A Qualitative Way for Automatic Attendance Tracking Using Beckon Signal

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ABSTRACT

Attendance collection is a challenging and time consuming process, especially in educational institutes. This paper proposes a system that register attendance using MAC addresses of Smartphone of students and teachers. Wireless router is used to scan MAC addresses. The paper explains the implementation details of the proposed system. It also discusses how the system verifies student identity to eliminate fake attendances. This is cost effective system that speedup the process of attendance management.

Keywords:—Attendance System; MAC Address; Wireless Router; Wi-Fi; Passcode

I. INTRODUCTION

Attendance tracking is a crucial activity in every organization whether it be any organization with employees or an educational institution. Pen-paper based manual approaches are most commonly used for this purpose. Nowadays a variety of techniques like RFID, biometrics, etc. are emerging to implement systems which reduce the effort for attendance data collection and add more accuracy to it. However, these methods are much delicate and ineffective for educational institutes where data needs to be collected many times during course of the day. This caused a scenario where automation along with the cost effective and robust method had to be brought into the process.

This paper proposes an attendance system that offers to reduce such a waste in the lecture time. The proposed solution requires transfer of students' smartphones' MAC (Media Access Control) addresses to wireless router mounted for group of classrooms; presence of student can be confirmed. This system also takes care to prevent unauthorized attendance registrations using passcode and such attempts by any student are also detected.

A wireless router is a device that performs the functions of a wireless access point and also include functions of router. Routers knit together the constituent networks of the global internet, creating the illusion of unified whole [8]. Their primary goal is to

transfer packets from a set of input links to a set of output links. They are found at every level of internet; however, they are still useful without the connection of internet as link from a device to a device. Routers are setting-able i.e., we can restrict people by IP/MAC address, block website or modify download/upload speed.

MAC address is a unique identifier assigned to network interfaces for communications on physical network segment. MAC address of every connected device to wireless router can be obtained by examining the ARP (Address Resolution Protocol) table of the router. Using system root login, we can see the contents of this table by running command *arp*.

ACTIVE DHCP CLIENT TABLE

This table shows the assigned IP address, MAC address and time expired for each DHCP leased client.

ACTIVE DHCP CLIENT TABLE

Name	IP Address	MAC Address	Expiry	Type
android-76eed653394ddbbe	192.168.1.4	e0:2c:b2:c7:23:d4	In 0 days 04:08:38	Automatic
DESKTOP-66GLOCV	192.168.1.3	48:45:20:f0:09:a1	Expired	Automatic
DESKTOP-72P2D6H	192.168.1.8	a0:d3:7a:27:03:ee	In 0 days 23:25:22	Automatic
DESKTOP-1P0SCM3	192.168.1.10	18:3d:a2:e4:58:63	In 0 days 23:12:50	Automatic
android-54bb5d6acfcd8319	192.168.1.11	60:e3:ac:d2:11:bf	In 0 days 22:00:50	Automatic
Redmi3S-Redmi	192.168.1.6	ac:c1:ee:a5:da:d7	In 0 days 04:55:14	Automatic
Windows-Phone	192.168.1.7	48:50:73:e2:52:0c	In 0 days 19:00:29	Automatic
rjsaurav	192.168.1.5	2c:33:7a:f7:de:2f	In 0 days 13:24:30	Automatic
PAPPUKUMAR	192.168.1.12	b4:6d:83:2c:17:ad	In 0 days 09:54:34	Automatic
android-73c118ede058f505	192.168.1.9	a4:70:d6:87:9c:9c	In 0 days 21:07:24	Automatic
Che1-L04-e9695798906080c2	192.168.1.13	7c:7d:3d:9a:52:ae	In 0 days 23:05:41	Automatic
dev-lumia	192.168.1.2	48:50:73:c0:6b:88	In 0 days 23:23:20	Automatic

Figure 1: MAC address detection in D-Link Router

II. RELATED APPROACHES

In this section we are going to discuss several automated systems that are employed for efficient attendance collection.

