Project Title: RFID Based Authentication System.

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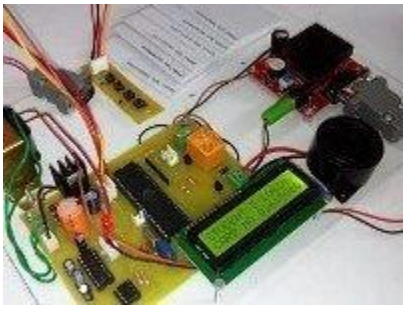
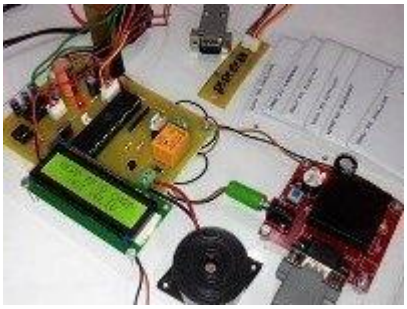
1. Description of the project:

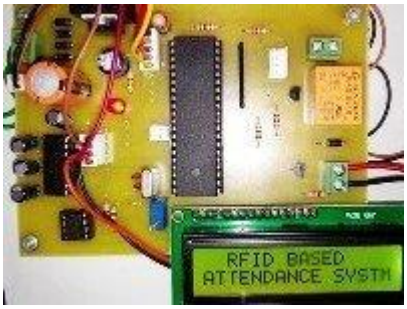
Authentication needs to be taken at various places including colleges, school for students and in the industries for the login logout time of employees. Radio Frequency Identification (RFID) based authentication management system can be used in any college or university or company. Main objective of RFID based Authentication System project is to take the authentication of students or employees. Microcontroller does the task of storing the authentication of the respective person in the Microcontroller memory.

The existing authentication system is manual and it is taken on paper and it consumes lot of time. As we aware that many traditional "Authentication system" uses authentication register to note down the authentication. It has less accuracy. Also the administrative person needs to maintain the authentication papers / sheets. In many industries authentication register is used to note down the authentication of their employees. In school authentication is taken on roll call musters and in colleges authentication is taken by respective professors. Problem with existing authentication system is that wrong authentication can be entered. For example, in an industry, employee can enter invalid/incorrect login logout time. They can come at 10am and can enter time as 8 am. Also in colleges one student can give proxy authentication of another student. Probability of this is very less but it does happen.

2. Project Photographs:



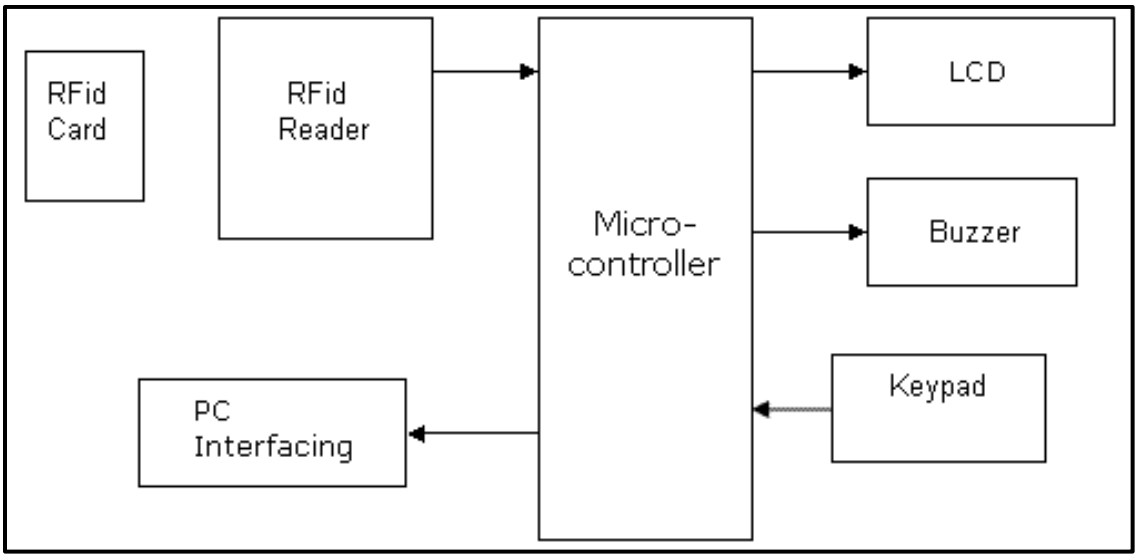




To avoid all such problems, we have implemented automated authentication system which utilizes RFID cards. Thus it is a RFID based authentication system. In this system each user, student or employee will have a RFID card. And RFID reader will be placed on the door or the entry gate of the company or on the door of the classroom or school. Whenever employee wants to enter in the office; he/she has to show the RFID card to the reader. He/she has to take the RFID card near to the RFID reader. Then the RFID reader will note down the RFID card number and the time at which the employees / student has logged in. And in the same manner while leaving employee/student has to show the card. So the exit time will be noted.

