CHAPTER ONE

INTRODCTION

1.1 Background to The Study

According to Bevan (1998), attendance management is the act of managing attendance or presence in a working environment to minimize losses due to theft of time for employees. The present world relies on different attendance management methods and activities, ranging from biometric devices. This category is covered by human resource management system. Advanced technology will be used on the market by the best attendance management software. The current technology serving multiple work environments includes the attendance of fingerprints. In addition, mobile applications operating in the same way as traditional attendance management systems. Time clock application is an example. These applications are arrested on three basic rules of attendance: identity, time, and location. Applications for attendance management use GPS and facial recognition methods. Time clocks, time sheets and time tracking software have been used to control attendance using conventional methods, but attendance management goes further in providing a working environment that maximizes and motivates employee attendance (Hasanein, 2018). Using real-time location systems, it is now possible to 'automatically collect attendance data, which also allows cross-linking between attendance data and performance. In all educational campuses, whether university, college or school, attendance management takes place.

Yuru and Liping (2013) found that information technology (IT) played important role in assisting the development of multiple aspects in academic sectors and fields such as student monitoring and management systems. Sunehra and Goud (2016) explained that they are critical to tracking the attendance of students in the school, college and university environment. Because it will help to encourage students to attend on time, improve learning efficiency, increase the level of learning and ultimately boost and improve the level of education. Sayanekar (2016) found that calling the name of the student or signing the student are two traditional ways of tracking student attendance in the classroom and are more time-consuming. According to Arulogun and Olatunbosun (2013), in comparison with traditional method, the emergence of an electronic learning paradigm and the availability of nearly all information on the information superhighway (Internet), students were

less motivated than ever to come to the lecture rooms. Students' laziness, extra social activities that are not important in helping the institution's goals, non-equilibrium in school work, and much more, may prevent students from attending lectures. In most developing countries, lecturers and administrators have come up with different ways to ensure a healthy participation of students and ensure that the interactive relationship between student and lecturer is maintained intact. This has occurred in simple forms such as roll calls in some cases, whereas in more interesting cases formats such as surprise quizzes, extra credit in class, etc. can occur (Fakolujo & Olaniyi, 2013). However, these strategies are time-consuming and laborious because the valuable lecture time that could otherwise be used for lectures is dedicated to other activities (Longe, 2009). In addition to all these challenges, the attendances are sometimes not accurate and the tutor records them manually and is therefore prone to personal errors. A more efficient and effective way to solve this problem arises.

Radio Frequency Identification (RFID) technology is a technology that can solve identification problem and do much more. RFID is an automatic identification method that works as a process by which a person's data is stored on a device called "a tag" containing a microchip with its own unique id. The device is programmed to perform many functions on a different device called an RFID reader at each swipe. The tag transmits and receives information through the microchip to the reader at the time of swipe using its own unique Id. Hence, the RFID is a wireless identification which has two parts that make up the RFID system (RFID Reader and RFID Tag). RFID is not a new technology though but it has advances in other computing fields due to its low cost and which makes it available for easy use in other application areas. In this area, there is a wide range of research and development that seeks to take full advantage of this technology, and many new applications and research areas would continue to emerge in the coming years. As such this project adopted and implemented the use of RFID to take and manage class attendance at Mountain Top University.

1.2 Statement of The Problem

It has been discovered from observation that many universities use traditional method or style to take the attendance of the students present in a class or institution. The students write names and other information on papers in this case. This approach results in the students acting dishonestly as they try to help others who are not present. Likewise, involvement in the traditional approach

results in loss or division of attention. Students who then consume more time, increase requirements for the workforce and duplicate efforts. Hence the need to develop a radio frequency identification system for attendance management.

1.3 Aim and Objectives

The aim of this project is to design and implement a radio frequency identification (RFID) attendance-based management system. The specific objectives are to:

1. collect records of student attendance
2. design and implemented the attendance system using RFID
3 test the system performance with the RFID reader

1.4 Research Methodology

The primary purpose of an RFID system in this project is to detect the presence and absence of student data to be wirelessly transmitted by mobile device, called a tag, which is read by an RFID reader and processed according to the programmed instructions on the personal computer (PC).

1.5 Scope of The Study

The scope of this study is to track, record and maintain the attendance of Mountain Top University students during the class, chapel or examination activities.

1.6 Significance of The Study

Universities, lecturers, admins, students who still use the old styles to mark attendance will benefit from this project. It will assist in monitoring attendance. It will also benefit the school authority as it will only allow accredited students to enter the premises of the school.

1.7 Definition of Terms

Antenna**:** The tag antenna is the conductive element that enables the tag to send and receive data. Passive, low- (135 kHz) and high-frequency (13.56 MHz) tags usually have a coiled antenna that couples with the coiled antenna of the reader to form a magnetic field. UHF tag antennas can be a

variety of shapes. Readers also have antennas which are used to emit radio waves. The RF energy from the reader antenna is "harvested" by the antenna and used to power up the microchip, which then changes the electrical load on the antenna to reflect back its own signals.

Automatic Identification**:** A broad term that covers methods of collecting data and entering it directly into computer systems without human involvement. Technologies normally considered part of auto-ID include bar codes, biometrics, RFID and voice recognition.

Attendance Management System: Attendance management is the act of managing attendance or presence in a work environment to minimize loss due to the theft of employee time.

Frequency**:** The number of repetitions of a complete wave within one second. 1 Hz equals one complete waveform in one second. 1KHz equals 1,000 waves in a second. RFID tags use low high, ultra-high and microwave frequencies. Each frequency has advantages and disadvantages that make them more suitable for some applications than for others.

Memory: The amount of data that can be stored on the microchip in an RFID tag.

Radio Frequency (RFID): It is an automatic identification method that stores the personal data of a RFID reader on a device called a Tag containing a microchip with its own unique Id.

RFID Reader: the device is programmed to perform multiple functions on a different device at each swipe.

CHAPTER TWO

LITERATURE REVIEW

2. 0 Introduction

This chapter discusses the works done in existing literatures and the previous works. It includes radio frequency identification history, hardware, radio frequency identification design and implementation.

2.1 Overview of Radio Frequency Identification (RFID) Technology

The history of radio frequency engineering goes back as far as 1864 when, through Maxwell's equations, James Clerk Maxwell predicts the existence of electromagnetic waves, of which microwaves are a part. Heinrich Hertz (1881) demonstrated the existence of electromagnetic waves by building a device that produced and detected microwaves in the UHF region, the radio frequency chosen by the MIT Auto-ID Center a century and a half later for its passive RFID initiative. As radars were developed in the 1930s, during World War II, military aviation first deployed the technology on a larger scale. Backscattering radios were especially used to identify friendly aircraft Modulating radar signal backscattered. Putting aside military technology, Harry Stockman in 1948 presented the first scientific landmark paper "Communication by Means of Reflected Power." Checkpoint and Sensormatic were established in the late 1960s. Both of these firms developed Electronic Article Surveillance (EAS) systems which basically use passive 1bit RFID tags. EAS is undoubtedly RFID's first and most widespread commercial use that still lives strongly today Northwestern University applied RFID technology to track nuclear materials in the 1970s at Los Alamos Scientific Laboratory. A spin-off from this Los Alamos laboratory, Identronix and other individuals from the same research team founded Aimtech (which later became part of Transcode) In the 1980s, this continued to market automated toll payment systems. That was 915 MHz already, but there was only a limited amount of information on the tag. Another application field of RFID at that time was cattle tracking. The technology was originally used to monitor medicated cows, but use soon expanded. These applications used low frequencies at around 125kHz, enabling small tag size convenient Texas Instruments has launched the TIRIS system on the commercial side, which is still in use today. High frequency technology soon

followed at 13.56 MHz, bringing higher read range and higher data transfer rates. The MIFARE was launched in Europe by Micron (later part of Philips, now NXP). Today MIFARE serves as the basis for NFC and payment cards along with many of its variants. IBM was working on RFID UHF technology in the early 1990s and was making pilots with Walmart. The technology never made it commercial, though. IBM went on to sell Intermec (now part of Honeywell) the related patents). Like other physical signals in nature, radio frequencies are analogous, as is the case with voltage, current, pressure, temperature, and speed. Radio frequency waves and radar radiation connect questioners and tags through "inductive coupling" or "backscatter coupling" as Marlin Mickle will analyze in depth in "HF and UHF resolution and integration". In conjunction with radar technology at the second height, the first RFID applications were Developed World War Identification Friend or Foe (IFF) systems where RF transponders (tags) and interrogators (readers) were designed to detect aircraft that were friendly. An electronic precursor to passive RFID Article surveillance (EAS) systems deployed in retail stores in the 1970s using short-range detection (DSRC) RF technology. Auto-ID RFID technology builds barcode standards for product identification on automated data capture (AIDC). That, together with the standardization of shipping container dimensions, in recent decades has so dramatically reduced transport costs. Companies that took advantage of this technology to optimize their supply chains have become some of the largest companies in the world. Including Wal-Mart, Metro, Target, and Carrefour retailers. The best known and most widespread use of AIDC barcode technology was in consumer products, where in the mid-1970s the Universal Product Code (UPC) was developed to meet the requirements of the grocery industry. Where barcodes are widely used today in these networks, RFID systems are now being installed to accelerate the capture of non-line-of-sight data using RF to read the electronic product code (EPC) on RFID tags. Four main frequency bands, the low frequency range (125 or 134.2 kHz), are commonly used. the high frequency range (13.56 MHz), the ultrahigh frequency range (UHF) (868 to 956 MHz) and microwave frequency range (2.45 GHz or 5.8 GHz) The information stored on the tags are read by a tag reader, this induces the power needed for passive tags to emit their data. The reader can be a handheld device or a fix installed like a reader walk. It receives and supplements the identification data with additional data from local or global databases. The distance from which a tag reader can receive data from the tag scan is very short for passive tags from 0.2 mm up to a few meters to a very long distance (ten meters). RFID applications can be used in different fields.