A. RFID based attendance management system

Reference [1] states, the input from user is collected through an RFID card which is scanned across a RFID reader which will get the information from the RFID tag and pass it onto the application which will validate the data with the database. If the data is valid then the system will record the attendance information into the database. In case if the information is found invalid then the system will reject the information and exit from the application. In this system the attendance collection process is much faster but the authenticity of data is not guaranteed.
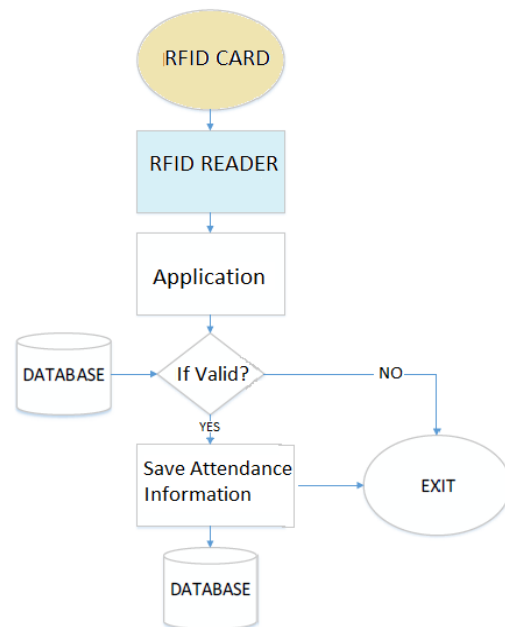

Figure 2: RFID Based Attendance Management [1].

B. Attendance collection using QR-Code

Reference [3] offers a QR code solution to challenging attendance collection task. QR code is given to students for scanning via a specific smartphone application. The code along with the student identity taken by the application will confirm the students' attendance [2]. This system prevents fraudulent attendances but requires costly devices such as smart screens to be present in each classroom of institution.
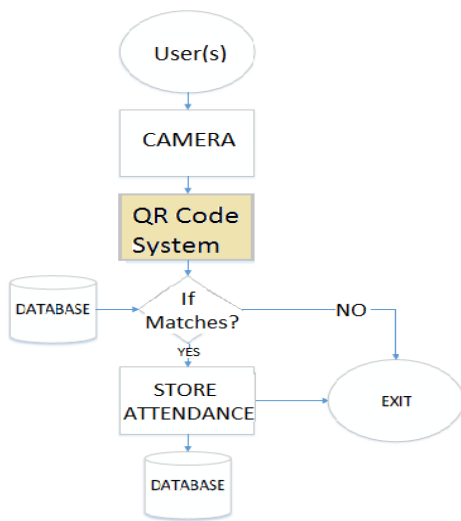
Figure 3: Attendance Collection using QR-Code [3].

C. Location based attendance system

In this system [7] we use GPS system and track the location of the user. Based on the location we can collect the attendance information. This system needs a GPS unit to be associated with each user which can be even the smart phone that the user carries along with him or her. Use of GPS technology [5] causes issue of lack of accuracy since the GPS system has limitation that it can mention the approximate position of user which can lead to issue depending on the framework or the infrastructure of the organization in which the system is going be implemented.
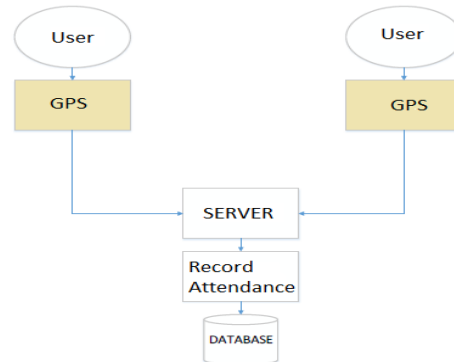

Figure 4: Location Based Attendance Collection [7].

D. Attendance registration using Biometrics

Biometrics is considered the most effective [4] and safe method (is very difficult to falsify), but have disadvantages, for example, that since it is a relatively new technology, it is not still integrated in PC and comparatively costly with respect to other techniques [5]. Table II.I shows comparison among various biometric techniques available for attendance collection.

