

DYNAMIC SMART MOBILE ATTENDANCE SYSTEM

Dr.B.Chandra Sekaram, System Analyst, Rashtriya Sanskrit Vidyapeetha, Deemed University, Tirupati-517501

Abstract: Student and teacher attendance management is a tedious process in school, colleges or universities. Student and teacher attendance records are very essential to maintain learning discipline and productivity of an educational institute. Manual attendance making is highly time-consuming and involves lot of paper work. Manual system is prone to lot of mistake, fraud and human errors which affect the productivity. Hence, automated attendance recording system is expected to enhance the performance, profitability with real time data visibility. The proposed Dynamic Smart Mobile attendance system captures student and teacher attendance with number of teaching hours along with number of students spend in the class room. However, existing attendance systems may not cover possible use cases of the school or universities along with additional implementation cost. Real time data may not available to monitoring attendance, with flexibility of local and remote database storage capacity system. The proposed attendance recording system is developed in python using Django Framework and is integrated to work with an android app. Teacher can record the attendance with the help of his/her own smart phone from anywhere within the campus and outside the campus under special circumstances. The proposed system also offers online portal which allows Realtime monitoring of data by heads of the institute from any where with in and out of the campus. This was properly protected with a secured Login process with authorised Teacher access and stops the unauthorised access for data manipulation

This paper discusses key issues and corresponding solutions relating to designing and implementation of Dynamic Smart Mobile Attendance System.

1.Introduction:In general, Attendance will play major role in determining the Academic performance of an institute. Most of the institutes mark Student attendance manually, using paper-based system. Manual Attendance system is inefficient as it will consume a lot of student- lecture hours and prone to errors, data manipulation and frauds. Student attendance consolidation is another tedious and time-consuming process for every teacher which will take hours and days to build the reports. In order to address this problem and improve the attendance tracking systems, many researchers have come up with different attendance management systems like Bhattacharya's[1][2] has proposed Face Recognition based Attendance marking system which will mark attendance once Face of the student is recognized in a class room environment but it requires high processing time and lot of system space to store the data. systems sometimes fail to recognize every face of the student present in the classroom. Sai Ba Oo [3] has proposed NFC-RFID based attendance marking system for their employees, to monitor late arrivals, early departures, and time taken on breaks etc but it will not capture the attendance for field officer who is working outside the campus. Narra Dhanalakshmi [4] has proposed Aadhar based Biometric Attendance capturing system but most of the cases finger prints of students are not matching with the central servers and some students may not possess Aadhar card. Sometimes will see connectivity issues with Aadhar server. Biometric Attendance Management system with finger print scanner [5]. According to survey report each faculty is taking 20% of assigned class time in a traditional dedicated enterprise resource planning [8].

However, most of the attendance systems have their own limitations with respect to discussed above and besides this it only covers high level use cases of university Attendance system.

In the proposed model will try to cover all possible use case that fits to university Attendance system. To identify, enumerate and cover all possible use cases that fits to University Attendance System a wide survey of available e-attendance systems is surveyed.

2. Following are the problems or use cases of E-Attendance automation process

- On time teaching and student attending verifiability
- Capturing a student attending class and time he spends in the class room
- Number of periods a lecturer/ teacher has taken to complete the course
- Avoidance of Duplication of Software in different devices
- Capturing On-Time attendance.
- Restriction of Unauthorised Access
- Realtime data projection
- Handling of class wise Student data
- Handling of Subject wise teacher's data
- Consolidation of day-week-month and Year attendance
- Consolidation of Student attendance data
- Consolidation of Periods handled by the Teachers
- Monitoring of Periods taken by teacher
- Real time monitoring of Teacher and student availability
- Automated Notification of irregularity of students to the higher Authorities and their Parents
- Uploading and binding of class room picture with unique-classid
- Visibility of Attendance taken by the teacher
- Providing role for student and students parent in verifying the attendance.
- Reducing the teacher hours in marking the attendance to each student
- Allowing teacher to communicate in advance about his not taking class there by saving student time.
- Allowing student also to communicate teacher/attendance system in advance about his absence.
- Restricting teacher/student using multiple devices for using the application
- Enabling to mark attendance for unscheduled classes which are not a part of scheduled time table
- Providing the flexibility to swap a student of one class with another during time slot
- This system focuses student centric attendance system

3. Assumptions:

It is assumed that almost all lecturers and students are having smartphones with data connectivity. The University campus is well connected by campus LAN and each floor in the class room complex has been covered by wi-fi LAN. It is also assumed that student and teacher are convenient in using the technology. A separate provision has been made to those students in computer Resource Centre who don't have provision capture their details in their smart phone. Student paper-data, teacher paper data is available in database form.

