

# RFID AUTOMATION SYSTEM

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**Abstract:** Radio frequency identification (RFID) technology is being used widely for access control system. It is also possible that, however the people holding the RFID card passing through the access control (RFID reader) may not be the authorized one. Therefore, an access control system combining RFID technology and face recognition based on neural network is presented in this work. The system recognizes the face of the person holding the RFID card and denies access if they do not match.

We used a Radial Basis Function Neural Network to learn the face of authorized card holders and save the parameters of RBFNN only. This could reduce storage when the number of card holders getting large. We have used the Eigen object recognizer for the face recognition. The Localized Generalization Error Model (L-GEM) is adopted to train a RBFNN for better generalization capability. The face recognition system is first evaluated by benchmarking ORL face image database. The whole access control system is then tested in a real environment. Experimental results show that the proposed method has a good performance and could improve the security of RFID access control.

**Keywords:** RFID Reader, RFID tags, Sensor, Camera, Neural Networks.

## I. INTRODUCTION

Radio Frequency Identification based attendance system is an automatic attendance system which consists of a micro controller, RFID reader, RFID tag and a data base as its primary components. RFID tag provides different tags for each student identity. A student places his identification card in the proximity of RFID reader which detects the unique ID and student details present in the identification card. In RFID the details of the students are stored in record. This data can be used to record and maintain the attendance of the students/employees in class organizations. Roll call in educational institutions and offices consumes considerable amount of time and resources. The manually marking the attendance is still popular in many a school, The use of RFID based attendance management system is slowly increasing in cities. The teacher need not maintain attendance records by manually calling out roll numbers or names of each student in class at the start of the day or after lunch hours. This stand-alone project aims to solve this problem by automating the attendance system which will automatically record the attendance.

### 1.1 RFID TECHNOLOGY

Radio frequency identification (RFID) is a technology that transmits data using radio waves from an RFID tag attached to an object by the reader for tracking and identifying objects. RFID system consist of two main components i.e. , the reader and the tags. The tag is normally attached to the objects to be monitored and carries information in a microchip. The reader on the other hand detects tags that are within it frequency range and writes to or read from the tags.

### 1.2 THE RFID TAG

The RFID tag is primarily is a kind of a memory device that can transmits its contents when being scanned by the reader. The memory consists of binary digits called the bits, and the transmission and receiving of data has a communication channel. The tag can be an electronic circuit with its own power supply (an active device) or a very low power integrated circuit (passive device) which taps energy from the scanner to transmit its content. In a tag, the transmission power is very low and is measured in millionths of watt i.e. microwatts. Tag can be passive, semi-passive or active. It can also be categorized based on memory type and based on the transmission channel. Passive RFID tags have no internal energy source; energy supplied to the antenna by the incoming radio frequency waves induced enough energy for the CMOS integrated circuit in the tag to get activated and transmits a response. The semi passive tag is similar to passive tag, but has an addition of small power source (battery). This battery constantly powers the integrated circuit of the tag and the need for an aerial to tap energy from the incoming signal is removed. Active tags have their own internal energy source which supplies energy for the integrated circuit producing the outgoing signal. They are more sophisticated and reliable due to their ability to conduct a session with the reader. As a result of their onboard energy source, they can transmit at a higher power level than passive tags, allowing them to be of more effective in RF challenged environments such as water, metal or at longer distances. A battery can live up to 10 years and have practical ranges of hundreds of meters.

### I.III THE RFID READER

The RFID reader sends radio waves to the tags and waits for its response. The tag detects this pulse and sends back a response to the tag ID number and possibly other information as well. The read only RFID reader only reads data from tags, usually a microcontroller based unit with a wound output coil, peak detector hardware, comparators and firmware which are designed to transmit energy to tags and read information back from them by detecting their backscattering modulation, different types for

different protocols and standards existing. The read/write reader reads data from/to tags. While in stationary reader, the device is attached in a fixed way.

#### I.IV CAMERA

The camera is also added in the RFID automation system to capture the real time image of the authorized person. The camera will detect the face of the student and match with the picture stored in the database. The designing is done in a way to detect the motion of the face to tell that it's a real face or a fake image. With the addition of the camera for face recognition the accuracy of the system increases up to 60%.

#### II. RELATED WORKS

RFID Control Unit Uses Student ID Card Based on RFID Technology, the control system developed gradually to prevent contrary entry of people into a School and preventing unauthorized people to enter in the premises. The door locking system functions in real time, the door open as soon as the user scans the tag. The system also stores the login and logout information of the user. The time in and out of every student is generated through scanning of their ID card at the gate followed by sending the notification of the attendance to their parents. Limitation of the system is that there is no acknowledgement between the sender and the receiver.

