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GPS and RFID Based School Children Tracking System

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Abstract— **The educational institutions are unable to trace the students who don't attend college during regular working hours. To resolve this, in this paper we have implemented a new system which will help the parents to identify whether their kid reached the educational organization at correct time or not. In this paper the system keep track of the wards who board the bus and reach college or who manage to get down on the way to college or back home. To trace the students we implemented a system which uses an RFID, GPS, GSM and ARM processor. In this paper we have shown the results which are implemented and tested in our own organization.**

Index Terms— **ARM processor, gps, gsm, rfid**

I. INTRODUCTION

The number of students enrolled in schools in India is steadily increasing. It has been steady since 2010 at 96.7%. But there has been a decline in children's attendance. From 73.4% in 2007 it has declined to 70.9% in 2011 says an annual report on the state of education in the country [4].

There is a sharp decline in attendance in some states. Figures revealed that enrolment in undivided Andhra Pradesh from Class I to V slipped from 74 lakhs in 2005-06 to 72 lakhs in 2013-14. In Bihar it has declined to 50% from 59% in 2007 and in Madhya Pradesh it was 67% in 2007 and it has declined to 54.5% in 2011[4].

To aid the enrolment, now a days almost every school provides transportation facility to their students. Parents also prefer them so that the children reach the school on time and come back safe in the same bus. As students grow up they find chance to bunk classes. They board the school bus but get down on the way before reaching the school. The students may also get down on the way back home. Even though the school maintains supervisors in the bus, the students find a chance to get their way out.

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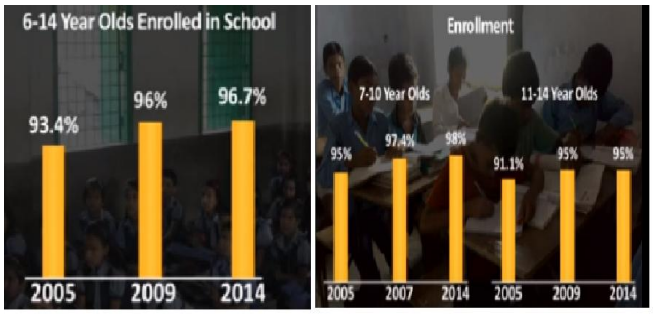


Fig 1: ASER survey 2014 results on school children enrolment in India

In this project we have developed a system which ensures the students who boarded the bus will get down at school only. The system automatically detects when a child boards or leaves the bus and issue an alert message when a child deboard the bus at any location. They are tracked with the following:

Microcontroller
RFID
GPS
GPRS

Every student is given an rfid card with their details stored in it. Whenever the children board the bus they must show the RFID card. The boarding point, deboarding locations are traced by GPS and are informed to the parents and the school authorities.

II. RELATED WORK

This section checks the related works. There are many systems which uses Bluetooth devices worn as necklace bracelets etc [1]. But this works only for a particular range. There are biometric products also [2]. Here if the children fail to place the palm correctly on the reader, proper image can't be obtained. The use of RFIDs makes it easier to maintain and usage. The authors of [3] used RFIDs to detect the children and entering and moving out of the bus. The students are not mistakenly locked in the bus. This system informs the parent and driver whenever the students board the bus and exit. They don't provide a facility to check whether the children are being dropped at the correct stop or elsewhere. Our paper devised a method to identify the students are dropped at correct locations and if they are dropped elsewhere the location is identified and alert is sent to parent.

III. CONTRIBUTION OF PAPER

In this approach we collect the boarding and deboarding locations of the students using the architecture below. This unit checks the students boarding the bus, getting down from the bus, send information to the parents and school authorities. When the student boards the bus, he places his RFID tag on the reader. This data is then sent to the processor. At the same time the location is identified using GPS. These values are then send to the modem to forward to the parent and the school.

