

# A Mobile Based Smart Attendance System Framework For Tracking Field Personals Using A Novel QR Code Based Technique

<sup>1</sup>Mr. K.Navin

Department of Information Technology  
SRM University  
Chennai, India

<sup>1</sup>navin.k@ktr.srmuniv.ac.in

<sup>2</sup>Dr. A. Shanthini

Department of Information Technology  
SRM University  
Chennai, India

shanthini.a@ktr.srmuniv.ac.in

<sup>3</sup>Dr.M.B.mukesh Krishnan

Department of Information Technology  
SRM University  
Chennai, India

mukeshkrishnan.mb@ktr.srmuniv.ac.in

**Abstract**—Tracking of a person for official purpose is a fiddly task. Quite a few scenarios that demands such requirements are tracking of attendance on a service person meeting a customer ,sales person meeting a client or a health worker attending an outside patient to monitor adherence of treatment if they are frequently on field. It would require to monitor time of visit, the frequency and duration of contacts made by them ,location of interaction are needed to be recorded and intimated to the concerned .To ensure better productivity and effectiveness in service in field tracking official work of field personals is a justifiable act. Constraint lies in implementing a automated attendance registering system which needs to be fool proof ,cost effective, privacy protected and abiding ethical values. Many companies have made smart phones to be de facto requirement to be carried with them for employees like sales staff, service staff and health workers having field work. This paper proposes a smart phone based attendance framework which can overcome the above mentioned constraints. The proposed framework uses two different mobile applications used by field personals and recipient clients. The mobile apps requires simple internet connection and works on Quick Response(QR) code based technique as a mechanism for registering attendance remotely in to the web portal for field personals interacting respective recipient client. The high level implementation details of the proposed system is explained in this paper. It also discusses how the system verifies identity to eliminate false reporting.

**Keywords**— smart phones, mobile computing, attendance system, QR code

## I. INTRODUCTION

Need for tracking field operating personals is to ensure that they execute their assigned work properly in appropriate time. But at the same time it needs to weigh the pros and cons on the strategy employed in tracking them ensuring ethical practice is in place [1] [2] . It would increase productivity, in case of sales and service and provide timely services to the recipients. Availability of good internet service at affordable prices and cheaper the smart phones makes smart phones an indispensable tool to be a part of strategy for field working personals. The proposed solution offers a QR code based attendance marking system which has features to prevent unauthorized attendance registration. The purpose served through the developed app is to record the interaction of field personals with the recipients and get the details like location of interaction, time of interaction and duration of interaction

through a fool proof mechanism. A computed encryption message is generated as a QR code in registered attendance initiator app which can only be decrypted by the registered attendance provider app .

The interaction happens between attendee and recipient is recorded through registered attendee mobile app scanning a QR code generated in recipient registered mobile app. The attendee could be a sales person at sales point attending a client the recipient ,similarly service person addressing a customer or a health worker attending a patient could also be monitored. A remote web database is used to keep the record of time, duration and place of interaction. A notification would also be send to intended observer for verification about the attendee interaction with the recipient.

## II. RELATED APPROACHES/WORK

There has been many approaches for automated attendance system for recording the presence of the working persons. Biometric based attendance systems [3] like face recognition , finger print and even iris based attendance system. Device based attendance systems like card reader, RFID based [4] are various techniques available in market as products. These various techniques are suitable to different scenarios and are successful in practice deployed in factories, laboratories, offices, institutions etc. But all these techniques can be applicable only within bounded places which has to be owned. For tracking and recording attendance for a field workers the above mentioned automated attendance system techniques will not work out. With smart phones becoming compulsory gadget to be carried by the field workers during their official stay in the field the accountability on them to answer to the observer make them to discharge their duties effectively. But there is no complete solutions for automated attendance system for field personals. But with mobile phone as platform there are quite a few techniques which can achieve the objective to an extent with pre agreed terms and policy . One time password (OTP) mechanism is a common practice for verification through automated process for remotely checking weather authenticated person is present or not in executing a task. It sends a randomly generated number through server to one system and asking the generated code to be replicated in other system for verification. This system is effectively used for verifying banking transactions, but to apply it to the

scenario where verification is to be done by remote system on two person interaction happening at field somewhere is not always a fool proof methodology. Impersonation can still happen if verification cannot be done by remote observer all the time.

