Real Time School Bus Tracking Identity Verification Using RFID and GPS

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Abstract- *This paper highlights the implementation of an intelligent bus monitoring device based totally on current challenges and troubles. Today crime against kids are increasing immensely, therefore it's time to supply security to the youngsters. This paper projected a system that monitors entry and exit off of youngsters throughout daily transportation to and from school. In these system RFID, GPS Module, web service are accustomed determine the youngsters leave and board time and it conjointly accustomed monitor the bus. This system uses a combination of RFID, GPS (Global Positioning System), TCP and open source Apache Php and Mysql technologies. Each pupil contains a unique RFID card. The card is embedded in each of the student's faculty baggage whenever a scholar enters or exits from the bus, the reader facts the time, date, and location and so transfers the records to a secure statistics via TCP employing a python script. It conjointly consists humanoid application for the parent with parent user id and password. This application gives the location of the child to their respective parent.*

Keywords- Radio Frequency Identification (RFID); Global Positioning System (GPS); Microcontroller2560; Web service

I. INTRODUCTION

Transportation is one among all the essential infrastructure of any USA several cities in developing international locations are full of great congestions basically attribute to the power aren't low-budget. School bus transportation plays a crucial function in carrying most of the child every day. But the school bus in maximum cities is on occasion unreliable and provider frequency maximum of a while isn't real time and again parent thinks that it's a whole waste of sometime attend without intention at bus stops; they're doing no longer have any plan as soon as the college bus can arrive. Therefore in an effort to enhance the normal shuttle of college youngsters there's need to enhance the varsity kids transportation with observation bus and alerting mother and father, consequently, RFID based totally tracking gadget ensures their safety whereas traveling to and from college. There is a unit numerous cases anywhere child loss due to no accurate management of college buses. This approach provides facilities for their determination to protect their youngster from any disaster. I specialize in the specific threat that's able to come returned in the course of everyday transportation to and from faculty our most important focus is to supply automatic detection as soon as youngster board or leave the school bus and problem alert message constant with them to their Individual dad and mom [1].

In RFID era, RFID has been a growing technology in latest years. RFID technology might be successfully applied in an expansion of packages because of its liking for efficiency. As for its application, it's been a good sized device for each chase the Transit transports. A simple device of RFID consists of two number one components: RFID reader and RFID tag, the card is embedded in each of the pupil's school baggage. Whenever a scholar enters or exits from the bus, the reader records the time, date, and site then switch the statistics into comfy statistics and this does not want any movement from the drivers and school students [2].

Safety of child is the fundamental situation for this reason GPS vehicle trailing device guarantees their safety whereas motion. GPS is one of all the technologies that region unit utilized in a large style of programs these days. One of all the programs is chased your car and keeps ordinary commentary on them. This chase system will let you know the state of affairs and route traveled with the aid of the automobile, which statistics can be ascertained from the alternative far-flung vicinity. It additionally includes the online utility that has you actual vicinity the intention [3, 4].
Today's automobile monitoring tool unremarkably use Global Positioning System (GPS) era for locating the car, however, special styles of computerized tracking vicinity era can also be used. Vehicle facts may be regarded and located at the electronic Google maps via the internet or specialized

Software system. An automobile chase gadget combines the installation of Associate in nursing device that is installed in an exceeding car, or inside vehicles, with cause-designed pc software program gadget to permit the owner or a user to hint the car's vicinity, grouping understanding in the technique [5].

The device can encompass Web-Based information, a student report, that offers time and date for all loading and unloading activities by pupil and bus report that has all students' ridership information thru bus. In precise, the machine can adjust university authorities, fleet residence proprietors, and fogeys to stay track of the bus online facilitate transporters and government to arrange and manage the bus routes better, saving cash and making positive sleek and speedy rides to the locations [6].

II. OBJECTIVE

Real time school bus tracking with identity verification using RFID and GPS works for the security of children by sending departure notification to their parent and also the tracking information of bus is continuously sent to the server due to which parent can track their child location using web service.

- To monitor the everyday transportation of the school transport for pick up/drop off of youngsters.
- To explore the wireless technologies to connect the buses and students.
- To improve the everyday transportation of the school transport to and from the school.
- To give a database to store student, driver and GPS location data.
- To provide security and safety for the school children traveling into the school bus.
- Automatically distinguishing when the kid broads or leaves the transport.
- To create easy to understand interfaces for getting to continuous travel information.
- To provide location tracking using GPS and tagging the location.

