SMS Based Kids Tracking and Safety System by Using RFID and GSM

Nitin Shyam1 (nitinshyam109@gmail.com), Narendra Kumar2 (nkkumarnarendra27@ gmail.com), Maya Shashi3 (aj.kumar29stm@gmail.com), Devesh Kumar4 (mit.devesh@gmail.com)

1,2,3: Students, Department of electrical engineering, MIT Moradabad, Uttar Pradesh, India.
4: Assistant professor, Department of electrical engineering, MIT Moradabad, Uttar Pradesh, India.

Abstract-- In present time due to increase in number of kidnapping and road accident cases, Parents always worry about their children. This paper proposes a SMS based solution to aid parents to track their children location in real time. The proposed system takes the advantage of the location services provided by module kit which carry by the Childs in their school bag. It allows the parent to get their child's location on a real time map by the geographical coordinates which send by the module kit. Information such as GPS coordinates and time are gathered and sent to the parent's phone that's preregistered on the module kit. The communication between the parent and the child module kit is done using Short Message Service (SMS). SMS offers the system unique features. It will allow the system to work without the need of internet connection. The system sends the location of child's smart phone to parent's smart phone when the parent wishes to check on the child.

KEYWORDS— RFID (RADIO frequency identification)**,** Global Positioning System (GPS), Child Tracking System.

I. INTRODUCTION

In this prototype, GSM and GPS module kit, RFID, RF receiver and HT12E-HT12D is used. When the child leaves home, RFID will interface with the module kit; this module kit contains GSM and GPS which is in constant communication with parents' mobile. There is another RF receiver at school gate which can interact with RFID and disable the module kit when the child enter in the school. In this a MODULE KIT and RFID tag is given to the child. When the child leaves home RFID reader turns on the module kit via RF communication which is GPS and GSM enabled. Parents get the location of the child via GPS. Sometimes school bus drivers drive the bus above the threshold limit, so our system limits the maximum speed of school bus. A sensor is connected with school bus speedometer which ensures that threshold speed of bus is not exceeded. If bus exceeds the threshold limit then the module kit gets ON via HT12D and GSM sends message to the parents. As the child will enter the school, the module kit will get turn OFF due to RF interfacing with the school receiver and the parents will get a message - "your child has reached safely". The main advantage of our system is that it works automatically, the child has nothing to do with this kit, it will be simply kept in his bag.

Details of the System:
- **RFID:** used to turn on and turn off the module via HT12E.
- **GSM\GPRS Unit**: will contain module for transferring data, SMS to the external entities viz. relatives and parents.
- **GPS Unit**: containing cohesively made GPS module for obtaining the longitude and latitude of the kids location.
- **Sensing Unit**: The sensing element will connect with the speedometer of the school bus for the security against the threshold limit of the bus.
- **RF Receiver and transmitter module** :Its function is to guide RFID

II. SYSTEM FUNCTIONAL REQUIREMENTS

The system functional requirements are described according to their priority. The priority value (high, medium, or low) will be indicated at the end of each requirement description between round brackets.

A. Hardware Requirements (High Priority)

The system requires the usage of RF (Radio Frequency) active readers with an Omni-directional antenna that provides a circular coverage area of at least 30 meters, or uni-directional antenna that provides a straight coverage area of 100 meters. The system requires the usage of RF active readers able to communicate with the system. The system requires the usage of RF active tag that are neither affected by the human body temperature nor the human body water.

B. Readings and Measurements (High Priority)

The system shall be able to provide the user with the following information, at any time, when required:

- Reader ID and Tag ID, detected at anytime by any reader.

C. Detecting the Child (High Priority)

The system shall be able to detect the child if s/he is in
the coverage area of a reader.

D. Adding new user (High priority)

- The system shall be able to add a new user to the system.
- The user shall be able to specify the new user's name, his middle name, last name, age and his parent's phone name.
- The system shall be able to assign a new tag number to the new user from the pool of unassigned tag numbers.

E. Deleting user (High priority)

- The system shall be able to delete a user from the system by specifying his tag number.