Commonly used RFID cards are of the size of credit card and are white in color, these are used in many RFID projects. However now days RFID cards are also available in small or RFID key tags are available. These key tags can be connected with the key-chain. And normal RFID card can be stick together with the ID-card of employees or students. Or we can even print the ID-card information on the RFID card itself. This means that there are no extra efforts required or no extra trouble is caused for carrying this card since students and employees always carry their I-cards in college and industries respectively. Credit card needs to be swapped or need to be inserted inside the credit card reader machine. But RFID card does not need to be inserted, user just needs to take it near the RFID reader. So student/employee can even keep it in wallet and they can just take wallet near the RFID card reader without removing card from wallet. This way RFID module will read the card information.

3. Block Diagram:



Block Diagram Description in detail:

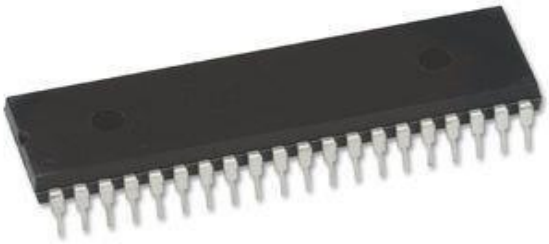
It contains following blocks

1) RFID Reader: Full form of RFID is “Radio Frequency Identification”. Wireless communication is used between RFID tags and RFID Reader. Reader does not require line of sight communication with tags. It means that Reader detects the RFID tag even if there is some object between Card and Reader. Thus it is a non-contact type of reader. The Radio frequency used in our reader is 125 kHz which is a Low Frequency (LF). RFID reader interfacing with Microcontroller is done using serial port. RFID reader will communicate with Microcontroller using serial communication. When RFID tag comes in the range of Reader module, then RFID reader detects RFID card. And at that time RFID reader sends out a series of alphanumeric unique codes on the serial port. So while adding the employees/student card number in the program memory. First we need to store this series of alphanumeric code into program memory and later on this unique series of codes will be compared with the incoming card number. RFID card reader module requires 9 volt power supply and output is given on DB9 connector port.

2) RFID cards: There are two main types of RFID cards, Passive and Active. In this project we have used Passive RFID tags. As given in introduction, we can use normal RFID cards which are of the size of credit card. These are rectangular in shape and white in color and can be attached with the ID-card. Or even we can use RFID tags which can be attached with keychain

3) Microcontroller: It is the main component of the project. It is the heart of the system. Microcontroller communicates with all input and output devices. Various functions of Microcontroller are as follows:

1. Displaying clock on LCD
2. Reading input from RFID reader
3. Comparing it with the data / RFID card number stored in Microcontroller memory
4. Turning on buzzer if the cards does not match
5. Logging/Storing time into memory if cards match

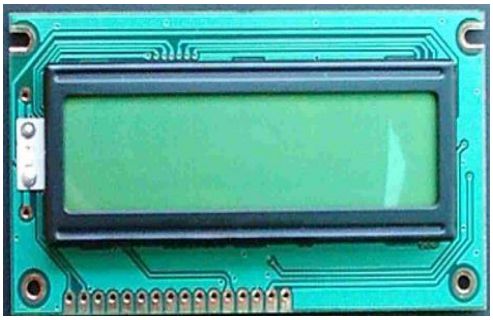


6. Reading input from keypad and adjusting time according to the keypad entry given by user.
7. Sending data to computer.

4) Keypad: We have used 4by 1 keypad. It is a simple type of keypad. It gives low output to Microcontroller when key is pressed. It has 4 keys. Functions of these keys are Increment, Decrement, Enter and Escape. These are used in Time setting mode.

5) Buzzer: We have used 12 volt buzzer for demonstration purpose. Buzzer will be turned on for invalid card access.

6) Liquid Crystal Display: It is used to show current time and various messages. These messages are Invalid card, Valid card, authentication of student. We have used 16 by 2 alphanumeric display.



4. Working of this project / How to operate this project?

For operating this project first user has to insert the card numbers into the microcontroller memory. It can be done by company authority person or college administration person while issuing the card. Whenever a new student joins or new employee is recruited in an organization/company at that time, card will be issued. And same entry will be made in the microcontroller program memory. In the current project, these numbers are stored in the microcontroller's program memory. Which means while burning the program into memory, we need to add these card numbers into the program. Then this card will be issued to the respective person.

Once the project is switched on, it will display time clock on LCD. We have provided "4 by 1" keypad for setting the time. User can press the setting key and use the increment / decrement and enter button to set the current time. Once the time is set then he/she can exit from the time setting mode / time set routine. Then the LCD will display current time set by user.

Then this project operates in **normal mode**. Whenever user comes near RFID reader module and shows RFID tag then microcontroller will store 2 information or 2 types of data will in the microcontroller memory. First is the card number and second is the time at which user has shown the card. Same situation happens for logout. For logging out also student will show the card. In this project single RFID card reader module will be used for in and out operation. While in actual implementation in industries or colleges, user can install 2 RFID reader modules. One will be placed at the outer side and second at the inner side of the door.

