

# Child Security using IOT

Prajakta Dhamanskar<sup>1</sup>, Blewett Dmonte<sup>2</sup>, Russel Rodricks<sup>3</sup>, Damian Fargose<sup>4</sup>

<sup>1</sup> Assistant Professor, <sup>2,3,4</sup> U.G. Student

<sup>1</sup>Information Technology Department, Mumbai University  
Fr. Conceicao Rodrigues college of engineering, Bandra, India.

**Abstract**— The proposed system uses an IOT technology for increasing the children's security which mainly focuses on their route from home to school and school to home with the help of a system that consists of a Android application for the parents, a hardware system including Finger print scanner and Wi-Fi module to track the Bus routes assuming the use of school going buses .The applicability of Finger print scanner and Active RFID is tested by monitoring children's in and out of school bus and their locations respectively from home to school and vice versa.

**Keywords**--- IOT, Wi-Fi module, Finger print sensor, Active RFID, School

## 1. INTRODUCTION

Children's security has always been a priority problem whose solution must constantly be improved with the help of new technologies available. Many techniques and ways have been invented in the need of providing a more favourable environment for children's living and learning, but focusing on this aspect it has also to deal with challenges due to complex environments of the cities. Such an environment indeed is generally lacking of safety conditions for children which leads to the Threats that children may come around like kidnapping ,that is the highest factor on the graph of students security.

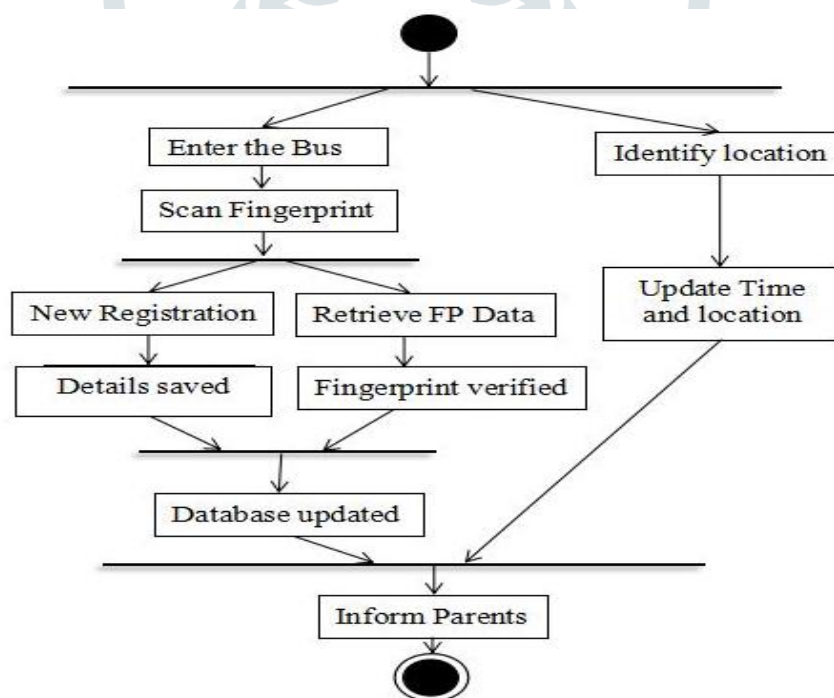


Figure 1.1 Flow chart

According to the incomplete statistics of news reports,[3] the school-age children security accidents in recent years can be classified into four types: 34.7% of accidents happening outside the schools, 11.7% of children's misconceptions, 29.8% of school bus drivers carelessness and 23.8% of children's losses. Many start-ups are coming up with a solution binding the ICT services and building the security systems for school. For parents the safety of their children is vital and a low cost technology may give a big contribution to improve it. Many of the International Boards are moving in that direction, trying to offer a more efficient service aimed to solve children's security issues. One line of experimentation is related to the monitoring of child's movements through a system involving both Fingerprint module and RFID (Radio Frequency Identification) technologies.

