Class Management Using RFID And FACE DETECTION

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Abstract

RFID and Face Detection technology is an automatic wireless identification system. In this work we have tried to ease the problem of manually taking attendance with the use of RFID and image processing technology. This system will help the authority manage the attendance system in a more organized, efficient and time saving manner. The proposed method has been implemented in a prototype system that has proved the effectiveness of the system in easing the chores of attendance taking as a result of the automation of the system. The design of the system is simple, inexpensive and portable making it a good candidate for commercial and academic purpose.

Index Terms— *RFID Cards, Face Detection, Face Recognition, Smart Grid, Smart Protection, Security, Smart Management, Smart Infrastructure, server, database, data analysis*

INTRODUCTION

Now a day there is high development in technology all the information is present on internet so if anyone want any information then it will easily available on internet. Because of this reason student are attracted towards various thing and they try to ignore study and they waste much more time. When student are entered in campus they try to avoid the lectures. Students are not ready to attend lectures and they are bunking lectures and parent assures that their son/daughter will present to lecture. But it is not happen in reality. So to avoid these things this system can be implemented. This system will track the student in the campus and also manages attendance of student..

System uses RFID technology and Face Detection to track the student. 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 contains two main components; 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
The face is the identity of a person. The methods to exploit this physical feature have seen a great change since the advent of image processing techniques. This method is secure enough, reliable and no need for specialized hardware for installing the system in the classroom. It can be constructed using a camera and computer.

ATTENDANCE AND CLASS MANAGEMENT

The applications using Image Processing and Radio Frequency Identification (RFID) are increasing nowadays and are seen being applied in various fields such as transportation, agriculture, industries etc. A major problem faced in educational institutions is the time consuming manual attendance.
Our goal is to solve this problem using RFID and face detection technology. RFID, which stands for Radio Frequency Identification, is an automatic identification technology used for retrieving from or storing data on to

RFID Tags without any physical contact. The RFID system mainly has RFID tags, reader, a backend storage system and also a middle part that contains all the electrical elements. This RFID based attendance system has a storage system that store the unique identification number of the student/employee and also the attendance system is very user friendly for commercial purpose. In this project, we designed a system to record the attendance using RFID technology which will be time efficient rather than taking the attendance manually which is very much time consuming. The main objective is to make a system that will take the attendance of authorized individuals, record the data along with time and date and store in an internal SD card file, and finally send the data to Thingspeak channel (an API application) at the end of the day using Wi-Fi connection.

The face is the identity of a person. The methods to exploit this physical feature have seen a great change since the advent of image processing techniques. The attendance is taken in every schools, colleges and library. Traditional approach for attendance is professor calls student name & record attendance. The system described in this paper aims to deviate from such traditional systems and introduce a new approach for taking an attendance using image Processing. This paper describes the working of An Automatic Attendance System in a classroom environment Initially video clip of classroom is taken and is stored in the database, and these video is converted to frames/images, then we apply Face detection techniques such as Ada-boost algorithm to detect the faces in frames/images and then features are extracted of detected face by Histogram of Oriented Gradients (HOG) and Local Binary Pattern (LBP) algorithm. The system first stores the faces of the students in the database. The detected faces are compare with the faces stored in the database during face recognition by using Support Vector Machine (SVM) classifier. If the system recognizes faces, the attendance gets marked immediately of recognized faces

  It serves mainly two purposes. Firstly, to record attendance along with time of entry and time of leave and secondly its work is for authentication and authorization purpose. At present, this system is taking over schools, hospitals, industries etc. The RFID tag is actually a transponder which transmits information through radio frequency. In the tag, necessary information of the user is stored which allows the tag to work