F. Display Child's location (High priority)

- The system shall be able to state whether the child is in the coverage area of one of the readers or not.
- The system shall be able to state whether the child is in the area covered by two readers or more.
- The system shall be able to mention which reader(s) detected the child.

III. SYSTEM CAPABILITIES

The system will be designed to monitor children ridership in a safe and non-intrusive way. It will use a combination of RFID, GPS (Global Positioning System), and GPRS (General Packet Radio Service) technologies. Each student is issued one or more unique RFID card(s) to carry. The card will be embedded in the school bag for each student. As the student's tag is detected by the reader installed in the school bus upon entering or leaving the bus, the time, date and location is logged and transmitted to a secure database. It will require no action on the part of drivers or students, other than to carry the card and will deliver the required performance without impeding the normal loading and unloading process. The system will enable parents to receive instant SMS alerts when bus is within 10 minutes of the designated pick up and drop off points reducing the time the child spends on the street. The system will also notify parents via SMS when the child boards and alights from the bus or enters/leaves the school. Parents will take the appropriate action because they have precise answers to boarding status and times. If a child is still inside the bus for a predefined time after the vehicle's engine is turned off, and doors are closed, an SMS message will be sent to parents.

IV. SYSTEM ARCHITECTURE

The full system architecture includes four main components: 1) the on-board/in-school RFID Tracking System; 2) the on-board/in-school Smart Gateway (RFID system, GPS, and GPRS).

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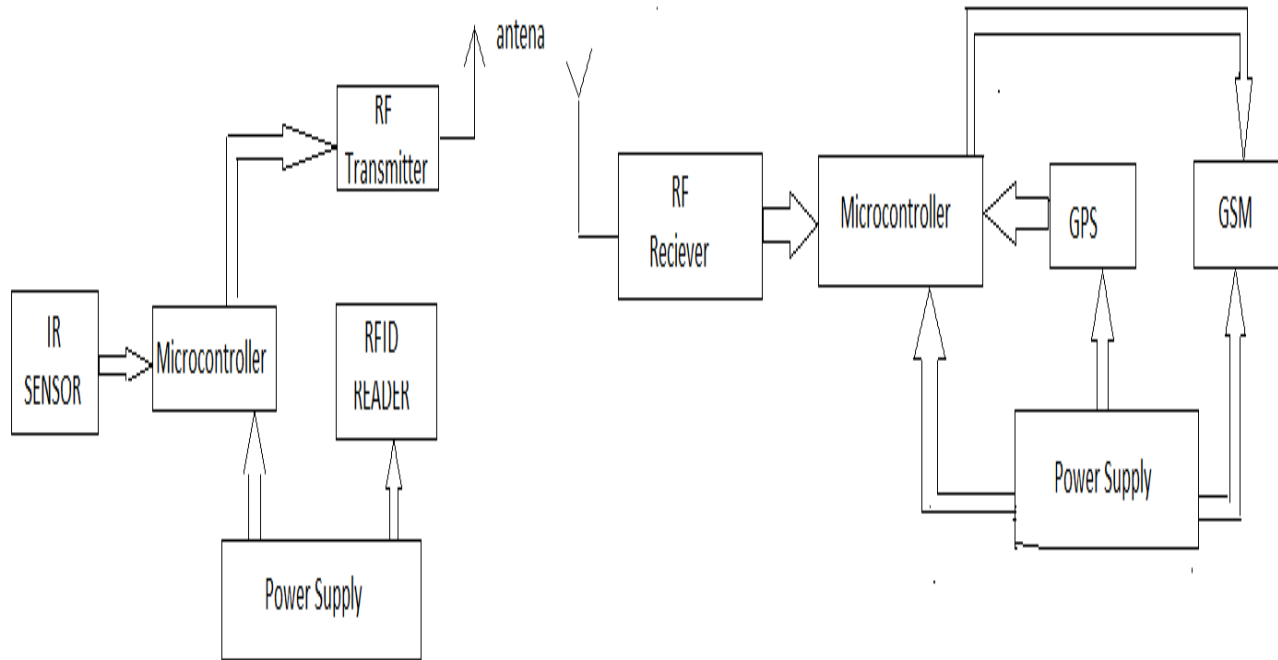Figure 2. Overall System Architecture