The first solution is exploited for children's entering and exiting the school bus, while the second to gather information about the location of the school bus. This paper is especially focused on child's security while travelling from home to school and school to home back, trying to solve a little part of the school-age children's security problem.

A possible flow of security system for children is displayed in Figure 1, [4]. The Novel "Internet of Things" (IOT) which was first introduced by Kevin Ashton in the year 1998, has gained increasing attention both in the academia and industry in the area of wireless communications and networking [7]. Nowadays, researchers use the term "Internet of Things" to refer to the general idea of things, especially everyday objects that are addressable, recognizable, readable, and/or controllable via the Internet, whether via RFID, wireless LAN (Local Area Network), WAN(Wide Area Network), or other means. Combining different developments will build an "Internet of Things" that enables interaction of intelligent systems with the real world. Based on IOT, RFID ,Fingerprint scanner and Wi-Fi module technologies, the system is designed to guarantee the children security protection, focusing on the security on the school route category in figure 1.

The system uses such types of information to alert parents when their child is travelling by school bus. The system generates alert on the app, managed by a back-end system, when the child enters and exits the school bus .There is a speech(TTS) system for parents in the Android application which gets activated when there is a alert of child being missing and absent[8]. This paper only present the children tracking process while they are in the school bus, although the children's movements prior to entering and after exiting the school bus is not covered. Nevertheless, the same monitoring solution can be exploited for children's entering and exiting the school, allowing for a better safety check. It is worth noting that the chosen technology is also dependent on the idea of maintaining the cost of the system as low as possible in order to make the solution affordable for municipalities and parents. The paper is organized as follows: In section II presents Literature survey , section III presents the overall system architecture by detailing each subsystem, advances of the prototype are discussed in section IV, while in section V concluding remarks are presented.

Finally,completecontentandorganizationaleditingbeforeformatting.Pleasetakenoteofthefollowingitemswhenproofreadingspelling andgrammar.

## 2. LITERATURE SURVEY

- The system proposed in [15] uses an RFID tag is attached to every student which is used for identifying the students .Two IR sensors are used for checking arrival of child . And a GPS sensor which is used to know the location of bus which is sent to the parents through SMS.
- With the help of the system proposed in[11] Parents are able to view the Tracking of the bus through SMS. Also the system sends an SMS when the child enters the bus and when he leaves the bus.
- The system presented in [9] uses RFID ,GSM to send notification to the parents and proximity sensor for monitoring the speed of the bus and alcohol sensor to check alcohol consumption of Driver.
- Wearable device is used in [16] to analyse physiological in a conjunction with body position which can be used to analyse body temperature and skin resistance.
- The system proposed in [17] uses an RFID tag for identifying any student .Two IR sensors are used for checking arrival of child .
- The system presented in [12] consist of a watch which when activated tracks the place of a women using GPS .
- The system proposed in [14] was called project KHESTO, where University of L'Aquila and L'Aquila Municipality, Italy worked together in a conceptual similar environment.The specific objectives of KHESTO were:

To increase the use of public transportation, decrease the burden on the environment, reduce the isolation and the feeling of abandon in people living in marginal areas , reduce the depopulation of areas where isolation prevents the full exploitation of their potentialities ,enhance the social cohesion, carry out pilot actions showing different possibilities of application in the transport systems of the tools developed as examples for policy makers.

## 3. HARDWARE REQUIREMENTS

- I. Arduino UNO
- II. Finger Print Sensor (R305)
- III. Active RFID
- IV. Wi-Fi Module(ESP8266)

#### 4. SYSTEM ARCHITECTURE

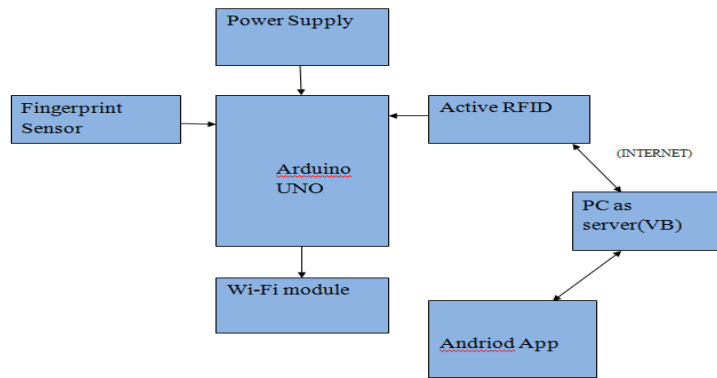


Figure 4.1 Architecture of security system .