III. RELATED WORK

RFID innovation has been broadly actualized everywhere throughout the world and its effect on our day to day life is extremely assorted and huge. Those assorted zones of RFID application incorporate strategic following, observing and support of items, item well-being and data, and installment process. Today numerous administrations around the globe in both developed and developing country are attempting to apply it for different frameworks. Over the past 50 years, RFID technology went through innovations and progressions to become a more efficient and effective gadget for human beings as well as effective solutions of technical and organizationalproblems in various industry sectors. Literature has shown there are a unit several studies created use of RFID a system that area unit used track the provision chain. In their system RFID is employed to trace the provision chain to produce visibility and improve the method [7, 8].

Anwar Al-Lawati uses RFID and system integration system is projected to trace children the youngsters the kids employing a child module that transmit the tracking data to the system this method is projected to derived the kind module victim is action RFID, however, the disadvantage of this module is that the there's no way to track the bus location[9].

The author Saranya proposed system wherever kid toddler baby is caterpillar-tracked employing a child module that sends the notifications to the information and a mobile device. This method isn't cheap being the preparation price high and therefore the module might not be convenient for kids [10].

Mori counseled the paper that during which within which} the system uses robot terminal which has wireless local area network device and Bluetooth with the a-host network. The key disadvantage of this general that the event cost is extremely high [11].

Sumit S. Dukare used GPS, RFID, and GSM to trace the vehicle and alerting purpose. The trailing system is changing into additional vital in massive cities and it's more secure than different systems, the downside of this method isn't user-friendly [12].

Ankit Kesharwani projected the system automatic observation of bus operation, it uses a computer and WSN (Wireless sensing element network) to monitor the system, however, the downside of this method is brief vary of transmission of knowledge. Zigbee have short vary of knowledge transmission [13].

Khaled Shaban in his paper titled "Smart trailing System for varsity Buses victimization Passive RFID Technology to boost kid Safety" adopted RFID Technology to safeguard the youngsters from wrong identification of their destination location, methodology to curtail the scholars sleeping within the bus its self while not feat to categories. This paper additionally targeted to produce the safety to the youngsters from beginning location to the destination purpose with applied RF technology. This appears to be a decent resolution for keeping a track of the child; however, it lacked with a number of the safety mechanisms that ought to are enclosed like speed management mechanism, hearth safety and hindrance of bibulous individuals to drive the college bus[14].

Arifa K used RFID, RF era, youngster's protection, Speed discount and trailing. The movable terminal unit is a partner embedded gadget having RFID reader, GPS and analog compass as records enter device to get region and orientation [15].

Yamuna projected GNSS (Global Navigation Satellite System) based mainly bus commentary gadget. The most objective of this approach is to cut back the ready time of traveler in stop with the aid of causation records regarding the situation of buses to the tourist through SMS. GNSS primarily based basically net software is developed which gives actual time location of the bus on Google Maps together with velocity [16].

Other merchandise like child track uses biometric options like the palm of the kid. The entry and exit of the youngsters into from the bus are marked by scanning their palms across a palm reader. The scanned palm patterns area unit sent to secured information to credit againstpreregistered users' patterns. The college administrator will keep a watch on kids standing. The youngster's area unit needed to position palms on the scanner properly which could result in inaccurate knowledge transmission resulting in inaccurate results. During this system, is that the entry and exit isn't automatic and is to be triggered manually [17, 18]

In a framework is proposed to tune The maximum associated paintings to the issue tended to By manner of this paper is in, a framework proposed to track the kids making use of a tyke module that transmits the subsequent facts to a database and a cell phone. The hindrances of this framework are that the module might not be extraordinary for kids and huge-scale arrangement is moreover luxurious. The framework is partitioned into fundamental gadgets: a shipping unit this is situated within the school transport, and a faculty unit that is situated in the college shipping, and a faculty unit that is located inside the school. The transport unit is for distinguishing the teenager whilst the masses up or leaves the transport and after that, this record is dispatched to the faculty unit.The school unit is the focal unit in which it gathers data from each one of the transports, offers them to the framework database, checks if there are lacking youngsters, and it sends an immediate message notification to their child. The message is sent utilizing GSM modem which is set in the transport associated with the microcontroller. It can cost more by utilizing the GSM modem. So the framework goes costly by the microcontroller and the GSM modem for the SMS passage correspondence with the parent. The real burden here can be the understudies given a predetermined time to be on their stops, on the off chance that they are late then they can be missed the transport and can be late for school[19,20].

