STUDENT ATTENDANCE USING RFID SYSTEM

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ABSTRACT

There has been a rising interest in a secure framework that must be solid and quick to react to enterprises and organizations. RFID (Radio Frequency Identification) is one of the solid and quick methods for recognizing any material article. Their huge favorable position is that they can read wirelessly, contain more data than standardized identification and progressively hearty in nature and in view of non-observable pathway innovation. RFID tags can read in any natural testing conditions where others read innovation likes barcode or optical card reader useless. In this research, we purposed a secure system that provides information about the attendance of students. In this framework when the card brought close to the RFID module, it reads the card data and its contrasts and the information in the program memory and showcases the corresponding name to that card. The attendance is saved in a text file on the SD card then it converted to an excel sheet on the computer.

Keywords--- Attendance system, Radio frequency identification technology, SD Card.

1. Introduction

Radio-frequency identification (RFID) is a technology that uses radio waves to transfer data from an electronic tag, called RFID tag or label, connected to an object, via a reader for the cause of identifying and monitoring the object. Radio frequency identification (RFID) is a matured technological knowhow that accommodates the use of electromagnetic or electrostatic coupling in the radio frequency portion of the electromagnetic spectrum to uniquely become aware of an object, animal, or person. RFID chips include a radio transmitter that emits a coded identification number when queried through a reader device. Some RFID tags can be examined from various meters away and beyond the line ofsight of the reader. The utility ofbulk reading allows an almost-parallel analyzing of tags. This small type is incorporated in client products, and even implanted in pets, for identification.

The tag's facts are stored electronically. The RFID tag includes a small RF transmitter which transmits an encoded radio sign to interrogate the tag, and receiver which receives the message and responds with its identification information. Some RFID tags do not use a battery. Instead, the tag makes use of the radio power transmitted by way of the reader as its strength source. The RFID machine plan consists of an approach of discriminating countless tags that might be within the range of the RFID reader.

RFID can be used in many applications. A tag can be affixed to any object and used to track and manage inventory, assets, people, etc. For example, it can be affixed to cars, laptop equipment, books, cellular phones, etc.

The RFID attendance device is an automated embedded system used in taking attendance of registered individuals in a specific organization. The RFID attendance gadget presents an organization, the efficiency and comfort-related with RFID technological know-how at a low cost. This approach is fast as properly as simple. Each employee makes use of an RFID card and the reader records the information when the employee enters or exits.

RFID devices and software ought to be supported through a state-of-the-art software structure that enables the collection and distribution of region-based data in close to real-time. A whole picture of the RFID attendance device combines the RFID Tags and readers with getting the right of entry to the international standardized database, ensuring actual time get right of entry to up to date data on the card. The card consists of a unique identification wide variety known as an electronic product code (EPC)[15].

Nowadays, there are loads of groups around the world and some of them consist of employees up to 10 thousand or more. To manage a large variety of employees might also be a hassle especially to get the attendance of the workers.

The guide process ability that whenever a worker comes to work, he goes to sign at the time officer's table. This guided process has some flaws due to the fact in a case the place a worker bribes the time officer or is acquainted with him, the time officer might also tamper with the attendance records. This would be a huge problem in the company and may affect the productivity and administration of the enterprise the appropriate answer for this trouble is with the aid of designing a gadget that will record attendance automatically. In this research, RFID gadget is used to report the numbers of employees' attendance automatically. The ID cards of the personnel is embedded with RFID tag which is read through a reader. This RFID gadget is interfaced to a database thru a computer. This approach is nicer to forestall hassle encountered when getting attendance manually.

These problems can be listed in several formats as per below:

- Energy loss of professors: Each professor should check attendance of about 25 to 30 students per session and thus his energy is wasted.
- Loss of time useful for teaching: Students attendance is naturally associated with the time and spending this time leads to a waste of time that is useful for teaching.
- Misuse of list to change the absence of a student to attendance: In some cases, it is observed that students ask professors frequently to change their status from absence to presence.
- The possibility of missing list: Its students' right to be behaved in justice regarding the presence and absence. It is not possible in case of loss or lack of list [13].

2. Literature Survey

[3]Have implemented a system called RFID Based Automatic Attendance systems. This attendance system software has been developed using VB.net and database (Microsoft Access). Each student has RFID tag attached with their Student ID card. There is a serial connection amid computer and RFID reader also has been maintained for connection between RFID and the computer system. The RFID reader is placed at the lecture hall door. Whenever students enter the lecture hall RFID reader read the RFID tag and it store the all information (Entry time, Name, etc.) of students into database via serial connection and maintain the system. Here admin of this system can view all documents using the software interface by retrieving information from database without any difficulties not like traditional system.