There are proposed work with QR code based automated attendance registration in class room where the QR code is generated in the teaching screen needs to be scanned by students the attendance providers through their mobile [5] . Here the teacher is initiating the attendance and the students are to provide their presence and also the system is applicable in bounded place. If the scenario demands attendance to be taken during field visits by field workers ,it is the field worker the attendance provider needs to initiate the process of providing attendance by ensuring his interaction with the client who invokes the attendance process.

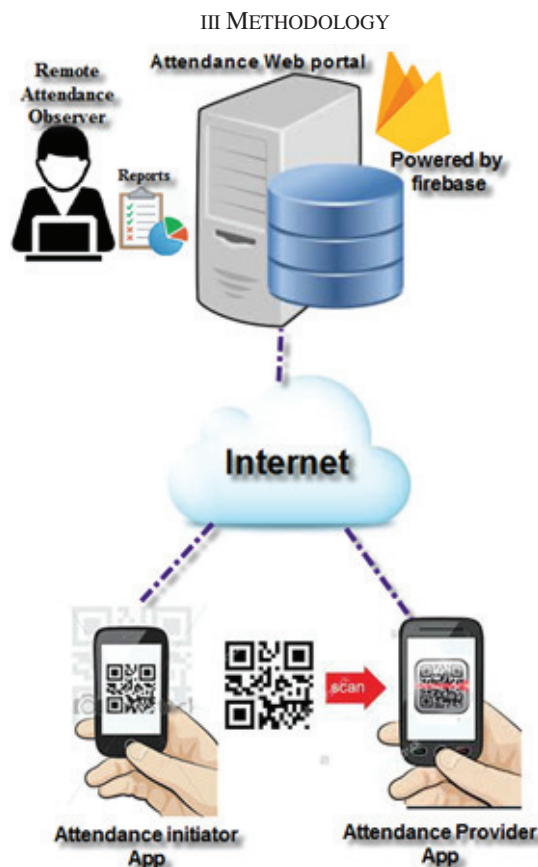


Fig. 1. Shows the architecture frame work of smart attendance system using QR code technique

Fig 1 shows the architecture of proposed system which involves two different mobile apps one for attendance initiator and other for attendance provider. Both the apps needs to communicate with web services hosted in attendance web portal. The scenario involves a field persons like health workser in field attending a patient, a service person addressing a customer ,a sales person meeting a client who can

be a dealer ,a stockist or a shop keeper.The precondition involves field person has to install the attendance provider app and register it for approval through the web portal,same way the recepients also have to install anttendence initiator app and needs to register it for approval through the web portal.When the field person is destined to meet the recepients in the field,he/she has to initiate the receipt to invoke the recepients attendance initiator app.The attendance initiator app would connect to webportal to generate the computed QR code which would be downloaded to the app screen.The attendance provider app in the field personals mobile will be invoked to scan the generated QR code in the attendance initiator app in the receipient mobile.The scanned code is decrypted in the app and is send back to the web portal .The web portal verifies the generated code send to recipient app and the returned code from the field personal app.On successful verification a time stamp is generated which will be entered in to database as a marking to denote the interaction has taken place.The unique ID of device,registered ID from firebase for individual mobile phones and encryted code in QR image all makes the part of the data being exchanged in the QR code technique.It makes attendance app fool proof which works on authenticated mobile only .An instant message through SMS /push notification is send to the attendance observer who can verify to ensure the designated person is using the mobile for providing attendance.

#### IV SMART ATTENDANCE FRAMEWORK WORKING PROCESS

- First the attendance initiator app to be used by recipient(clients, customer, patients etc) is loaded his/her Smartphone. When the app is opened for the first time ,the registration process in the app involves getting user details like name, mobile number and other details. They are submitted to attendance web portal along with the device unique ID. The framework uses firebase real time database for storing data.
- Similar process is done for attendance provider app used by field personals(sales men, service men, health workers who work in field).
- An administrator in attendance web portal will do verification on the details submitted through the app to ensure the app is used by the authenticated user and sends approval to the registered user on verification. Firebase database and push notification are used .The attendance portal also generates unique server ID for each registered users through firebase and sends back to the device. This ID will be used while sending scanned code from the generated QR code while proving attendance.
- Now the approved apps which always checks for approval status from web portal database very time it logs in will be ready to process attendance registration. The recipient's attendance initiator app can initiate QR code from web portal and field personal's app is ready to scan and respond back to web portal.

