embedded microcontroller has the knowledge to give AT commands to initiate and send the child information message to Mobile phone through GSM module.

(B) GPS

GPS is a multiple–satellite based radio positioning system in which each GPS satellite transmits data that allows user to precisely measure the distance from the selected satellite to his antenna and to compute position, velocity and time parameters to high degree of accuracy. GPS delivers with high sensitivity and accuracy with low power consumption. GPS module design is flexible to accommodate various RF interference.

(C)GSM

GSM Modem can accept any GSM network operator SIM card and act just like a mobile phone with its own unique phone number. Advantage of using this modem will be that you can use its RS232 port to communicate and develop embedded applications. Applications like SMS Control, data transfer, remote control and logging can be developed easily. The modem can either be connected to PC serial port directly or to any microcontroller. It can be used to send and receive SMS. This GSM modem is a highly flexible plug and play quad band GSM modem for direct and easy integration to RS232 applications.

D. Voice Playback Circuit

The voice playback circuit has the following features:
1) Single chip, high quality voice recording and playback solution.
2) User friendly, easy to use operation.
3) Non - Volatile - flash memory technology, no battery backup is required.
4) 4-8 KHz adjustable sampling rate can be done.
5) Audio output to drive a speaker or audio out for public address system.
6) Can record voice with the help of on-board microphone or via any audio input.

3. Software Design of Proposed System

(A)IAR Embedded Work Bench

This software is mainly used to activate ARM7 (LPC2148) microcontroller according to the input received by it. "Embedded C" code is written using this work bench. In this project, coding is written for GPS, GSM and Voice playback circuit which is interfaced with ARM7 board at the transmitter end. As per the code embedded in the controller, the interfaced modules generate appropriate output at the receiving end.

(B) ECLIPSE

Application in android mobile device is created using Eclipse software. It is flexible and provides compatibility to create new applications in android mobile devices. Java language is preferred as the basic platform for application creation. In this project application named "SMSMAP" is created using ECLIPSE which enables the parents at receiving end to visually see the place in Google map corresponding to the position of their child at the transmitting end.

(C) Visual Basic with .Net

A combination of Visual Basic and .Net is used for the creation of monitoring database at school end. This database includes all basic parameters to be known at this receiving end (control room of the school). Parameters include child details (ID no., Name, Phone number, current position, etc...). When .Net is used for coding purpose, more features can be used and one such is that timers can be used in database which will enable people in school end to refresh and update the child's location at every possible minutes.

4. Results and Discussion

Figure 2: ARM7 Board (LPC2148)

(Fig.2) illustrates LPC2148 microcontroller .This controller filters the incoming GPS data which holds repeated six packets and forwards only the latitude and longitude values (i.e.) current position of the child to GSM

