

Attendance marking system using face recognition & RFID and prevention of examination Malpractice system

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Abstract

In the present scenario, Every University/College consists of many students, with the increased number of students it is a very tough task for the university to verify attendance manually and control malpractice during the examination. During a written test it is very easy for students to copy. To overcome these problems, in this paper we are going to discuss on Exam Monitoring system with a computer-based examination, attendance verification, and malpractice detection. This system consumes comparatively less time to verify attendance, generates distinct sets of questions for students, monitors during the exam, and the result is stored in the cloud.

Keywords: Examination malpractice, JAVA & SQL based examination system, Face recognition, RFID, Sensors

1. Introduction

Examination Malpractices is one of the major issues that many countries are facing at present. According to Reference Government & Politics [11] Examination malpractice is any form of an illegal act committed during the examination. There are different forms of examination malpractice including copying from another student's test, getting notes to examination, plagiarism and impersonating another student during a test. All these scenarios and many others give students an unfair advantage. There may be many factors that cause examination malpractice like physiological factors, societal value system, over emphasis on paper qualification and poor learning facilities.

Impersonating another student during a test is caused due to traditional attendance system, where attendance is taken manually. It is very hard for the invigilator to verify every student and Unnati A. Patel and Dr.SwaminarayanPriya R 2014 [7] notes that at the same time the student wasting the precious examination time in signing, verifying and submitting the attendance sheet manually.

To overcome the issues described above, in this paper, we introduce a computer-based system which can automatically verify attendance using Face Recognition & RFID, generate random questions for each student using Java (Net beans)&SQL (Server database) languages, detects if someone cheats during Exam using sensors and sends the message to the parents.

2. Literature Review

Unnati A. Patel, Dr.SwaminarayanPriya developed a system using RFID and Face Recognition for student attendance management [7]. SulakshnaSarkar, PradnyaliGaikwad, SnehaAgrawal, SeemaArote used GSM and Face Recognition for implementing a wireless network for student attendance system [15]. Nurbek Saparkhojayev and SelimGuvercin developed an attendance control system using RFID technology [16].

3. Proposed System

The method proposed in this paper has following objectives:

- Attendance marking using a cascade system of Face Recognition and RFID.
- Using Different sensors to prevent malpractice.
- Generating a Random set of questions for the user and after exam results are stored in the cloud using Java programming.
- The Message is sent to parents.

A. PIC16F877a Microcontroller

PIC16f877a Microcontroller belongs to PIC (Programmable Interface Controllers) family. It is a 40-pin microcontroller with a high-performance RISC CPU. The main reason to choose this controller is it can directly convert an analog signal to digital signal without connecting an external device for conversion. It consists of five ports A, B, C, D and E. These ports are bi-directional. Ports A and E used as analog pins, Ports B and D used as digital pins, and Port C used for serial communication. Sensors and RFID are connected to Port B and computer, Buzzer and LCD are connected to Port A. Code for Ultrasonic sensor is read into microcontroller using programmer toolkit.



Fig. 1: PIC16F877a Microcontroller

B. Face Recognition

A face recognition system is a computer application which can verify person by comparing captured image with the database image or video frame [13]. In our project, we have implemented face recognition using MATLAB. The three steps involved in this system are Face Recognition, Feature Extraction, and Face Detection. We have used Viola-Jones algorithm for real-time object detection using Haar transform. Feature Extraction can be done by using GLCM (Gray level Co-occurrence matrix), Histogram of Oriented Gradients(HOG) and Gabor Filter. GLCM measures the distance between the pixels and the relative orientation. HOG describes local object appearance and shapes by their distribution or intensity gradients or edge directions. The Gabor filter (GF) is optimally localized in both space and spatial frequency, getting a set of filtered images which correspond to a specific scale and orientation component of the original texture. The Euclidean distance is the measure of distance between two points in space.

C. RFID Module:

Radio Frequency Identification Module consists of two components: The Interrogator (RFID Reader) which transmits and receives signals and Transponder (RFID Tags) which can be active or passive. In our project, we have used passive tags. The main difference between active and passive tags is passive tags does not require any power source. They are small and have a shorter communication range. Reader and Tag communicate wirelessly and does not need a Line of sight.



Fig. 2: RFID Module

D. Ultrasonic Sensor

An Ultrasonic sensor is used measure the distance of an object by using sound waves. It emits the sound wave at a specific frequency and listening for that sound wave to get reflected by the object. Sensor measures sound waves on three principles: time of flight, the Doppler effect, and the attenuation of sound waves. The sensor consists of transmitter and receiver, sound waves are sent from the transmitter, and it is reflected the receiver when there is an obstacle, based on the time taken for the sound to reflect back to the receiver the distance between sensor and obstacle is measured. They operate at the frequency of 40 to 50 kHz, which is the frequency of RF signals. The speed of Ultrasonic rays is 330m/s. For our project, we have used the hc-sr04 sensor. Operating Voltage 4.50-5.5V, Quiescent Current-1.5-2.5mA and Working Current-10-20mA [8]. This sensor works in the range of 2 cm to 3 m.