 Ease of Use Before, teachers had to write down the attendance of students on papers. It was time consuming and there was always a risk of losing the attendance sheet. With the RFID and Face Detection technology it can be used to take attendance of the students, teachers and staffs. It records the time and date and stores the data in the school or university server. It also used in Library. IT companies hire part time employees. In industries, this technology is used to track items for inventory control and supply chain management by handheld RFID reader. RFID tags are attached to the objects with information electronically stored. Organizing large professional gatherings such as international technical exhibitions, conferences, competitions, training events, etc., is a challenging task where a number of participants/ delegates can be at the range of hundreds or even thousands. The event organizing committee has to correctly estimate an interest to sessions among the delegates, and to allocate premises, facilities and equipment to different topic sessions, presentations, demonstrations, etc. To keep track of the major aspects, indicators and statistics of the current year gathering as well as to help the organizer of the future events, an automated attendance management system can be put in place. For example, it could help to collect inflow and outflow delegate numbers attending particular sessions or tutorials. To achieve it, the system has to be equipped with a capability to sense delegates passing an entrance in both the directions, as well as to transfer the data to some database where the information is stored, processed and presented in a meaningful form (for example, as an MS-Excel files, texts, graphs) thus helping to prepare the relevant reports and carry out planning of the future events of similar types.

1.RFID

RFID (radio frequency identification) is a form of wireless communication that incorporates the use of electromagnetic or electrostatic coupling in the radio frequency portion of the electromagnetic spectrum to uniquely identify an object, animal or person. RFID systems consists of an antenna and a transceiver, which read the radio frequency and transfer the information to a processing device, and a transponder, or tag, which is an integrated circuit containing the RF circuitry and information to be transmitted. 1 "Class management using RFID. RFID systems can be used just about anywhere, from clothing tags to missiles to pet tags to food – anywhere that a unique identification system is needed. The tag can carry information as simple as a pet owners name and address or the cleaning instruction on a sweater to as complex as instructions on how to assemble a car. Some auto manufacturers use RFID systems to move cars through an assembly line.

1.1 Tags

A radio-frequency identification system uses *tags*, or *labels* attached to the objects to be identified. Two-way radio transmitter-receivers called interrogators or readers send a signal to the tag and read its response.

RFID tags can be either passive, active or battery-assisted passive. An active tag has an on-board battery and periodically transmits its ID signal. A battery-assisted passive (BAP) has a small battery on board and is activated when in the presence of an RFID reader. A passive tag is cheaper and smaller because it has no battery; instead, the tag uses the radio energy transmitted by the reader. However, to operate a passive tag, it must be illuminated with a power level roughly a thousand times stronger than for signal transmission. That makes a difference in interference and in exposure to radiation.

Tags may either be read-only, having a factory-assigned serial number that is used as a key into a database, or may be read/write, where object-specific data can be written into the tag by the system user. Field programmable tags may be write-once, read-multiple; "blank" tags may be written with an electronic product code by the user.

RFID tags contain at least three parts: an integrated circuit that stores and processes information and that modulates and demodulates radio-frequency (RF) signals; a means of collecting DC power from the incident reader signal; and an antenna for receiving and transmitting the signal. The tag information is stored in a non-volatile memory. The RFID tag includes either fixed or programmable logic for processing the transmission and sensor data, respectively.

An RFID reader transmits an encoded radio signal to interrogate the tag. The RFID tag receives the message and then responds with its identification and other information. This may be only a unique tag serial number, or may be product-related information such as a stock number, lot or batch number, production date, or other specific information. Since tags have individual serial numbers, the RFID system design can discriminate among several tags that might be within the range of the RFID reader and read them simultaneously.

1.2.Readers

RFID systems can be classified by the type of tag and reader. *A Passive Reader Active Tag (PRAT)* system has a passive reader which only receives radio signals from active tags (battery operated, transmit only). The reception range of a PRAT system reader can be adjusted from 1–2,000 feet (0–600 m), allowing flexibility in applications such as asset protection and supervision.

An **Active Reader Passive Tag** (**ARPT**) system has an active reader, which transmits interrogator signals and also receives authentication replies from passive tags.

An **Active Reader Active Tag** (**ARAT**) system uses active tags awoken with an interrogator signal from the active reader. A variation of this system could also use a Battery-Assisted Passive (BAP) tag which acts like a passive tag but has a small battery to power the tag's return reporting signal.

Fixed readers are set up to create a specific interrogation zone which can be tightly controlled. This allows a highly defined reading area for when tags go in and out of the interrogation zone. Mobile readers may be handheld or mounted on carts or vehicles.

