Fingerprint-Based Attendance Management System

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Abstract: Our project aims at design of finger recognition attendance system which could effectively manage the attendance of the students at institutes like Galgotias University. The attendance is marked after the student provides their biometric identification to the system and for that we are using a fingerprint recognition-based identification system which then identifies the student from a set of enrolled fingerprints. As fingerprint recognition feature is considered as the fastest and the best method for biometric identification save the time for wasting to call the student name and mark the attendance. It also gives a fool-proof method as every person has their own unique fingerprints and it does not change in one's lifetime. In this project a minutiae algorithm is being used for developing an identification system which is faster in implementation. The proposed system has been implemented using Java/Python Programming platforms. In the past, there has been a high level of imitation that you simply encounter a day secretly and within the publicized space, ghost employee problem has been a threat to almost every organisation, workers are worried about the extent of unemployment among employees and therefore the difficulty of supervising a student is present during the study. Fingerprints are a singular biometric authentication and don't change throughout one's life.

INTRODUCTION

To detect the existenceof the person is very crucial in various sectors like hospital, colleges and also the supermarkets and hotels and many more fields , Till few years back we were using a register to take or determine the attendance of the workers in the company, presence of a doctor in the hospital, presence of the attendees in the supermarket and also classroom attendance of the students.

If an organizational worker uses a register, he has to waste their time and energy and he has to do more man work as compared to the automated systems. So here in this research paper we have added a different type of fingerprint scanner which totally depend biometric structure that documents the existence subsequently. The Raspberry pi 3 is used for developing the Student Attendance Management System. So now we have developed a system using a structure in which firstly all students have to enroll themselves in the databases, if the student is enrolled in the database, he will receive a message with an id of that student being enrolled successfully. Now to confirm that the student is present, the student has to put his finger on the scanner so that the scanner will scan the impressions of the student and to confirm whether the student's data is there or not in the database. If the record is there then make available or otherwise it gives the message that data is not present. By creating this system, we can have many advantages like saving the time, less man work is required by the coordinator, correctness of the result is more as compared to the physical records and no one can make a proxy for another student because here for the detection we have used fingerprint as biometric identification as of the student.

To develop this system, we used Raspberry-pi 3, Python programming language.

ATTENDANCE MANAGEMENT:-

Attendance management is a method which supervises the attendance or existence in the workstation to reduce losses due to employees 'rest periods. Traditional attendance management has been facilitated by the use of timepieces and timecards, its regulation goes far off this to come up with a workplace that strengthens and uplift staff's attendance. Managing attendance is a crucial part of new era staffing systems,

have a good look at staff performance, planning and efficiency, which is why regularity in the presence and timeliness are hoped from all workers or the crew in the workplace. Unsatisfactory attendance caused by absenteeism and untimely occurrence of work disruptions, affected productivity, and created behavioral problems when the burden was transferred to other employees.

In addition, in many institutions, as well as in educational institutions, attendance is also a very important means of communication. These goals include student assessment, record keeping, and the promotions of fair and constant arrival in the classroom. In all countries like ours which are still in the developing phase, a small part of class workers are needed in many institutions and this strategy has not been stuck due to the many difficulties of the present style of collecting contributions. So this orthodox technique includes the use of paper sheets or registers to record the movement of students. This method can easily from a excel sheet not a paper based but previously the sheets on which attendance is taken can get ripped off, lost or stolen. It is difficult to count and determine the total presence of students and it's also a time taking process so it's difficult to find the students who have acquired the minimum percentage criteria and are eligible to give the exam. Hence, a plan was needed to resolve all these problematic areas.

CATEGORIES OF ATTENDANCE MANAGEMENT SYSTEM:-

Attendance Management are mainly two types namely; Default and Standard methods. Typical methods include a attendance muster ,time and timeline. Time cards are data's, automated or other that documents how long a worker spends on an activity. Attendance muster is a proper inventory of the people who attended the institution or organization. A timeline that is a piece of mechanical (electronic) time are used to detect and track the employee time spend in company. The default methods include a Barcode system, a magnetic field system, a biometric attendance system and a Radio Frequency Identification (RFID) system. The barcode program requires that all employees be provided with a badge / card where the barcode is located. To get in and….out of the institution, the id card is interchanged with a timer, and the information is

held by the timer. In the existence of magnetic lines, data of the employee is present in the magnetic field card. If the magnetic card is swiping with a timer, the details on the card magnetic field are recorded in time we have swipe. This program has the capacity to read only one magnetic card at once and needs contact from the student. The Radio-frequency identification system is a type of technique in which transfers data utilising radio waves from an magnetic tag known as an RFID tag which is added to an entity by the program with the motive of recognizing for finding down the entity. The ID cards which are implanted with RFID tags recognized by the student. This RFID program is encrypted in a systems directory. Every worker owns an RFID card and the recognizer datas details that if a worker has left the institution or has entered in it. In this fingerprint Attendance program, there is an existing software matched with a staff timer that needs fingerprint technology for verification purposes. Whenever we utilize this type of system workers can use their impressions of fingerprints to get inside and outside of the institution. These processes have the significant influence that the whole system is more simple and fast. Other benefits include the removal of pre-existing costs for obtaining employee cards.

