

Design and Development of Geofencing Based Attendance System

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Abstract: Most educational institutions administrators are concerned about student irregular attendance. Truancies can affect students overall academic performance. The conventional method of taking attendance by calling names or signing on paper is very time consuming and insecure, hence inefficient. Geo-fencing based attendance system is one of the solutions to address this problem. This system can be used to take attendance for students in school, college, university and working places. In the present day scenario, every guardian is worried whether his/her child has reached safely or not. Therefore, the guardian is intimated by a Short Message Service (SMS) sent using the Global System for Mobile Communications (GSM) modem of the same. As per the report of Human Rights Commission of India, over 40,000 children are reported missing every year of which 11,000 are untraced. Kidnappers target victims most often after school programs. The system proposed in this work, utilizes the Global Positioning System (GPS) module for determination of the exact location of the victims.

Keywords: Attendance, Zigbee, GPS, Location, Tracking, GSM, Renesas Microcontroller, Security, Microsoft Visual Studio, Database.

I. INTRODUCTION

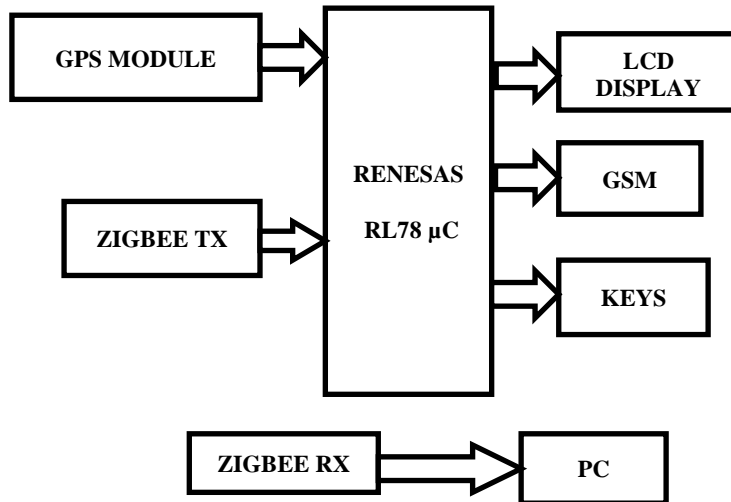
Attendance plays a vital role in evaluating a student. Regular attendance at an institution is vital to help students to achieve and get the best possible start in life. The traditional method of taking attendance is way time consuming and often leads to human error. This paper aims in automating the attendance system which will automatically record the attendance. The teachers need not maintain attendance records by manually calling out roll numbers or names of each student after every class. This paper uses emerging technology that eliminates the problem faced in manual attendance entry and will prove to be more reliable and accurate. We have used GPS to track the location of a student continuously. This helps to provide access to parents for peace of mind when they are concerned with the safety of their child and effectively respond to and manage emergency situations. The system combines GSM, GPS and ZigBee wireless technology. Global System for Mobile Communication: GSM is an open, digital cellular technology used for transmitting mobile voice and data services. GSM supports voice calls and data transfer speeds of up to 9.6 kbps, together with the transmission of Short Message Service. One of the key features of GSM is the Subscriber Identity Module (SIM). The SIM contains user's subscription information and phone book. AT commands are used to send or read SMS through GSM modem. Global Positioning System: The Global Positioning System is a satellite-based navigation system made up of at least 24 satellites. The GPS system makes use of the geographical lines of latitude and longitude to provide coordinates for a person's location or a place of interest.

ZigBee: ZigBee technology is a wireless protocol designed for small, low power devices like sensors for data transfer.

II. PROPOSED SYSTEM

In this busy world, to save the time of teachers an automated attendance system has been designed that uses Smart Identity Cards. The system performs 4 major operations:

1. Records attendance automatically in a database using Zigbee.
2. Tracks the location of the student using GPS.
3. Sends SMS upon request by the parent regarding the location of a child using GSM module.
4. Displays the availability of a teacher using keys.