#### 4.1 Fingerprint Module

When a child boards a bus, the Fingerprint scanning is done in the bus and the system will identify and match the child's information. If match is found the time and location of child is sent using Wi-Fi module. When enrolling, user needs to enter the finger two times. The system will process the two time finger images, generate a template of the finger based on processing results and store the template. When matching, user enters the finger through optical sensor and system will generate a template of the finger and compare it with templates of the finger library.

For 1:1 matching, system will compare the live finger with specific template designated in the Module; for 1:N matching, or searching, system will search the whole finger library for the matching finger. In both circumstances, system will return the matching result, success or failure as shown in Figure 3. [5] [6]

A fingerprint module is installed into the bus. Firstly the children need to complete the registration process. Once the registration is done the route is selected. Firstly the "Home to School" route is selected. From home to school the driver and attendant scans the fingerprint, after that the children's scan their fingerprints at different locations while they reach the school.

Now when the children reach the school again the biometric identification is done. Firstly the children scans the fingerprint followed by the attendant which is the confirmation that all the children have reach the school.

If the fingerprint is not detected in the morning that means the child is absent for the whole day and the parents will get this message via an Android application provided to them.

While coming back, "School to Home" route is selected. After that the driver scans the fingerprint first, followed by children and thereafter by the attendant indicating that all the children have entered the bus. If any of the fingerprint is Missing that means the child is still at school. Now while reaching home again the fingerprint print is again scanned for the final time indicating the child has safely reached home.

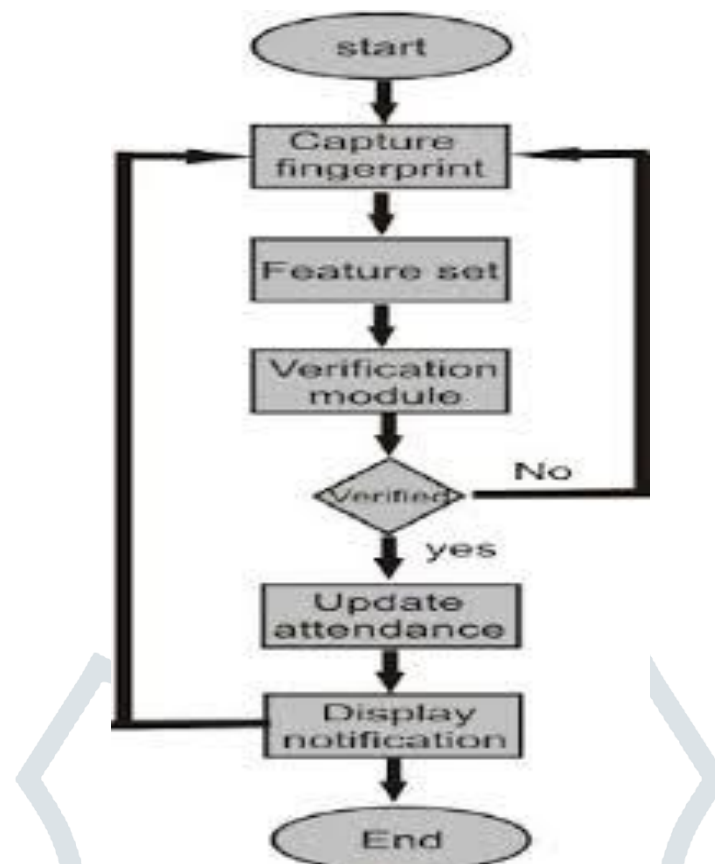


Figure 4.1.1 Fingerprint module working

## 4.2 Wi-Fi Module

The Wi-Fi module will update Data log on a server and server will send data to the parents consisting the current location and time. Parents can see in their application that who the driver and attendant is, where the bus is and who is boarding into the bus and at what time. ESP8266EX offers a complete and self-contained Wi-Fi networking solution; it can be used to host the application or to offload Wi-Fi networking functions from another application processor.[13][1]

An active RFID transmitter is used to send location information and the bus will have active RFID receiver which will receive the information which will be sent to the server using Wi-Fi module.