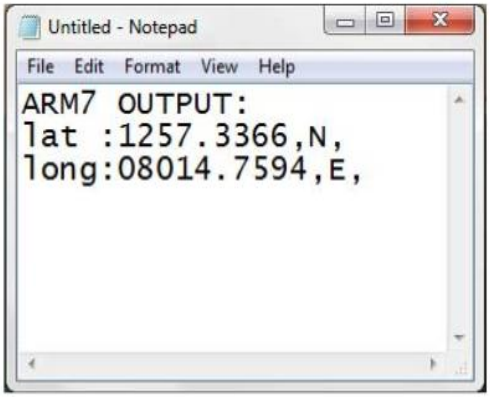

Figure 3: ARM7 output

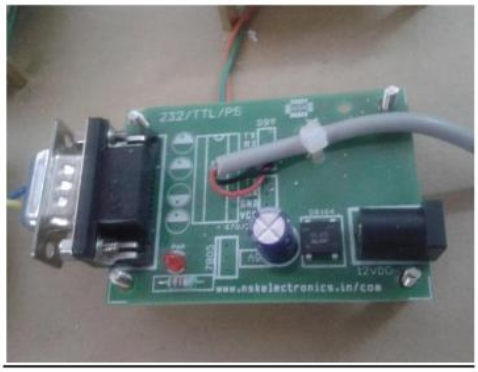

Figure 4: GPS board

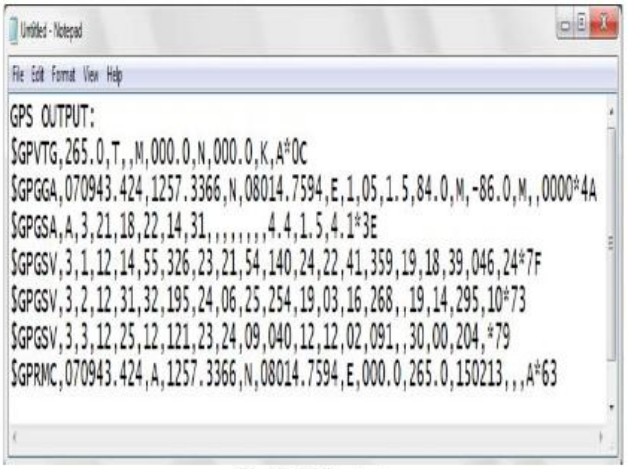

Figure 5: GPS output

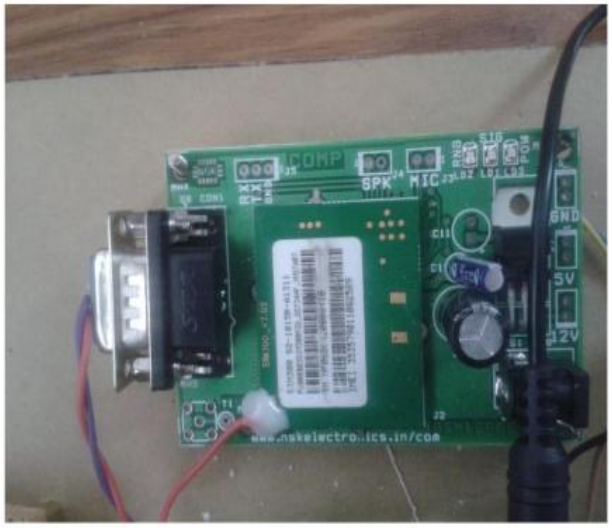

Figure 6: GSM board

GSM module (Fig.6) receives the latitude and longitude value of the child's current position and sends it to two receivers.

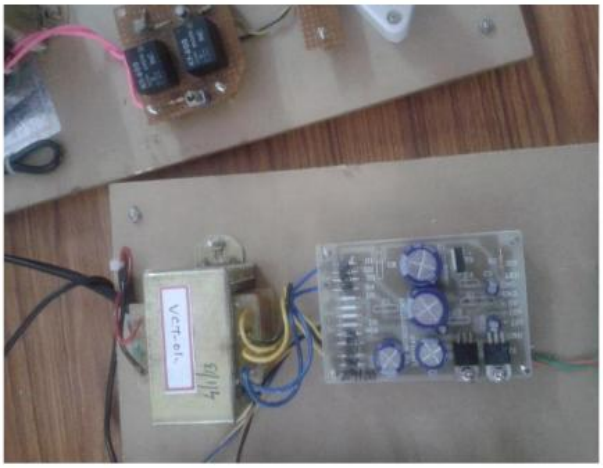

Figure 7: Power Supply

(Fig.7) illustrates power supply unit which provides VCC and GROUND for all the hardware modules.

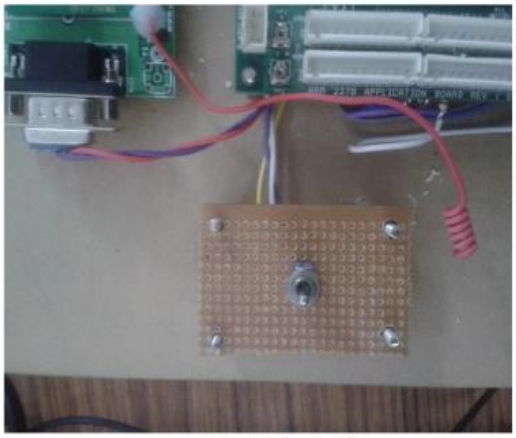

Figure 8: Relay Switch

(Fig.8). represents a relay switch which will be closed whenever the child cries inside the school campus. The control over closing and opening of switch comes from ARM7 controller. This switch in turn alerts the speaker in voice playback circuit. The GSM responds to this event by sending text message to parent android mobile device.

