

Location Based Attendance Tracking Using Mobile Devices

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Abstract— This paper focuses on the automation of the mundane process of attendance tracking using the location determination capabilities of a modern day smartphone. The idea is to use the Global Positioning System (GPS), Wireless Fidelity (Wi-Fi) and Network signals to determine the location of the mobile device with the desired accuracy. We then determine a suitable threshold to determine a radius from the fixed location (the place of work perhaps), within which if the device is present, the bearer of the device is considered to be present at work. The aim of this system is to automate the archaic and mundane process of recording attendance without the necessity of any additional hardware requirements other than a smartphone. Attendance recording has come across a handful of make-overs up until now, and the most successful system seems to be the Radio-Frequency Identification (RFID) based access control cards which need to be held in front of a reader at the place of work. This system relies on the additional hardware requirement of the RFID enabled card and a reader, dependencies which, we aim to eliminate. This paper focuses on the automation of the mundane process of attendance tracking using the location determination capabilities of a modern day smartphone. The idea is to use the Global Positioning System (GPS), Wireless Fidelity (Wi-Fi) and Network signals to determine the location of the mobile device with the desired accuracy. We then assign a suitable threshold to calculate a radius from the fixed location (the place of work perhaps), within which if the device is present, the bearer of the device is considered to be present at work.

Keywords— Attendance, Mobile Device, Efficiency, Global Positioning System

I. INTRODUCTION

With the growing necessity to improve the efficiency of a work force, there is a need to make sure that most of the people are working most of the time. This calls for recording and maintaining the presence of individuals at their workplace. Since manual attendance tracking is time consuming, this calls for an Automated Attendance tracking system [1]. This not only reduces the cost but also ensures that it is accessible to everyone since all of us own smartphones these days [2]. This paper focuses on automating the mundane process of attendance tracking using the Global Positioning System of a mobile device as a key factor for the process.

Rest of the paper is organized as follows, Section I contains the introduction to Location Based Attendance Tracking, Section II contains the related work of Location Based Tracking using Web services, Section III contains the architecture and essential steps involved in Location Based Tracking, section IV explains the Android Application methodology with flow chart, Section V describes results and discussion and Section VI concludes the research work with future directions.

II. RELATED WORK

Several applications involving location based methods and wireless network techniques have been developed to monitor employee attendance in their workplace. In the system developed in [3] biometrics have been used to track the attendance of employees. In this the employee's fingerprint is scanned for the first time and then registered in the database. When an employee logs in his fingerprint is compared with the one in the database. If matched the transaction is authenticated and the attendance of that employee is updated in the database. The drawback involved in this is the added cost in setting up the hardware required for fingerprint sensing as well as the necessity to monitor the daily functioning of the system.

In [4] a location based tracking application has been developed using the Wireless Fidelity (Wi-Fi) technology where the user's attendance is updated in the database residing on the remote server when the smartphone is connected to Wi-Fi.

The system we have implemented uses Wi-Fi and Global Positioning System (GPS) to track the employee's location and provides a user-friendly interface for easy monitoring. It

allows the Administrator to set the location at which to track the employee within some predefined radius. It then records the activity of the employee (i.e either present or absent at that location) and temporarily writes it to local storage as a buffer. When a working internet connection is available to the device, the application pushes the recorded data to the central database on the remote server and then clears the local storage.

III. PROPOSED ARCHITECTURE

To be able to develop a proof of concept of this idea, we require a widely accepted and used open source platform. For this purpose, we have chosen the Android platform.

We plan to use PHP with a MySQL Database to serve as our model. This will contain all the data and processing logic that will be common to all users. We plan to use PHP or Java controller modules with JSON data transfer methods to cater for the web and mobile application. The web application will use HTML5, CSS and JavaScript to improve the usability and responsiveness of the web pages. The mobile application will use the Android platform.