[4] Implemented an attendance system with the combination of RFID and Web-Based system. This system uses a RFID tag and reader for getting students' attendance and read particular student. Then this reader connects with Arduino microcontroller which passes the RFID reader response to web server by using Arduino shield, finally the attendance of students can be stored in web server by using PHP and MySQL. The admin of the system can view all students' documents by login to this particular
Web based application and also can view the student's details using LCD displays.

Found a system that, RFID and Pose Invariant Face Verification for automatic attendance system. This system works under two-factor verifications. In the first step, students need to use RFID tag which is read by RFID reader. If the first step is succeeded then it moves to second step of verification, if not, student becomes under unrecognized category. The second step is Face verification, if the face match with particular RFID tag then it marks attendance into database. Missing the above both readings, the system identifies the fraud students. This two-factor automatic system reduces the misuse of identity theft for the purpose of getting attendance [5].

"Arduino Based Smart RFID Security and Attendance System with Audio Acknowledgement" is developed by Yashi Mishra et al. SD card module with RFID tag which carry different voice codes is used in this system. The tag ID and code of the voice greeting stored in SD card module. While a student enters the class room door, his / her RFID tag is being read. If the ID of the tag matched with stored data in the SD card then particular person needs to use the voice greeting, if it is matched then the door will be opened and the attendance will store in excel sheet. Student can view the attendance detail using the LCD placed in Arduino. Here Arduino working as microcontroller to connect LCD, RFID reader, SD card module and so on. This system is also working as two-factor verification process. Moreover, this system is very simple schematics than other system because of very simple components and design. Also here we get fast response with accuracy [7].

[8] Had been created a prototype system called Microcontroller Based Attendance System Using RFID and GSM. This system consists three atMega16 microcontroller placed in between RFID reader, GSM modem and computer. Each microcontroller has its own purpose. The system starts whenever a teacher used his/her RFID tag to enter the class room and students will enter the class room by swapping their tag within five minutes. RFID reader reads RFID tag and sends the signal to first microcontroller which analyses the signal of RFID reader and opens class room door using IR signal which is influenced by a motor. The signal is temporarily stored in microcontroller, when teacher finishes his / her class he /she must swap the RFID tag again to the reader and system decides automatically that the class is over. Thus, microcontroller passes the temporary stored signal to computer database as attendance. In case of absent of student, the signal passes to GSM modem and it will send the message to parents of the students who were not at the class. If any students go out before teacher use finishing RFID tag which doesn't count the status (present) of the students. This system itself added advanced and reliable security features.
Thus students are not able to cheat the administration and parents [8].

Proposed a system that working with RFID and GSM. Here they have used microcontroller (LPC) as an intermediate amid GSM module and RFID. Whenever students enter the classroom, they need to use their tag which read by RFID reader and it send to the present signal to GSM module. If the ID of the tag does not match with database it considered as unauthorized access. If it is okay then GSM module send massage administration and parents. [9].

[10] Proposed a system that web based attendance using four-tier architecture by using RFID and Biometrics. In this system student's and teacher's RFID unique code will store into the database. A RFID reader and fingerprint device are placed at the door of the classroom. When students enter classroom, they need to use the RFID tag which read by reader and verifies identify by comparing with database whether the tag matches or not. Second level verification will be allowed if and only if first level is succeeded. Verification with fingerprint is the second step of the system and if the student's finger print matches with database then the attendance will be marked and stored into database, if not there is no attendance for students. The fingerprint verification only active in span of ten minutes including five minutes before the schedule and after the schedule of class starting time. If anyone late then it denies to provide attendance to particular student but students can stay at the lectures and learn. Finally, SMS will send to the student's parents about inform particular students' presence. This system is time oriented.

[11] Developed a prototype for attendance management system with the placement of a greater number of RFID readers placed in room and there is a server application maintains via a laptop. The reader and laptop or PC connected with the help of wireless router or LAN connection. When a person enters the room, he / she needs to use the RFID tag which reads by RFID reader and passes the attendance to the server through wireless or LAN connection. Since many RFID readers are placed, more than one person can get the attendance simultaneously and get the higher efficiency than traditional method.