Requirements:-❖Language – Python 3.8

❖ MS Excel as a Data Base for storing the report.

❖ The fingerprint scanner connect to our system. Fingerprint Scanner can send the video and image information to our Computer system. Scanner take the input and give the response to Scanner for turn on and turn off etc.

The OpenCV concept has been used to detect the finger.

❖ 3: -Platform – IDLE

❖ Optical Fingerprint Scanner

RELATED WORKS:-

The proposed computer-based speech management system in this system are based on single-chip subsystems (card reader and advanced electronic card) are operated respectively in the com port of the electronic based systems. The magnetic card is an imitation of a smart card in which given all the detail of the student like ID ,Name etc. If we swipe the card in

the machine they verified the student detail ID, Name and check the login code with the card detail processed the further process. The attendee has been given and / or denied the existence of a particular talk based on the result of checking a system software program that works on a system where the swiping machine is interrupted sequentially. Although the program offers an easy and cost effective system resolution for the institution of travel, the difficulties in countries like ours do not exclude the factor of mimics. It is based on the students have their RFID cards are not and second most important thing RFID machines are present at that time. Proposed a significant system algorithm for automated attendance management systems using face recognition techniques and computer vision and both of the technique are added in attendance management system. The Process excludes in this System foe identification to call out the student name, or check their Id card, but still can not recognize every student in the institution the class thus providing a low level of identification cause pictures or the views of the face changes from the time of admission to the time of verifying and it also makes the whole process more costly the placing do not have any security of the privacy. An on-air system to manage attendance based on iris detection was given by utilizing daugman's algorithm. The Program has an incomplete iris vision management system that can complete the whole work form having scanned the iris saving, extracting minutiae, identification and matching but that way is problematic where topography of the transmission lines are incorrect.

## ATTENDANCE MANAGEMENT SYSTEM OVERVIEW: -

The proposed of system introduces a new automated system to manage attendance for workers as well as the students. We have fabricated it into two requirements: one is registration and the other one is verification. At the time of registration, the person's biometrics are scanned and then minutiae information is extracted and store the data in database of system with User Id. The main work of the registration module is to welcome the Student or user using User ID and fingerprints to the database after the feature is released. This type of attribute makes a figure that is utilized to identify the user's identity, which enables the authentication

process. The registration process is done by the attendance program organiser. At the

time of verification user fingerprints are scanned again and the drawn out attributes are matched to the one's which are already documented in the system to verify. If it is successfully recognized the presence of the person id documented finger impressions are used as input by the users for image acquisition, an advanced fingerprint recognition system and an identification system and a user database. The website contains fingerprint templates as well as other user information and user records. Figure 1 shows the process required in attendance management system

SYSTEM ARCHITECTURE: -

The Blueprint or Algorithm of the attendance management based on fingerprints includes the following:

i). Enrolment module: - The function of the registration module is to include users with their fingers in the program details. During registration, impressions of the fingers and some other user information are scanned and distinctive attributes are drawn out from the impressions and saved in the system such as a figure and ID of the user. Employee details to be held include: ID number, last name, gender, spot, type of employees, passport picture, mobile number, mail id and division. Student information includes : id number, last name, section, gender, mobile number,photo and the scholarship.
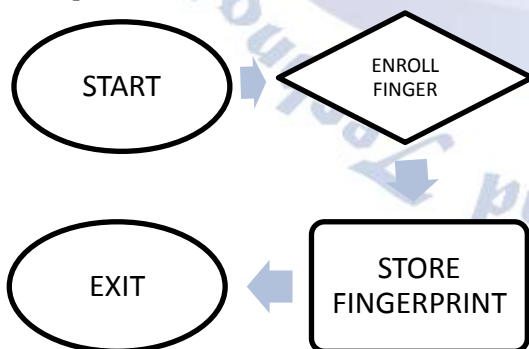
(a) Flow Chart of Fingerprint

To maximize the standard of the scanned the image of fingerprint during registration / registration, take two images samples with each finger used for set to the highest level of accuracy. When fingerprints and the username of the person to be registered are provided with the registration module, the algorithm known as minuate extract is initially applied to finger impressions

and the minuate algorithm patterns are drawn out. These attributes form a figure that is utilized to identify the person's identity that makes them able for the verification part. The registration is done by the attendance program administrator. The registration and admission phase is the management phase . The person's finger impressions and other

details are saved for the first time in the registry database. Subjects, exams, classes, teachers and sections are initially and tests are also registered in this category. All the information and the details needed for the saving of the attendance are registered in this model. The technique which is generally utilized for extracting minuate is Crossing Number.

$$CN = 0.5 \sum_{i-1}^{8} |P_i - P_{i+1}| P_9 = P_1$$

Where P_i the pixel value in the neighborhood of P.

