A Multifactor Student Attendance Management System Using Fingerprint Biometrics and RFID Techniques

A. Ahmed[1], O. M. Olaniyi[2], J. G. Kolo[3], and C. Durugo[4]

Department of Computer Engineering, Federal University of Technology Minna, Nigeria

[1]aliyu.ahmed@futminna.edu.ng, [2]mikail.olaniyi@futminna.edu.ng, [3]jgkolo@gmail.com, [4]durugo@st.futminna.edu.ng

Abstract—**Attendance is an important factor for measuring eligibility, commitment and record keeping for assessment of students and employees. Several automated attendance systems have been developed. These systems are mostly based on single factor template based, which pose a security fault line. This paper presents the development of a multifactor attendance system that employs the flexibility of RFID technology and the security of fingerprint biometrics to manage students' attendance record. Performance evaluation in terms of response time and event using 10 students shows that average execution time of approximately 4.61 seconds could be achieved. Likewise, the system recorded zero percent (0%) of false reject, which tries the system reliability and integrity of the result.**

Keywords- RFID; Fingerprint Biometric; Cryptography; Authentication; Security.

I. INTRODUCTION

In schools and various institutions or organizations, attendance is used for several purposes which include assessment of students' eligibility for term or promotional exams, assessment of staffs' commitment toward their job, and record keeping for employees. Attendance can be defined as being available either at a meeting or a particular place at a given time. It can as well be seen as the recurrence with which a person is available or the numbers of individuals present [1]. This concept can be applied and adopted for recording attendance in companies, industries, schools and so on where people are involved.

Radio Frequency Identification (RFID) is a fast and reliable means of identifying objects whereby identification data are saved in an electronic device known as RFID tags, also called transponders, and the data is retrieved by RFID readers, also called Interrogators, through radio waves. RFID tags are classified into two, namely: Active RFID labels and Passive RFID labels. Active labels have a battery incorporated with the label and transmits signal periodically to the reader. Whereas a passive label is cheaper, smaller, and makes use of radio energy that is transmitted by the reader because it is not self-powered by a battery. This project used passive RFID tags since they are less expensive, flexible, light, and last longer than active tags.

Biometrics means "Life Measurement", but the term is linked up with the function of measurable unique physiological and biological characteristics to identify an individual. Biometric characteristics are considered to be unique to a particular individual. Therefore, use of biometrics in this system provides a good approach against impersonation. This ensures users to verify a person's identity based on "who is he/she?", rather than verifying by what he/she possesses (Example, an ID card), or by "what he/she remembers" example, a password [2]. Selected biometric feature for Human Recognition System includes – DNA, Retina, Voice, fingerprint, iris, facial, and hand.

This paper presents the development of a multifactor authentication system (RFID and Finger Print Biometrics) for students' attendance management system.

The rest of the paper is structured as follows. Section 2 presents some of the related literatures in the field of study. While, Sections 3 presents the system design and implementation. Section 4 presents the system evaluation, while conclusion and recommendation for future work is presented lastly in section 6.

II. RELATED WORKS

A number of related works exist in the application of different methods and principles to effectively monitor the attendance of students. In [2], an attendance management system using Biometrics was developed. The system took attendance of students via a fingerprint module and the records were stored in a database. There was no false identification of students as success rate was over 90%. However, there were no security measures adopted in the database to protect students' data.

Also, [3] implemented a Wireless, Fingerprint Attendance Marking System, which presented a framework using which attendance management can be made automated and on-line. But the system lacks security measures to protect students' data.

In the same vain, [4] implemented a Zigbee Based Student Attendance System Using Local Area Network (LAN) Networking. In this system, students could report their attendance via biometric system and notification of attendance is passed to the administrative