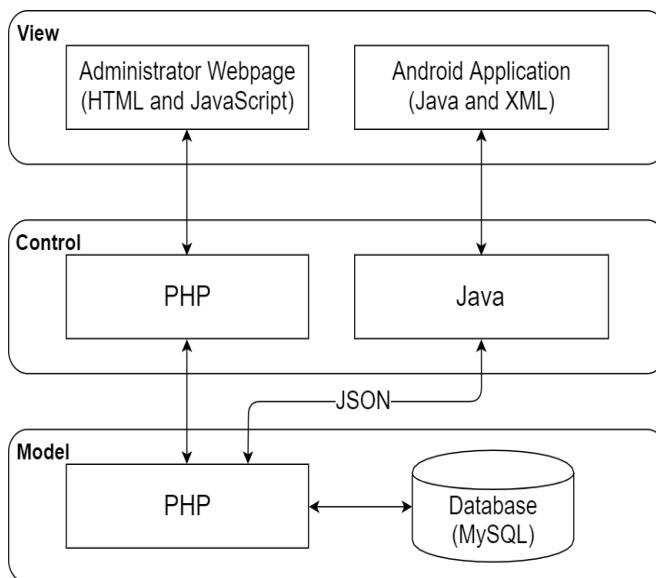


Figure 1. Model View Controller Architecture of the Proposed System

IV. METHODOLOGY

User authentication is one of the major factors in the proposed system. Every employee is authenticated based on his/her unique user identification number. This unique identification number is the number which is given by the office. The identification number along with other information is also saved in the employee device. At first employee has to install the required system APK files into

their android device. Mobile location service has to be on when the system was running. If mobile location service is off then the whole process will not go further. Mobile location service helps to trace the employee location. When the employee enters the office area, android device of the employee is automatically connected to the office internet and a message is sent to the office server with the employee id and local time of the device which is counted as login time of that employee. When employee leaves the office area, a message is sent to the office server with employee id and local time which is counted as logout time. Figure 2 depicts the overall methodology of our proposed system.

If the current time is within the working hours of the employee, the current location of the device is retrieved and the proximity between the current location and the fixed location of the workplace is determined. If this proximity is within the predefined radius then the employee is considered to be present at the location else absent.

This result is then stored onto a buffer file on local storage. Upon the availability of working internet connection, the data stored in the local buffer is pushed to the database on the remote server and the local buffer is then flushed.

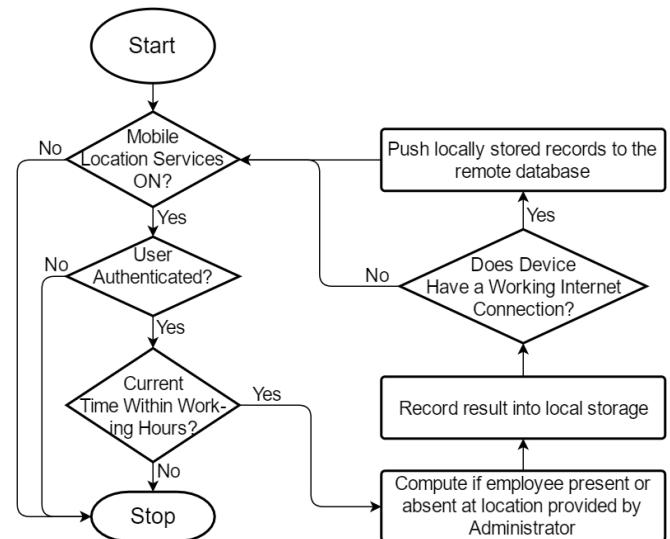


Figure 2. Flow of Operation for the Proposed System

V. RESULTS AND DISCUSSION

As discussed above, android client application has been implemented which is able to effectively monitor the employee's attendance through the above described process. The application was test run and found to be battery efficient while being reasonably accurate in terms of the location and in turn attendance tracking capabilities. The attendance is currently being recorded in a CSV file in the phone's local storage and can be easily migrated to an online database once it is developed. However, the server and the web interface for the Administrator is yet to be implemented and hence the

application as of now relies only on local storage for storing the employee's attendance data. The frequency at which the attendance is monitored is currently every 15 minutes. After user authentication the attendance will be monitored on a Background service that is spawned by the application itself. This background service does not run on the User Interface (UI) thread and hence this process will not be interrupted if the user or the Operating System decide to kill the Foreground process.

VI. CONCLUSION and Future Scope

The proposed system automates the process of Attendance tracking, thus saving human effort and time. It is also cost effective since it relies only on a smartphone which most of us own these days. As this completely automates the attendance system, it leaves no room for human error.

This application is currently developed only for the Android operating system but can be extended to other Mobile Platforms. In the future, Internet and Mobile Networks can be incorporated to increase the accuracy of the location being considered.

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