ISSN NO.: xxxx-xxxx

International Journal of Technical Research & Science

REVIEW OF ATTENDANCE MONITORING SYSTEM BASED ON RFID

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ABSTRACT

This paper introduces the distinctive components of RFID technology and focuses on its core competencies: scalability and security. It will be then supplemented by a detailed synopsis of an investigation conducted to test the feasibility and practicality of RFID technology incorporates a review of research done on sample consisting of sixty candidates in the same course and studied the view of various analyzers who have performed the comparison.

Key word-GUI, *RFID, Visual C*

1. Introduction

Radio-frequency identification (RFID) is the wireless use of electromagnetic fields to transfer data, for the purposes of automatically identifying and tracking tags attached to objects. The tags contain electronically stored information. Some tags are powered by electromagnetic induction from magnetic fields produced near the reader. Some types collect energy from the interrogating radio waves and act as a passive transponder. Other types have a local power source such as a battery and may operate at hundreds of meters from the reader. Unlike a barcode, the tag does not necessarily need to be within line of sight of the reader and may be embedded in the tracked object. RFID is one method for Automatic Identification and Data Capture. A plethora of industries has leveraged the benefits of RFID technology for enhancements in sectors like military, sports, security, airline, animal farms, healthcare and other areas. Industry specific key applications of this technology include vehicle tracking, automated inventory management, animal Monitoring, secure store checkouts, supply chain management, automatic payment, sport timing technologies, etc. This paper introduces the distinctive components of RFID technology and focuses on its core competencies: scalability and security. It will be then supplemented by a detailed synopsis of an investigation conducted to test the feasibility and practicality of RFID technology An RFID system primarily comprises of RFID Tags, RFID Reader, Middleware and a Backend database. FID Tags are unique and universally identified by Identification, sequence, governed by the rubrics of EPC global Tag Data Standard2. A tag can either be passively activated by An RFID reader or it can actively transmit RF signals to the reader. The RFID reader, through its antenna, reads the Information stored on these tags when it's in its vicinity. The reader, whose effective range is based on its operational frequency, is designed to operate at a certain frequency. The operational frequency of the reader ranges from 125 KHz –2.4 GHz [5]. The Middleware encompasses all those components that are responsible for the transmission of ermine information from the reader to the backend management systems. The Backend database stores individual tag identifiers to uniquely identify the roles of each tag. The database stores, record entries pertaining to Individual tags and its role in the system application. The RFID system is interdependent on its core components to Achieve maximum efficiency and optimum performance of the application. Due to its high degree of flexibility, the system can be easily adopted for an array of applications ranging from small scale inventory cabinets to multifarious and highly agile supply chain management systems.

1. Components of an RFID System

An RFID system consists of various components that are connected to one another by a dedicated communication path. The individual components are integrated into the system to implement the benefits of RFID solution. The list of components is as follows:

Tags – an object that is attached to any product and uses a unique sequence of characters to define it. It comprises of a chip and the antenna.

Antenna – it is responsible for the transmission of information between the reader and tag using radio waves.

Reader – a scanning device that uses the antenna to realize the tags that are in its vicinity. It transmits signals at a certain frequency.

Middleware – it is a communication interface to interpret and process data being fed by the readers into the information. It takes into account all relevant parts of communication and a software application to represent this information.

Backend database – a repository of informationwhich is designed specifically to the application. The database stores records of data specific to individual tags.

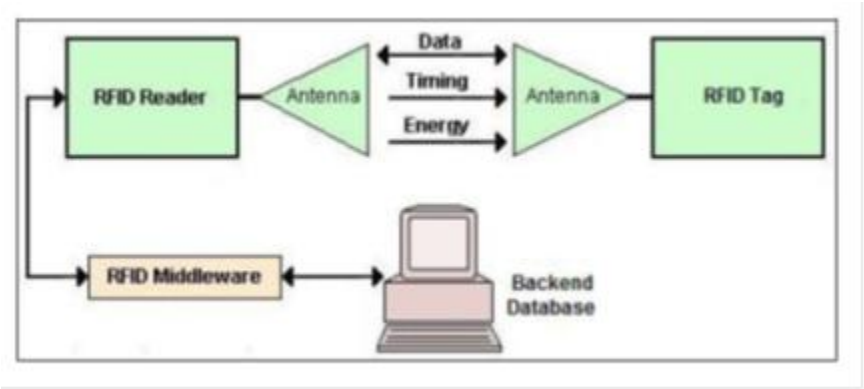

Fig.2.1.Components of RFID System

2. Implementation of RFID System on Monitoring

This paper focuses on the development of an attendance management system using RFID technology to monitor the attendance of a group of students [2]. This paper attempts to evaluate the benefits of implementing RFID technology to an existing system implementation of RFID in student management will provide additional capabilities like high efficiency and overall ease in management of the system [11]. The objectives of the research should be clearly organized to successfullydevelop the system.