Fig.1. Block Diagram of the System

V. CIRCUIT DIAGRAM

Circuit diagram for the system is shown in fig. 2. The complete system consist of two modules one is the tracking module which consist GPS and GSM, the second module consist RFID reader and speed sensing components. The connections of circuit diagram is done as the standard define and as our requirements. In the first module the GPS and GSM is connected with the microcontroller for the sending coordinates of the child location. The second module consist RFID reader and automatic speed sensor which connected with the pic16f877 microcontroller. For making the speed sensing element we make the automatic speed sensor. In automatic Speed sensor we are using IR sensor and 555 timers in mono stable mode. Pin no 4 and pin no 8 is connected to the positive supply. Pin no 1 is connected to the negative voltage. Output is available on the pin no 3. Sensor is connected to the pin no 2. In the case of infra red sensor Pin no 2 is negative bias through the 33k ohm resistor and pin no is positively biased through the photodiode. One infrared transmitter led is focused to the photodiode. Infra red led is directly connected to the positive and negative supply through the 330ohm resistor. The complete circuit diagram of the system is shown below in fig 2.a and 2.b
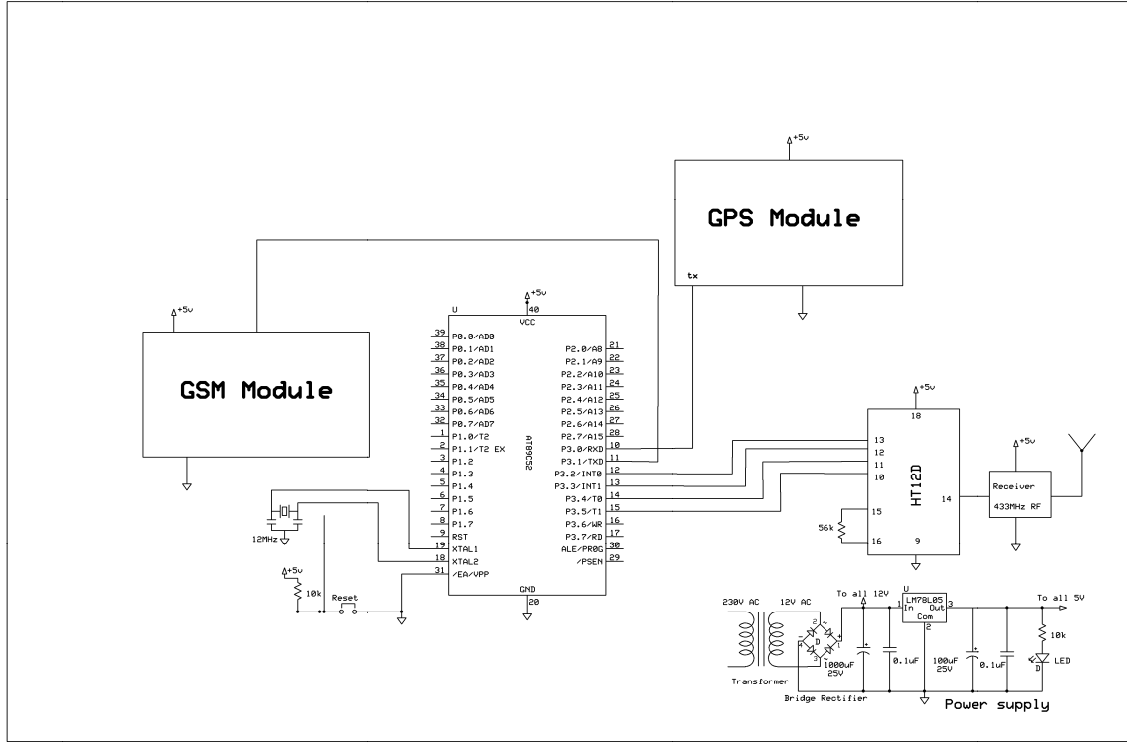
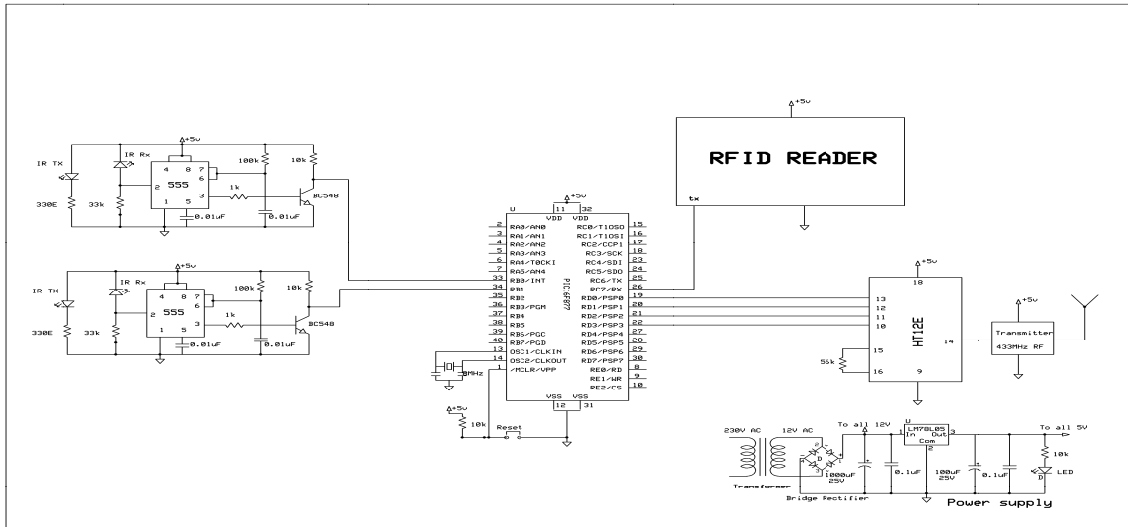Fig.2 (A) Circuit Diagram of Tracking Module