1.3 HOW RFID WORKS:

 Long checkout lines at the grocery store are one of the biggest complaints about the shopping experience. Soon, these lines could disappear when the ubiquitous Universal Product Code (UPC) bar code is replaced by smart labels, also called radio frequency identification (RFID) tags. RFID tags are intelligent bar codes that can talk to a networked system to track every product that you put in your shopping cart. Imagine going to the grocery store, filling up your cart and walking right out the door. No longer will you have to wait as someone rings up each item in your cart one at a time. Instead, these RFID tags will communicate with an electronic reader that will detect every item in the cart and ring each up almost instantly. The reader will be connected to a large network that will send information on your products to the retailer and product manufacturers. Your bank will then be notified and the amount of the bill will be deducted from your account. No lines, no waiting

2. IMAGE PROCESSING

The face is the identity of a person. The methods to exploit this physical feature have seen a great change since the advent of image processing techniques. The attendance is taken in every schools, colleges and library. Traditional approach for attendance is professor calls student name & record attendance. The system described in this paper aims to deviate from such traditional systems and introduce a new approach for taking an attendance using image

Processing. This paper describes the working of An Automatic Attendance System in a classroom environment Initially video clip of classroom is taken and is stored in the database, and these video is converted to frames/images, then we apply Face detection techniques such as Adaboost algorithm to detect the faces in frames/images and then features are extracted of detected face by Histogram of Oriented Gradients (HOG) and Local Binary Pattern (LBP) algorithm. The system first stores the faces of the students in the database. The detected faces are compared with the faces stored in the database during face recognition by using Support Vector Machine (SVM) classifier. If the system recognizes faces, the attendance gets marked immediately of recognized faces.

The system consists of a camera that captures the video of the students sitting in the classroom and sends it to the administration server using the web service. For the database, the input are the image of the student, the pre-processing of the image is done and then the features of face are extracted using Local Binary Pattern (LBP) and Histogram of Oriented Gradients(HOG), the features are eyes, nose, and mouth, and then it is subjected to the Support Vector Machine (SVM) classifier. After all this process the images of the student are stored in the database.

In the administration server, video is processed. From the video we generate number of frame/images. The pre-processing of the image/frame is done and then image subjected to the Face Detection where faces from the image/frame is detected. The features of the face are to be extracted in the feature extraction module using LBP and HOG; the features are eyes, nose, and mouth.Then the SVM training is done on the faces. Here all the faces are detected from the input image and the algorithm compares them one by one with the face database. If the features of the face match that with the face of the database then the attendance is marked from where anyone can access and use it for different purposes. Teachers come in the class and just press a button to start the attendance process and the system automatically gets the attendance without even the intentions of students and teacher. In this way a lot of time is saved and this is highly securing process no one can mark the attendance of other. Camera takes the video continuously to detect and recognize all the students in the classroom. In order to avoid the false detection we are using the Adaboost technique. Using this technique enhance the efficiency and accuracy of the detection process.

2.1 Image Conversion:

The input image which is in RGB format is first converted into the gray-scale image. For this process, we calculate the average value of RGB for each pixel and if the average value is below than any specified value like 110, we replace it by black pixel and otherwise we replace it by white pixel. By this method, we get a binary image from RGB image. Histogram normalization is good technique for contrast enhancement in spatial domain

2.2 Frame Generation:

After inputting the video to the computer, frame generation is first performed by dynamic frame generation of video. We get no. of frames/images, the generation of frames/images per/sec is 30 to 40 frames. The length of the input video captured is 1 minute 8 sec, hence the generation of frame is huge, so we can select the frames in between, like between 99 to 1356. Hence the frames will be processed between 99 to 1356 frames.

2.3 Face Detection:

In face detection any one student face is scan and this face is match to the stored data set in your storage.