2.2 The Cassette Attendance System

One of the technology is paper attendance machine, this way of wide applications attendance, it is used by many small businesses. The advantage is easy to use and the cost is low, but the disadvantage is more difficult statistical data, vulnerable data, and more vulnerability. This way is not really suitable for the management of college students, the reason is that data quantity is too large, CARDS and powder ink often appear to be insufficient and paper waste, not environmentally friendly Protection, the failure rate of the punch machine is high. In the form of attendance machine, a credit card. Currently, this attendance method is widely used, many units make this unit's worker card the exclusive, in the form of a credit card during the rush hour. There is also a common way of using universities. Nearly every university is extended to the campus card Id, lending books on campus shopping, etc. In some teaching building dormitory, some university campus card integrated function in attendance set some attendance machine. Use the CARDS way to attend campus. And then use the function of background management, for summary statistical attendance analysis information, etc. B. Fingerprint attendance technology because the fingerprints of each person are unique and unchanged for a lifetime. It is therefore possible to extract the fingerprint to analyze the characteristics, find out the difference between each fingerprint to distinguish between the fingerprints provided. Fingerprint identification technology is the characteristics of fingerprints that are based on analysis and are a technology that seeks to identify individuals. This technology is the premise for a complete database of fingerprints. Today, the identification technology for fingerprints is quite mature and should be used widely in many areas. In practice, we can read equipment with fingerprints, use the analytical tool to analyze fingerprints Characteristics and extract characteristic value of the Treasury fingerprint match and then fingerprint characteristic value Fingerprint attendance has to some extent solved the fraud in attendance phenomenon, but with the appearance of the fingerprint membrane, fingerprint fraud can also be performed.

2.2.1 The Iris Recognition of Attendance Technology

Iris identification is a technology which produces less interference with the person's eyes of biological recognition. It uses quite common components of the camera, and users do not need to contact the machine. It also has the ability to achieve higher performance that matches the template. Iris identification is the most convenient and accurate application in any biological recognition technology.

2.2.2 Barcode Attendance System

The barcode system is a common type of time and attendance system that can increase the efficiency of measuring and tracking employees ' time to a great manual or eliminate attendance. The system therefore provides high levels of accuracy and reliability in tracking the attendance of employees. Furthermore, the cost of installing the system is not too high relative to the cost of payroll or attendance errors. It's easy to implement the barcode system. Each employee is issued with a barcode badge / card. The badge / card is swapped on the time clock to check in or out of the company and the data is captured by the clock. The manager or administrator can download these clock data and then use them to update and maintain time and attendance records. The UPC is a unique 12-digit number assigned to retail merchandise that identifies a product and the vendor. Typically, the Universal Product Code (UPC) on a product appears adjacent to its barcode, the Universal Product Code (UPC) machine-readable representation is always the same for a particular product. The vendor's unique identification number is the first six digits. All the products sold by the vendor will have in their UPCs the same first six digits. The product is identified by the next five digits. The last digit is called the digit of the check This is used to verify the correctness of the UPC for that particular product. Every time UPC is read, usually by a barcode scanner, a calculation is performed. And if the check digit is different from the one calculated, then the computer knows the UPC is wrong.

2.2.3 Magnetic Stripe Attendance System

In the magnetic stripe attendance system, data is encoded in the employee card's magnetic stripe When the card is swiped through the employee's time clock, the card's magnetic stripe information is recorded by the time clock. Barcode use is well-known for the many application-based systems.

But recent advances in RFID technology have stolen the spot light and proved to be the enhanced technology.

2.2.4 Non-Contact Attendance Technology Face Recognition Technology

Face recognition technology is widely used as a processing technology and biological principles of statistics in one body in the regional characteristics analysis algorithm face recognition. Computer image processing technology to extract video portrait feature points and then use the biological statistics principle to establish a mathematical model, i.e. face feature template. Using the completed face feature template with those tested people face like feature analysis, according to the results of the analysis are given to a similar value, through this value can determine whether for the same person. This technology can be used to perform student attendance, accurate attendance, the phenomenon of attendance cheating can be avoided, but attendance costs are too high.

2.2.5 RFID Attendance System

RFID (Radio Frequency Identification) RFID (Radio Frequency Identification) is an automatic non-contact identification technology. Identifying work without human intervention, and it can work in all kinds of bad environmental conditions. RFID technology can identify the moving objects and identify multiple tags, the operation is fast and convenient The basic working principle of RFID technology is the label in the magnetic field and then the reader receives a RF signal, with inductive current energy to send the product's stored information. Passive tags or send tags with signal initiative Active tags, active tags or active tags, Reading is decoding and reading information, sending information about data processing to the central information system. Reading is decoding and reading information, sending information about data processing to the central information system. The working principle of Reader of the radio waves launch specific frequency energy to the Transponder. To drive. Transponder circuit sends out internal data, receiving reader data at this time and sequence, giving the corresponding processing of the application. Based on the RFID monitoring system's mobile phone. The information processing is responsible through the receiver in the mobile phone SIM card for the launch of attendance information function. Based on the RFID attendance system for the second generation Id card. Using the second generation Id card reading card equipment in combination with attendance function, this can be used effectively

in student timekeeping and summary attendance at school. The attendance was also a way of social promotion at the moment, but no use was made on the campus. Another way to attend involves security issues with ID information, so many units are more cautious. Based on the RFID attendance system for the campus card. It is also a highly feasible method of campus attendance that could integrate the campus card into the RFID and then use the wireless attendance campus card (Meghdadi & Aza, 2016).

2.3 Review of Related Work

Kurniali (2014) focuses on the development in an Indonesian higher education institution of a web-based attendance system with RFID. This system's development is motivated by the fact that the attendance records of the students are one of the important elements that reflect their attendance Academic accomplishments. However, such a hassle is caused by the current manual practice implemented. However, senior management is inspired by the development of this system. And through the learning management system, the system can be easily accessed and a report can be generated in real time.

Zainab (2014) reviewed the use of web and windows-based intelligent systems to strengthen academic management using web technologies, biometric and radio frequency identification (RFID) technologies. System (AMS) in a campus to monitor and improve teachers and students' academic performance. A mobile application on campus will enable guardians to monitor the history of the student's movement on campus, e-payments and canteen food choices, class attendance, daily academic attendance. Students will be able to view their class schedules, teacher appointments, e-payment statements, warnings or advertisements, locate their exam halls and search for classrooms.

Isaac (2015) developed and created a web-based management system for electronic attendance and logging using Radio Frequency Identification (RFID) and Short Messaging Service (SMS). Portal enabling users to access data in real time to ensure campus security and intelligent information management. The students will use the RFID card system to check in and out of the main entrance, both to track attendance and to prevent unauthorized access. The LPU-LAGUNA SEALS system

developed in this study has six main functions to use t e student RFID chip as a gate pass in the ID's, to send parents daily SMS about the student entry and exit time record, to efficiently and effectively Manage and monitor student attendance and intranet and internet logs, integrate web-based system portal to access real-time logs and attendance, provide printed and electronic attendance and log files, and implement the system. The researcher applied the Rapid Application Development (RAD) method as the system framework model focusing on the development of the system using prototypes there by flexibly adjusting requirements as needed arises. The system was successfully implemented by utilizing the use of both RFI and SMS technology in the process which resulted in an efficient monitoring and managing of attendance and logs of the students that provides campus security and efficient information management.