Fig.2 (B) Circuit Diagram of Speedometer Module

VI. WORKING OF THE SYSTEM

In this system a MODULE KIT and RFID tag is given to the child. When the child leaves home RFID reader turns on the module kit via RF communication which is GPS and GSM enabled. Parents get the location of their Childs by the sms in which the module kit sends the coordinates of the child. The complete process is easily understood by the shown fig 3.
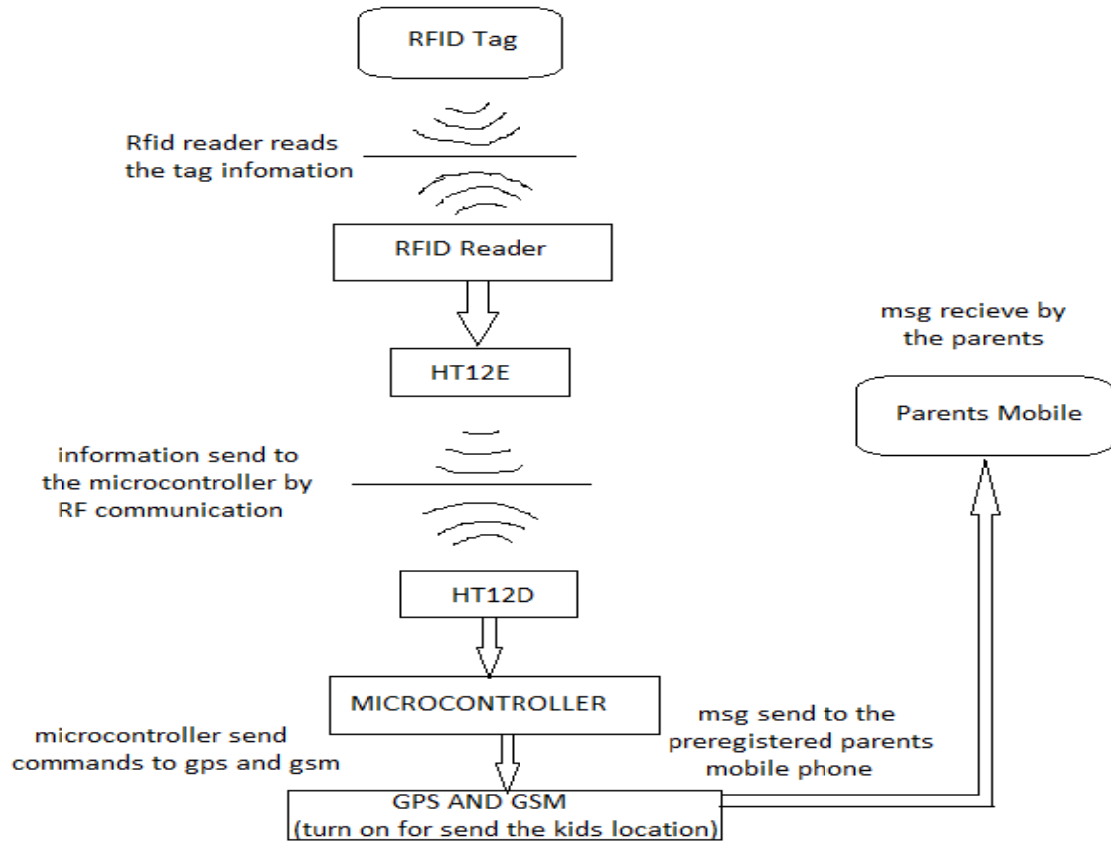
RFID Tag

Rfid reader reads
the tag infomation

RFID Reader

HT12E

information send to
the microcontroller by
RF communication

HT12D

MICROCONTROLLER

microcontroller send
commands to gps and gsm

GPS AND GSM
(turn on for send the kids location)

msg recieve by
the parents

Parents Mobile

msg send to the
preregistered parents
mobile phone

Fig .3(A) working of the module kit

SPEEDOMETER MODULE

As pointer crosses 40 km/hr mark, then it sends signal to microcontroller through RF
module, microcontroller will turn on GSM and it will send message to parents that driver is
rash driving.

(OUTPUT FROM SPEEDOMETER)

HT12E

(TX   MODULE)

HT12D

(RX Module)

MICROCONTROLLER

(TURN ON GSM)

