



TEACHER ASSISTANCE SYSTEM

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Abstract

This paper presents a handheld device which acts as an assistance for the teachers to maintain records of student attendance, and many other day to day activities like to update daily attendance, to view free classroom slots, to enter the examination marks and to maintain the timetable, and to keep reminders. This system can replace the existing manual system to a more systematic and electronic form because at the end of the day the attendance on the paper have to be updated in an electronic form, so this system improves the efficiency and adds many other features which can be very useful for teachers to irradiates many trivial and inefficient activities like to reduce the presence of proxy attendances done by the students and the system can also reduce problems such as the missing paper which can easily get damaged.

Keywords: Microcontroller, Attendance System, Fingerprint Sensor, Biometric Sensor

I. INTRODUCTION

A Teacher has to maintain many records of many activities in his daily routine like the attendance, examination marks which is traditionally done through pen and paper which is a very inefficient way to do so in today modern world because at the end of day ever record has to be updated in an electronic form i.e. to Central Database of the institute. The device in this paper tries to reduce this problem by already saving the record data in a digital form so the need for re-entering the record data from the attendance sheet no longer is required. The device double up as an assistance for the teachers by maintaining the track of the free classroom slots to take extra lectures since it is difficult to find an unoccupied room. The device can also be used to do many other activities like to update examination marks

of the student, to keep reminders and to track the timetable.

All the educational institute has some specific attendance criteria which the students have to maintain throughout the tenure of an academic semester. That is why maintaining the track of proper of attendance is extremely important to irradiate further complications. Traditionally, attendance is mostly marked using paper sheets, this approach is in use since long time and has lot of problems. It becomes difficult for the institute to regularly update the record and manually calculate the percentage of classes attended by every student. Analysing this problem, in this paper a system is designed to overcome the problems associated with the existing system of attendance. The main focus of the device is to mark and record the attendance of the students. Biometric systems have been widely used for the purpose of recognition. These identification methods are associated to automatic identification of people based on some specific body features [1]. There are various types of body features which can be used for identification for some definite systems but the important way of recognition in biometric system is always similar across different types [2]. Biometric systems are mostly used for one of the two objectives recognition [3] or verification [4]. Recognition means to find similar features between the questioned biometric sample to the one which is pre-loaded in database of the system [5]. The technique of fingerprint matching is in practice since long time i.e. in the late 16th century, most famously the finger imprints were used to on letters and also who cannot sign [6] but modern electronic matching techniques have been added mostly in 20th century. Fingerprints are considered one of the most developed biometric technologies and have been worldwide used in unique identification of a

person [7]. The device in the paper incorporates bio-metric sensor which can identify specific person based on the persons fingerprint pattern. The finger print acts as a unique ID [8] of the student which can be associated with the student's Division, Roll number etc. This information can later be used to maintain the track of the attendance. This approach simultaneously removes the problem of proxy attendances which is common in the pen and paper system.

The data obtained from daily attendance can be saved on devices SD card storage or set to update directly to the Central Database System of the institute through the institute's recognised Wi-fi Network which is connected to the institute's Central Servers. The device can also be used to maintain the track of free classroom slots by constantly updating the occupied classroom and thus identifying the free classroom slots, which can be used in case of extra lectures to adjust the free classroom.

II. RELATED WORK

Alessandra Lumini and Loris Nanni have previously worked on combinations of various biometric systems [9]. There are various types of biometric recognition such as: Iris Recognition which involves recognising a person by analysing the apparent pattern of a person's iris [10], Face Recognition identifies by getting the coordinates of features such as width of mouth, width of eyes, pupil [11], Fingerprint Recognition involves identification of a person based on his/her fingerprint patterns [12]. Papers on Biometric attendance management systems have been published earlier by many authors, one of such being Maddu Kamaraju and Penta Anil Kumar, who proposed fingerprint attendance management system wirelessly using Zigbee technology [13].

Previously not much works has been done concerning to the academic attendance monitoring problem. Some software's have been designed formerly to keep track of attendance [14]. But they require manual entry of data by the users. So, the problem remains unsolved. Moreover, idea of attendance tracking systems using facial identification methods have also been proposed but it needs not so cheap devices and still not getting the required exactness [15]. Such devices lack portability. Such a system will

fail in schools and colleges where attendance is to be marked every other lecture since it is not possible for the students to go to the device and mark their attendance. And also, such devices are mainly focused on only one job that is to take attendance. Such a device cannot be used as an assistant for teachers since the teachers have to maintain many activities in daily routine.