Kong (2016) studied the active RFID system and its applications, including two tasks: attendance recording and tracking. The system uses RFID technology to monitor a specific student's whereabouts, enhancing attendance data management and improving management efficiency. The teachers, the RFID-based student database management system has been designed and the RFID tag is attached to the student ID card, which provides data on all students, including the basic student information that includes the student. Simultaneously, it can be used to track student attendance, such as attendance, course, etc. RFID and fingerprint identification systems are used to manage students and equipment in the literature boarding school when students use an RFID card, the RFID identity-based monitoring system Information and fingerprint detection to confirm students ' identity in order to record students ' whereabouts and improve equipment safety. Many schools on board use smart monitoring, both in primary and middle school, and RFID technology is used for every student to apply for an electronic student card, to manage automatically, the attendance of the students and their time to leave. Many university students are applying for a RFID-based card, and one card can handle all kinds of things on campus, such as spending cards, entering the department, etc. The system is designed not only to provide a convenient method for learning and life for students, but also to strengthen the security management of the school.

Meghdadi and Aza (2016) reviewed the ability to use the RFID system to automate and integrate teacher and student attendance in the classroom. One of the most important goals that have been pursued in most systems is to increase efficiency, reduce errors, and improve data entry tasks such as better organizational services. The use of smart tools is therefore one of the most important requirements for a management system to collect complete and accurate data and generate complete information. It is recommended to use new technologies to have smart systems in management and to reduce human errors. The findings of this study show that attendance checks in universities and schools are carried out through the class list and student attendance checks, time and energy needs to be spent so that valuable time is wasted It is therefore essential to use efficient and modern systems, because by designing and implementing the RFID attendance system and replacing the traditional system, time and energy wastes could be avoided and an intelligent and integrated attendance system could be promoted. The system designed includes a number of hours of presence and absence, delays and rush to pay professors ' salaries at the University with their automatic radio frequency identification. This system is intended to bring about changes in this area, and it is entirely economic.

Prandesh (2016) showed different techniques that are used to mark student attendance. Most systems use cards and devices for Radio Frequency Identification (RFID). In these methods, students simply place their RFID card in front of the RFID terminal to mark their attendance. Some papers use biometric techniques to authenticate student attendance and mark student attendance. Students mark fingerprint or iris attendance. For daily attendance, both techniques are very useful. Students must mark attendance on a daily basis while entering campus alone or both when entering and leaving campus. However, it is better for lecture-based attendance if teacher takes personal attendance with the help of handheld device.

Mijanur (2017) conducted an attendance study after the biometric identification of the student is marked. A fingerprint identification system based on identification is used for student identification Fingerprint characteristics are considered the best and fastest way to identify biometrics. These features are safer to use and unique for anyone who does not change his or her

lifetime. Fingerprint recognition is a mature field today, but it is a time-consuming process to still identify individuals from a set of fingerprints. Improving It was very necessary to have a fingerprint identification system for the implementation of large databases, e.g. an institute or a country. The algorithm is used in this project to develop a faster identification system Implemented than any other available on the market today. The proposed fingerprint-based automated attendance system was tested on a student fingerprint database The students of the Department of Computer Science and Mathematics achieved significant results. The proposed system was implemented using the paradigm platform for C# programming. Although the technological development aspects of RFID specified above show that the technology has gone a long way, it still needs to focus primarily on reviving the architectural design of an RFID system with the ability to scale in line with changing needs.

Hasanein (2018) conducted the current study to propose an RFID-based attendance management system (AMS) as well as an academic information service system using RFID technology in addition to the programmable logic Circuit (such as Arduino) and web-based application aimed at managing student attendance recording and providing student absence tracking capabilities, supporting information services Include grading marks for students, daily schedule, lecture and classroom numbers, and other instructions provided by faculty staff. Based on the findings, he proposed attendance and information system is time-efficient and reduces documentation and has no power consumption. In addition, the proposed RFID-based systems for student attendance are also analyzed and criticized with regard to the functionalities and main findings of the systems.

2.4 Summary of the literature reviewed

Radio Frequency Identification (RFID) is an upcoming technology that has recently attracted the interest of the research community because of its extraordinary advantages over other existing technologies for identification and data collection. The format of this chapter is to review the existing RFID literature and explore the issues in the current RFID systems as the technology is still in its acceptance stage. In addition to its stated positive aspects, since the growth of RFID

technology from the 1900s, the technology also bears some concerns or issues. The purpose of this chapter is to further expand the literature on radio frequency identification Academic research and insight into some of the outstanding and critical issues that hamper RFID technology growth. To provide greater visibility and increased product velocity of RFID technology, there is a strong need to address these issues.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter highlights the methodology for designing and implementing a class attendance system using RFID. This section examines two key aspects: RFID tags, RFID reader.

3.1 RFID Tags

RFID tags contain some data and transfer the data when it comes within the reader range. In doing so, the person or object carrying the tag can be identified. The tag can be programmed to mark a student's attendance, track a student record, and after it has been transmitted, the person's data can be accessed on a database. This study is being carried out using Mountain Top University to automate the student attendance register. Each student receives a student card upon enrollment at the institution. The student card contains a picture of the student, the name of the student, the course he / she has enrolled for and an identification number of the student which is a unique ID used to distinguish each student. The tags are designed to work on a frequency of 13.5 MHz where different RFID readers would assess the student cards.

Fig 3.1 RFID Tags

3.2 RFID Reader

Reader is a two-way radio transmitter-receiver that sends a signal to the tag and reads its response.

The MFRC522 RFID reader works at 3.3V and it can use SPI or I2C communication. The library we're going to use to control the RFID reader only supports SPI, so that's the communication protocol we're going to use.

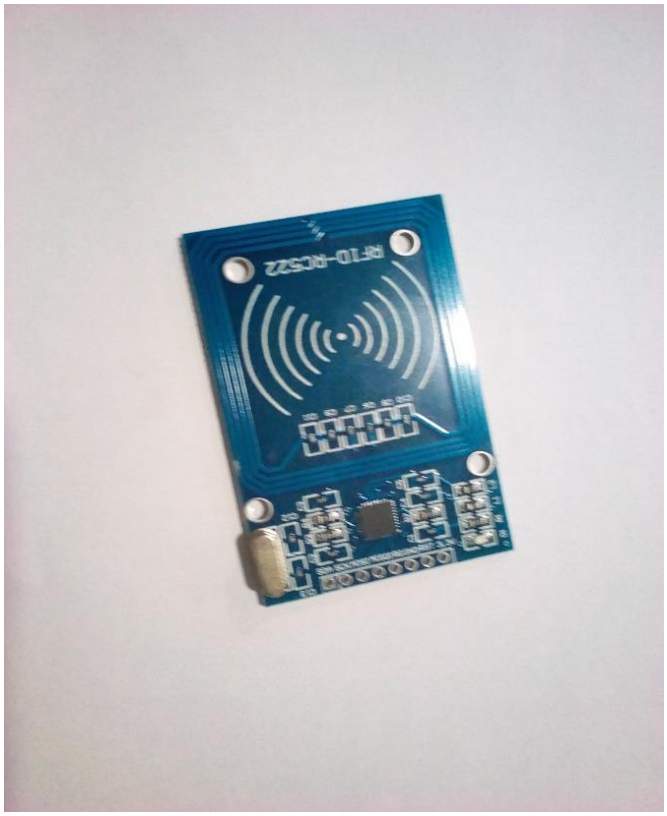


Fig 3.2 RFID Reader

3.2.1 Software Section

Data was collected from the computer's serial port in the software part of the setup and uploaded into the board via Arduino IDE using Embedded C programming language. The general idea was to program all of a student's details from his / her student card (that is, the tag) in a class. Upon entering a classroom, the student scans his / her RFID reader card, the reader collects from the student card the unique card number and sends the data to the RFID middleware (computer) serial port. Using Embedded C programing, the incoming data and the data already uploaded on the

Arduino Uno board are compared. When a match between the two occurs, the received data is entered together with the date into a memory card via the memory card module. All the details of the students are recorded into the memory card, which can be accessed via the computer.

3.2.2 The Diagram of the System

This modular system is designed to collect data, compare and transmit information to the memory layer of the information management system.