Also, [12] suggested a system that working with RFID and Telegram Messenger Application. In this system students are needed to meet the teachers for tapping of RFID tags. If it is matched with tag stored in the database, then it sends to the attendance to the principal in the form of excel as well as it sends a message to the specific student's parent via Telegram messenger.

#	Attendance Systems	Security	Reliability	Performance	Cost
A	RFID Bases attendance system	High	Low	Medium	High
B	RFID and web-based system	High	Low	High	High
C	RFID with Face verification system	High	High	High	Medium
D	RFID with Fingerprint system	High	High	High	High
E	Arduino based RFID attendance system	High	Medium	High	High
F	Microcontroller based RFID and GSM	High	Low	Ultra High	Low
G	RFID and GSM	High	Low	High	Low
H	RFID four tire system with biometrics	Ultra High	Ultra High	Medium	Low
I	RFID attendance management system	High	Low	High	High
K	RFID with telegram messenger	High	High	Low	Low

Table 1: comparison table of all systems

3. SYSTEM DESIGN

RFID based Automated Student Attendance system is a highly specialized system that automate the whole system of students' attendance registration using RFID. The major factors in designing a RFID attendance system include: choosing the hardware and software components and integrating both to work together, defining the system working mode (verification or identification) and defining administration and optimization policy [14,16]. Student attendance system framework is divided into three parts: Hardware design, Software design, Attendance Management Approach and Report Generation. Each of these is explained below.

4.HARDWARE DESIGN

4.1 MICROCONTROLLER PIC18F452

The controller used in this project is a 40 pin wide DIP (Dual In Line) package chip named PIC18F452; This chip was selected because it is robust, and the DIP package interfaces with prototyping. Supplies like solder less bread boards and solder-type per-boards. This same microcontroller is available in a surface mount package, about the size of a dime. Surface mount devices are more useful for circuit boards built for mass production. Figure 1 below shows the 'pin-out' diagram of the PIC18F452. This diagram is very useful, because it tells you where power and ground should be connected, which pins tie to which functional hardware, etc.

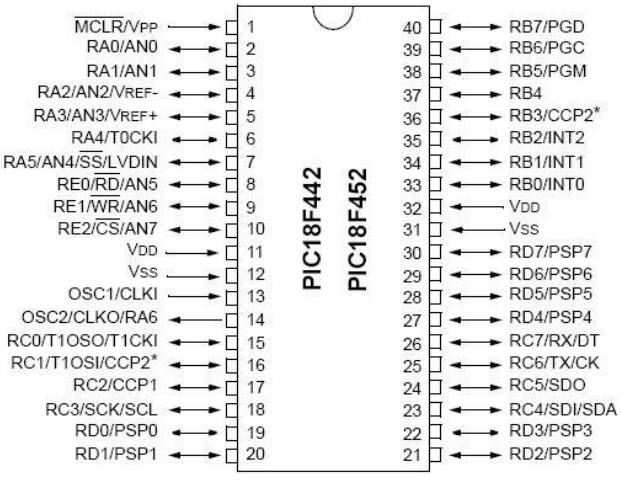

Figure 1: Pin Diagram of PIC18F452

4.2 LCD DISPLAY

The display support 4X20 characters, which means, the LCD can support 4 lines on the display and each line can display up to 20 characters which is relevant as the only essential output to be displayed is the student's name, metric no., gender and ID. Besides LCD Display, the output is displayed on LCD. The diagram of LCD display is shown in Figure 2 below

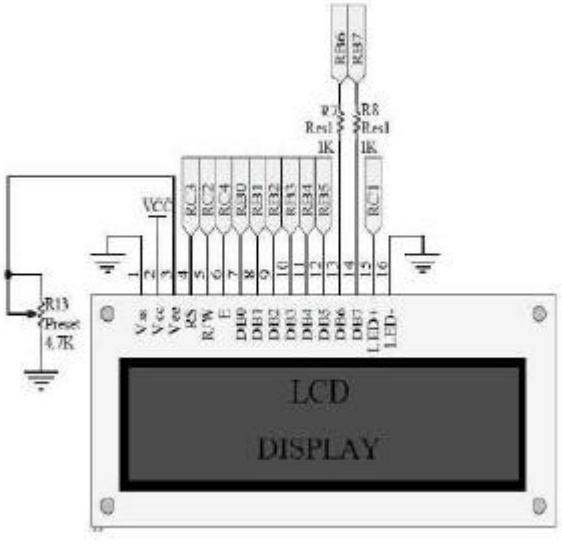

Fig 2: Circuit Diagram of LCD Display

4.3 RFID READER

A reader (now more typically referred to as an RFID interrogator) is basically a radio frequency (RF) transmitter and receiver, controlled by a microprocessor or digital signal processor. The reader, using an attached antenna, captures data from tags, then passes the data to the controller for processing. The reader decodes the data encoded in the tags integrated circuit (silicon chip) and the data is passed to the microcontroller for process.