The primary aim of the research is to uniquely identify individual students based on their unique tag identifiers [22].The research should shower light on how scalable and efficient the system is [15]. A systematic and serialized approach is required to solve this conundrum. The key characteristics of the application include:

(i) Perform automated attendance

(ii) Generate report of attendees for a particular course

(iii) Error free tag identifier detection

(iv)Easy scalability to incorporate more records

(v) Integrity and security in data storage

The application graphical user interface (GUI) is designed using Visual Basic 6.03 and Microsoft Access is used as the database provider. The Atmel4 AT89S52 is the heart of the system, which is a low-power, high performance CMOS 8-bit microcomputer with 8K bytes of downloadable flash programmable and erasable read only memory [11]. It is operable in two models namely (1) Idle mode and (2) Power down mode [9, 11]. The microcontroller can be programmed with the 80C51 instruction set along with additional standardized features like:

I) 256 bytes of RAM5

II) 32 Input/ Output data lines

III) Three 16bit timers/ counters

IV) SPI6 serial interface

V) Power off flag

The circuit contains a 16x2 LCD7 display panel, which is the output device of the system [17, 19]. It displays the user's information when the stored tag is read by the reader. The serial interface allows connectivity to a local database for data Storage and retrieval [20] the input to the system is the unique tag identifier stored in the RF tag, which is sensed by the reader [21]. The components are mounted on the printed circuit board for interconnectivity between them.

The software module of the middleware processes the rawData fed in by the hardware circuit. The raw data fed into theMiddleware is:

1. Unique tag sequence number

2. Time stamp of data entry

The middleware obtains the unique identifier from the reader and compares it with the list of stored tags. If the identifier sequence is present, then the details are fetched and displayed on the LCD display and the GUI. The identifier is not present then a new record is created with the corresponding timestamp and it is stored in the database. The student will be prompted to fill in the following details:

Name, Course details, Course, Stream and Trimester

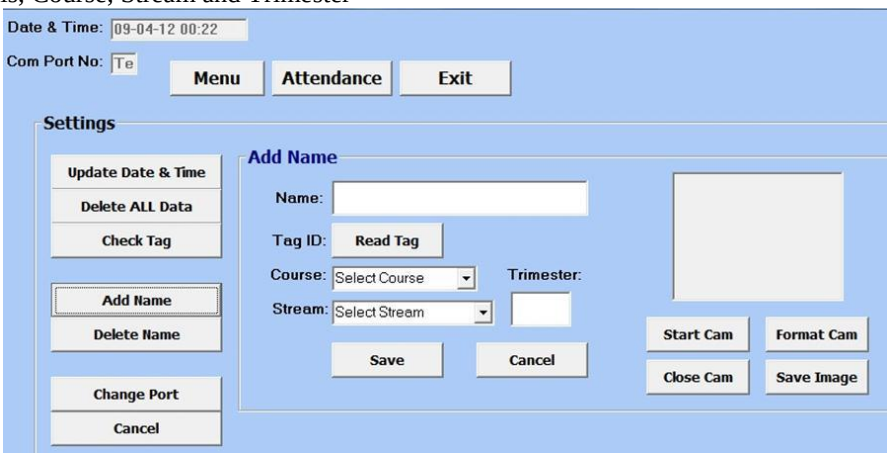

Fig.3.1.GUI form for student detail

The RFID reader used in this research operates at a frequency of 125 KHz with an effective read range of 10cm only [13]. A short read range is preferred so as to maintain the authenticity and security of the attendance being recorded. Data being recorded can be easily exported to a Microsoft Excel file for report generation.

The implementation of RFID technology in the system must be evaluated in a holistic to quantify its success

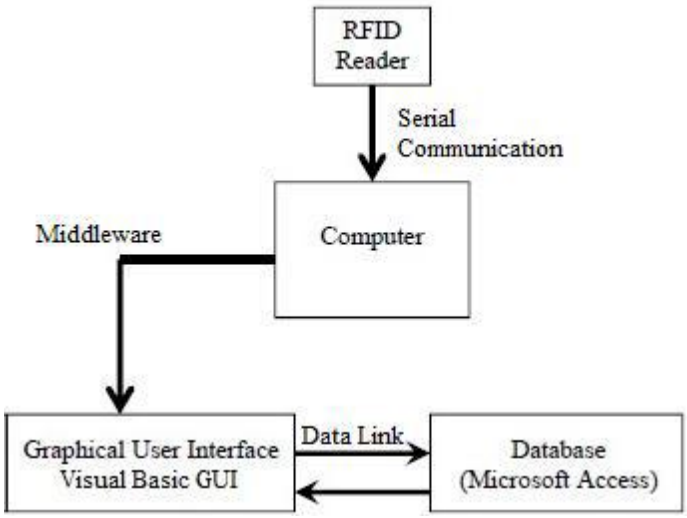

Fig.3.2. Block diagram of RFID system

3. Software Design Consideration

During the development cycle of the system decisions were made on the part of the system to be realized in hardware design and the parts to be implemented in the software. The software is decomposed into modules so that each module can be individually tested as a unit and debugged before the module are integrated and tested as a software system to ensure that the software meets the consideration of the design.