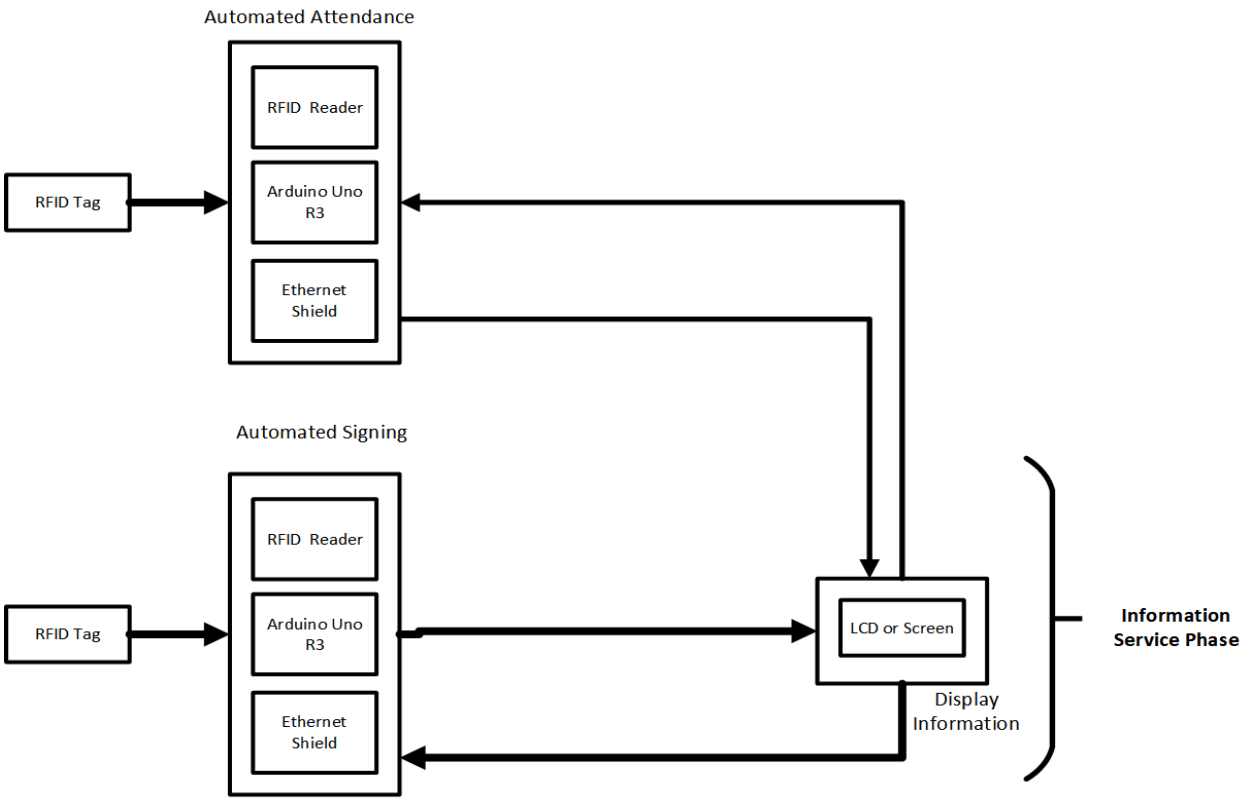


Fig. 3.3. Block diagram for the proposed system architecture Hasanein (2013)

3.3 Hardware Systems

An element of the hardware part called Buzzer gives a constant alarm when the tag installed on the ID card is not stored and relay is not activated. When the student's Ids number is stored in the

memory, the buzzer gives the card once Output and send card code to serial port, but this time the relay is activated and while the card remains under the antenna coverage of the module, the relay remains on and the relay turns off when the card moves away from the module.

3.3.1 Implementation Plan

Based on these requirements, the hardware and software parts are mandatory to establish the implementation process selected, cost, availability, and easy programming. The RFID reader connected to the Arduino Uno microcontroller, an open circuit system connected to the Arduino board by pins and memory device. The Arduino circuit then sends the signal via the SD module to the SD card. The information retrieved from the SD card is archived, keeping student attendance records past and present student records. In order to present student attendance records and for student registration through departmental staff, the proposed system also provides student information by displaying information such as students name, matric number, and lecture time on the Serial Monitor

System Design and Development

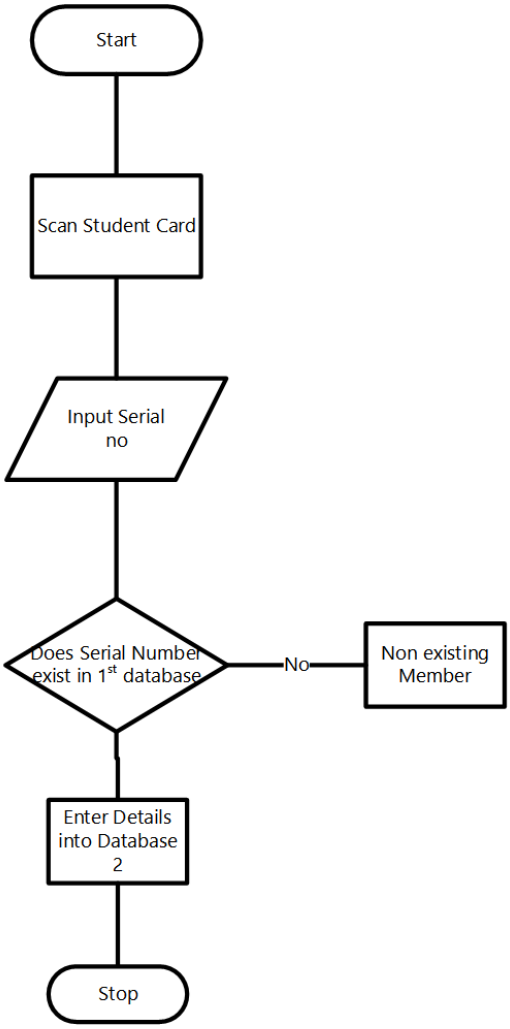


Fig 3.4 System Design and Development

CHAPTER FOUR

IMPLEMENTATION

4.0 Introduction

This section shows the processes for implementing the RFID attendance scheme for students. Implementation

4.1 The Basic Structure

The use of RFID tags leads one to consider the possibility of its use to monitor student attendance in academic organizations. While each student receives a particular RFID tag through the front gate, the serial number of the tag (linked to the registration number of each student) is connected with the introduction of the student database. Therefore, whenever a student uses his / her card, the entries with the time stamp would be entered into the database. The attendance information can therefore be used to generate many kinds of reports such as daily attendance information, monthly, weekly and real-time feedback. The calculation of the attendance score can be automated with the information gathered. The tag is triggered by passing through a field of radio frequency (RF) (in this case 125 kHz) produced by the antenna inserted in the reader box. The program would check whether or not the tag is valid. If the tag is correct, the database program would proceed and the student's attendance would be recorded for the course. If the tag is invalid, the program would notify any pupil that the tag was not registered and would require the user to either provide a valid tag. The starting and end of the lecture in the classroom with extra time limit for the end of the activation of the class to allow each student to record on the reader exit time. Using queries supplied by the application, the lecturer / instructor may call for data about any student. By using active tags, more flexibility and unconscious student communication with the advanced scheme can be accomplished. This would boost the system's general price because of the expense and flexibility of implementing. This RFID participation design implementation utilizes a passive tag, so learners should carry their tags near to the reader for each class (about 10 cm from the reader). The reader would read the tag and the application program records the student’s arrival time and Students will also need to take their tags close to the viewer once they leave the class. Appropriate

short message service is sent to relevant stakeholders with arrival and exit time records. The lecturer can grade the participation results of the student in a specific course at the end of the semester based on certain specific metrics given in the implementation. The chosen metrics could be class attendance frequency, length of class stay, timeliness, etc. The program provides the following output: the name of the student, the number of the tag Id, the department, the course in question and the participation status depending on the metrics indicated. A privileged user can remove learners from their particular tag and reassign the tag to other learners if necessary as shown in the RFID system application control program's Graphical User Interfaces (GUIs)

4.2 How RFID works

How to use Arduino Uno's RFID-RC522 module (RFID reader)? RFID stands for RFID identification and can be used in many apps requiring an identification mechanism on how to use RFID and shows how to use the Arduino Uno RFID-RC522 module. The RFID-RC522 module is an RFID reader capable of reading near-range RFID tags. The reader and tag must have the same frequency to read an RFID tag. The RFID-RC522 module reads only high frequency tags at 13.56 MHz to show the RFID-RC522 module, a straightforward application is programmed to identify a user based on an RFID tag. List of materials: –

Arduino Uno

Jumper wires (female/male)

RFID-RC522 module

RFID tags

How to connect the RFID-RC522 to the Arduino?

Eight buttons are included in the RFID-RC522 module. The pin layout is displayed as suggested by the MFRC522 library documentation (used later in the programming chapter). The module RFID-RC522 operates 3.3V. The 3.3V pin of the module must therefore be linked to the 3.3V of the Arduino. The module could be harmed if it is attached accidentally to the 5V pin of the Arduino.

The components used in the Arduino are the following: RFID-RC522 PIN, ARDUINO UNO PIN, SDA 10, SCK 13, MOSI 11 MISO 12, IRQ UNUSED, GND, RST 9, 3.3V.

4.2.1 SD Card Module

The Micro-SD Card Module is an easy option for information transfer from and to a normal SD card. The pin out can be used directly with Arduino, but also with other microcontrollers. It enables you to add to your project mass storage and information logging. This module has a SPI interface that is compatible with any SD card and is compatible with Arduino UNO 5V or 3.3V power supply. SD module has different apps like information logger, audio, video, graphics. This module will significantly expand Arduino's ability to do with its bad restricted memory.