IV. METHODOLOGY

The projected system consists RFID, GPS, Arduino technology that The RFID tag reader is put in close to the bus entrance. It'll browse all the passive tags that the students carry with it whereas coming into going away the bus.As before long as a child enters within the bus; the reader can establish him supported the unique positive identification related to the RFID tag [21].

It uses MYSQL server information to store the student data and internet service to give notification to child's parent using email. This technique detects once youngster's board or leaves the school bus using RFID technology, send data to MYSQL server using transmission control protocol in turns, it sends a notification to kid parents. By using internet Service Parent will see their kid location similarly as they're getting into and exit time from the bus at any time. now the work of GPS module comes into the picture during this system we tend to browse the GPS position coordinate latitude and line of longitude using Python and send this coordinate to the server in each ten second and server update all the coordinates data and offers the proper location of the school bus on Google map.Fig.1 explains the system diagram. During this system, we tend to use Arduino microcontroller 2560. GPS module communicates with a microcontroller with the assistance of input interface, it communicates with GPS likewise as computer and carries out the relevant operation.

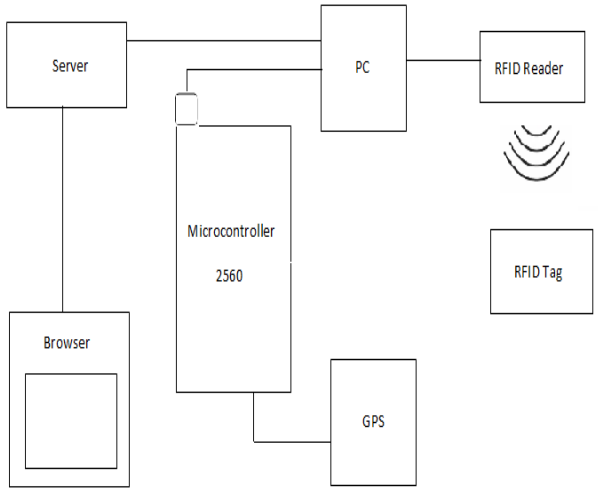

Figure 1. System diagram

The Tx1, Tx2, and also the Ground pin of Arduino square measure connected with Tx1, Tx2 and ground pin of GPS.Adriano Mega 2560.GPS need 3 to the 5-Volt power offer for operating. The RFID reader communicates with a Microcontroller or directly computer with the assistance of input interface. The micro controller is additionally related to

the ignition of the varsity bus with the assistance of relay switch. The computer connects with the server victimizationprotocol, protocol then information will extract from the browser.

A. ALGORITHM:

On RFID side:

1. Initialize all I/O, variables and serial ports.
2. Initialize reader.
3. Wait for a signal from RFID tag.
4. Scanner identifies RFID tag.
5. Data transmitted to MySQL server
6. Server creates provisional entry report.
7. Check database where tag valid or not.
8. If valid entry (notification) then time of entry send to parent.
9. If not valid wait for other tag.
   Repeat from step 3.

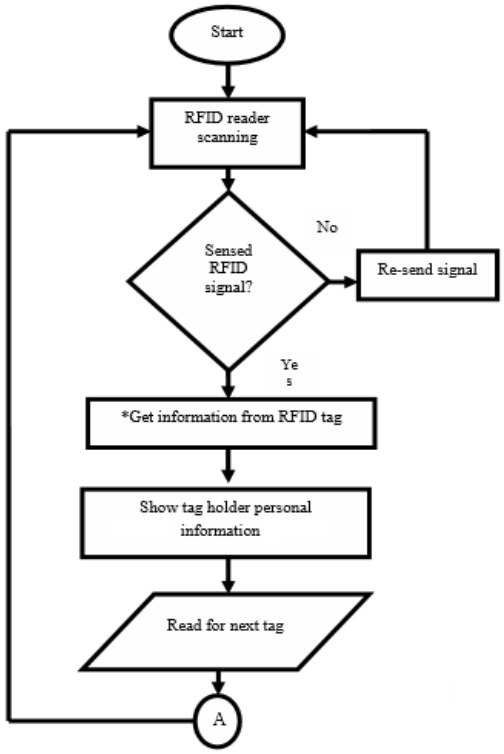

Figure 2. Flow diagram of RFID

On GPS side:

1. Initialize all I/Os, UART ports, sensors.
2. Initialize GPS+ with required settings.
3. Establish a secure GPRS connection.
4. Retrieve data from GPS ($GPRS format)
5. Send the GPS data to the server using GPRS Connection until status ok.
6. In case of error, repeat from step 2.