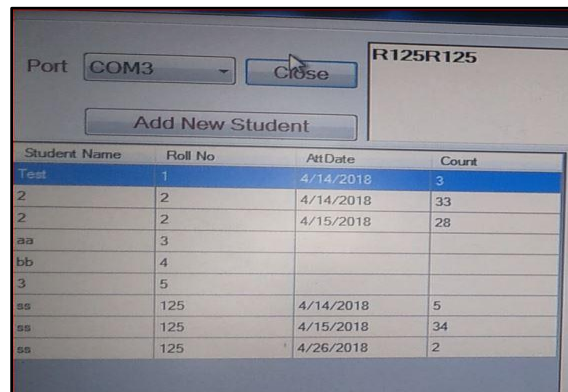


III. WORKING

The Zigbee receiver receives the data when the student enters its range. Hence, an automatic attendance is taken and updated in the database. The range within which the Zigbee receiver receives the signals from the Zigbee transmitter is of approximately 10-30 meters.

A. Transmitter Section: The system uses hardware to take the attendance of student. Each student is provided with unique roll number and the records are maintained in the database. When the student enters the room for the first time in a day, the date will be fetched and stored in the date field. Thus the record is maintained whenever a student enters and leaves the premises. The data is sensed by the microcontroller and is sent through Zigbee transmitter.

B. Receiver Section: The Zigbee receiver receives the data and sends it to the host computer. The host computer archives data in a data warehouse such as Microsoft Visual Studio. The count is incremented in database for every attendance.



Student Name	Roll No	AttDate	Count
Test	1	4/14/2018	3
2	2	4/14/2018	33
2	2	4/15/2018	28
aa	3		
bb	4		
3	5		
ss	125	4/14/2018	5
ss	125	4/15/2018	34
ss	125	4/26/2018	2

Fig.1. Student Attendance Database

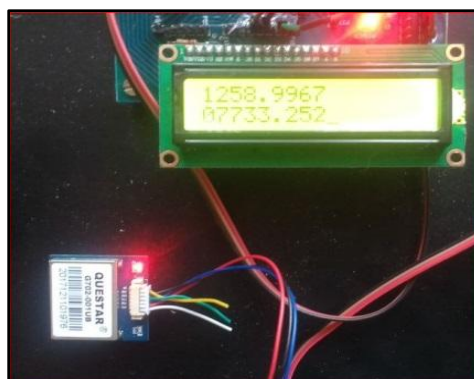


Fig.2. Student Location

Global Positioning System is used to track the location of the student. The working of GPS is based on the tri lateration principle. The position is determined from distance measurements to satellites. Four satellites are used to determine the position of the receiver on the earth. The target location is confirmed by the 4th satellite. And the three satellites are used to trace the location. GPS sends the latitude and longitude of the student and the same is displayed on the Liquid Crystal Display (LCD). Earth-point coordinators are used to find the exact area of the student. Global System for Mobile Communication module receives the location from GPS. When the parent requests for the location of a child the GSM module sends the location in latitude and longitude through SMS to the registered number of parent.