### 2.4 Face Recognition:

First the faces on the screen are traced out and the recognition process starts. During the recognition phase, the detected facial features are compared to the features stored in our database. If the system recognizes the features, the corresponding face is recognized and the name of the recognized student is displayed on the screen in message box.
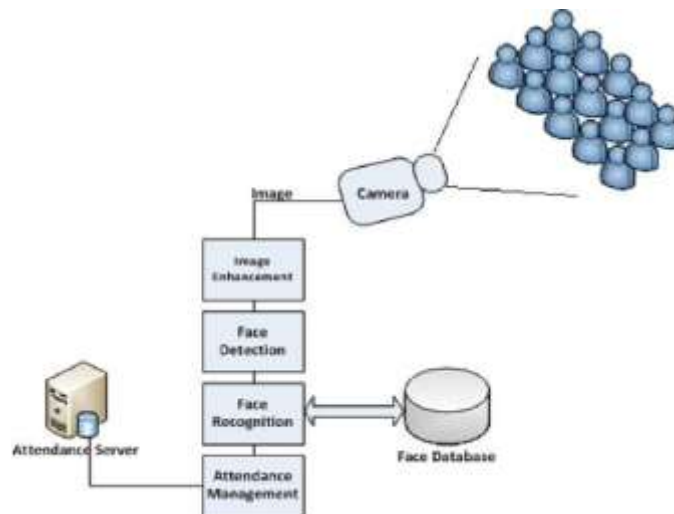
System Architecture:

The development of Student Tracking and Attendance
Monitoring System Using RFID is divided into two main parts; the hardware and software. The hardware part consists of the RFID reader, tags, camera and the host computer. The software part is the host system application designed using 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. And video also taken, and these video is converted to frames/images, then we apply Face detection techniques to verify with RFID details.
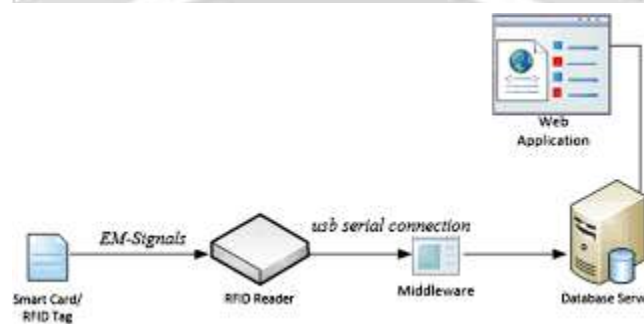
Figure 1. Overview of Student Tracking and Attendance Monitoring System Using RFID

Figure 2. Overview of Student Tracking and Attendance Monitoring System Using FACE DETECTION
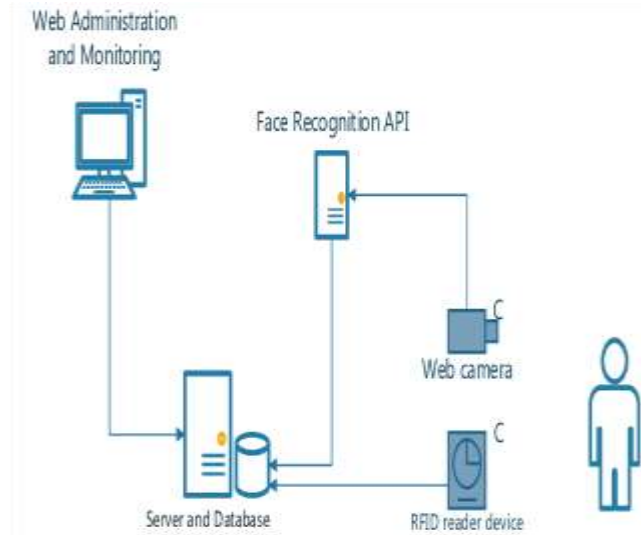
Figure 3. System Architecture

CONCLUSION

Today the attendance in colleges and classes are done manually .The proposed system i.e student tracking and attendance management system using RFID and Face Detection technology will improve the process of manual attendance, especially in an organization or school environment. So we have come up with a system which would mark the attendance of the student as well as track them in and around campus. This system gives automated approach to maintain the student attendance. In proposed system it is necessary to issuing RFID tag to each and every student in the college. The students have to swap their RFID cards to the RFID reader. By using this system we will track the particular student and check whether he/she is bunking his/her lectures. The purpose of developing this system is to track the student using RFID tag which will be provided to the student. The system can also generate detention list of the students, Because of this system the task of manual attendance filling is made easy and time required to do this is also reduced. It is very useful for the teacher as they can easily monitor their student's attendance and manage the attendance of them. Because of this system the frequency of student bunking the lectures is reduced and Parents also assure about their son/daughter. So this system is very useful for colleges and schools. . This method is secure enough, reliable and available for use. No need for specialized hardware for installing the system in the classroom. It can be constructed using a camera, RFID tags and computer.

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