- To initiate attendance process the attendance initiator app used by recipient opens the app, if it holds approved status the app screen asks to download QR code from attendance web portal. The server ID stored in each approved registered device with the device ID will be send along with the request for QR code in the process of initiating attendance to ensure the request is from authenticated device only.
- The attendance web portal QR code generating module on receiving the request from the attendance initiator app invoked by a registered mobile app of an recipient, checks for registered unique ID of the device as well as the web portal provided unique ID for generating a computed random number. The random number is further fed to QR code generating module which generates the QR code. The generated QR code is downloaded to the app.
- To register the attendance the attendance provider app used by field personal will open the app if the app has approved status then it goes to the screen to scan the QR code. The field personal will hold his device to scan the QR code generated in the recipient device. The scanned code will be decrypted in the app. The decrypted code along with device ID and server ID stored in the device during app approval will be send back to web portal from the attendance provider app.
- The attendance web portal receives the data from attendance provider app which contains authenticating IDs go location and decrypted code. It authenticates for approved device and compares the code generated for attendance initiator app, if it matches it registers a entry in the database .The entries are the time stamp of field personal and recipient interaction, location information and the recipient information entered against the row field of official field person in the database .This process has to happen within two minutes since the request generated from attendance initiator app otherwise session would expire and recipient has to again request for another code.
- The attendance web portal on getting the attendance entry in the database for a field personal would send a notification through bulk SMS provider API interface to the registered observer mobile number for the entry in database allotted for the field personal through web portal.
- Provision for monitoring duration of interaction is an optional feature where entry time and exit time could be recorded by scanning two QR codes and calculating the duration between two scan is taken as duration of interaction.
- The administrator has privilege to deactivate the app of registered users any time with disabling approval through web portal.
- Each registered field personals will have a new row field entry in the database table with date wise

column entries. Every assignment including the recipient interactions through the smart attendance framework can be appended to the day wise entry. Report can be generated which could bring various statistics information for perusal.

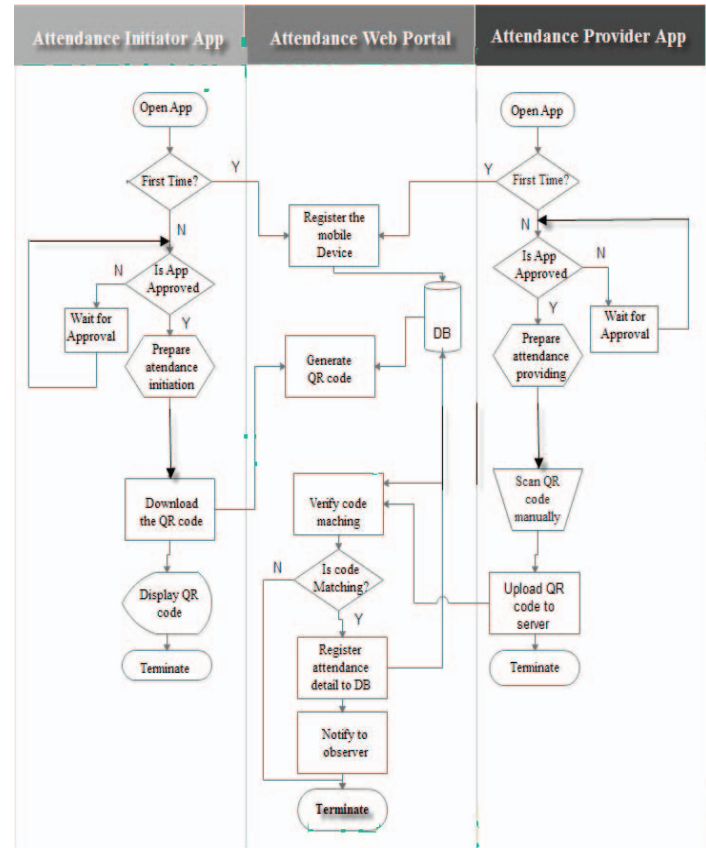


Fig. 2. Shows the swim line flow chart diagram representing process flow of the smart attendance system frame work.