4.Proposed Solution

There will be single entry and exit for the entire classroom complex. Student or teacher need to show their id card record to Active/ Passive RFID Device to record their entry or exit time into/out of the campus. The device reads Unique ID information from ID-Card and send that information to the server with current time stamp details. Same process follows when student or teacher leaving the campus

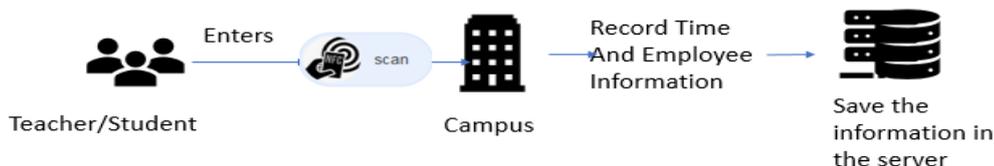


Figure 1

(Shown in Fig 1). Smart attendance system proposed by Ghosh [8] saves 59.27 sec from 70 secs, but it was found student giving the attendance in biometric is not some times attending the class. This system ensures that student/teacher has entered into/left out the class room complex at the specific time. This time will be compared later when attendance of specific class is submitted to the server. This cross checking is used as double cross the attendance submitted by each teacher/student which makes the system Dynamic in nature. This also provides an option for double attendance system.

Android app/ Mobile MVC interface will validate the teacher/student id with device mac address

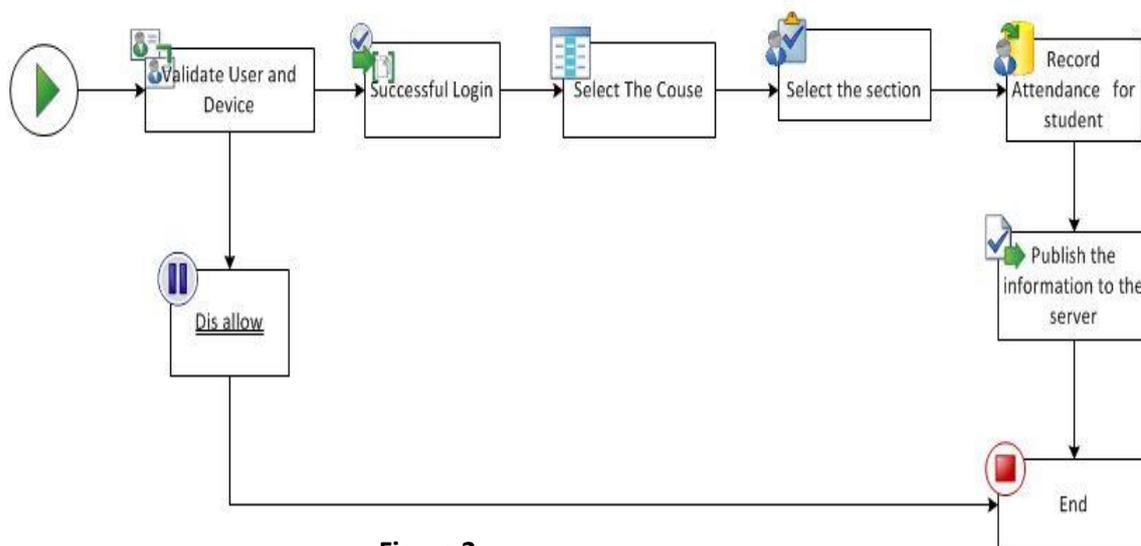


Figure 2

register in the server, once both are validated it allow the Teacher to go to next sept to take student attendance. Mac Address Registration is required to avoid duplication of software in multiple devices. Separate login credentials are provided to each and every student and teacher binding them with their mobile device MAC Address. Based on their privileges Role specific User Interface will be available for Teacher, staff, student Dean and VC.

Wi-Fi routers with bridge configuration are installed in identified places near to the class rooms. Each Wi-Fi router is assigned with static IP address to ensure that attendance is marked from the class room premises. Teacher once enters class room he/she can log into Attendance App (Custom developed android application installs in his smart phone). The overall process is illustrated in Figure 2.