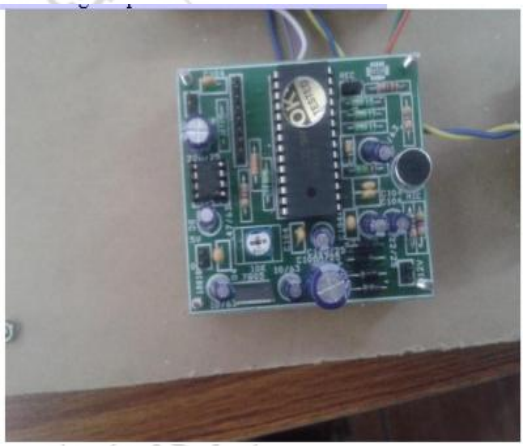

Figure 9: Voice Playback Circuit

This circuit primarily focuses on matching the child crying in school with the recorded child's crying, upon which a high signal is supplied to this circuit from microcontroller leading to an alarm sound.

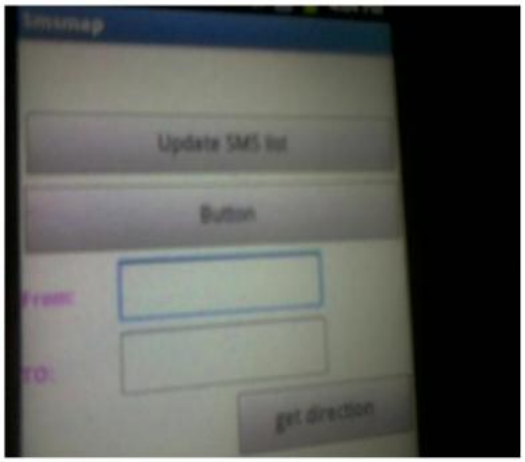

Figure 10: SMS MAP application

The above figure shows the "SMSMAP" application created in the parent's android mobile. Upon double clicking this application the above image is displayed in the phone. When an update SMS List tab is pressed by the parent it results in retrieving the latest Lat, Long values sent by GSM Module and updating it in android mobile devices. When button tab is pressed it leads to GMAP indicating the place.

Figure 11: Pointer in GMAP

The above figure illustrates the GMAP output obtained at the receiving end (parent android mobile device). It shows the pointer indicating the current location (place) of the missed child.

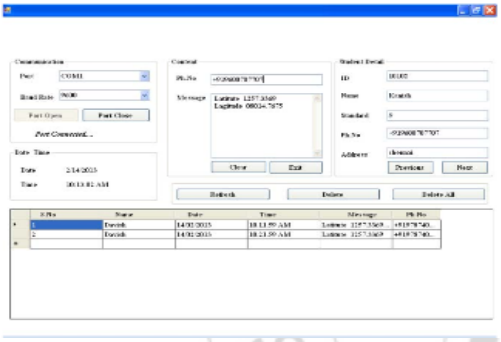

Figure 12: Monitoring Database

The above figure represents monitoring database created at the control room of the school (receiver) it shows the information of the missed child on periodical basis.

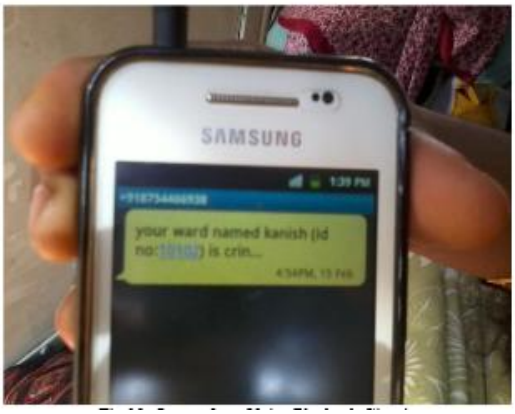

Figure 13: Output from Voice Playback Circuit

The above figure represents the text message being forwarded to parent's android mobile when the crying of the child matches with the recorded voice in the voice play back circuit.

Figure 14: Overall view of transmitter module

5. Conclusion

This project implementation primarily focuses on tracking a child's position and its location is sent to its parent and control room. It can be extended to perform the same for all children in the school by reducing the size of the child module, thus fixing it to ID card of every child. This project also focuses on recording a child's cry and when it matches with crying of the child in school the text message is sent to its parents. It can be extended by placing voice recognizing sensors which senses the cry of all the children inside the school and send the information to their parents appropriately by using the school database.

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