This information along with the time and location is sent to the server using Wi-Fi module which is then sent to the Android application.

## 4.3 Arduino

Arduino controller is used to connect the various modules in the system like the fingerprint module, Wi-Fi module and Active RFID. Arduino is a tool for making computers that can sense and control more of the physical world than your desktop computer. It's an open-source physical computing platform based on a simple micro-controller board, and a development environment for writing software for the board. Arduino can be used to develop interactive objects, taking inputs from a variety of switches or sensors, and controlling a variety of lights, motors, and other physical output. The Arduino Uno is a micro-controller board based on the ATmega328. [2]

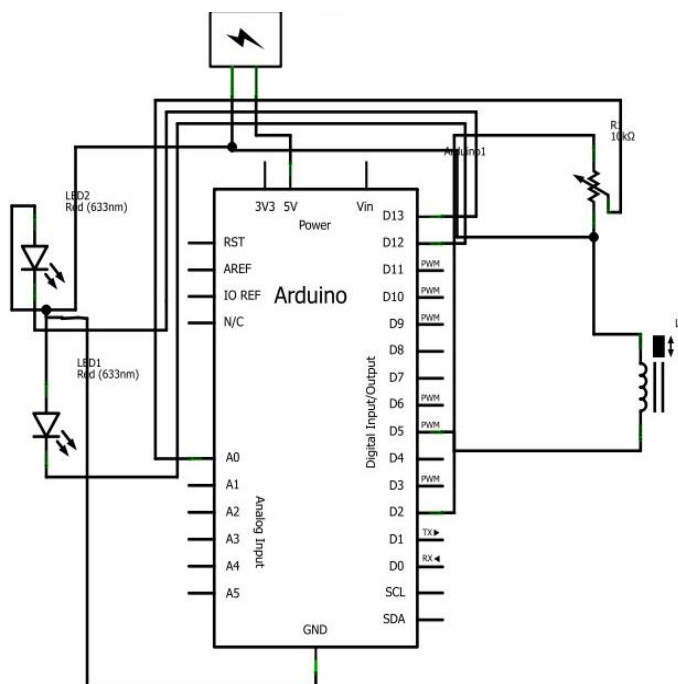


Figure 4.3.1 Arduino ATmega328 Pin diagram

#### 4.4 RFID Module

Active RFID module is used to show different locations of bus and to keep a track of the bus. Active RFID transmitter sends the information regarding location of the bus. The Active RFID transmitter will be installed at various locations in the route of the bus and receiver will be installed on the bus which will receive the location. And all location details are sent on a server via Wi-Fi module. For each child there will be different location and before scanning the fingerprint locations needs to be selected. Whenever a child boards a bus, the biometric identification is done.[11][9][10]

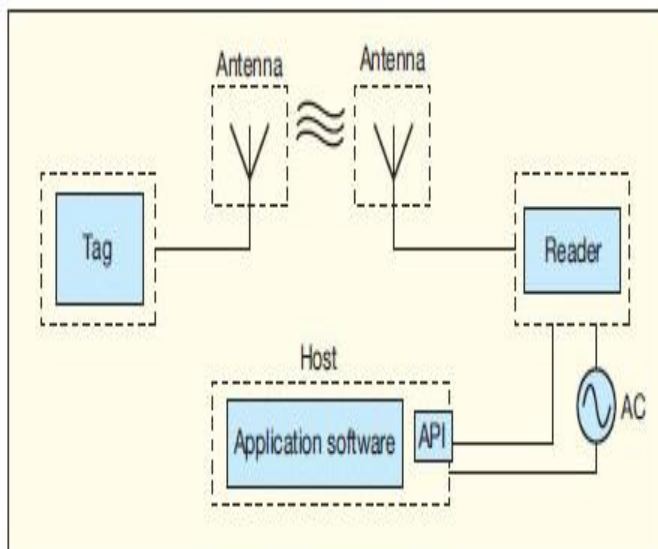


Figure 4.4.1 Active RFID working module.

