Student Attendance System and Authentication using Face Recognition

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***Abstract*— Problem statement: The existing attendance system requires students to manually sign the sheet every time they attend a class. This includes the more time consumed by the students to find their name on sheet, some students may mistakenly signed another student's name and the sometimes sheet may got lost. For avoiding the sheet problem, we used RFID technology, RFID card capture the attendance by flashing their card and save all data but sometimes RFID card may got lost. Approach: For avoiding the problem in sheet and RFID, we used face recognition and authentication using web cam with GSM based. After having images from Web-Cam, the image is cropped into square shape. We also focus on the special characteristics of human facial aspects such as eye, nose. In this recognition different control point are detected. The input image goes through the recognition system for facial identification. In some cases where the input image from the Web-Cam does not exist in the database, the user will get some error. However, in cases where the image exists in the database, that image will be computed for similarity measurement using Distance between control point measures from the input image. Results and Conclusion: The result of our experiment indicate that the recognition process of number of images in the database and some images from the Web-Cam provides 100% accuracy in terms of recognition.**

Key Words: GSM, Microcontroller ATmega16 A PU 1350, PC, camera, RS232, LCD etc…

I. INTRODUCTION

The most common means of tracking student attendance in the classroom is by enforcing the students to sign the attendance sheet, which is normally passed around the classroom while the lecturer is conducting the lecture. There are numerous disadvantages of using such system. For instance, lecturers with a large class may find the hassle of having the attendance sheet being passed around the class and the manual signing of attendance by students are burdensome and most likely distract them from teaching [1].

Besides, as the attendance sheet is passed around the class, some students may accidentally sign another student's name. The first case leads to a student missing out their name, while the latter leads to a false attendance record. Another issue of having the attendance record in a hardcopy form is that a lecturer may lose the sheet [2].

As a consequence of that, lecturer can no longer trace the students overall attendance record throughout the particular year. Apart from that, a lecturer also has limited access to the single-copy record. In terms of attendance analysis, the lecturer also has to perform manual computation to obtain the students' attendance percentage, which normally consume a lot of time. The limitations imposed by the conventional attendance recording system, we propose a solution in the form of an attendance tracking system based on RFID technology.

The main idea behind the system is to capture student attendance in a semi-automated way where the students are required to flash their card at the RFID reader upon entering the classroom. But the RFID based student attendance system requires students to manually handle the RFID card every time they attend a class. The RFID card may got lost. Face recognition helps to recognize the facial image in more efficient and accurate in order to match with the identity stored in the database. Having said the limitations imposed by the RFID attendance recording system, we propose a solution in the form of an attendance tracking system based on Face recognization and authentication technology [3].

As such, the objective of our project is to implement a still-image based face recognition algorithm by using web cam(i-ball). After extensive research into the field of face recognition, we have found that there is ample room for improving upon currently available face recognition systems. These improvements range from the robustness of the design to the speed of the system. An RGB camera can provide us with the necessary resources to achieve such improvements in face recognition. These resources include various camera (i-ball), GSM board, Personal Computer.

II. OPERATION OF STUDENT ATTENDANCE USING FACE RECOGNITION

The block diagram of the student attendance system is as shown in Fig. 1

i) Using GSM board we can send message to any mobile number which are stored into database.

ii) By interfacing the GSM modem with PC containing MATLAB code.

iii) GSM MODEM, PC, SIM, LCD (Liquid Crystal Display), microcontroller, power supply and also some connecting

wires are the common peripherals required for developing GSM based applications [4].

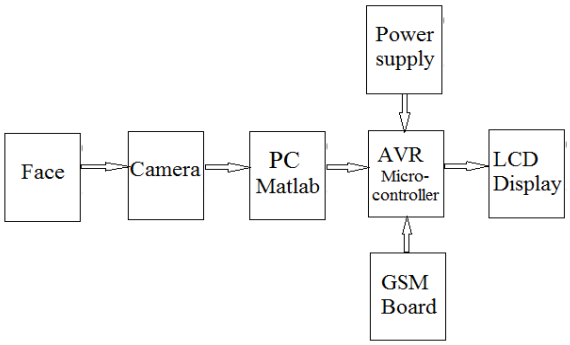

Fig. 1: Block Diagram Of Student Attendance Using Face Recognition With GSM Based.