Table 1: Comparison Between Various Biometric Attendance Collection Techniques [6]

Biometric Technology	Accuracy	Cost	Devices Required	Social Acceptability	Interference
Iris recognition	High	High	Camera	Medium-low	Glasses
Retinal Scan	High	High	Camera	Low	Irritations
Facial Recognition	Medium-low	Medium	Camera	Low	Irregular illumination
Voice Recognition	Medium	Medium	Microphone, telephone	High	Noise, cold
Hand Geometry	Medium-low	Low	Scanner	High	Arthritis, rheumatism
Fingerprint	High	Medium	Scanner	Medium	Dirtiness, injury, roughness
Signature Recognition	Low	Medium	Optic pen, touch panel	High	Changeable or easy signatures

II. PROPOSED SYSTEM

This system uses a network device and online attendance record-keeping process in a way that enriches lecture time so that it can better be utilized rather than wasting in the traditional pen-paper style, time taking attendance. Proxy detection module of this system retrieve fraudulent attendances for further disciplinary action.

A. System Architecture

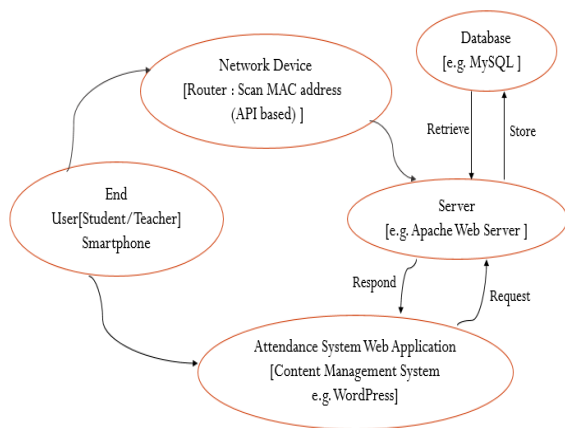Figure 5 illustrates the relationship between elements of system architecture.

Figure 5: Elements of Proposed System Architecture

1) System requirements

a) Hardware requirements

Our system requires network device [wireless router] to be mounted on walls of each classroom. These wireless routers are connected with the college server for processing of scanned MAC addresses.

College server performs following tasks:

- ❑ Mediates attendance requests of teachers and students
- ❑ Generate passcode for proxy detection module
- ❑ Runs identity check on basis of MAC address scanned by wireless router

b) Software requirements

PHP, Apache web server and content management system e.g. WordPress, which are used to store data from end user[student/teacher] to server or vice versa are required. Moreover, the system also requires a database e.g. MySQL to store information about teacher, student, timetable and attendance. Figure 6 shows attributes of each corresponding entity in system database.
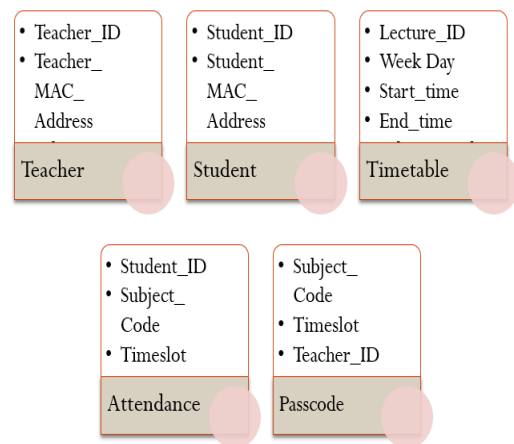

Figure 6: Structure of tables in database.

B. How the system will work

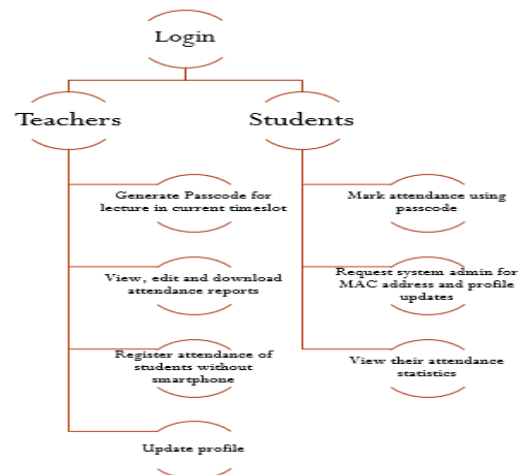Figure 7 illustrates interaction of students and teachers with the proposed attendance system.

Figure 7: Students' and Teachers' Interaction with the Proposed System.