## 5. RESULTS AND IMPLEMENTATION

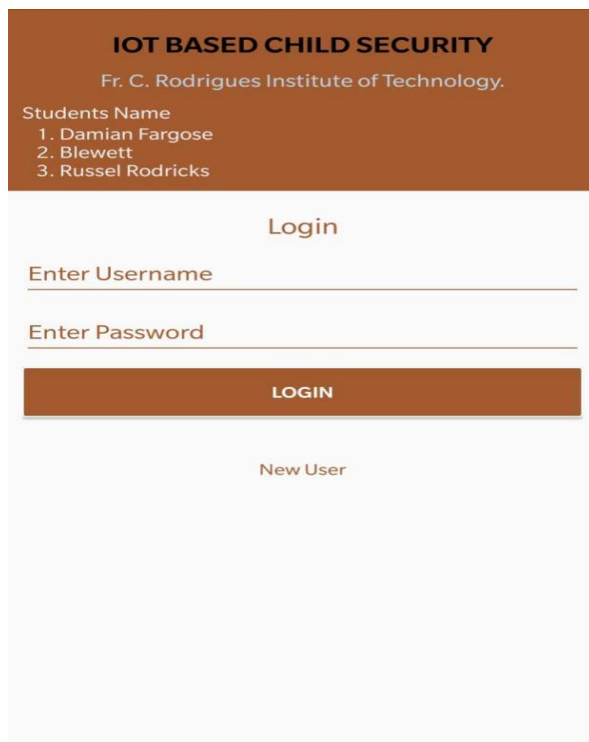


Figure 5.1. Android app Login

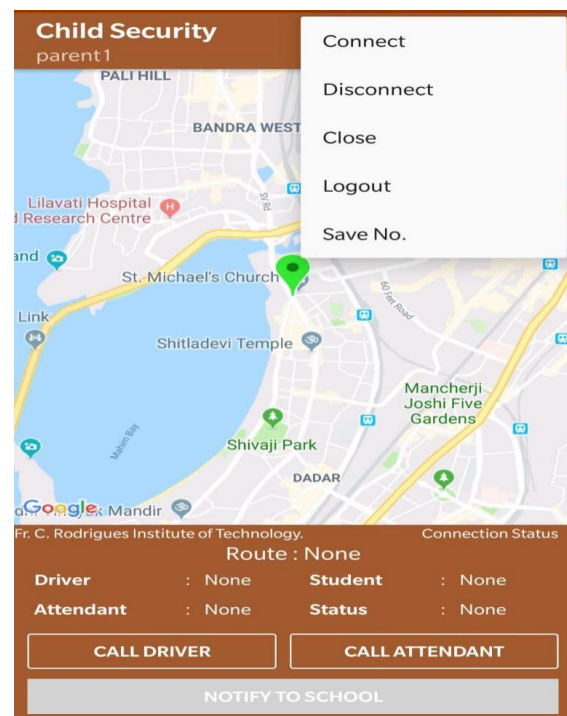


Figure 5.2. Android app Homepage

### 5.1 FLOW OF WORK

The project consists of three phases:

1. Child Identification
2. Tracking the location of the bus.
3. Updating the parents.

#### 5.1.1 Child Identification:

To identify the identity of the child a biometric identification is used which is inbuilt in the system. Whenever a child boards a bus, the biometric identification is done in the bus and the system will identify the child and send time and location of a child using Wi-Fi module.