III. SYSTEM DESCRIPTION

A. Hardware Description

The device presented in this paper is a hand-held device which can be passed student to student throughout the classroom to mark their attendance. The CPU of the system is a Microcontroller (Arduino Mega 2560), a 2.4-inch TFT display used to display various information and a Fingerprint Sensor Module (R305 V_1.6) [16]. The Arduino Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 Analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button [16].

The fingerprint sensor module is TTL UART interface for direct connections to microcontroller UART or to PC through MAX232 / USB-Serial adapter. It can store the finger print data in the module and can configure it in 1:1 or 1: N mode for identifying the person [17].

The 2.4-inch TFT touch Screen LCD Module is a display shield with built in microSD card connection. This screen has 240×320 pixels with individual pixel control

B. General Description

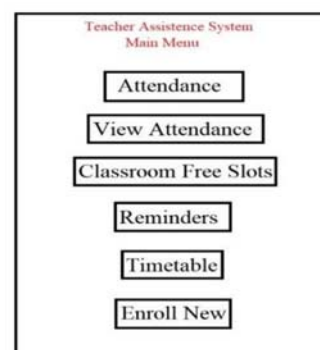


Fig1: Main Menu

At the start, the system checks for the fingerprint module. If the fingerprint is detected only then the next process is continued. The Main Menu window contains several options. If the user selects the option “Attendance” he will be asked for the date and the lecture for which the attendance record is to be saved. Once that information is entered the Fingerprint scanning process begins and the information associated with that fingerprint ID (i.e. Name, Roll Number, etc) is added to the file.

The Information obtained from the fingerprint Sensor goes to the microcontroller where it is analysed. In case the match is found, the name of the student is displayed on the TFT Display as to confirm that their attendance is being marked. When all the data is collected the information is stored in the system’s SD Card and updated on the Central Database daily at a particular set-time. Similarly, if the user selects the option of “View Attendance” after selecting the desired date and the class information regarding that class will be displayed (i.e. Total Student, Total Present, Total Absent). Next option of the “Classroom Free Slot” will display the updated information of unoccupied classrooms. For which every user in the complete network has to update the classroom availability if the classroom is not occupied in regular slot. The following options of Reminder and Timetable will set the desired reminder and display the Timetable of the respective teacher. The “Enroll New” will add new student fingerprint and the relevant information to the system.

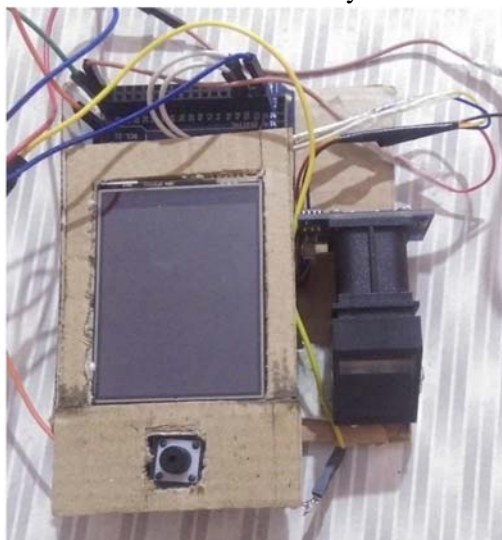


Fig2: Attendance System Device

IV. PERFORMANCE AND EXPERIMENTS.

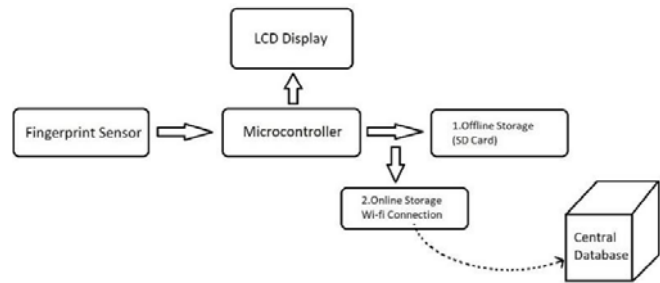


Fig3: Main Block Diagram

At the start of every new record, every enrolled student specific to that class is marked as absent. The user first sets the date and then proceeds to take records.