Our system work in two phases:

Phase 1 make system ready to accept attendance of students. Teachers are main working entity in phase 1. As teacher of current timeslot lecture enters classroom, connects with attendance system wireless router and login website of our proposed system. Router communicates scanned MAC address of teacher to system server for further processing. Server generate passcode for current lecture. Passcode is dynamically created random code which is generated using information of current timeframe, Teacher_ID from teacher table and Subject_Code from timetable table stored in database. The main purpose of passcode is to detect fraudulent attendance, which is further illustrated. Teacher retrieve passcode by clicking on "Get Passcode" button on his or her homepage of website, for current lecture which is conveyed to students to register their attendance. Students without smartphone can register their attendance using teachers' smartphone. Thus attendance could be granted if MAC addresses scanned match with the stored MAC address in database or matches with the teacher's MAC address. Figure 8 shows the data flow model for teachers.
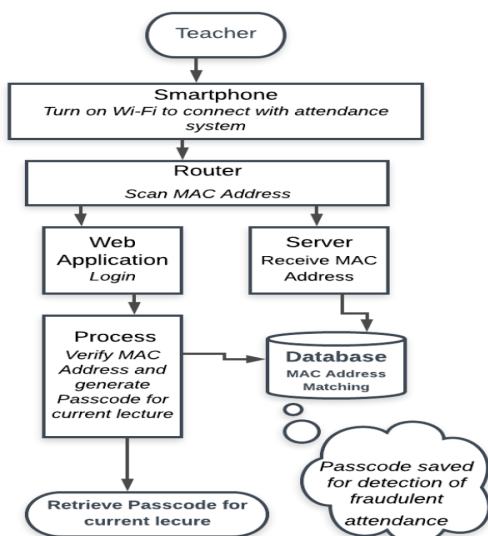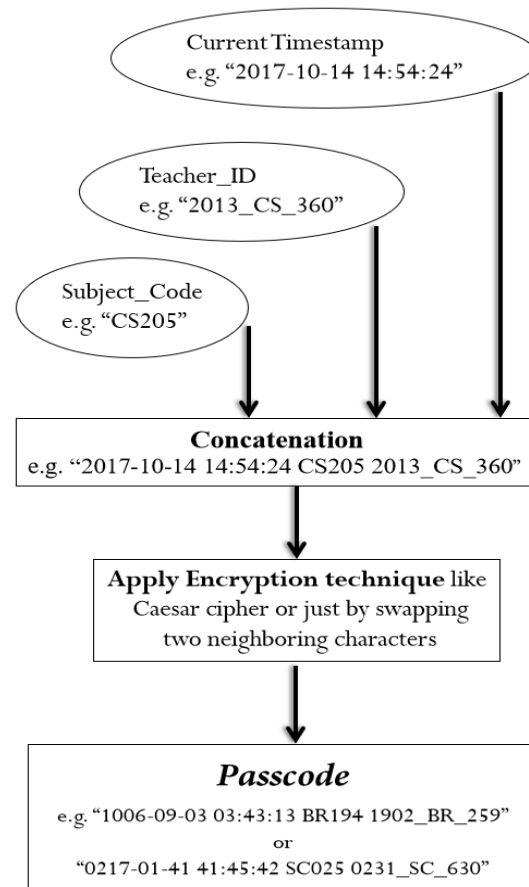

Figure 9 Proposed method to generate passcode.

Figure 9 illustrates how passcode for any lecture can be generated.

Phase 2 works with students. After receiving passcode for current lecture from respective subject teacher, students connect with wireless router of the attendance system and login to feed passcode to system. Wireless router scan MAC address of students that are present in classroom. Attendance grant depends entirely on matching of MAC address scanned by wireless router with the stored MAC address of students in database. Passcode further confirms does any student given his or her smartphone to their friends for marking their proxy attendance. Marked attendance notification on website dashboard make students aware of their registered presence during lecture. Figure. 10 display the data flow model for students.

Figure 8: System data flow for teacher.