Fig. 3: Ultrasonic Sensor

E. Capacitive Sensor

The capacitive sensor works on the principle of capacitive changes when a human finger is near the pad. This sensor has two types of outputs. When the finger is 2cm above the touchpad, the sensor

gets activated, which is proximity output and when the sensor is just above the touchpad, which is a touch output. Operating voltage is 2.4V to 3.6V, the temperature of -40°C to +105°C and 20mA Operating Current.



Fig. 4: Capacitive sensor

F. Voice Detector Sensor

According to Ramírez J, J. M. Górriz, J. C. Segura 2007 [10] Voice activity detection (VAD) is a technique used to detect the presence of voice activity. Some of the features this sensor are low output noise, small size, high sensitivity, fixed gain at 20dB, support 3.3v and 5v two power supply.



Fig. 5: Voice detector senso

G. Camera

The camera is used to capture images and store them. In our project, we have used LOGITECH C170 web camera for Face Recognition. According to LOGITECH [14] C170 has Photo quality of 5 megapixels, video capture-1024*768 pixels and video calling-640*480 pixels.

4. Design Methodology

This Methodology consists of two parts Attendance verification and the Examination. This system consists of a Microcontroller, Ultrasonic sensor, Capacitive sensor, Voice Detection sensor, RFID Module, Buzzer, Camera and PC. For attendance marking, we are going to use Face Recognition using MATLAB and RFID.

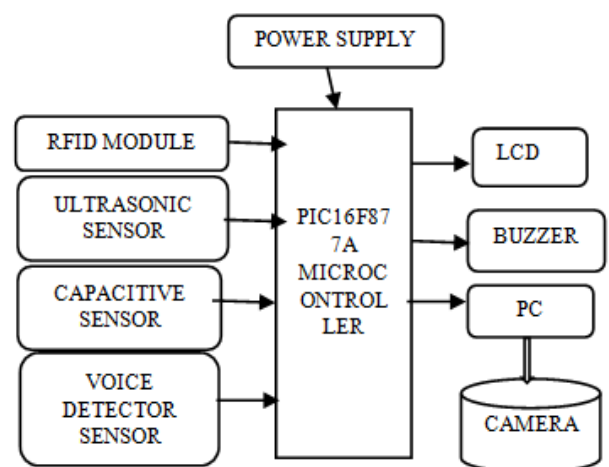


Fig. 6: Block Diagram of the system

After Attendance verification, a distinct set of questions will be displayed on the screen. Ultrasonic sensor, Capacitive sensor and Voice Detector sensor is used to detect malpractice during

Examination. Ultrasonic sensor will find the distance between the system and the student. The Capacitive sensor is used to monitor the student availability in the seat and voice detector sensor will detect the student voice in between the exam. If any violation is detected, a buzzer will on. After completion of the exam, the result is stored in the cloud.

Module 1: Attendance Verification:

Attendance is verified using Face Recognition & RFID. For Face Recognition, we have used MATLAB software and viola-jones algorithm. Each student must be enrolled with a set of images and this image will be associated with their identity information. In this two-step verification process, the first step is RFID based verification where their tags are verified. If the tag number matches with identity information then the second step is initiated i.e. camera is initialized and captures the image, if the captured image matches with the database image then attendance is verified.

Module 2: Computer based examination

We have developed a computer based examination system using Java(Net beans) & SQL(Server database).SQL(Structured Query Language) is a domain-specific language used in programming and designed for managing data held in a relational database management system (RDBMS), or for stream processing in a relational data stream management system (RDSMS)[17]. First, the students have to give their details to the database by using SQL. Java and MATLAB are interlinked so, whenever the attendance is verified it will automatically redirect to the examination phase (Java platform). A distinct set of questions will be displayed on the screen, after completion of the exam the result is displayed and stored in the database.

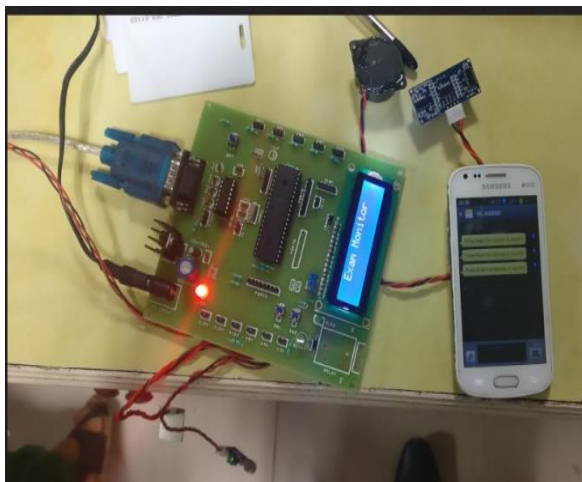
Module 3: Malpractice Detection

We have implemented Malpractice Detection Module using Ultrasonic and Capacitive sensor. These sensors are connected to Port A of PIC16F877A controller and LCD display is connected to Port B. We have used MAX232 IC in this module because the maximum voltage by the power supply is 5v and the external device connected to module has the voltage greater than 5v. MAX 232 is surrounded with capacitors to regulate voltage from 5v to 12v. Sensors are placed on the student's seat.