**Biometric Identification:** Biometric systems can be done in three steps:

- **Registration:** When the user uses the system for the first time the system maintains some information of user, like name, identification number etc. It then captures an image or recording of your child's specific trait.
- **Storage:** Contrary to what you may see in movies, most systems don't store the complete image or recording. They instead analyze users trait and translate it into a code or graph. Some systems also record this data onto a smart card that your child may carry with him/her.
- **Retrieval:** The next time the child tries to validate his/her fingerprint, the system compares the trait of the user present to the information of fingerprint stored on file. Then, it either accepts or rejects that user is who he claims to be.

#### 5.1.2 Tracking location of Bus:

RFID consists of two main units. The first unit is the reader module or interrogator and the second unit is the transponder or tag. The purpose of the interrogator is to retrieve data that is stored on the transponder. There are two types of design they are : an active transponder design, or a passive transponder design. An active transponder design allows for the interrogator to have a built-in power source. The range of the unit is very vast , but a significant increase in the cost of transponder production. RFID reader module: In order to achieve a significant read range, attention should be given to both the reader and transponder antennas.

### 5.1.3 Updating Parents:

The time and location of a child using Wi-Fi module are sent to the server. Data log update occurs on the server and will send to the parents consisting the current location and time.

## 5.2 RESULT

IOT BASED CHILD SECURITY							
View Attendance Home Page Logout							
INFORMATION							
No.	ID	User Type	Status	Location Name	Route	Date	Time
45	6	child	Not Reach Home	Sisca Mumbai	School to Home	20-04-2019	11:55:57
44	5	Child	Out	Sisca Mumbai	School to Home	20-04-2019	11:53:38
43	3	Attendant	In	School	School to Home	20-04-2019	11:51:34
42	6	child	In	School	School to Home	20-04-2019	11:50:48
41	5	Child	In	School	School to Home	20-04-2019	11:50:16
40	1	Driver	In	School	School to Home	20-04-2019	11:49:46
39	3	Attendant	Out	School	Home to School	20-04-2019	11:48:37
38	6	child	Out	School	Home to School	20-04-2019	11:47:52
37	5	Child	Out	School	Home to School	20-04-2019	11:47:22
36	1	Driver	Out	School	Home to School	20-04-2019	11:46:49
35	6	child	In	Swami Vivekanand Marg	Home to School	20-04-2019	11:45:42
34	5	Child	In	Mahim Koliwada	Home to School	20-04-2019	11:45:08
33	3	Attendant	In	0	Home to School	20-04-2019	11:44:29
32	1	Driver	In	0	Home to School	20-04-2019	11:43:54

Figure 5.2.1 Log on Website

**Step 1:** At first the stage the Registration of Driver , Attendant and Child done with the system.

**Step2:**When travelling to the school the route needs to be selected .The Driver gets on the bus at initial location with the attendant.As seen in the above figure 9 ,the Driver (No-32) and Attendant(No-33) fingerprint is verified with the system successfully at location 0.

**Step 3:** At the next location which is Mahim Koliwada , Child 5(No-34) boards the bus ,his fingerprint is scanned and verified. Same is done with child 6(No-35) at location SVM.

**Step 4:** When the Bus reaches the School the Driver(No-36) gets of First , then the students and lastly the Attendant(No-39) where all the students as well as the Driver and Attendant should scan their FP.

**Step 5:**During the way back, again the route needs to be selected ie. School to Home. Here the Driver (No-40) gets into the bus then the students and lastly the Attendant(No-43).

**Step6:**When the bus reaches the respective location the child 5 (No-44) gets off the bus by scanning their FP and a message is sent to their parents over the Android app.

As seen in the above Fig9. Child 6 gets off at a different location . In this case the parent is constantly notified with the help of TTS over the App and Also with the help of NOTIFY TO SCHOOL feature in the Android app (refer fig 8) parents can send a notification whether the child has reached home or not .