Driver is
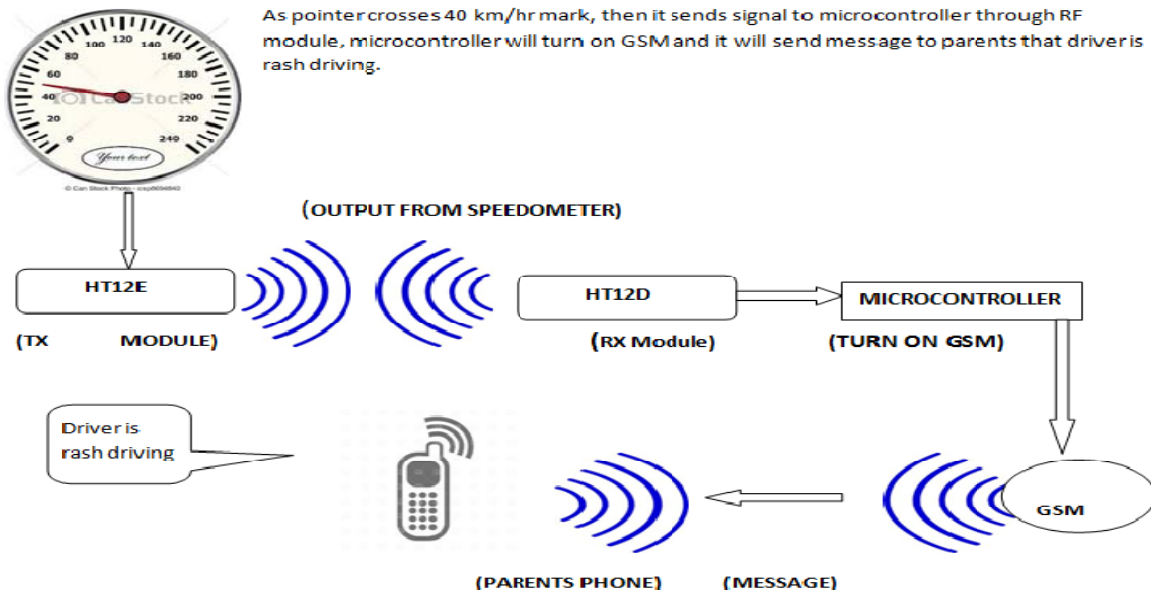rash driving

GSM

(PARENTS PHONE)   (MESSAGE)

Fig.3 (B) Working of Speed Sensing Module

VII. CONCLUSION AND FUTURE WORK

In conclusion, this system was developed to aid locating children with their parents and this research showed that RFID tracking technology is a practical option for monitoring and tracking the children during their trip to and from school on school busses. Lab and field trials confirmed that the RFID tags functioned well under different conditions. The readings were consistent and resulted read ranges that were acceptable within the constraints of locating children stepped into the bus, stepped into the wrong bus, left the bus, and left behind in the bus. In addition, the cost associated with tagging of materials is relatively low. It should be noted that the work completed in this research is the first phase of the project. Future work including combining RFID tracking with an information management system will result in detailed children tracking that will provide different application to the users. Once the next phases are complete, the system will be capable of notifying parents via SMS when the child enters/leaves the school, enabling school authorities and parents to keep track of the bus online, helping smooth and quick rides to the different destinations.

