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Smart Attendance Monitoring System using Raspberry PI

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Abstract: Attendance marking is one of the important tasks in each and every institute. There are many ways to maintain attendance of students with traditional methods and automated system. This paper aims at providing one of the efficient methods for taking attendance and finds current location of the student. The attendance will be marked based on location of the student. In this proposed system the student will carry a phone having GPS system which sends GPS location to Raspberry PI enabled GPS module to replace a computer system. Each any room and nearby location of campus latitude and longitude values are stored in the database. In this paper the proposed system will consist of two modules Phone module and Raspberry PI modules. It helps teachers by reducing manual processes. Every Institute has a specific location, which is determine by the GPS. This paper use location as a proof for monitoring attendance of students.
Keywords: GPS, Attendance monitoring system, GPS enabled phone, Raspberry PI

I. INTRODUCTION

Monitoring the attendance is very important in all the institutes for checking the attendance and presence of students. Every institute follows their own method for maintaining attendance. Some teachers take attendance manually using the traditional pen and paper and some uses automatic attendance methods. There are many ways existing for this purpose they are as follows:

1) Biometrics based Attendance System (Iris, Face, Thumb, etc..).
2) RFID Based System.
3) Extracting Features from an image based Attendance System.
4) Bluetooth Based Attendance System.

Now-a-days two types of attendance system are available as Manual and Automated system. Manual attendance systems use paper by teacher to fill out and afterwards overseen for accuracy. However time and attendance information is subject to human error. A lot of man hours go into calculating and maintaining records of attendance when using a manual system. Automated systems uses RFID tags, bar-codes cards or biometrics and touch screens [1] in place of paper which students touch or swipe to identify themselves and recording in and out time. The recorded information is then automatically transferred to computing device. An automated system reduces the risk of errors that are commonly appear in manual system and reduces man power instead of wasting time on tedious administrative work. This paper proposed an Automated Attendance Monitoring System using Raspberry PI and GPS i.e. location based system.

II. RELATED WORK

In this section, we review some related technologies and previous works on the topic of Attendance Monitoring System based application. The most widely used location based technologies are GPS, Radio Frequency Identification (RFID), Bluetooth and many more. Researchers work on these technologies for improving the services for its accuracy and efficiency. A number of application exists of different methods to effectively monitor the attendance of each and every student. Attendance Management uses passwords for authentication. Many researchers [3] have designed and implemented a password based authentication system.

The system required improvement as passwords can be shared or tampered with. Other attendance monitoring techniques uses RFID-based student attendance system. Problem with RFID [4] based systems is that individuals have to carry RFID cards and also the RFID card reader are needed to be installed [8] which is not cost effective solution.

Some application of attendance system uses biometric system which has been explained by Simao, Fonseca and Santos [11] with integration of wireless communications.

However, the improvement of the system has been discovered by M. Wong. [6] by introducing palm-print which developed an attendance system to record the employee attendance. Meanwhile a similar project has been implemented by Kardry and Smaili [7] which applied wireless Iris recognition attendance management system.

In Biometric identification security is the major concern as if one lost our it's biometric identification from database then user of system has to face many challenges. Mohammad Salah Uddin, , S. M. Allayear, N. C. Das, and F. A. Talukder have defined location

based Time and Attendance System, that use Location as the key of attendance. The employees in organization can be determined with the help of GPS device if both coordinates matches then employee is present in the organization. Which can extended for different applications and on all mobile phones.

III.PROPOSED SYSTEM

The system replaces the traditional methods like RFID Cards and Biometric by an mobile application and Raspberry PI module. The application need to be installed and all user will register for the same by individual username and password. A unique username with GPS coordinates i.e. latitude and longitude will be continuously send to Raspberry PI module. A software is running on workstation for processing the data which will received from user mobile and store the latitude and longitude values in database. The database will firstly stores all the GPS coordinates of whole campus with naming convention for ex. Degrees, minutes, and seconds (DMS): 41°24'12.2"N 2°10'26.5"E for Programming laboratory. For maintaining class lecture attendance teacher will initiate a request to take attendance which is acknowledge by admin i.e. Raspberry PI module and then all students which are specific range of class room will be marked **Present** and rest will be marked as **Absent** through bulk SMS services notification will be given to parent and teacher about absent students. The block diagram is shown in Fig. 1.
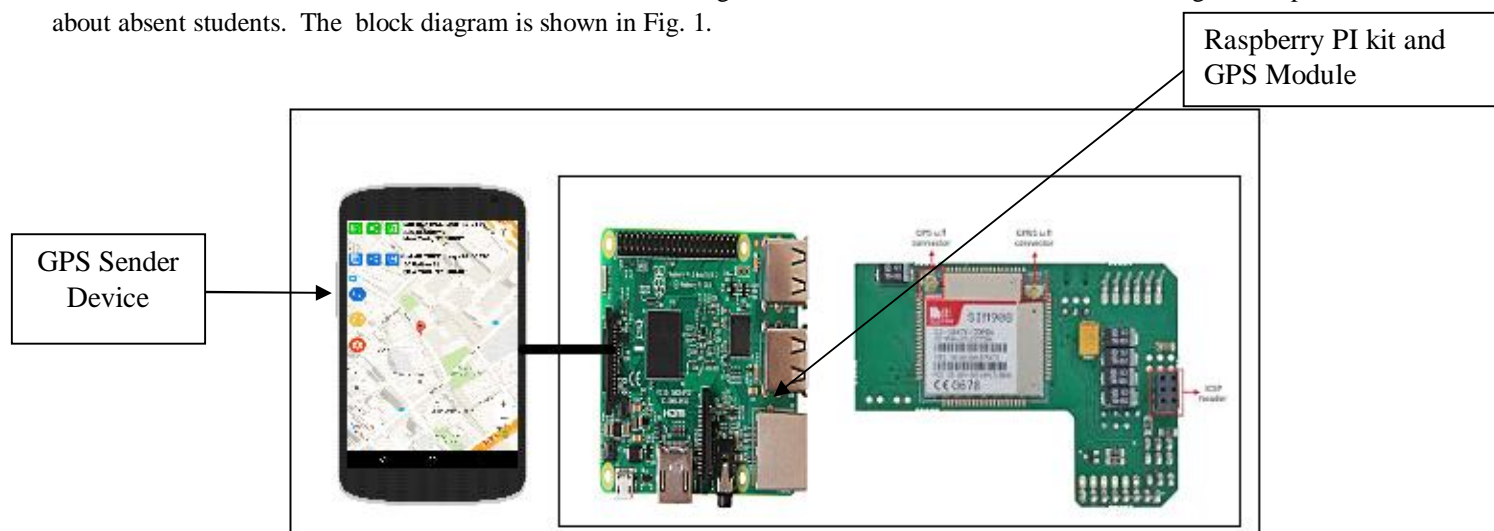