Following Code Snipped is used to capture MAC address of the Android device [6].

```
WifiManager wifiManager =
```

```
(WifiManager) getApplicationContext().getSystemService(Context.WIFI_SERVICE);
```

```
WifiInfo wInfo = wifiManager.getConnectionInfo();
```

```
String macAddress = wInfo.getMacAddress();
```

add below permission in your manifest file

```
<uses-permission android:name="android.permission.ACCESS_WIFI_STATE
```

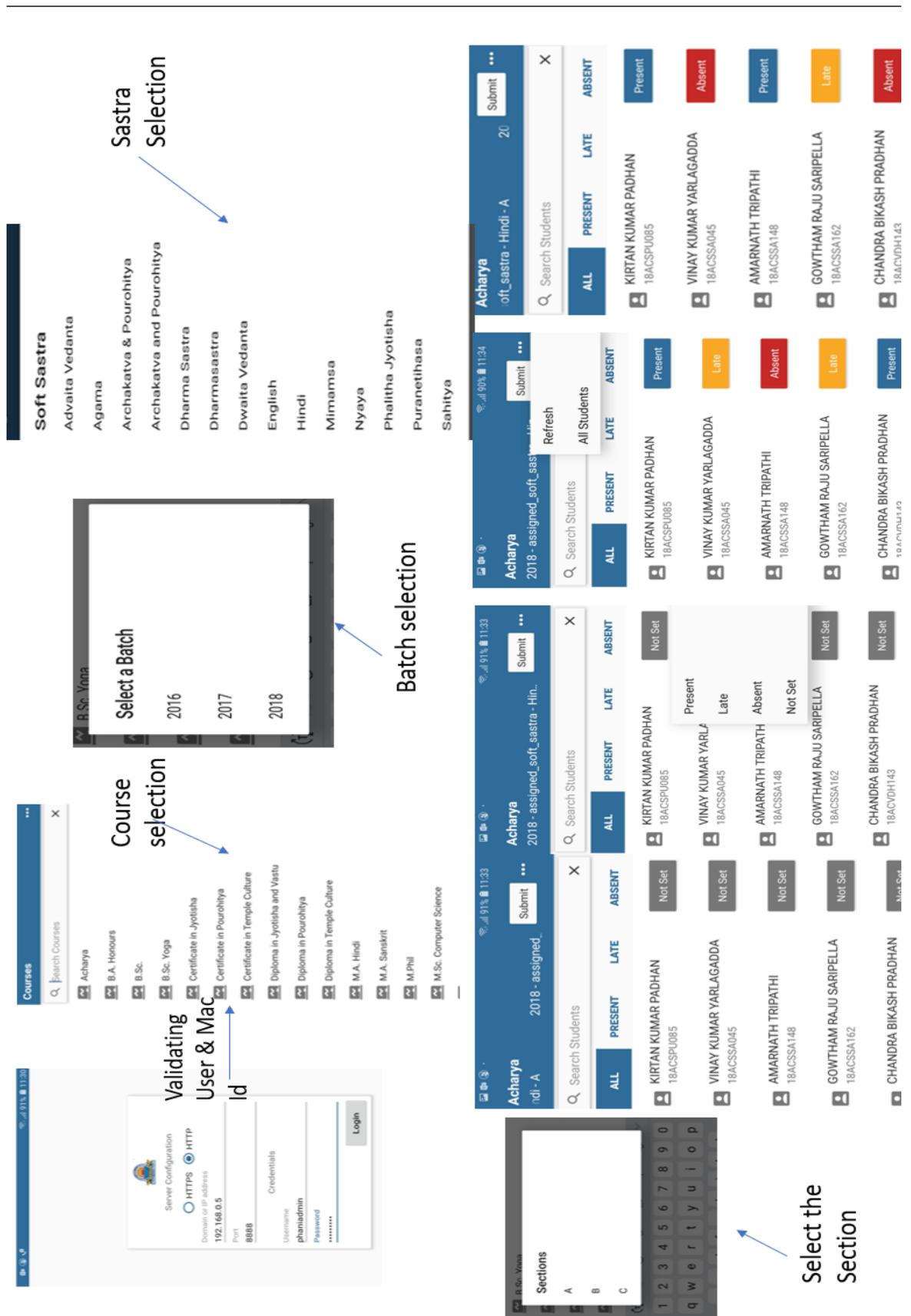
Sequence of Screen shots of Mobile Attendance is shown in **figure 3**. The application developed has been tested with **Marshmallow** OS or Android 6.0 equal above version. Teacher will be providing Topic of the class while marking the attendance to the students. Depending upon teacher-id and time-slot a unique id is sent to teachers mobile

Issue 1: The basic expectation of any attendance system is to bind teacher, topic, student, time slot and class room as one thing. As teacher-id, studentid classid and Wi-Fi IP Address are sent to the server while submitting the attendance, the system ensures that teacher, student and class room are correctly tied. While binding the time slot to a classid we tried to bind mobile system time which raised a conflict between server time and mobile time. This conflict was resolved by considering classid to contain server-time component in that.