The program is to be written in Microsoft Visual C# programming language for front end and backed programming is based on Microsoft SQL server Relation database Management System or known as RDBMS.
The visual C# enables the rapid application development of Graphical User Interface application and provides the access to a database using tools and creation of ActiveX control and objects.
Programming provides the user with the ability to utilize a combination of visually arranged components and writing additional lines of code for more functionality.
The research was conducted on a sample of 60 students, enrolled in a particular course. The implementation of RFID technology is definitely quickening the entire of the process of recording attendance. The traditional method of recording attendance involves individual manual entry; an arduous and a time consuming process. On average, based on experiment, the total time taken to record the attendance of a class of 60 students with a manual entry method took approximately 10 minutes. This implies that approximately 10 seconds per student was required to record their attendance. This time duration includes visual and written authentication, after which the teacher records the attendance

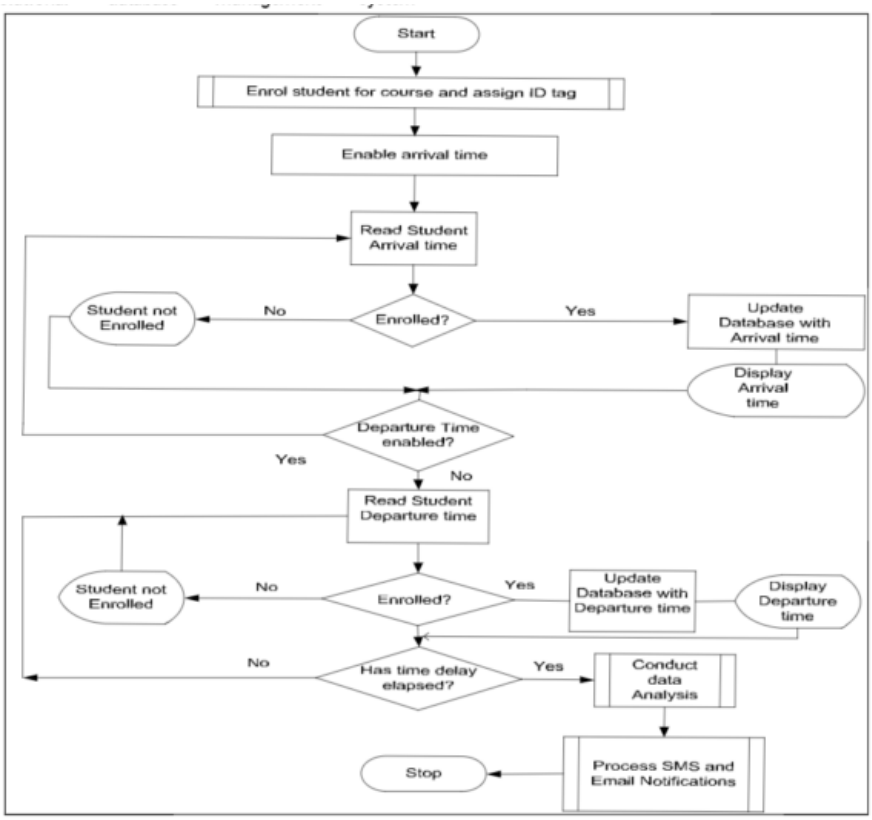

Fig.4.1: Flow chart of mode of operation

4. Result and Conclusion

The paper discusses the feasibility of employing RFID technology and how it is benefactor of improved efficiency at low costs. The last part of the paper highlights one of the numerous practical implementations of RFID technology.
RFID technology definitely promises an increased effectiveness and improved efficiency of business processes
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Method	Total Number of Students			
	1	10	60	100
Manual Entry	10 seconds	100 seconds	600 seconds	1000 seconds
Bar Code	2 seconds	20 seconds	120 seconds	200 seconds
RFID technology	0.2 seconds	2 seconds	12 seconds	20 seconds

Table5.1.Result of Study done by a Researcher

Based on the relationship obtained, a projection for a batch of 100 students is also forecasted.
The main limitations are:

1. By incorporating a facial recognizatiopn application that would serve to further increase the security of the system against breaching
2. Evaluation of the performance of combination of the facial recognition system and thumb print or retina scanning or heartbeat scanners with RFID system leads to problems regarding the monitoring of the system.
   The use of High Frequency RFID tags against the low frequency tag has better flexibility and efficiency

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