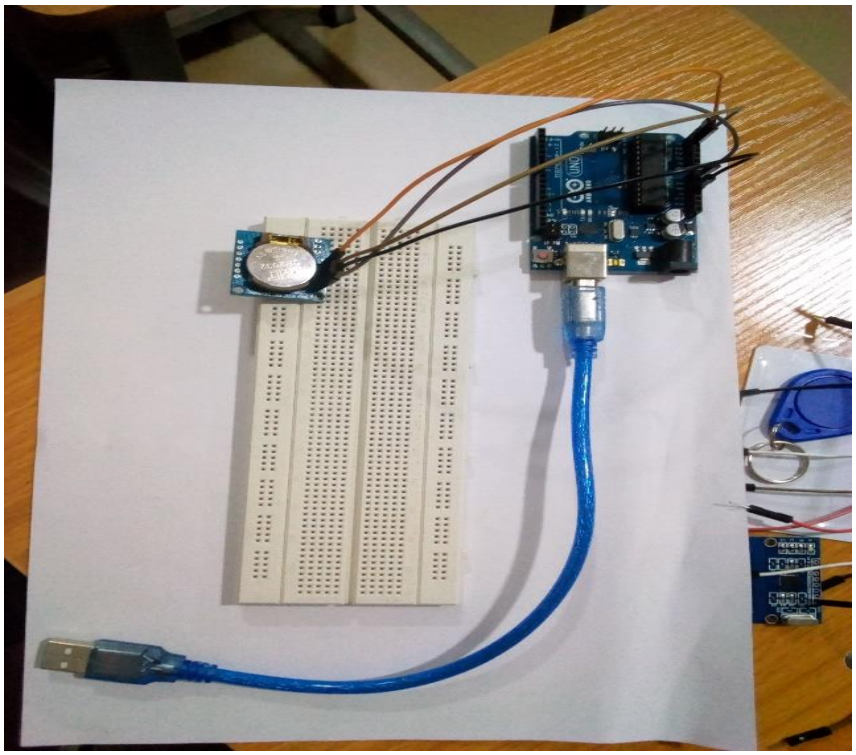


Figure 4.1 The setting up

The RFID reader connected to the Arduino Uno microcontroller, an open circuit system connected to the Arduino board by pins and memory device. The Arduino circuit then sends the signal via the SD module to the SD card. The information retrieved from the SD card is archived, keeping student attendance records past and present student records

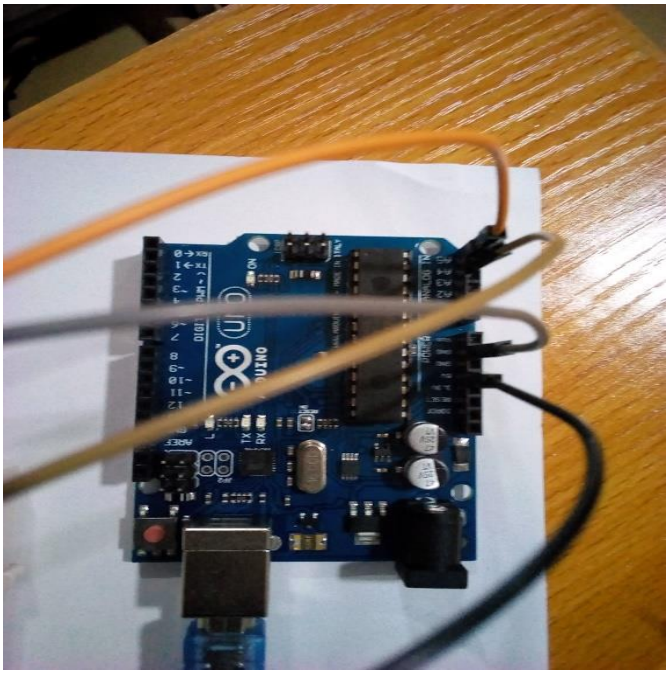


Figure 4.2 Arduino Module

The RFID-RC522 module comes with eight pins (of which seven pins are used for this project). In the following, the pin layout is shown as recommended by the documentation of the MFRC522 library (used later in the programming section). The RFID-RC522 module runs with 3.3V. Therefore, the module's 3.3V pin must be connected to the Arduino's 3.3V. The module might get damaged, if it is accidentally connected to the Arduino's 5V pin.

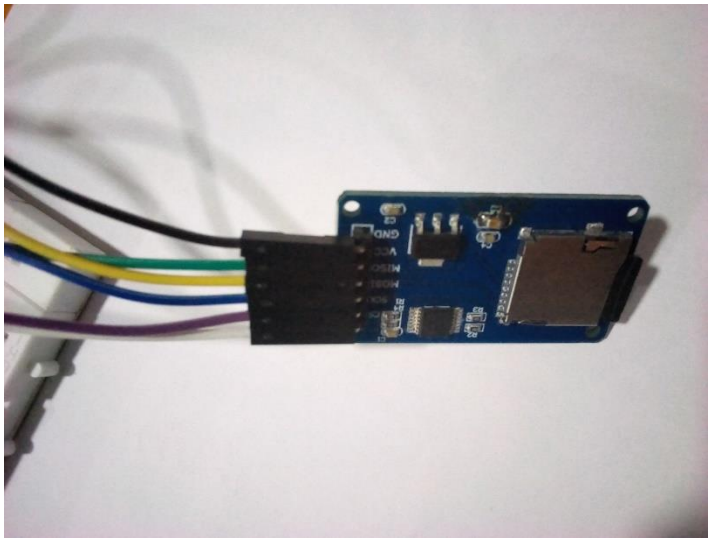


Figure 4.3 SD Card module

The micro- SD Card Module is a simple solution for transferring data to and from a standard SD card. The pin out is directly compatible with Arduino, but can also be used with other microcontrollers. It allows you to add mass storage and data logging to your project.

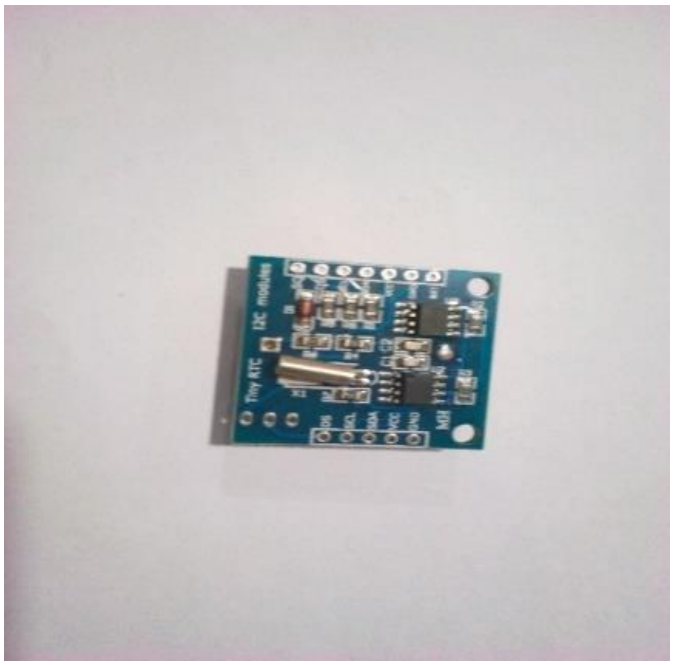


Figure 4.4 RTC ModuleA

RTC modules are simply TIME and DATE remembering systems which have battery setup which in the absence of external power keeps the module running.

Figure 4.5 RTC ModuleB

This keeps the TIME and DATE up to date. So we can have accurate TIME and DATE from RTC module whenever we want.