ii). Verification Module: - The function of the verification module is to check the person's details whoever wants to use the system. The significant one has to be approved and has to show his or her identity and have to put their finger in the Scanner (Fingerprint Scanner). The scanned the fingerprints process is continue further scaled down to the image processing stage, and in the feature removal phase, after a biometric template is left. It is then integrated into the same algorithm, similar to the human biometric template stored on the system website to establish ownership. During confirmation, to the staff, the employee gives his name and department, and puts his finger on the fingerprint scanner or reader, fingerprint sensor comparing fingerprint and saved in the data file, after a fingerprint is match , The employee User is send to the datafile where the data is present …. next to do so there is also a refresher (may or may not be) of the user's daily attendance. Workers were arrested twice a day for both arrivals and departures.

$$\begin{bmatrix} \varphi_m^I \end{bmatrix} = \begin{bmatrix} \gamma_m^I \sqrt{\left(row_m^I - row_{ref}^I\right)^2 + \left(col_m^I - col_m^I\right)^2} \\ \tan^{-1}\left(\frac{row_m^I - row_{ref}^I}{col_m^I - col_{ref}^T}\right) + rotatevalues(k,m) \\ \theta_m^I \theta_k^T - \theta_{ref}^T \end{bmatrix}$$

where for an input image,

γ_m^l = radial distance of mᵗʰ minutiae.

φ_m^l = radial angle of mᵗʰ minutiae.

θ_m^l = orientation angle of mᵗʰ minutiae.

row_{ref}^l , col_{ref}^l = row index and column index referen

Points currently being considered. Rotate values (k,m) Represents the difference between the orientation angles T_k and I_m. row_m^l and col_m^l represents row index and the column index of the mᵗʰ minutiae. T_k and I_m represent the extracted data in all the columns of row k and row m in the template and input matrices, respectively.

iii). System database: - System for managing attendance datafile(database) it consists a data tables, each of process accompanied by an authorized(approved) person who access all detail and system. Every detail of student consists minutiae templates for username and fingerprint of person or other important details such as pin and as a template reference. System data design uses a related data model given a set of tables in which all the data of user is stored. The database is created in the Microsoft database Sql Server and also use other platform. SQL Server is very easy and fast , it can store a large and big amount of data and its require a very less time configuration.
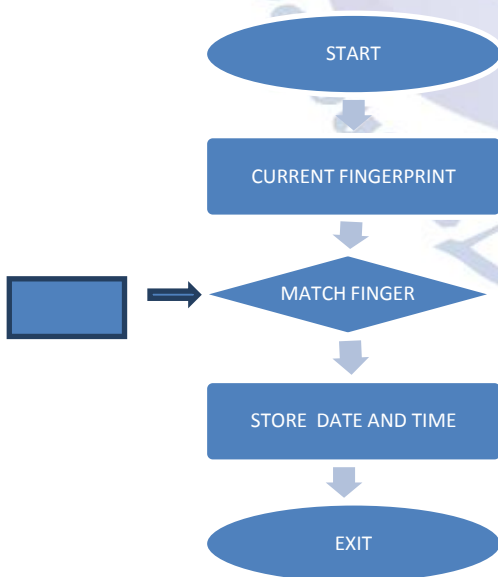
(B) **Flow Chart of Fingerprint Matching**

System Performance and Evaluation: -If a finger impression match is given, one would have to check the accuracy and performance of the speed in the real world. Unlike cryptographic keys and passwords, biometric templates have high incalculability. There are important differences between biometric(fingerprint) samples for a person(user) A takes at different time lapes. So it is always done right. This compares to the exact match required by the token-based methods the password. Inconsistent comparisons lead to error are mainly two types: False (real person) Rejection Scale

(FRR) and False (Deceptive) Acceptance Standard (FAR). FRR / FAR measurements are depending, among other things, on used the type of complexity of the algorithms for finger extraction. In general, lower acceptable FAR/FRR leads by medium sized algorithms.

Formula of FAR defined by: FAR=(FA/N) *100

Fa: Total no false accept

N:-Total no of verification occurs

Formula of FRR defined by: - FRR =(FR/N) *100

FR: Total no false reject

N:- Total no of verification occurs

CONCLUSION:-

In this research paper, we have discuss about a fingerprint base attendance management system. The embedded system is a developed system that is parts of a fingerprint authentication/ recognition system and it is based on minutiae points. The local characteristic of the fingerprint extracts which is minutiae points on the basis of template. Templates of student are matched during the process of verification processes and registration. And improved the quality and speed in during the verification process and registration process , the success of the operation determines by using the matching scores. The matching-score was already specified so that only sets of the minutiae data is exceed the score accepted then the data below to the score given will be rejected. In this paper, we present the make-up of the fingers.

Therefore, In Fingerprint Recognition using to find the percentage of the student and teacher in present and time he and she is coming. In paper and pen attendance

taking system teacher count present detail in every month of all student detail it's very hard and taking much of time but in Fingerprint Recognition System he directly clicks student detail he gives all detail of student. This Software is very useful for both student and teacher for saving the time. In Fingerprint Recognition the most and best method to find the student and teacher behaviour and manner. In this system the good thing is its record a real time of worker when he inter. Also, it compresses or less most of the administrative jobs and it's also remove the human errors, no option for student to mark proxy, reduce the time and easily access the detail of student.

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