A. Components of system

Different component are used for implementation. They are mentioned below [5].

1. USB to Serial Convertor
2. GSM MODEM
3. SIM
4. Power supply or Power Adapter
5. LCD
6. Microcontroller
7. Web Cam

B. Software used

a) AT Commands: AT commands are instructions used to control a modem. AT is the abbreviation of ATtention. Every command line starts with "AT" or "at". That's why modem commands are called AT commands. Many of the commands that are used to control wired dial-up modems, such as ATD, ATA, ATH and ATO, are also supported by GSM modems and mobile phones.

b) PC (MATLAB): We are using Personal Computer. In that system MATLAB code are used. MATLAB is a high-level technical computing language and interactive environment for algorithm development, data visualization, data analysis and numeric computation.

III. FLOW CHART OF THE ATTENDANCE USING FACE RECOGNITION WITH GSM BASED

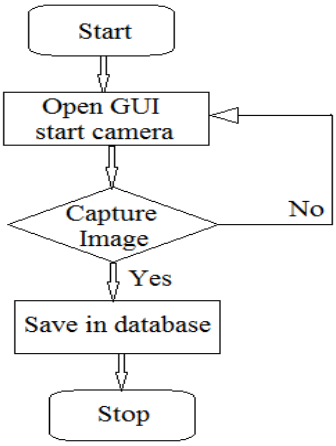

Fig. 2: GUI Input Image Flowchart explains briefly how our GUI processes the input image

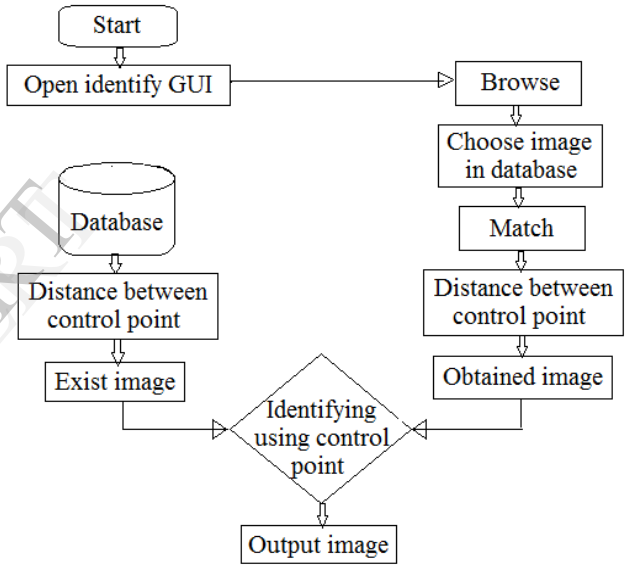

Fig. 3: Flowchart of the GUI of Identify Face Process

IV. SIMULATION RESULTS

The control panel can be interpreted as different parts; the Web-Cam control I/O and the processing unit. The first part receives an input image through the camera, which is further described in Fig. 4 as a Startup GUI.

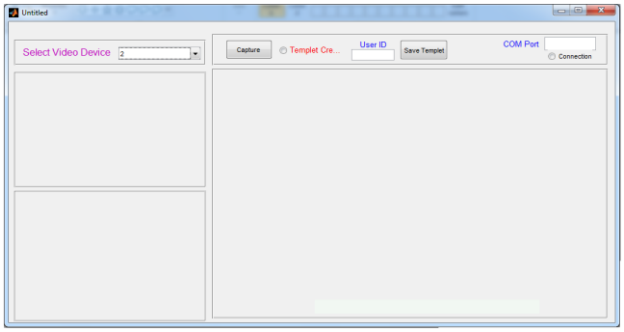

Fig. 4: Startup GUI

The Selection of device from the list indicates Web-Cam activation. The square frame is design to surround the facial area as to relocate the prospective area and separate the facial area. After the "Capture" button is pressed, the interrupt signal is sent to our Web-Cam, which has now stopped its task since the prospective image is obtained. As shown in Fig. 5, this process captures only the facial part of the image [6].