When a student or employee has lost his/her card. Then in such situation he/she has to report this incident to the administration person. Then admin person can remove the card number from microcontroller memory. Also when any employee / student leave the office and they forget to return the card then at time also authority person will remove the card information from microcontroller memory. So in case of lost card or person left the company without returning the card and if these cards are shown to RFID reader then buzzer will be turned on.

Lets take an example that any outside/unauthorized person get a RFID card. And these cards does not have entry in our system. Or if existing employee manages to get a RFID card, and if he/she shows card, then microcontroller will check and find that this card is not stored in the memory. It means card number is not found in microcontroller memory then buzzer is turned on.

We have provided total 7 cards with this system for demonstration purpose. Out of these, 5 cards are valid cards and 2 invalid cards are provided. An invalid card means those cards which do not have information stored in microcontroller program memory.

5. How to view authentication on computer?

Computer Interfacing with RFID based authentication system:

We have provided PC interfacing to this project, so that authentication of employees can be seen on computer. To view the authentication first administrative person or the user operating this project has to press the Authentication key, then LCD display will display authentication of all students/employees.

LCD will display card number 1, login time then card number 2, login time and so on… It will show authentication of those people who have logged in on that particular day. LCD display is helpful if PC interfacing is not available. Which means Computer is not near system. In PC interfacing, Data is sent to computer as soon as it is shown on LCD display. Various software are available to view data received on serial port. On computer we can use hyper terminal software or we can use terminal software to view the data received on computer. Later user can copy this data into another file or he/she can directly take the print out. PC interfacing will be useful when the data is very large or when employee number is very large. At that time authentication monitoring on LCD becomes very time consuming and is not easy. However, data for all employees can be viewed on computer at a faster rate and very easily.

6. Applications:

1) This project can be used in various software companies, production industries and many other industries to take the authentication of employees. Presently many of these companies have authentication register or muster which is a traditional and old way of maintaining authentication. We can replace it with an automated system for taking the authentication of employees.

2) It can be used in colleges, various educational institutes as well as university campus for taking the authentication of students. Education institutes have roll-call muster or

teachers take authentication and note it down manually on paper. We can replace it by our automated authentication system using RFID.

3) It can be used in shops, shopping malls for the authentication of employees and workers.

4) We can also use it to note down the in and out time of vehicles. With little bit modification, this project can be used in vehicle/car parking systems. If parking charges are charged on hourly basis, we can use this project to note the exact in and out time of car to find out the total and exact parking charges of that particular vehicle.

7. Advantages:

1) This system is fully automated and it does not require any human interaction except setting the initial time setting.

2) LCD and PC interface both are provided with RFID based authentication system. This gives benefit of viewing authentication on the spot on LCD or remotely from computer.

3) This system is accurate and can avoid proxy or false authentication.

8. Future Development:

1) We can voice announcement system to this project. So whenever user logs in, we can announce message like, “Your authentication has been logged in” or “Your card is invalid”.

2) We can send this data through internet to the user. So that user can access it remotely via internet.

3) We can implement GSM technology. So this project will be advanced to RFID Authentication System With SMS Notification.

9. Conclusion :

In conclusion, the objective to build an RFID based authentication system was successfully achieved. In terms of performance and efficiency, this project has provided a convenient method of authentication marking compared to the traditional method of authentication system. By using databases, the data is more organized. This system is also a user friendly system as data manipulation and retrieval can be done via the interface, making it a universal authentication system. Thus, it can be implemented in either an academic institution or in organizations. However, some further

improvements can be made on this RFID in order to increase its reliability and effectiveness. An indicator or an LCD screen can be incorporated into the system to indicate when any unregistered card is scanned. An IP camera can be integrated into this system to monitor the actions like buddy-punching wherein a person cheats by scanning for another person. Finally, this authentication system can be improved by adding a feature where the authentication system indicates when a student is late for work or classes as the case maybe.

10. References

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[2] Subpratatsavee, P., Promjun, T., Siriprom, W., & Sriboon, W. (2014, May). Notice of Violation of IEEE Publication Principles Attendance System Using NFC Technology and Embedded Camera Device on Mobile Phone. In Information Science and Applications (ICISA), 2014 International Conference on (pp. 1-4). IEEE.

[3] Azasoo, J. Q., Engmann, F., & Hillah, K. A. (2014, October). Design of RF based multithreaded RFID student attendance management information system. In Adaptive Science & Technology (ICAST), 2014 IEEE 6th International Conference on (pp. 1-5). IEEE.

[4] Chitresh, S and Amit K (2010),"An efficient Automatic Attendance Using Fingerprint Verification Technique ",International Journal on Computer Science and Engineering (IJCSE),Vol. 2 No. 2,pp 264-269.

[5] Henry. S, S. Arivazhagan and L. Ganesan (2003), "Fingerprint Verification Using Wavelet Transform", International Conference on Computational Intelligence and Multimedia Applications, 2003.