- Annual semester wise attendance records.
- Pattern in absentee rate

IV. CONCLUSION

Time taken by instructors to take attendance may be viewed sometimes as a waste of the lecture time, especially when classes are big. Proposed system is a way to automate this process by tracking MAC addresses of smartphones of students and teachers using Wi-Fi connect with wireless router. This system is more accurate, cost effective and efficient and feasible for educational institutes. Moreover, it also provides features for unauthorized attendance prevention and detection of fake attendance. Tampering with proposed system by sharing passcode via social media can also be prevented by blocking these websites by modifying of certain kinds of host files in system network.
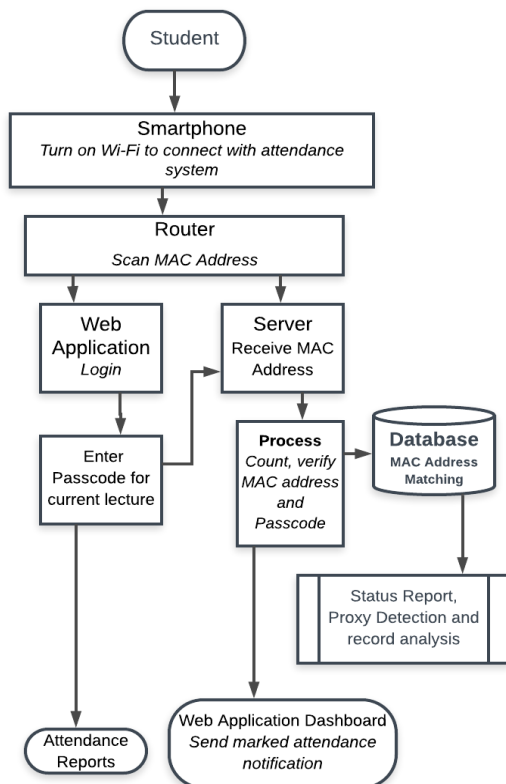

Figure 10: System data flow for student.

Proposed system provides password authentication and dual level verification for attendance grant. Fraudulent attendances are marked for those students that have marked presence in MAC address scan but fails to provide correct passcode after three prompts of website or MAC address scan failed but correct passcode for current lecture. This reveals that student, not present in classroom got passcode via some social media.

Attendance report generated in fig. 3.6 can be queried by all stakeholders such as concerned subject teacher, department HOD, system admin and parents. Even a student can track his or her attendance record in specific subject.

Website reveal results of following queries using attendance reports to stakeholders:

- No. of students present today in some particular subject lecture.
- Names of students marked present on some specific date.
- Names of students having total attendance below the desired percentage.
- Students that mostly fake their attendance would be detected.

V. FUTURE ENHANCEMENT

In future, we may be able to write a script (in e.g. PHP) that could login to router, navigate to the page showing MAC addresses of connected devices and captures the required information from it. This would require router that supports API which allows such a query.

REFERENCES:

[1] Arulogun O. T., Olatunbosun, A., Fakolujo O. A., and Olaniyi, O. M., "RFID-Based students attendance management system", International

Journal of Scientific & Engineering Research, vol. 4, issue 2, February-2013.

[2] M. H. Mohammed Baban, "Attendance checking system using Quick Response code for students at the University of Sulaimaniyah", Journal of mathematics and computer science 10, 2014.

[3] F. Masalha and N. Hirzallah, "A students attendance system using QR code", International Journal of Advanced Computer Science and Applications, vol. 5, no. 3, 2014.

[4] D.K. Yadav, S. Singh, S. Pujari and P. Mishra, "Fingerprint based attendance system using microcontroller and lab view", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, vol. 4, issue 6, June 2015.

[5] J. Kumar, A. Kumar, A.K. Choubey and A. Singh, "Automatic attendance monitoring and tracking system using Bluetooth and face identification", International Journal of Advanced Research in Electronics and Communication Engineering, vol. 5, issue 4, April 2016.

[6] Advantages and disadvantages of biometric technologies, October 5, 2017. Retrieved from https://biometrics.pbworks.com/w/page/14811349/Advantages%2520ad%2520disadvantages%2520of%2520technologies&grqid=GulaCsfhl=en-I

[7] Muralidharan P and V.K. Annapurna, "Attendance collection system: comparison of different approaches", International Journal of Advanced Research in Computer and Communication Engineering, vol. 5, issue 6, June 2016.

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