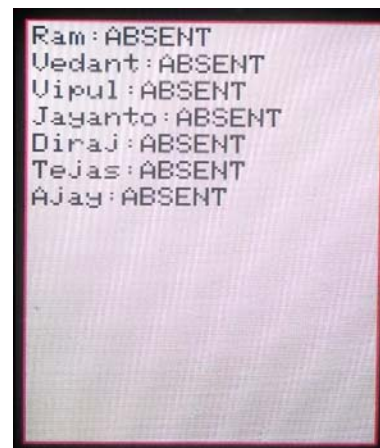


Fig4: Default Attendance Report

After giving the date, the student keeps his finger properly and if the fingerprint matches, the name associated with the ID is displayed. And subsequently his/her presence is marked.

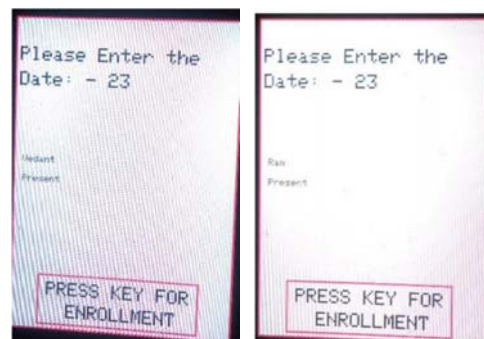


Fig5: Attendance Confirmation

For Class room free slots all the default class rooms allotted to the faculty has to be entered.

Default Time Tabel

Time				
Day				
		Free Class Room Slot(x)		

Fig6: Default Class Room Allotment

Whenever the faculty is not attending the class, to the room which is been allotted by default, he has to mark that class as free slot through his device. Doing so the central database will acquire knowledge about the availability.

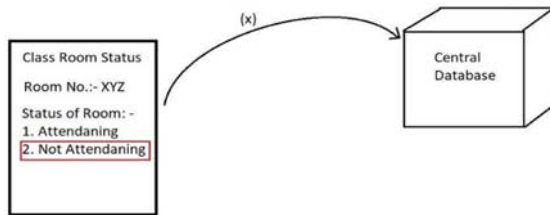


Fig7: Updating Info regarding Timetable

That availability can then be seen by everyone linked to the Central Database and then can make request to acquire the Room. Once acquired faculty acquiring it can mark it as allotted.

When the option for enrollment is selected, the system asks for an ID i.e. the information associated with that ID is to be entered. Once information is entered, the fingerprint and the information are saved corresponding to that ID.

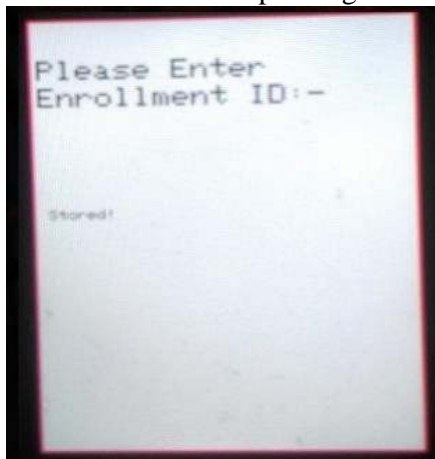


Fig8: Enrollment Menu

V. RESULT ANALYSIS

A report of the updated information is stored and saved both online and offline and a report can also be generated i.e. the record can be viewed.

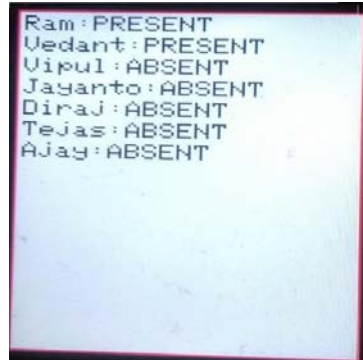


Fig9: Final Report

VI. CONCLUSION

The Teachers Attendance System proves to be more efficient for recording the attendance and can also double up as an assistance for the teachers in their daily routine. Many drawbacks of traditional way for marking attendance is reduced, thus increasing efficiency and reducing errors. Timely update of the information on the main Database tends to make records more organised. The device also solves many trivial problems like classroom free slots, timetable etc.