Issue 2; As a part of functional flexibility, the system is designed to allow a teacher to mark attendance to a student who does not form a part of regular class. This functional flexibility provided an option to allow other students of university to participate to his class and yet he can be given attendance. This use-case is intended to record class work attended by a student with other than stipulated teacher. This extended functional flexibility raised a conflict that sometimes two or more teachers mark attendance to the same student in single time slot. This conflict could be resolved by allowing the student to mark his own attendance from his own mobile using user id and classid provided by the teacher taking the class.

Issue 3: The basic purpose of taking up dynamic smart mobile attendance system was to ensure the availability teacher and taught in the same location during the scheduled class hour. This was initially achieved by generating a unique class-id which would be sent to every teacher at scheduled intervals. This class-id is shared as barcode/qrcode/id to the taught. Student interface on the mobile application is configured to logout from the wifi network with an option to enter the classid shared by the teacher at the time of entering the class room. The student is expected to enter the classid sooner he enters the class. This helps to record student's exact participation in the classwork.

Screen Shots of Dynamic Smart Mobile Attendance System Figure 3



Issue 4: Students without mobile, at the end of the day have to enter all class details in the ICT Lab manually. A use case occurs that a student who has not attended the class can falsely enter his presence in the lab was resolved with a solution that every teacher has to capture a photo of his class through mobile app (which is tagged automatically with classid) and send to the server.

Issue 5: This system extends provision to record/account for class work handled teacher/guest faculty. Dynamic Smart mobile attendance system resolved this use-case by allowing a teacher to request for a classid in non-scheduled hours. Teacher can take attendance other than schedule hours later it was displayed as Separate hours, so that system does not limit to recording scheduled class hours taken by the teacher. Later administration decides whether to considers these hours for completions of course work or not.

Issue 6:As each class-id is mapped to the title of the class so that it would be easier for teacher and student to plan for the reclass for the classes missed by the student. Teachers role is in marking the attendance is desired to be minimized by facilitating student to mark his own attendance in a full proof system.

Issue 7: This system is devised carefully to increase the teacher and taught interaction time by allowing the taught themselves to mark attendance for themselves. Any how the teacher will take attendance based on number of students present in the class.

Issue 8: Some times during the submission of attendance teacher or student may have to face Network problem. This issue was resolved by providing an interface to store attendance in offline mode. Teacher can save attendance locally on mobile and later update to the server.

Attendance data/information is readily made available on the server. Academic heads can monitor the information on real time basis with their access privileges.

The attendance system is designed to create customisable reports basing on current requirements like time-based reports and stake holder based reports.

- Hourly, Daily, weekly monthly and academic reports
- Teacher-wise, student-wise and class-wise report

Report views are linked to the dashboard views of stake holders (student, teacher and administrator), basing on user credentials. This system is dynamically integrated with short message service so that proper alert messages are text to stake holders of the system allowing easy and proper monitoring of the system. Further it also generates eligible student list to the examination section basing attendance criteria Thus this system facilitates academic institutions to maintain academic performance at desired standards.

5.Conclusion: An automated e-attendance management system aimed to solving the problems reported in manual methods of existing systems is proposed. In the proposed system it was tried to consolidate all possible use cases of an university with optimized portability, accessibility, cost and authenticity. We used all open source technology (python, Android API, Django frame work, SQLite database).

References:-

[1] Shubhobrata Bhattacharya, "Smart Attendance Monitoring System (SAMS): A Face Recognition based Attendance System for Classroom Environment" 2018 IEEE 18th International Conference on Advanced Learning Technologies

- [2] Sujit Kumar Gupta, "CVUCAMS: Computer Vision based Unobtrusive Classroom Attendance Management System" 2018 IEEE 18th International Conference on Advanced Learning Technologies
- [3] Sai Ba Oo, "Cloud-based Web Application with NFC for Employee Attendance Management System" The 3rd International Conference on Digital Arts, Media and Technology (ICDAMT2018) page1-3
- [4] Narra Dhanalakshmi "Aadhaar Based Biometric Attendance System Using Wireless Fingerprint Terminals" 2017 IEEE 7th International Advance Computing Conference
- [5] Janny Darren "Wireless Biometric Attendance Management and Payroll System"
- [6]<https://developer.android.com/about/versions/marshmallow/android-6.0-changes#behavior-hardware-id>
- [7] <https://developer.android.com/about/versions/marshmallow/>
- [8] Swarnendu Ghosh, "Smart Attendance System" 2018 International Conference on Smart City and Emerging Technology (ICSCET).