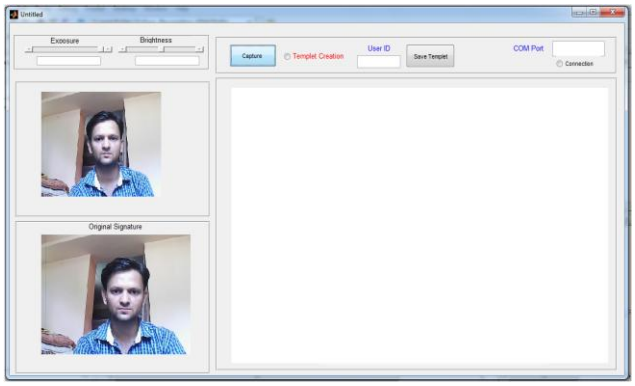

Fig. 5: Facial part

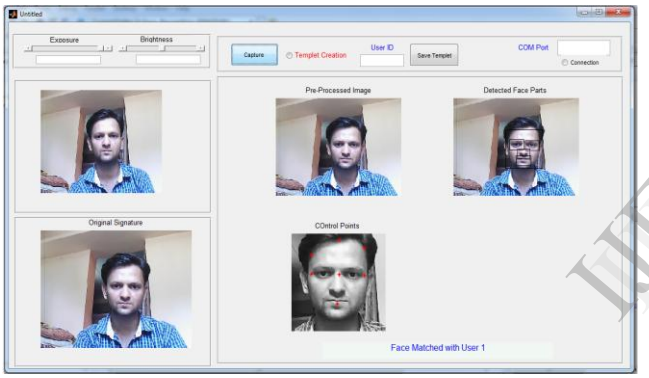

Fig. 6: Detection of Control Point

Later, control point detection techniques are applied to the image. In order to compare the similarity measurement with the database image, our reference point is based on the distance between extracted features is shown in Fig. 6.

Distance between control points of obtaining image is match with the distance between control points of previous image which are stored in database. After that the matching keeps continuously updates it score is shown in Fig.7 Depending on the value of score, it gives the result about matching in the form of message. i.e face matched with user1.After getting result, MATLAB code gives some particular id to the microcontroller. Controller detects the signal which is coming from PC. In such a way controller sends message to the other student who are absent in the class. Message sending is done with the help of GSM board.

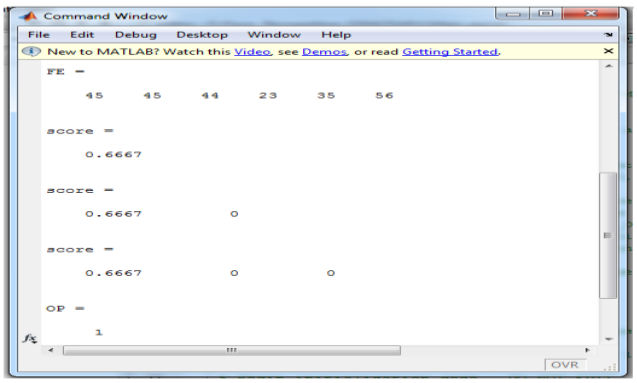

Fig. 7.An instant of command window

V.CONCLUSIONS

Student attendance system using face recognition was designed and implemented. It was tested with different face image. This study represents a facial detection and recognition model with different windows working in parallel and independently.

If face recognition is to compete as a viable biometric for authentication, then a further order of improvement in recognition rates is necessary. Under controlled condition, when lighting and pose can be restricted, this may be possible. It is more likely, that future improvements will rely on making better use of video technology and employing fully 3D face models. We hope that this system provides some additional insight into the field of face recognition and contributes to the development of the field. The MATLAB code was developed and it met the design criteria and solves the problem. Future work will be focused on verifying the algorithm performance against general images and studying the required modifications to make the algorithm robust with any image. These ideas will be implemented in future.

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