Further scope for research:

The scope of the device is limitless and much more problems can be solved through this concept. More powerful microcontroller can be used which can enhance the working and the efficiency of all the peripheral devices. Right now, the concept of the device is limited to Educational Curriculum but it can be implemented to various fields like Medical (to track the medical history of a specific patients during his time in hospital identifying them with there fingerprint), Sports, Agricultural etc.

REFERENCES

- [1] D. Maltoni, D. Maio, A. K. Jain, S. Prabhaker, "Handbook of Fingerprint Recognition", Springer, New York, 2003.
- [2] A.C. Weaver, "Biometric authentication", Computer, 39(2), pp 96-97 (2006).
- [3] J. Ortega-Garcia, J. Bigun, D. Reynolds and J.GonzalezRodriguez, "Authentication gets

- personal with biometrics”, Signal Processing Magazine, IEEE, 21(2), pp 50-62 (2004).
- [4] Anil K. Jain, Arun Ross and Salil Prabhakar, “An introduction to biometric recognition”, Circuits and Systems for Video Technology, IEEE Transactions on Volume 14, Issue 1, Jan. 2004 Page(s):4 – 20.
- [5] Fakhreddine Karray, Jamil Abou Saleh, Mo Nours Arab and Milad Alemzadeh, “Multi Modal Biometric Systems: A State of the Art Survey” , Pattern Analysis and Machine Intelligence Laboratory, University of Waterloo, Waterloo, Canada.
- [6] Federal Bureau of Investigation, “The Science of Fingerprints: Classification and Uses”, U. S. Government Printing Office, Washington, D. C., 1984.
- [7] H. C. Lee and R. E. Gaensslen (eds.), “Advances in [17] <http://www.sunrom.com/p/finger-print-sensor-r305> Fingerprint Technology”, Second Edition, CRC Press, New York, 2001.
- [8] Sharath Pankanti, Salil Prabhakar, Anil K. Jain, “On the Individuality of Fingerprints”, IEEE transaction on pattern analysis and machine intelligence, vol.24, no.8, august 2002.
- [9] Alessandra Lumini, Loris Nanni, “Overview of the combination of biometric”, Elsevier Information Fusion vol.33, January 2017, pp. 71-85.
- [10] Shima M. Elsherief, Mahmoud E. Allam, Mohamed W. Fakhr, “Biometric Personal Identification Based on Iris Recognition”, Computer Engineering and Systems.5-7 Nov. 2006, Cairo, Egypt .
- [11] Adrian Rhesa Septian Siswanto, Anto Satriyo Nugroho, Maulahikmah Galinium, “Implementation of face recognition algorithm for biometrics based time attendance system”,IEEE ICT For Smart Society (ICISS),24-25Sept.2014 Bandung, Indonesia.
- [12] Sanjay Thakre, Ambikesh Kumar Gupta, Shilpi Sharma, “Secure reliable multi model biometric fingerprint and face recognition”, IEEE Computer Communication and Informatics (ICCCI), 5-7 Jan. 2017, Coimbatore, India.
- [13] Maddu Kamaraju and Penta Anil Kumar, “Wireless fingerprint attendance management system”, Electrical, Computer and Communication Technologies (ICECCT), 5-7 March 2015, Coimbatore, India.
- [14] K.G.M.S.K. Jayawardana, T.N. Kadurugamuwa, R.G. Rage and S. Radhakrishnan”, Timesheet: An Attendance Tracking System”, Proceedings of the Peradeniya University Research Sessions, Sri Lanka, Vol.13, Part II, 18th December 2008.
- [15] Yohei KAWAGUCHI, Tetsuo SHOJI , Weijane LIN ,Koh KAKUSHO , Michihiko MINOH ,“Face Recognition-based Lecture Attendance System”, Department of Intelligence Science and Technology, Graduate School of Informatics, Kyoto University. Academic Center for Computing and Media Studies, Kyoto University
- [16] <https://store.arduino.cc/usa/arduino-mega-2560-rev3>
- [17] <http://www.sunrom.com/p/finger-print-sensor-r305>