## V IMPLEMENTATION AND RESULTS

The mobile app has developed using java programming for android devices. A java based barcode scanner library is used in the attendance provider app. The web portal was developed with PHP server side scripting and hosted in shared hosting environment. A QR code generating library[6] is used in attendance web portal for generating QR code on request by attendance initiator app. Fig 3 shows the screen shot of attendance initiator app downloaded a QR code image from web portal. Fig 4 shows the attendance initiator app using QR code scanner library[7] to scan the generated QR code in the attendance initiator app. The screen shot was taken during app test phase to check the scanned one time generated computed six digit random number(771106) prefixed by recipient ID(SUB0040) authenticated by web portal. Both the app uses firebase instance ID[8] by connecting to firebase during registration process and where stored in web portal database for future verification. When the app is uninstalled it requires fresh registration process which involves new approval from

the web portal administrator. The app was tested in android mobiles of various screen sizes.

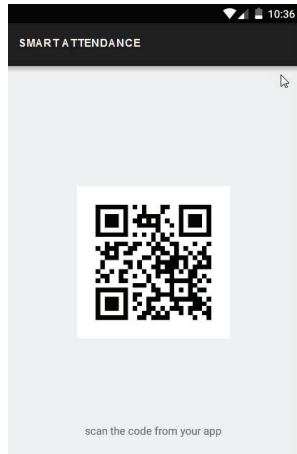


Fig. 3. Attendance initiator app screen shot after downloading QR code from attendance web portal server

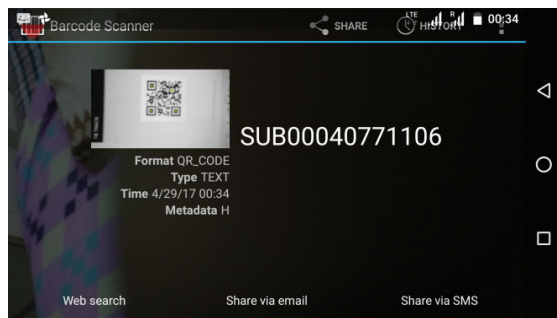


Fig. 4. Attendance provider app scanning the QR code from the attendance initiator mobile app screen. (\*Screen shot taken in Test phase of the app )

### *vi conclusion*

This paper provided a smart attendance system framework solution for companies ,hospitals etc. who would wish to track their field personals to ensure work is done in appropriate way when they work on the field. Some companies adapt the strategy of constantly checking the field workers to know the status of their work, this would dent the morale as well as sense of ownership in their job. Automated system would

bring accountability in to the field personals system providing messages on missed appointments or lagging in response to attend clients would be taken in right sense rather than being told by human intervention. This proposed attendance system addressed in this paper can be deployed in scenarios where it demands participation of recipients who could be possible clients like a stockiest maintaining sales of product needs to work with company's sales field person in field work, a customer who would receive service form field based service personals, a health worker addressing patients. The stockiest should comply to company strategy to install the attendance initiator app in to his mobile or a customer should accept the app to be installed in to the his device when he buys a product to ensure he/she gets better service through service man, similarly a patient being addressed by health worker needs to install the app for his betterment of getting treatment. The advantage of the proposed system is attributed to very minimal operating cost and maintenance cost since the individuals smart phone are the attendance registering devices.

### *References*

- [1] Johnathan Yerby, "Legal and ethical issues of employee monitoring." Online Journal of Applied Knowledge Management A Publication of the International Institute for Applied Knowledge Management Volume 1, Issue2, 2013
- [2] An Article :Category Human resources ."Electronic Surveillance of Employees Pros of Electronic Surveillance of Employees" Available at <https://www.thebalance.com/electronic-surveillance-of-employees-1919262> as on date 31.5.2017
- [3] M.A. Meor Said, M.H. Misran , M.A. Othman, M.M. Ismail, H.A. Sulaiman, A. Salleh, N. Yusop."Biometric Attendance" .IEEE Xplore Digital library. Technology Management and Emerging Technologies (ISTMET), 2014 International Symposium
- [4] Saikrishna chatrati, Sumanth naidu, CH. Raghava prasad ."RFID based student monitoring and attendance tracking system" IEEE Xplore Digital library. 30 January 2014 .Computing, Communications and Networking Technologies (ICCCNT),2013 Fourth International Conference.
- [5] Fadi Masalha,Nael Hirzallah.A," Students Attendance System Using QR Code" (IJACSA) International Journal of Advanced Computer Science and Applications, Vol. 5, No. 3, 2014
- [6] QR code generation PHP library available at: <https://github.com/t0k4rt/phpqrcode/blob/master/qrlib.php>
- [7] Zxing QR code scanner library available at <https://github.com/zxing/zxing>.
- [8] Firebase tutorial available at <https://firebase.google.com/docs/>