Fig.1. Block diagram of Attendance Monitoring System

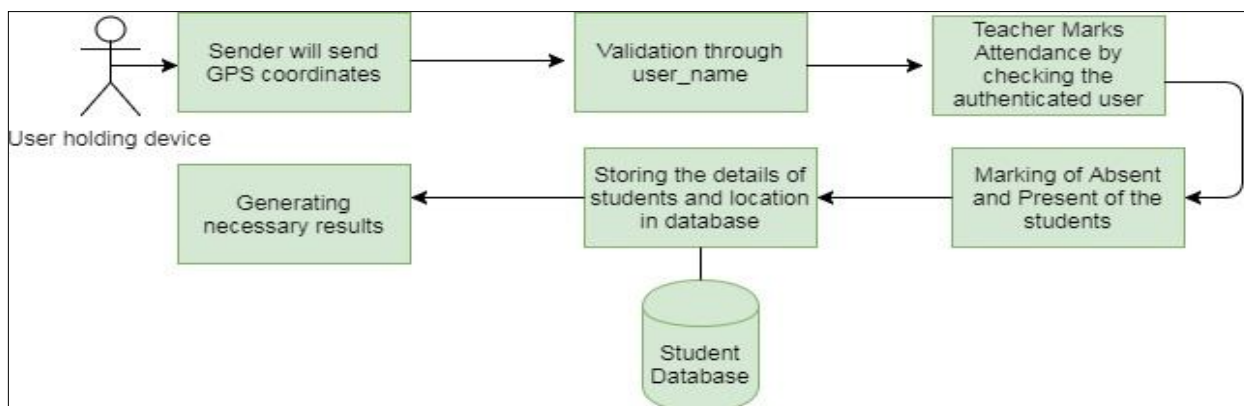The schematic diagram of proposed system is shown in Fig. 2.

Fig. 2. Flow diagram of various operations carried in Attendance Monitoring System

This system is design in two modules 1. GPS Coordinate Sender Module where application for registering a user and sending users GPS coordinate to receiver and 2. Raspberry PI module and GPS kit which is also connected to database by software application. The smart phone have built-in GPS receiver which can receive signal through GPS satellites such as Google maps API (Application Programming Interface) is used for finding student exact location based on the GPS coordinates. The application calculate the current

location of the user. Fig. 2. Flow diagram of operations carried by Attendance Monitoring system. The student will register first through application and then unique username is created for further process.

Steps involved by each module :

A. *GPS Coordinate Sender Module:*

1) Student will register through application.

2) GPS receiver in phone will send GPS coordinates through application to database.

3) If student want to check details of attendance can get it through application.

B. *Raspberry PI Module*

1) Authentication of student will be done by admin or teacher. Wait to accept attendance for student present in given location i.e. Suppose student is seating in classroom and GPS coordinate already stored for classroom in database with specific range will match with student sending its coordinates. If match found marked as 'Present' or else found and 'Absent'.

2) In any case if teacher need to find that student is not in class then through location one can find the exact location where the student is.

3) Also all 'Absent' student parents will get SMS about its absentee in class.

4) All teachers and admin can generate different results as per requirement.

IV. IMPLEMENTATION

The proposed system can be designed using Android app where student will register them firstly. In next page they will send GPS coordinates to receiver. On receiver end Raspberry PI will be connected to GPS receiver and Database where each coordinates of the institute will already be stored. Senders coordinates and already stored coordinates are matched to get location of the student. If teacher or admin raises a request to start attendance button student the range of that specific room will be marked as Present or Absent. Absent student parent will get SMS of absentee. Admin or Teacher can generate various result which will be downloaded.

V. COMPARISON

Table 1: Comparison between Traditional System and Proposed System

Properties	Traditional System	Proposed System
Cost	More	Less (As machine is replaced by Raspberry PI)
Efficiency	Less	More
Maintenance	More	Less
Security	If Biometric then More	Less
Fully Automated System	NO	YES

VI. CONCLUSION

This paper introduces the efficient method for monitoring Attendance of Student in the classroom which can be replace then old manual method. This proposed method is secure enough, reliable and available for installing the system in the institute. This paper introduce a Smart Attendance Monitoring system. The proposed system will work on coordinates of an institute/College and the students attendance can be monitored with the help of GPS device coordinate. We are currently developing the system for Android and Raspberry PI but the proposed system can be extended to provide more security in future.

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