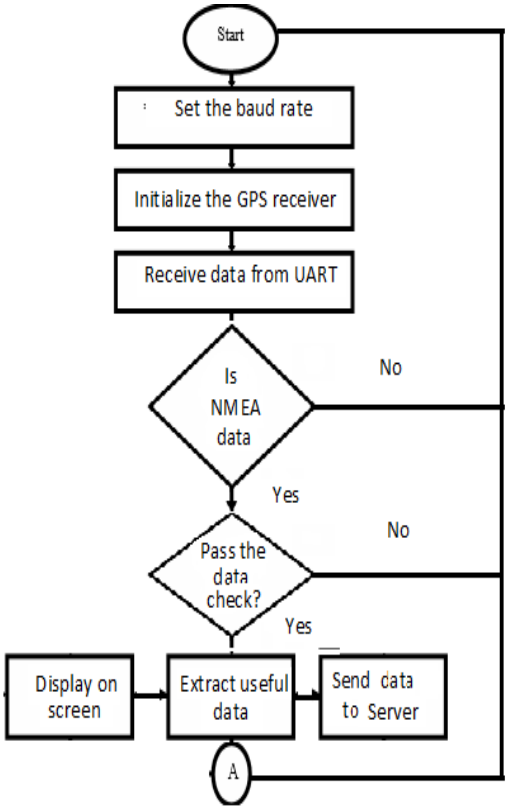

Figure 3. Flow diagram of GPS

V. TESTING AND RESULT

A prototype of the machine is implemented and examined. Testing could be very crucial part of the proposed machine. It must be designed to growth the probability of locating a mistakes of the proposed machine. The devices were applied for my part at the start and that they were tested to check in the event that they had been operating nicely. Then, they have been included and configured as required for the system. The unit test changed into held for all the devices in our gadget: RFID reader and tags, GPS and college server.

Testing of RFID:

The feature of the RFID reader is incorporated with RFID tags. It includes the reader module, which is going as each the transmitter and receiver of radio frequency alerts. The transmitter consists of an oscillator to create a issuer frequency, a modulator that effects on statistics commands, and amplifier to beautify the sign enough to awaken the signal. On the alternative facet, the receiver has a demodulator to extract the restored statistics and it consists of an amplifier to reinforce the processed signal [22].

In our system for reader testing, RFID reader connected to PC using cable RS232 converter which gives UART (Universal Asynchronous Receiver/Transmitter) output that converts the serial bit stream into the bytes that the computer handles. After doing all these connection Choose the appropriate COM port that got assigned to the USB in your system. By looking into the device manager like as shown below. In this figure you can see USB serial COM9 got selected.

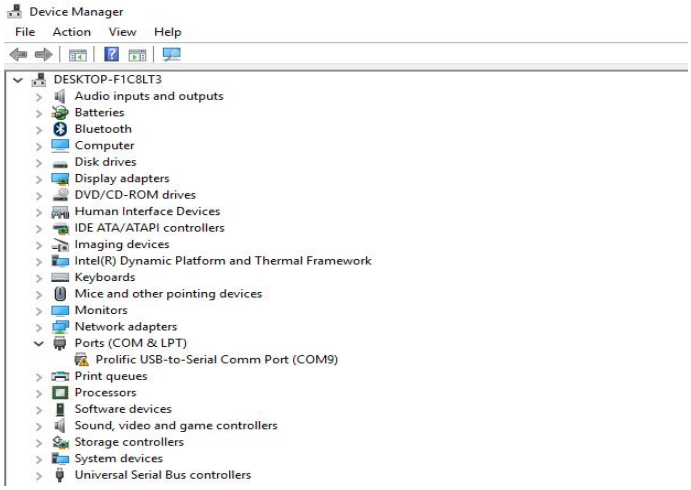

Figure 4. selecting the COM port from device manager

When RFID Reader (125 KHz) – Serial TTL detect the RFID tag, the LED on the reader "blinks" to indicate the presence of the passive tag. When PC receives the ID from RFID reader, the data on anaconda prompt is shown below.

