and DhaveS. Barsalote 2017. "Fingerprint Based Anti-Theft System for Vehicle Safety."International Journal of Applied Engineering Research, vol.12 pp. 2680-2687, November 11, 2017.

2. Aphale, T., Chaudhari, R., & Bansod, J. 2014. Automated Toll Plaza Using RFID and GSM. International Journal on Recent and Innovation Trends in Computing and Communication.

3. Baha, B. Y. Jones, E. K. Dodo, K. A. and Okimba, P. 2016. Radio Frequency Identification Gate Control System: Dutse Journal of Pure and Applied sciences 2(1) june 2016 PP 77-80

4. Hassan M.B. 2014. "Boko Haram Insurgency and the spate of Insecurity in Nigeria": Manifestation on governance crisis, Research on Humanities and social science IV (17). P.14

5. Jinaporn, N., Wisasud S., Nakonrat, p and Suriya A. 2008. Security system Against Asset Theft by Using RFID Technology. IEEE 5th International Conference Electrical/Electronic, computer Telecommunication and Information (ECTICON). Volume2, pp 761-764.

6. Geoffrey. C.E., 2012. "Automatic Access Control System using Student's Identification Card based on RFID Technology", Unpublished Thesis Faculty of Electrical Engineering, University of Teknologi Malaysia

7. Kalyani, V.L., Patidar, K. and Sharma, H. 2016. RFID Based Hostel Security System With Real Hardware Implementation. Journal of Management Engineering and Information Technology (JMEIT) Volume -3, Issue- 3, Jun. 2016, ISSN: 2394 – 8124

8. K. Sruthi, S. Ravi, and Y. Kiran 2016. "Anti-Theft Tracking System and Security System for Automobiles using GSM and ARM " IJEDR, Volume 4,Issue 1 2016

9. Ravi, K.S., Varun, G.H., and Pratyusha, P.(2013). RFID Based Security System. International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-2, Issue-5, April 2013

10. Salma N.R., Shikder S.B., Abdulallah M.D., Sazal M.D., Zadididl A,H,. and Maliha M. 2019 'Journal of Computer and Communications, 2019, 7, 21-30 http://www.scirp.org/journal/jcc ISSN Online: 2327-5227 ISSN Print: 2327-521

11. Sivasankaram, V., Muruganand, S. and Azha, P. 2013. Advanced Embedded System Assisted GSM and RFID Based Smart School Management System. International journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering. Vol.2 (Issue 7), ISSN (online), pp 2278-8875.