FEATURES OF RFID READER

a. Low cost solution for reading passive RFID transponder tags.
b. Industrial grade casing for better outlook and protection.
c. Integrated RFID reader, antenna, LED, power cable and data cable.
d. Every reader has been tested before is being shipped.
e. 9600 baud RS232 serial interface (output only) to PC.
f. Fully operation with 5VDC power supply.
g. Buzzer as sound indication of activity.
h. Bi-colour LED for visual indication of activity.
i. Standard RS232 serial cable (female) ready to plug to desktop PC or Laptop.
j. 2m reading range.
k. 0.1s response time.
l. Operating frequency: 125KHz

5. Project Flow

A particular methodology of executing is required in this undertaking like some other programming equipment incorporated task. This methodology underlines on well-ordered advancement by completing one stage before progressing to the next until it achieves the last phases of prototyping. Figure 3 demonstrates the task stream diagram.

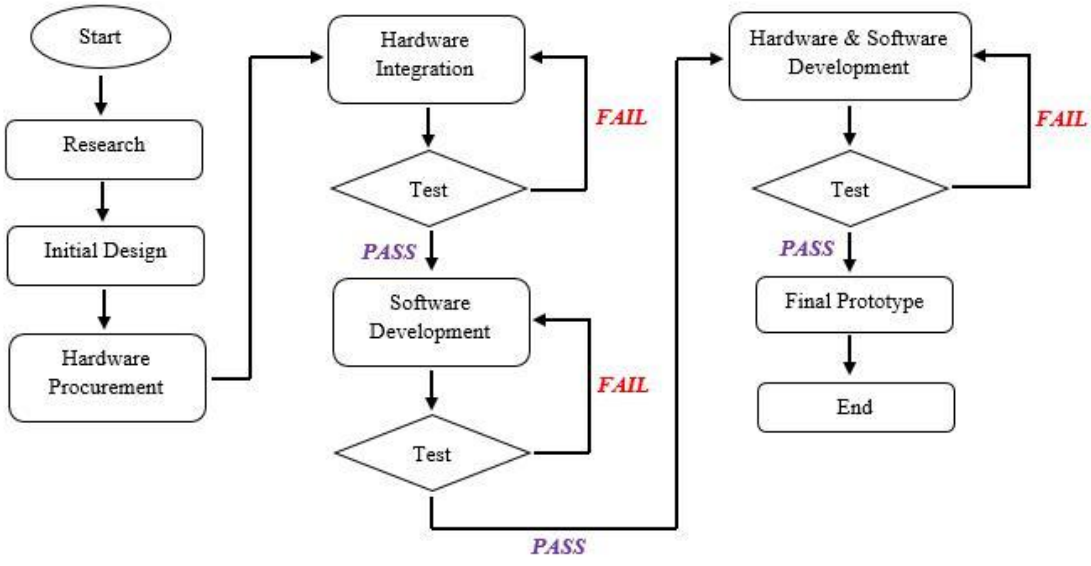

Figure. 3: Project Flow Chart

5.1. HARDWARE ARCHITECTURE

The system hardware is based on a Atmega2560 microcontroller. This microcontroller has 256 KB of which 8 KB used by boot loade Flash program memory & 8KB Static Random Access Memory (SRAM). The entire hardware can be divided into four parts like Liquid Cristal Display (LCD) display interface section, RFID module interface section, real time clock interface section and SD Card interface section. All these sections are controlled by the ATmega2560 microcontroller and the required software to control the sections are Arduino Integrated Development Environment (IDE).

5.2. CONNECT THE COMPPNNENTS

We adopted the project on a pair of processors (Arduino Ono) the research therefore divided into two parts.