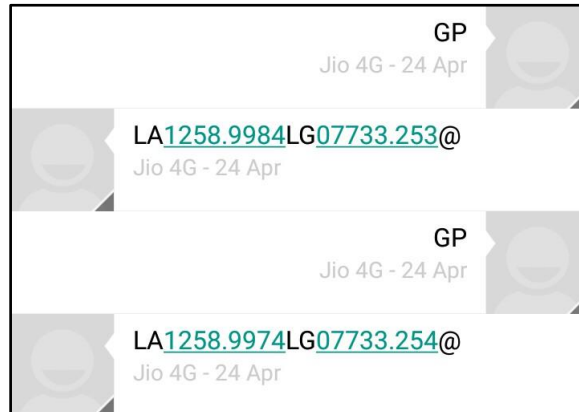


Fig.3. Location received as SMS upon request

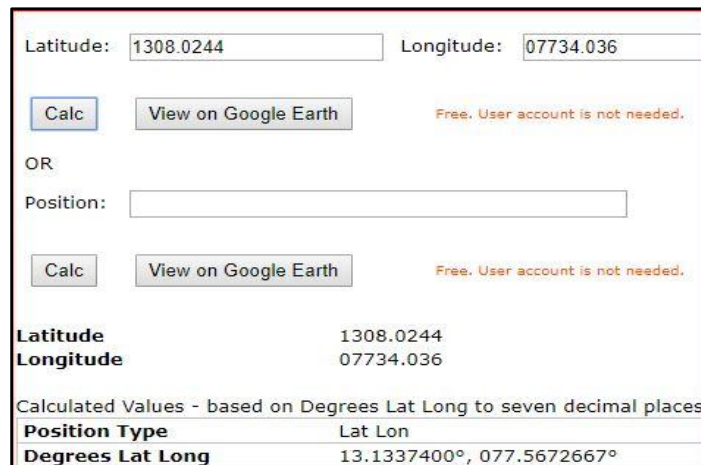


Fig.4. Earth-point Coordinates Conversion

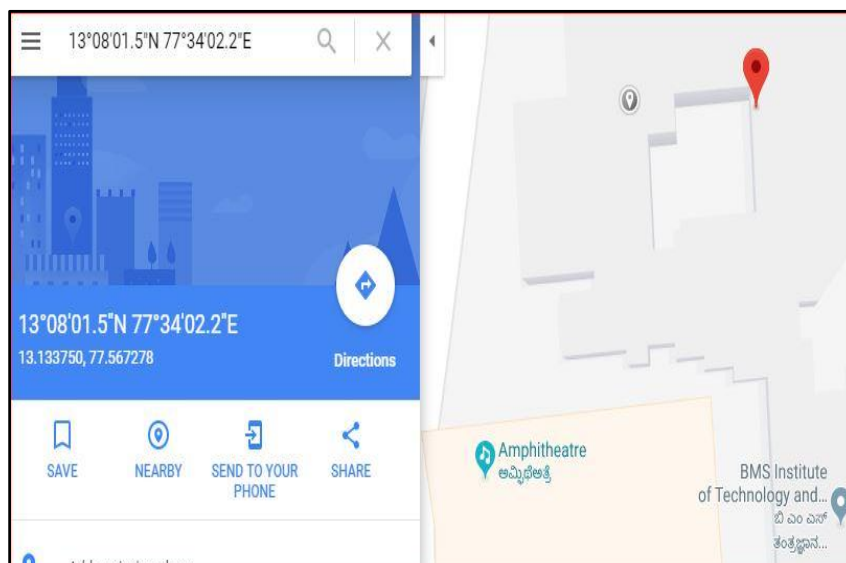


Fig.5. Exact Location on Google Maps

Keys are used to display the availability of the teacher. In this work, we have used two keys. The time period during which the teacher is free is known in advance. When the key is pressed, the free time of that particular teacher is displayed on the LCD.



Fig.6. Teacher 1 available at 10.30

IV. CONCLUSION

Geofencing Based Attendance System has been implemented and tested. The system combines GSM, GPS and ZigBee wireless technology. Zigbee technology is used to monitor the attendance of the student within the specified range. GSM supports real time transmission, lesser operation costs, SMS service and internet access. GPS is used to track the location of student to ensure security. An SMS is sent via GSM to parents when the parent request for the location.

Future Scope:

There is a chance that the student might misuse the card. One can give another person's attendance if he/she has the ID card. This can be solved by using a fingerprint sensor or facial recognition technique in the ID card to provide authentication. Introduction of messaging and emailing can be added to send the attendance details and the marks of the student to their parents. This feature may help in maintaining a good attendance of any institute.

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