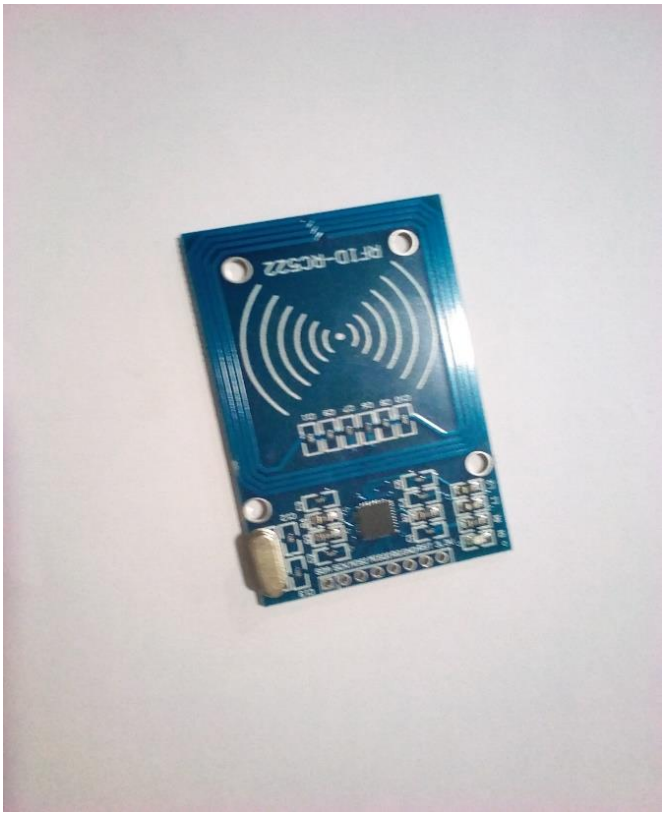


Figure 4.6 RFID reader

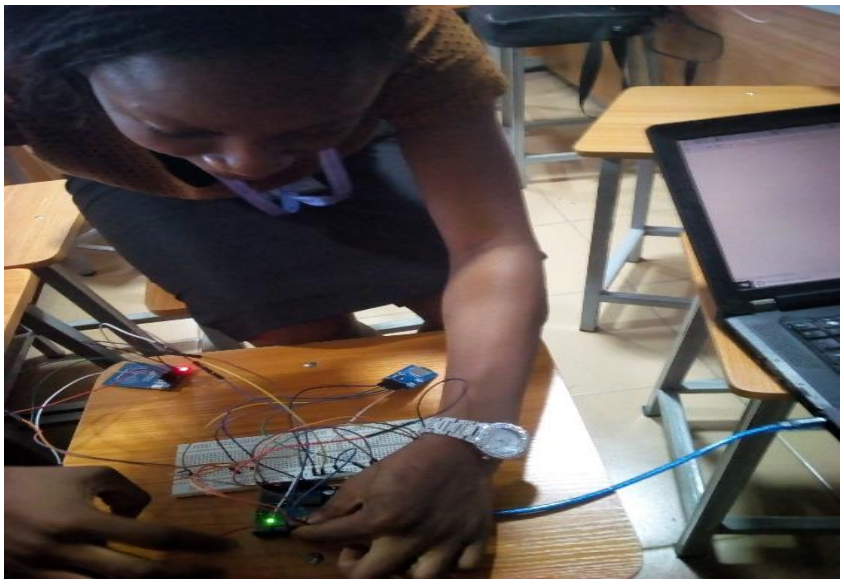
Reader is a two-way radio transmitter-receiver that sends a signal to the tag and reads its response.

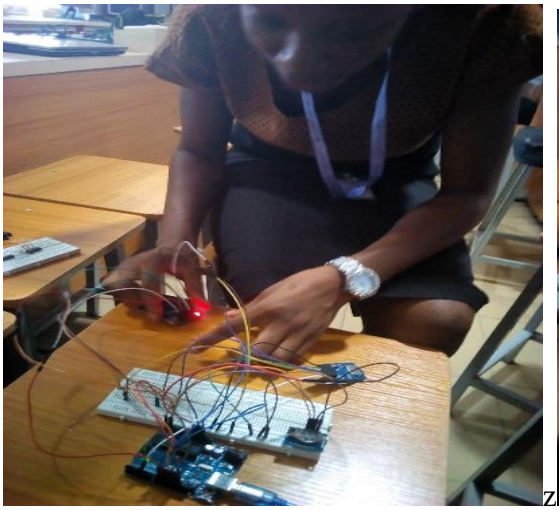
4.3 How to Program The RFID Reader

The code uses a current library of RFID. If the Arduino IDE is used, you can install the library readily by clicking on "Sketch->Include Library->Manage Libraries." Then search for "RFID" and enter the Github Community name "MFRC522." u need to set up the library itself, a SPI link, as well as the reader to get the RFID reader running. Fortunately, the library supervises two very convenient tag reading feature The first features enable detection of the presence of an RFID tag / card. The second feature reads identification of the RFID tag. A for-loop is used to iterate through the tag in the following code. A single byte is read and printed in each iteration as a hexadecimal value that can be used to define users when each user has a distinct RFID tag. The source codes are shown in Appendix I

4.4 Circuit Diagram & Connection

The circuit used by Arduino with Data Logger for this RFID RC522 Based Attendance System ‘project is shown in the following circuit schematics. There are 3.3V and 5V appliances in this circuit, make sure you wire them properly. Also, check the recommended voltage before powering the circuit if you are using separate modules. Wire one module at a moment and if necessary, follow the pinout tables