In the first, part (Arduino A) the following parts connected

RFID RC522:

3.3v ===> PIN 3.3v

RST ===> PIN 9

GND ===> GND PIN

MISO ===> PIN 12

MOSI ===> PIN 11

SCL ===> PIN 13

SDA ===> PIN 10

RTC:

VCC ===> PIN 5V

GND ===> GND PIN

SDA ===> PIN A4

SCL ===> PIN A5

BUZZER:

Positive side to pin

The negative side to GND

In the second, part (Arduino B) ,The following parts are connected.

SD CARD MUDLE:

SCL ===> PIN 13

MOSI ===> PIN 11

MISO ===> PIN 12

VCC ===> PIN 5V

GND ===> GND PIN

CS ===> PIN 4

LCD SCREEN:

VSS ===> GND PIN

VDD ===> 5V PIN

V0 ===> GND PIN

RS ===> PIN 10

RW ===> GND PIN

E ===> PIN 9

D4 ===> PIN 8

D5 ===> PIN 7

D6 ===> PIN 6

D7 ===> PIN 5

A ===> 5V

K ===> GND

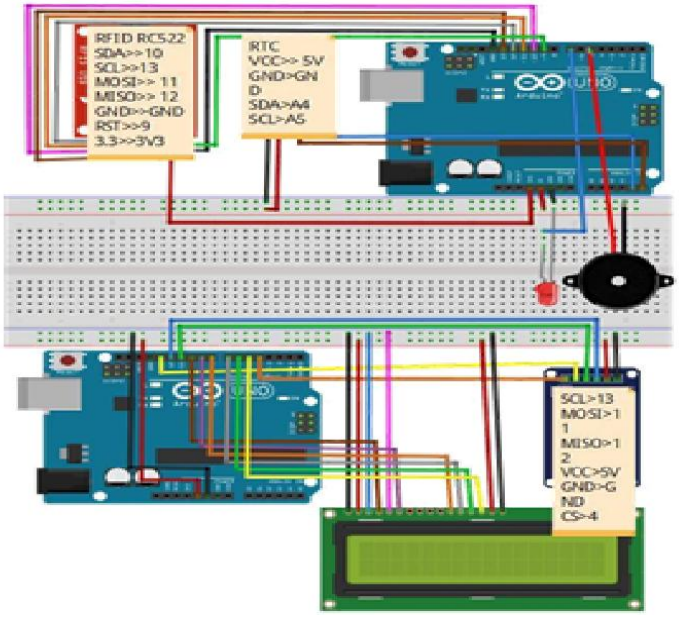

Figure 4: Connection Circuit

6. Implementation:

In this chapter, the results will be displayed in detail starting from the RFID tag reading until they are stored and displayed in the computer. The name of the person identified within the Arduino and corresponding to each card (which was previously programmed and assigned a name for each Tag) will be displayed on the LCD screen when reading the RFID Tag and at the same time it will be stored in a TXT file on the SD And then the information will be dragged to the Excel file to be displayed on the computer screen. These steps will be explained more clearly in the next paragraphs.

6.1. RFID Tag Reading

Before starting to mention the details of reading the RFID Tag, we would like to mention that a hand and a button have been added. When you place any Tag on the RFID reader, a flash is issued by the LED, plus a voice from the buzzer at the same moment as a signal The RFID Tag has been read.

In the following figures we will review the RFID read information where five tags were programmed and read by the department and take a picture of the information that appears when reading the Tag.

Starting with Figure 5 that shows the moment of the tag readers associated with the name "Tareq"

Figure 5: record the attendance of the 1st student

Note from the Figure 4-1 that the information that will appear is the student's name and date and the right part of the student's name is programmed, while the left part is for the date.

Let's now move on to the second Tag test and pass it on to the reader and take a picture of the information that appears on the LCD.

As shown in Figure 6 shows us the second name that was established for this Tag, which is "ali".

Figure 6: record the attendance of the 2nd student

6.2. Data Sheet of Recorded Attendance at TXT Format

After the recording of the event, which was stored by the Arduino as a TXT file on the SD RAM, the RAM is inserted by ADAPTER into the computer. The information stored in the table is shown in figure 7. The table consists of three fields : the first represents the name, the second represents The date of attendance and the third represents the time of attendance