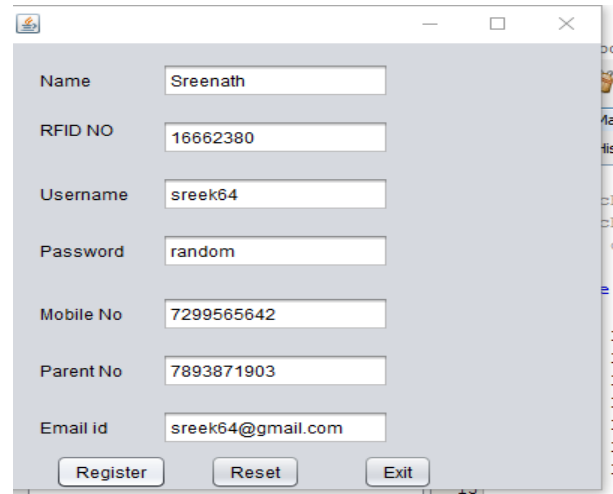
MPLAB software is used to code ultrasonic sensor, this code is read into controller using programmer toolkit.

5. Result

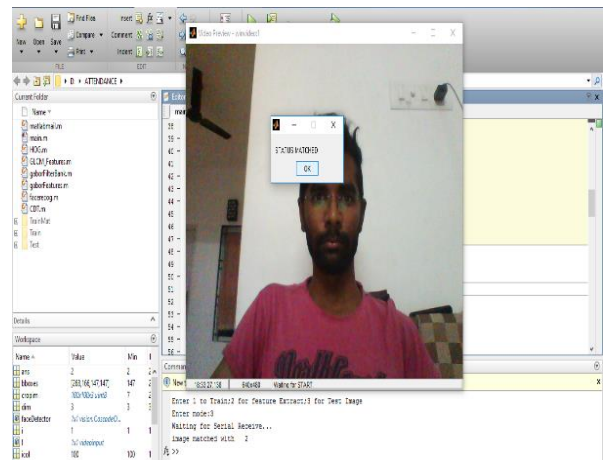
The complete hardware setup is shown in the below figure



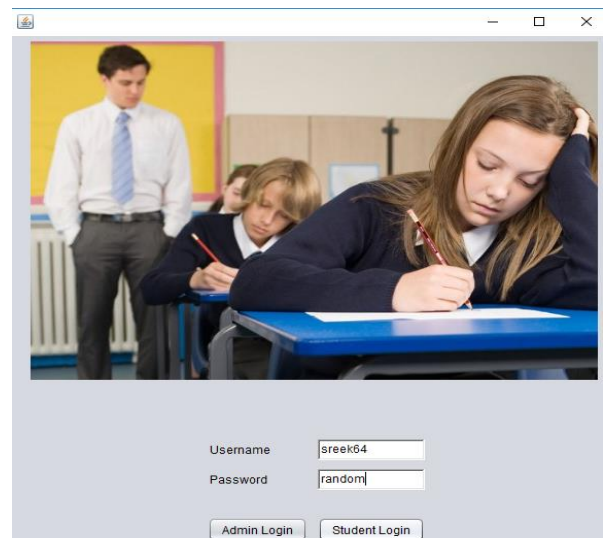
Step 1: when you run, the java program a window appears in that students should register their details. These details will be stored in the database.



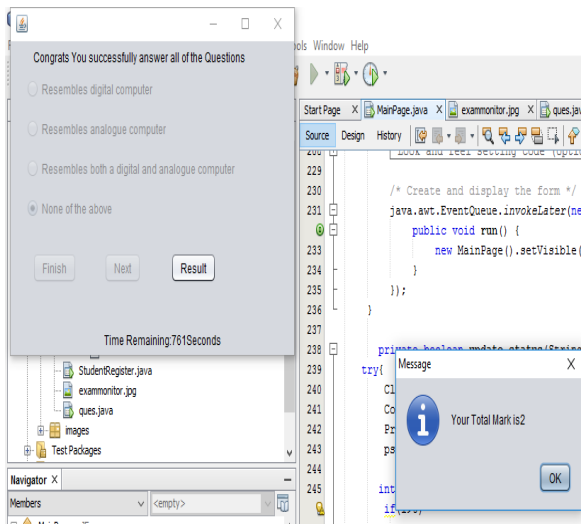
Step 2: Attendance verification process



Step 3: After successful verification exam login window appears on the screen.



Step 4: Questions are displayed on the screen with a time limit and after completion of the exam, the result appears on the screen and message will be sent to the student's registered number. If any student is absent for the exam, a message is sent to the parent.



6. Conclusion

Examination Malpractice is one of the serious issues we are facing in our society. To control malpractice is a challenging task. To overcome this problem, in this paper we have discussed on computer-based examination system with face recognition, RFID and Sensors. Face Recognition and RFID can detect if a person impersonates another person. Online examination system generates random questions for every student. Sensors detect if there is any malpractice. The installation cost of this project is affordable and reliable.

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