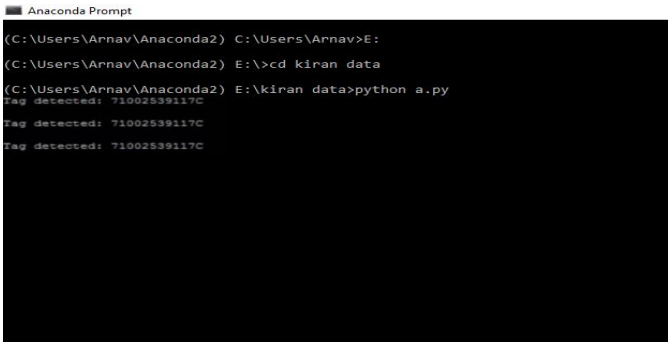

Figure 5. RFID reader detect RFID tag ID

After that assign each RFID id no to school children with their information using web service or MYSQL database.

Testing of GPS:

GPS connected to the microcontroller [23] first you should set the voltage switch on your GPS shield to 5v before you power it on your and connects it up next you need to set the jumper for Rx1 (receiver) and Tx1 (transmit)on the GPS shield. I set my GPS Rx1 to pin 19 and GPS Tx1 to pin18.wanted to receive the output of this circuit on my computer so we needed the default hardware serial interface for that. Then on Arduino IDE uploaded the code for GPS latitude and longitude these will be shown below.

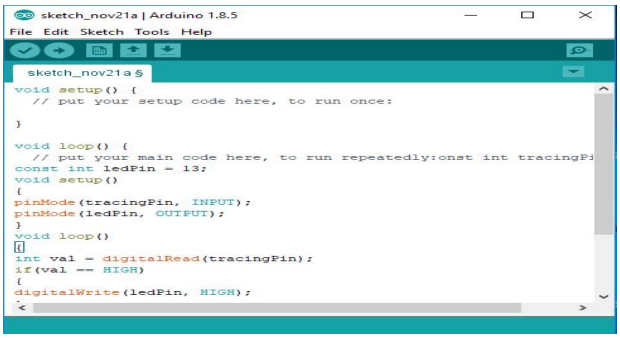

Figure 6. arduino IDE to upload code on microcontroller

Then create map file on which continuously latitude and longitude of the GPS taken and due to that we get an extract location of the vehicle and we get the location of the buson web service. Following figure showing the latitude and longitude value at initial stage

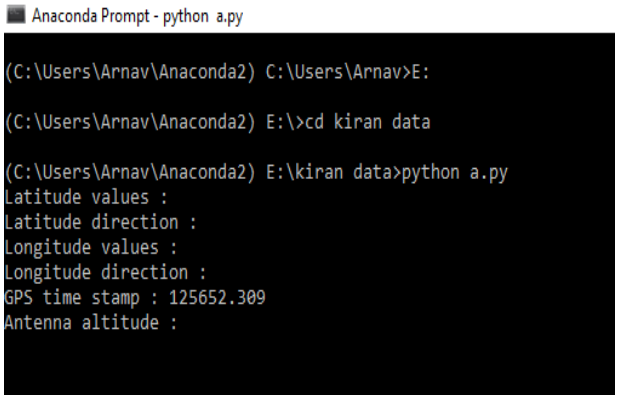

Figure 7. latitude and longitude value at initial stage

Latitude and longitude value of GPS is showing in following fig 8

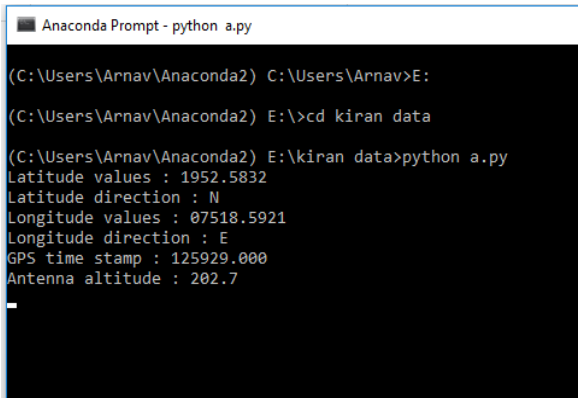

Figure 8. latitude and longitude value after some time

After sporting out the system simulation, designing this system the use of python and xampp trying out was completed. All components have accrued and related.

This research showed that RFID monitoring technology is a sensible alternative for tracking and tracking the Children sooner or later in their journey to and from school. Lab and challenge trials showed that the RFID tags functioned properly under brilliant conditions. The readings were steady and resulted studying degrees that have been applicable within the constraints of finding children stepped into the bus, stepped into the incorrect bus, left the bus, and left behind on the bus.The fig 9 given underneath shows the complete setup of the gadget that includes a microcontroller, RFID, GPS. Where the laptop is taken into consideration as the server.