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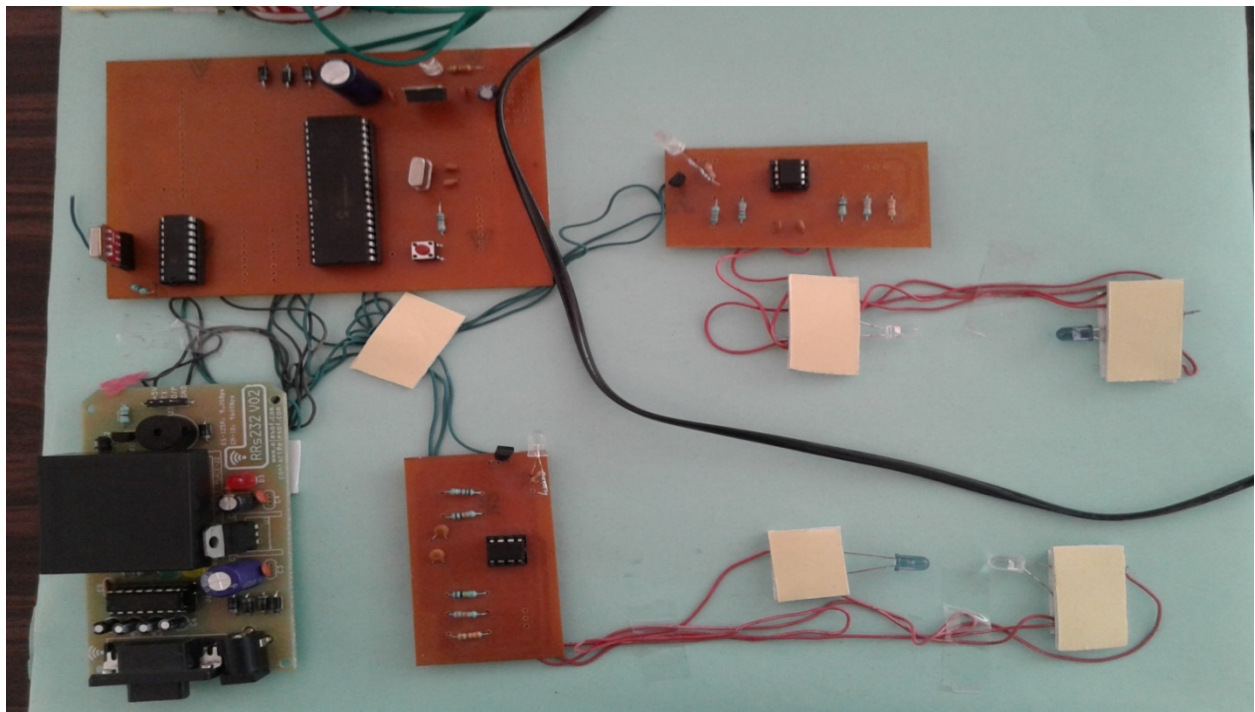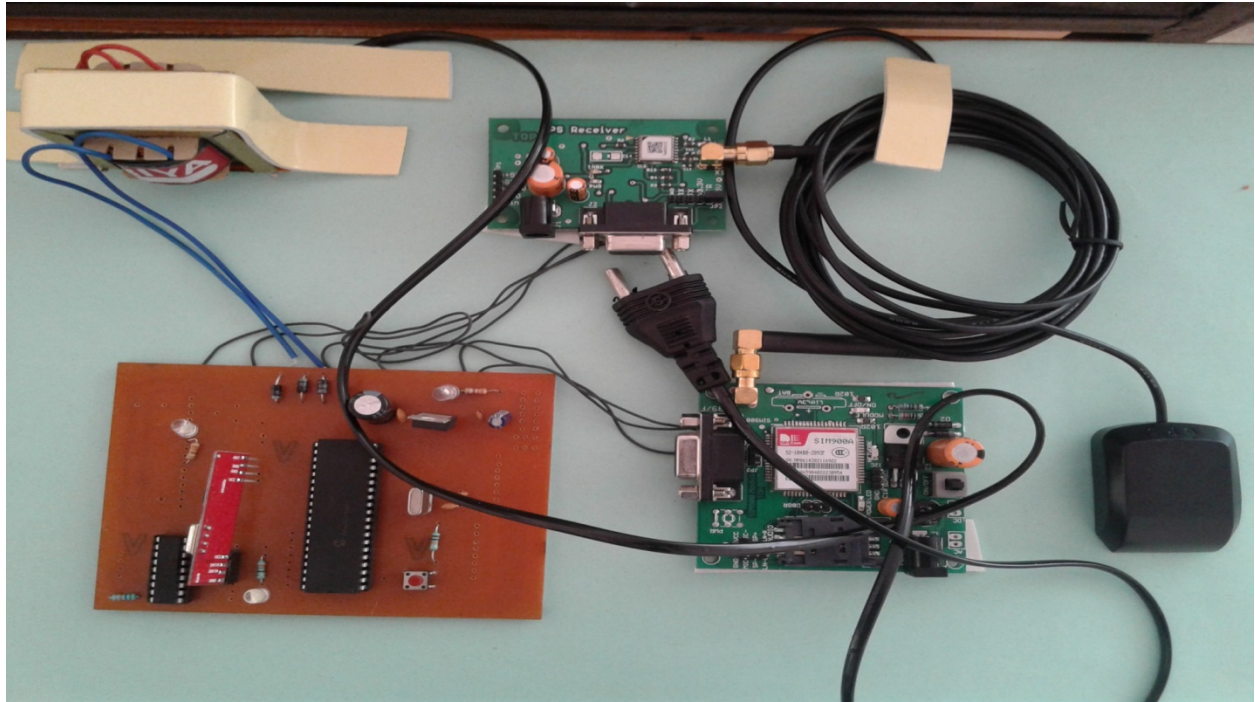[10] Stephen S. Intill, James W. Davis and Aaron F. Bobick, "Real-Time Closed-World Tracking",

Fig. 1(C) - Actual Figure of "SMS Based Kids Tracking and Safety System"