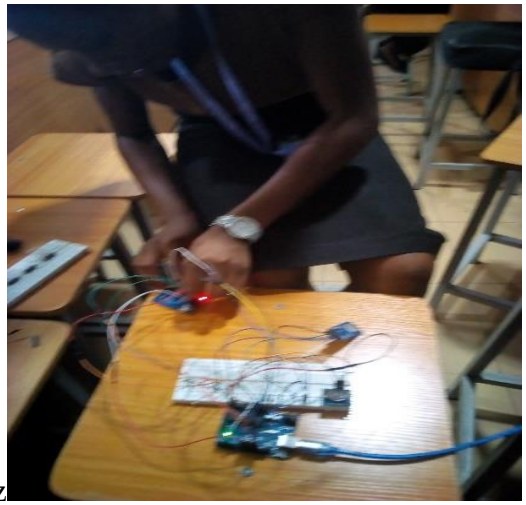


Figure 4.7: Working Illustration of The RFID Card

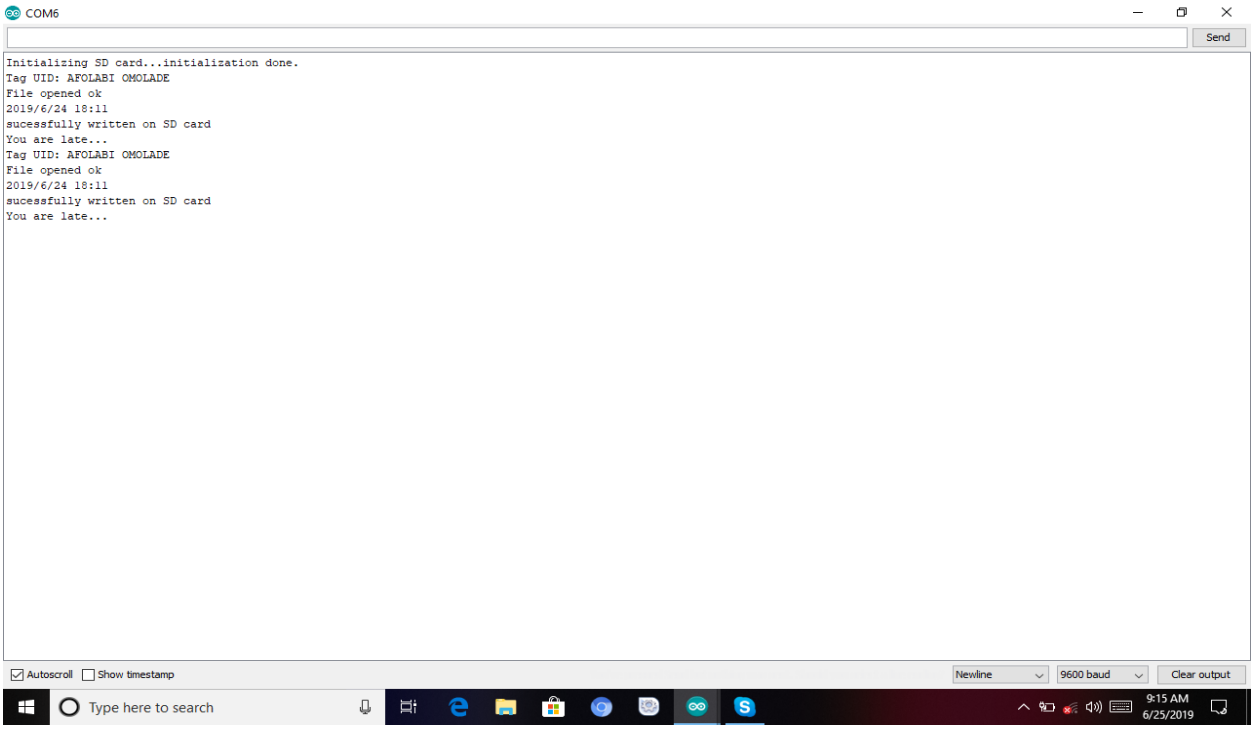


Figure 4.8 The result

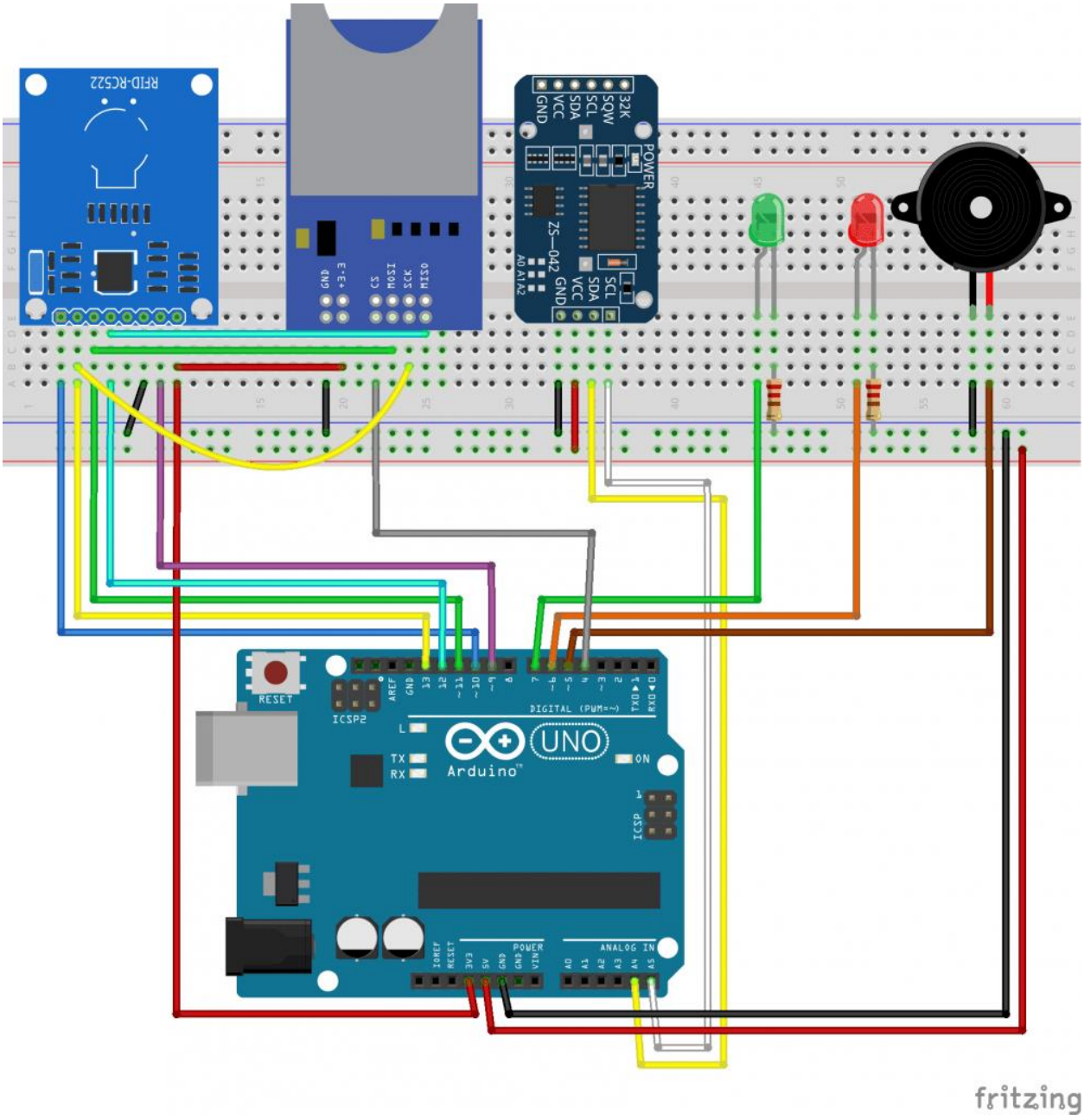


Figure 4.9 The block diagram

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary

This research was divided into five sections, the first section examined the notion of RFID and its use in monitoring, and the first section also highlighted the study's rationale. The second chapter examined the historical origin of RFID, the various kinds of RFID tags and the anticipated results. The section also examined the working principle of RFID tags and, in particular, how they were used for attendance schemes in their respective apps. The third section introduced a methodology for designing and implementing the RFID attendance scheme, while the fourth section introduced the RFID attendance scheme, ensuring optimal production. The fifth section summarizes and concludes the survey and makes suggestions for improvement and improvement possible.

5.2 Conclusion

The need to introduce the RFID attendance scheme and replace the old one with a fresh scheme in order to prevent waste of time and energy in order to optimize class time and integrate information with intelligent universities and colleges is relevant. System was intended for C+ RFID and satisfied the requirements of the sample. This study's primary goal was to record student attendance using RFID tags. To record their attendance, each student is given his / her approved tag to swipe over the reader. In schools, as it is accomplished manually, time is wasted in roll calls. Authorized students are provided an RFID tag in this suggested scheme. This tag includes a built-in circuit incorporated Used to store, process data by modulating and demodulating the transmitted radio frequency signal. The information stored in this card is therefore referred to as the person's identity attendance. Upon placing the card in front of the RFID card reader, the student reads the information and checks it with the information stored from 8051 households in the microcontroller. If the information fits in, then a message appears on the LCD confirming the

student's admission and shows a message denying participation. You can retrieve the status of a student participation from this scheme by clicking the interfaced status button to the microcontroller. Therefore, as all student attendance is stored directly in the database, a lot of time is saved.

5.3 Recommendation

This present scheme can be used in different areas like meal card scheme. In this study to guide potential scientists, RFID systems expenses were assessed and contrasted with meal card fees. In this research, however, this portion of the scheme was not regarded. This system can be used in the future to centralize online university relationships so that they can be controlled by the central office and communicate online through the Internet.

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APPENDIX I

RFID Reader Codes

```
#include <MFRC522.h> // for the RFID
#include <SPI.h> // for the RFID and SD card module
#include <SD.h> // for the SD card
#include <RTClib.h> // for the RTC

// define pins for RFID
#define CS_RFID 10
#define RST_RFID 9
// define select pin for SD card module
#define CS_SD 4

// Create a file to store the data
File myFile;

// Instance of the class for RFID
MFRC522 rfid(CS_RFID, RST_RFID);

// Variable to hold the tag's UID
String uidString;
String uname;

// Instance of the class for RTC
RTC_DS1307 rtc;

// Define check in time
const int checkInHour = 9;
const int checkInMinute = 5;

//Variable to hold user check in
int userCheckInHour;
int userCheckInMinute;
```

```
// Pins for LEDs and buzzer
const int redLED = 6;
const int greenLED = 7;
const int buzzer = 5;

void setup() {

  // Set LEDs and buzzer as outputs
  pinMode(redLED, OUTPUT);
  pinMode(greenLED, OUTPUT);
  pinMode(buzzer, OUTPUT);

  // Init Serial port
  Serial.begin(9600);
  while(!Serial); // for Leonardo/Micro/Zero

  // Init SPI bus
  SPI.begin();
  // Init MFRC522
  rfid.PCD_Init();

  // Setup for the SD card
  Serial.print("Initializing SD card...");
  if(!SD.begin(CS_SD)) {
    Serial.println("initialization failed!");
    return;
  }
  Serial.println("initialization done.");

  // Setup for the RTC
  if(!rtc.begin()) {
    Serial.println("Couldn't find RTC");
    while(1);
```

```
  }
  else {
    // following line sets the RTC to the date & time this sketch was compiled
    rtc.adjust(DateTime(F(__DATE__), F(__TIME__)));
  }
  if(!rtc.isrunning()) {
    Serial.println("RTC is NOT running!");
  }
}

void loop() {
  //look for new cards
  if(rfid.PICC_IsNewCardPresent()) {
    readRFID();
    logCard();
    verifyCheckIn();
  }
  delay(10);
}

void readRFID() {
  rfid.PICC_ReadCardSerial();
  Serial.print("Tag UID: ");
  uidString = String(rfid.uid.uidByte[0]) + " " + String(rfid.uid.uidByte[1]) + " " +
    String(rfid.uid.uidByte[2]) + " " + String(rfid.uid.uidByte[3]);
    if (uidString = "2B 3F 9A 22") {
      uname = "Afolabi Omolade";
      Serial.println(uname);
    }
     else {
      Serial.println("USER NOT RECOGNISED");
     }

  // Sound the buzzer when a card is read
```

```
  tone(buzzer, 2000);
  delay(100);
  noTone(buzzer);

  delay(100);
}

void logCard() {
  // Enables SD card chip select pin
  digitalWrite(CS_SD,LOW);

  // Open file
  myFile=SD.open("DATA.txt", FILE_WRITE);

  // If the file opened ok, write to it
  if (myFile) {
    Serial.println("File opened ok");
    myFile.print(uname);
    myFile.print(", ");

    // Save time on SD card
    DateTime now = rtc.now();
    myFile.print(now.year(), DEC);
    myFile.print('/');
    myFile.print(now.month(), DEC);
    myFile.print('/');
    myFile.print(now.day(), DEC);
    myFile.print(',');
    myFile.print(now.hour(), DEC);
    myFile.print(':');
    myFile.println(now.minute(), DEC);

    // Print time on Serial monitor
    Serial.print(now.year(), DEC);
```

```
    Serial.print('/');
    Serial.print(now.month(), DEC);
    Serial.print('/');
    Serial.print(now.day(), DEC);
    Serial.print(' ');
    Serial.print(now.hour(), DEC);
    Serial.print(':');
    Serial.println(now.minute(), DEC);
    Serial.println("sucessfully written on SD card");
    myFile.close();

    // Save check in time;
    userCheckInHour = now.hour();
    userCheckInMinute = now.minute();
  }
  else {
    Serial.println("error opening data.txt");
  }
  // Disables SD card chip select pin
  digitalWrite(CS_SD,HIGH);
}

void verifyCheckIn(){
  if((userCheckInHour < checkInHour)||((userCheckInHour==checkInHour) && (userCheckInMinute <=
checkInMinute))){
    digitalWrite(greenLED, HIGH);
    delay(2000);
    digitalWrite(greenLED,LOW);
    Serial.println("You're welcome!");
  }
  else{
    digitalWrite(redLED, HIGH);
    delay(2000);
    digitalWrite(redLED,LOW);
```

```
    Serial.println("You are late...");
  }
}

}
```