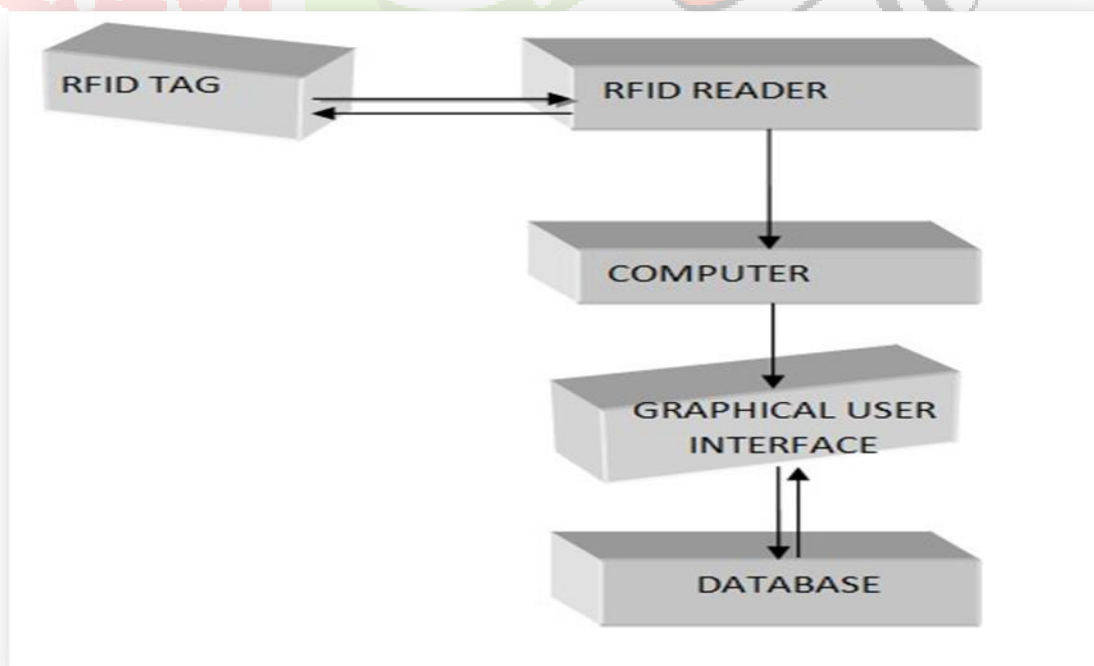
RFID Based Exam Hall Maintenance System resolves the problem of students searching for their examination halls and seating arrangements. The card reader is provided at the entrance of the building.

Application of RFID Technology in Libraries, RFID based library management saves the library staff's time and energy by automating their task. Borrowing and returning of books are automated using the check-in, check-out system which is RFID based. The limitation of the system is that it is costly to implement.

Many students wanting to write and sign the attendance list at the same time, which could lead to tearing of the attendance list or some students not being able to write down their names on the attendance list before the end of the class. Also the lecturer can also misplace the attendance list. RFID technology is implemented because it is cheaper, secured and easier compared to other technologies.

#### III. SYSTEM ARCHITECTURE AND IMPLEMENTATION

The development of the RFID based automation system is divided into two main parts; the hardware and software. The hardware part consists of the RFID reader, tags and the host computer. The software part is the host system application designed using .Net incorporated with Microsoft access database. Administrator or lecturer can login into the system and check necessary information in the application, which keeps a log of the ID, time and date of every student that enters the lecture room for lecture. It also can register new student using the tag ID of each tag. In connecting the RFID reader to the PC, UART is incorporated by through the RS-232 (Serial Port) cable. The complete system (see Figure 1) is placed at the entrance door of the lecture room.



A RFID tag is given to each student in the department (which is embedded into their ID cards) and this is scanned at the entrance of the lecture room by the reader. The RFID contains a unique code that is scanned by the reader. On every scan by the student,

the name, matriculation number of the student, the course to be taken and the date are displayed on the user interface if the tag number matches that which is stored in the database.

#### IV. CONCLUSION

The design and implementation of a RFID based automation attendance system which is the aim and objective of this paper was successfully implemented. This system provides an effective and more convenient method of taking attendance when compared to the manual system. Data are more organized, the system is user friendly, data manipulation and retrieval is done via the graphical interface.

#### Future Scope

For the further consideration, the plan is not to limit this at schools levels, in fact to carry this automation system technology to the higher platforms as per the needs and the requirements of various organizations working in different sectors like IT, banking and some organizations which carries sensitive information.

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