## 6.CONCLUSIONS

This paper proposes a solution to the problems that the children and their parents come across while going to the school and coming back home. The Android app helps the parents to keep track of their children while they are in the bus . The app also notifies parents during the time of boarding and of leaving the bus. Also the parents can find the exact location of the bus through inbuilt maps function in the app. The parents also can call the driver or the attendant in case the student doesn't get out of the bus at the specified location. The fingerprint scanner is also very important feature of this module. It avoids the situation of the students getting down at wrong stop or being missed out in the bus which may lead any mishap or demise due to suffocation. The fingerprint of the driver and the attendant are also registered into the system so that parents will be able to identify who is driving the bus. This system is going to be helpful for the parents as well as school. Parents can keep tracking current location of a child using this system in any case of the mishap or kidnapping case of a child.

## REFERENCES

- 1) "Security in Wireless Mobile Ad-Hoc Network Nodes Using Novel Intrusion Detection System" , Sushma Kushwaha, Prof.Vijay Lokhande , IJESC Journal.
- 2) "Home Automation and Security using Arduino Microcontroller"  
Viraj Mali, Ankit Gorasia, Meghana Patil, Prof. P.S.Wawage , IJRAT Journal.
- 3) Zhiyuan Fang, li Wei, Wei Chen, Yangjun He, "A RFID-Based Kindergarten Intelligence Security System", 2012
- 4) Atsushi Ito, Tomoyuki Ohta, Shinji Inoue, "Security system for children on school route", 2009
- 5) "A Study of Biometric Approach Using Fingerprint Recognition" Ravi Subban and Dattatreya P. Mankame, Lecture Notes on Software Engineering, Vol. 1, No. 2, May 2013.
- 6) "Anti-Theft System For Vehicles Using Fingerprint Sensor" Joel Sachin, Kiran Rana Gill , IJSER Journal
- 7) Santucci, G., "From internet to data to internet of things. In Proceedings of the international conference on future trends of the internet", 2009.
- 8) Robi Grgurina, Goran Brestovac and Tihana Galinac Grbac, "Development Environment for Android Application Development: an Experience Report", MIPRO 2011, May 23-27, 2011.
- 9) "RFID based School Children Security System(IRJET)", Divakar S, Loges D, Manoj Kumar S, IRIJET Journal.
- 10) Khaled Shaaban, Abdelmoula Bekkali, Elyes Ben Hamida, and Abdullah Kadri, "Smart Tracking System for School Buses Using Passive RFID Technology to Enhance Child Safety," Journal of Traffic and Logistics Engineering, Vol. 1, No. 2, pp. 191-196, December 2013. doi:10.12720/jtle.1.2.191-196
- 11) Nitin Shyam, Narendra Kumar, Maya Shashi, Devesh Kumar, " SMS Based Kids Tracking and Safety System by using RFID and GSM," International Journal of Innovative Science, Engineering and Technology, Vol. 2, Issue 5, May 2015.
- 12) D.Mani Megalai, U.Leena Agaliya, K.Aarti "Smart security solution for Women using IoT" IOSR Journal of Engineering.
- 13) Miao Yu, Ting Deng, Jie Fu1, "Application of RFID and GPS Technology in Transportation Vehicles Monitoring System for Dangerous Goods"
- 14) KHE-STO - Know-How Enhancement for Sustainable Transportation Organisation. <http://www.ipadriaticbc.eu/progetto/know-how-enhancement-for-sustainable-transportation-organisation-3/>
- 15) Abid Khan, Ravi Mishra, "GPS-GSM Based Tracking System," International Journal of Engineering Trends and Technology, Vol, 3, Issue 2, 2012
- 16) "Design and Development of an IOT based wearable device for safety and security of women and girl children", AnandJatti, Madhvi Kanan, Alisha RM, Shrishti Sinha IEEE International Conference 2016, 20-21, May
- 17) "Child Safety and School bus tracking solution", Mayur Bhor, Nikhil Kadam, Dinesh Shinde, Pranoti Mane, 3'd technical committee meeting on NW software of IEICE, February 2008