Time Code in Embedded C Language

```
// include the SD library:

#include <SPI.h>

#include <SD.h>


// set up variables using the SD utility library functions:

Sd2Card card;

SdVolume volume;

SdFile root;

// change this to match your SD shield or module;

// Arduino Ethernet shield: pin 4

// Adafruit SD shields and modules: pin 10

// Sparkfun SD shield: pin 8

// MKRZero SD: SDCARD_SS_PIN

const int chipSelect = 4;


void setup() {

 // Open serial communications and wait for port to open:
```

```
Serial.begin(9600);
  while (!Serial)
  ; // wait for serial port to connect. Needed for native USB port only
 }
 Serial.print("\nInitializing SD card...");
 // we'll use the initialization code from the utility libraries
  // since we're just testing if the card is working!
 if (!card.init(SPI_HALF_SPEED, chipSele
Serial.println("initialization failed.
 Serial.println("* is a card inserted?"
  Serial.println("* is your wiring correct?");
Serial.println("* did you change the chipSelect pin to match your shield or module?");
while (1);
 } else
 Serial.println("Wiring is correct and a card is present.")
 // print the type of card
Serial.println();
Serial.print("Card type:");
switch (card.type()) {
  case SD_CARD_TYPE_SD1:
     Serial.println("SD1");
     break;
   case SD_CARD_TYPE_SD2:
     Serial.println("SD2");
```

```
    break;
  case SD_CARD_TYPE_SDHC:
    Serial.println("SDHC");
    break;
  default:
    Serial.println("Unknown");
}

// Now we will try to open the 'volume'/'partition' - it should be FAT16 or FAT32
if (!volume.init(card)) {
  Serial.println("Could not find FAT16/FAT32 partition.\nMake sure you've formatted the card");
  while (1);
}

Serial.print("Clusters:          ");
Serial.println(volume.clusterCount());
Serial.print("Blocks x Cluster:  ");
Serial.println(volume.blocksPerCluster());

Serial.print("Total Blocks:      ");
Serial.println(volume.blocksPerCluster() * volume.clusterCount());
Serial.println();

// print the type and size of the first FAT-type volume
```

```
  uint32_t volumesize;
  Serial.print("Volume type is:    FAT");
  Serial.println(volume.fatType(), DEC);

  volumesize = volume.blocksPerCluster();    // clusters are collections of blocks
  volumesize *= volume.clusterCount();       // we'll have a lot of clusters
  volumesize /= 2;                           // SD card blocks are always 512 bytes (2 blocks are 1KB)
  Serial.print("Volume size (Kb):  ");
  Serial.println(volumesize);
  Serial.print("Volume size (Mb):  ");
  volumesize /= 1024;
  Serial.println(volumesize);
  Serial.print("Volume size (Gb):  ");
  Serial.println((float)volumesize / 1024.0);

  Serial.println("\nFiles found on the card (name, date and size in bytes): ");
  root.openRoot(volume);

  // list all files in the card with date and size
  root.ls(LS_R | LS_DATE | LS_SIZE);
}

void loop(void)
}
```

Scanning disc and Time code

```
#include <MFRC522.h> // for the RFID
#include <SPI.h> // for the RFID and SD card module
#include <SD.h> // for the SD card
#include <RTClib.h> // for the RTC

// define pins for RFID
#define CS_RFID 10
#define RST_RFID 9
// define select pin for SD card module
#define CS_SD 4

// Create a file to store the data
File myFile;

// Instance of the class for RFID
MFRC522 rfid(CS_RFID, RST_RFID);

// Variable to hold the tag's UID
String uidString;
String uname;

// Instance of the class for RTC
RTC_DS1307 rtc;

// Define check in time
const int checkInHour = 9;
const int checkInMinute = 5;

//Variable to hold user check in
```

```
int userCheckInHour;
int userCheckInMinute;

// Pins for LEDs and buzzer
const int redLED = 6;
const int greenLED = 7;
const int buzzer = 5;

void setup() {

  // Set LEDs and buzzer as outputs
  pinMode(redLED, OUTPUT);
  pinMode(greenLED, OUTPUT);
  pinMode(buzzer, OUTPUT);

  // Init Serial port
  Serial.begin(9600);
  while(!Serial); // for Leonardo/Micro/Zero

  // Init SPI bus
  SPI.begin();
  // Init MFRC522
  rfid.PCD_Init();

  // Setup for the SD card
  Serial.print("Initializing SD card...");
  if(!SD.begin(CS_SD)) {
    Serial.println("initialization failed!");
    return;
  }
  Serial.println("initialization done.");

  // Setup for the RTC
  if(!rtc.begin()) {
```

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    Serial.println("Couldn't find RTC");
    while(1);
  }
  else {
    // following line sets the RTC to the date & time this sketch was compiled
    rtc.adjust(DateTime(F(__DATE__), F(__TIME__)));
  }
  if(!rtc.isrunning()) {
    Serial.println("RTC is NOT running!");
  }
}

void loop() {
  //look for new cards
  if(rfid.PICC_IsNewCardPresent()) {
    readRFID();
    logCard();
    verifyCheckIn();
  }
  delay(10);
}

void readRFID() {
  rfid.PICC_ReadCardSerial();
  Serial.print("Tag UID: ");
  uidString = String(rfid.uid.uidByte[0]) + " " + String(rfid.uid.uidByte[1]) + " " +
    String(rfid.uid.uidByte[2]) + " " + String(rfid.uid.uidByte[3]);
    if (uidString = "2B 3F 9A 22") {
      uname = "Afolabi Omolade";
      Serial.println(uname);
    }
     else {
      Serial.println("USER NOT RECOGNISED");
     }
```

```
  // Sound the buzzer when a card is read
  tone(buzzer, 2000);
  delay(100);
  noTone(buzzer);

  delay(100);
}

void logCard() {
  // Enables SD card chip select pin
  digitalWrite(CS_SD,LOW);

  // Open file
  myFile=SD.open("DATA.txt", FILE_WRITE);

  // If the file opened ok, write to it
  if (myFile) {
    Serial.println("File opened ok");
    myFile.print(uname);
    myFile.print(", ");

    // Save time on SD card
    DateTime now = rtc.now();
    myFile.print(now.year(), DEC);
    myFile.print('/');
    myFile.print(now.month(), DEC);
    myFile.print('/');
    myFile.print(now.day(), DEC);
    myFile.print(',');
    myFile.print(now.hour(), DEC);
    myFile.print(':');
    myFile.println(now.minute(), DEC);
```

```
    // Print time on Serial monitor
    Serial.print(now.year(), DEC);
    Serial.print('/');
    Serial.print(now.month(), DEC);
    Serial.print('/');
    Serial.print(now.day(), DEC);
    Serial.print(' ');
    Serial.print(now.hour(), DEC);
    Serial.print(':');
    Serial.println(now.minute(), DEC);
    Serial.println("sucessfully written on SD card");
    myFile.close();

    // Save check in time;
    userCheckInHour = now.hour();
    userCheckInMinute = now.minute();
  }
  else {
    Serial.println("error opening data.txt");
  }
  // Disables SD card chip select pin
  digitalWrite(CS_SD,HIGH);
}

void verifyCheckIn(){
  if((userCheckInHour < checkInHour)||((userCheckInHour==checkInHour) && (userCheckInMinute <=
checkInMinute))){
    digitalWrite(greenLED, HIGH);
    delay(2000);
    digitalWrite(greenLED,LOW);
    Serial.println("You're welcome!");
  }
  else{
    digitalWrite(redLED, HIGH);
```

```
    delay(2000);
    digitalWrite(redLED,LOW);
    Serial.println("You are late...");
  }
}
=`
```