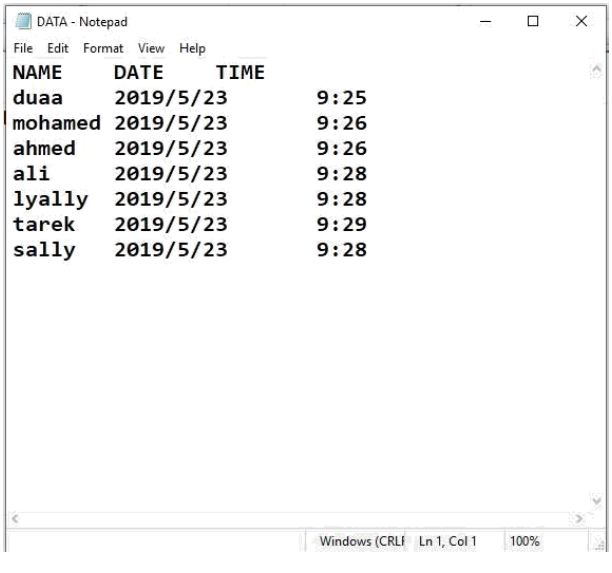

Figure 7.Attendance stored as TXT file within SD RAM

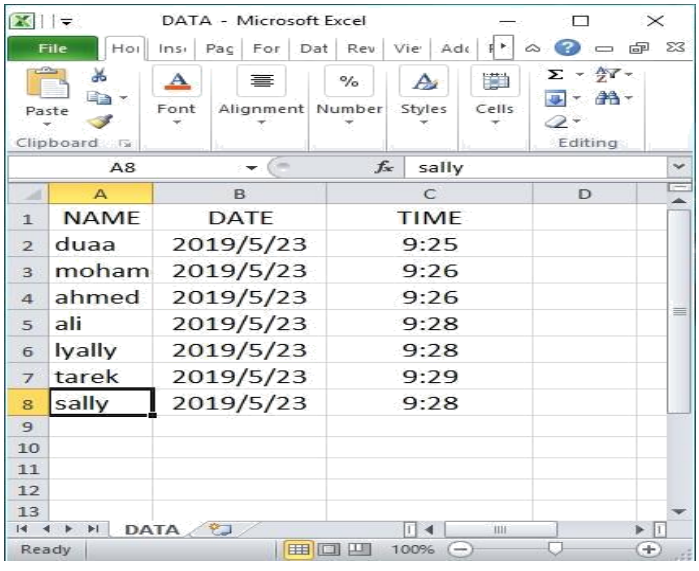

Figure 8: Data Sheet of Attendance as Excel Format

Here is the last step, which involves transferring the information stored on the TXT file to an Excel spreadsheet on the computer for the purpose of conducting statistics on attendance of students. Figure 9 shows the Excel file obtained

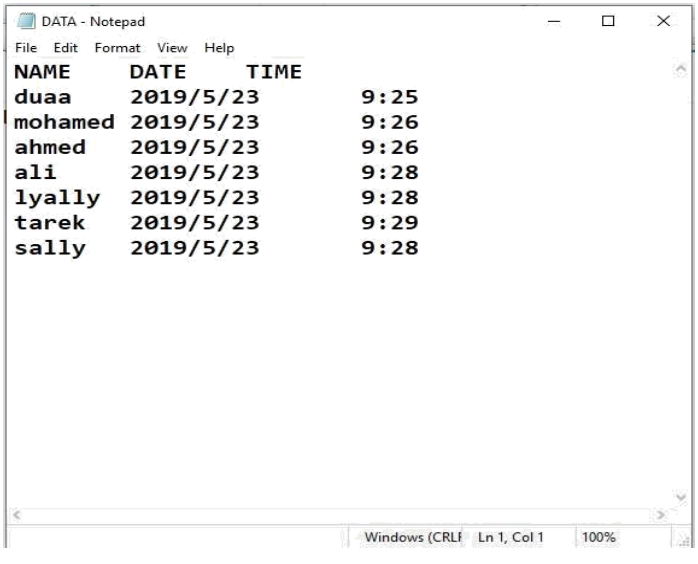

Figure 9: Attendance as an Excel file

7. Conclusion

The system is a low cost system which is designed to withstand any terrain and surrounding, providing tactical and surveillance and better comfort. Moreover, the Arduino board allows the system install in more simple way. RFID technology positively promises an increased effectiveness and improved efficiency for business and administrative processes. All the future work is expected without spend extra cost, even one cent from the current system.

8. Future Works

This study is considered the basic phase for several future types of research and the following operations can be carried out to improve the performance of this algorithm:

- Make a wireless connection between Arduino and pc
- Design an online database attendance system
- Add another input like a fingerprint

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