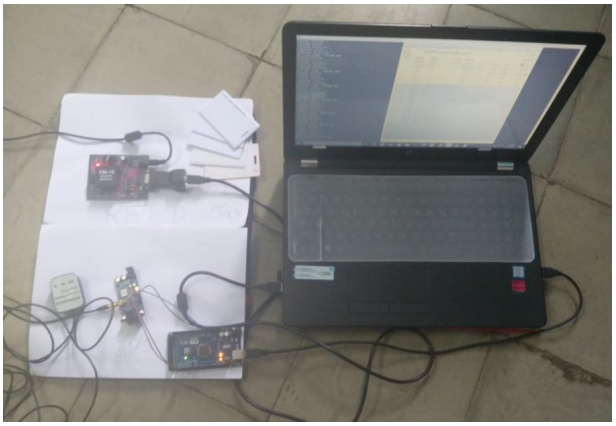

Fig.9: setup with laptop as server

The result of notification send to parent email id as their child enter or exit the school bus is showing below.

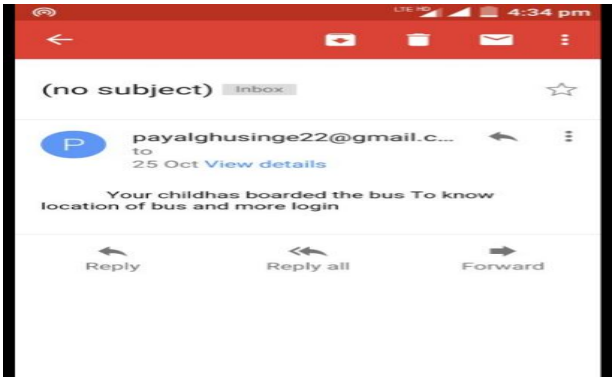

Fig. 10: Gmail notification send to parent

The result of tagging the school bus on Google map and tracking the school bus on web service showing below.

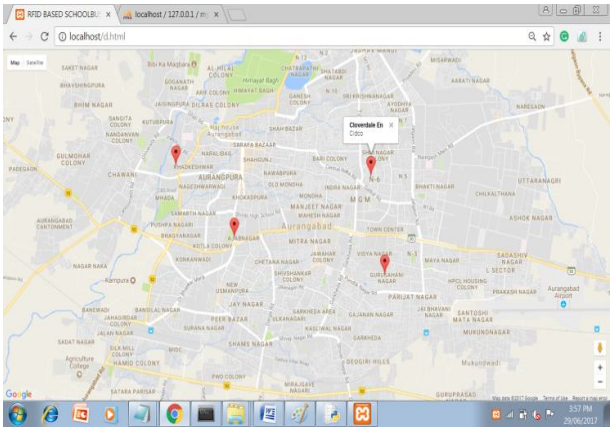

Fig. 11: locations of schools on Google map

This result shows that when parent login with their id and password they can see the board and leave time for their child on web site.

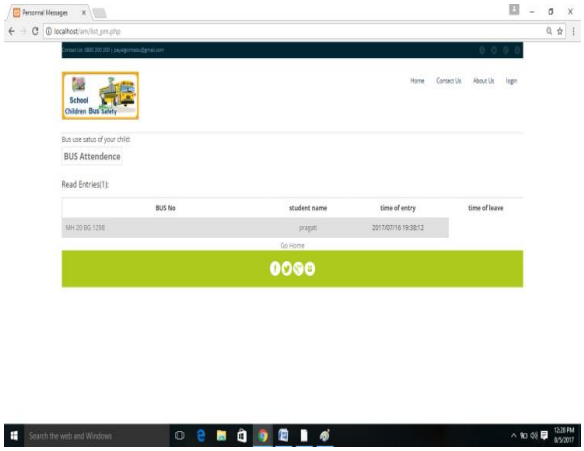

Fig.12: notification of entry and exit time of studen

VI. CONCLUSION

This work solves the issues like missing the bus of the child. Tracking of school vehicle and periodic information about the bus on Google map using tagging it easy to understand the location of the bus is near schools or other. Since RFID is the simplest and better technology for, school bus child attendance in a bus, this work effectively utilized the scope of RFID technique for tracking and attendance of child for high scale.

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