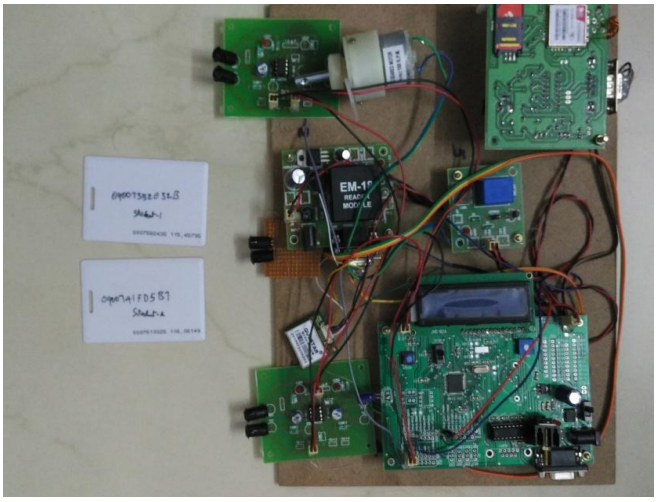


Fig 2: On board unit

The various entities used in the kit are:

A. ARM7 Processor:

ARM7 is one of the most widely used micro-controller in the embedded systems. It is based on reduced instruction set computing (RISC) architecture with 32 or 64 bit architecture. It supports upto 40 kb static ram and 512 KB flash memory. The 128 bit interface allows high speed operation. Embedded ICE RT and Embedded Trace interfaces allow real-time debugging and trace the execution of instructions. This collects the information from GPS and RFID send the data to gsm modem to forward to the necessary.

B. GPS (Global Positioning System):

The boarding and deboarding location of the students are identified using GPS technology. The GPS coordinates are captured and the GSM modem sends it to the parent and the authorities. GPS is a satellite navigation system which gathers accurate information regarding to the location and time. If there is no obstruction of sight between three or more GPS satellites on or near the Earth, the location can be accurately determined.

24 satellites are currently active in the GPS navigation system. Along with these satellites and ground stations, the GPS receiver calculates the location of the students.

GPS consists of 3 segments. The space segment, control segment and user segment.

- The space segment consists of the 24 space vehicles with the satellites. They orbit the earth in 12 hours and send radio signals.
- The control segment consists of the tracking stations. They measure the ephemeris i.e, orbital data and the satellite clock corrections and send them to the satellites which are sent to the receivers.
- The user segment consists of the GPS receiver which using the GPS signal calculates position, time, velocity etc.

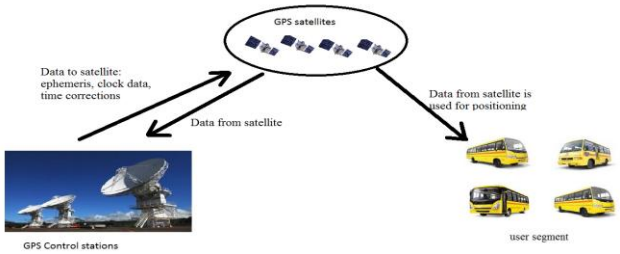


Fig 3: GPS system

GPS operates by a process of triangulation. Every GPS satellite transmits information about the time, and its position. By comparing the signals received from four satellites the receiver deduce how long it has taken for the signals to arrive and from knowledge of the position of the satellites it can calculate its own position.

C. GSM (Global System for Mobile Communications)

GSM was developed by the European Telecommunications Standards Institute (ETSI) which describes the protocols for 2G cellular networks used in mobile phones. It is operating over 219 countries and territories.

GSM is implemented using narrow band time division multiple access (TDMA) and is used in various digital wireless telephony technologies. The data is digitized, compressed and sent through a channel (which may have other users) during its time slot. The frequency band is 900MHz or 1800MHz. As the GSM operators are globally agreed upon, they allow the users to use their same mobile phone in different countries by changing the SIM card.

D. Radio-Frequency Identification (RFID)

This uses radio waves to read information stored in a tag attached to an object. A tag can be read from several feet away and need not be in direct line-of-sight of the reader. A RFID system has two units: a tag and a reader. RFID tags contain a transmitter and a receiver, a microchip to store and process information, an antenna to receive and transmit a signal. To read the information stored on a tag, a two-way radio transmitter-receiver called an interrogator sends a signal to the tag using an antenna which then replies with the data stored in it.

There are 2 types of RFID tags. Active and passive. Active tags has their own power supply hence can be read from several metres away. The passive tag work with the help of the radio waves generated by the reader. Hence they are small in size and have more life. In this paper we use passive RFID tags.

4: (a) rfid reader

(b) passive tags

IV. EXECUTION RESULTS:

The prototype was successfully implemented and tested. The below pictures shows the various stages of the execution.

A. Case 1:

The student boards the bus at his bus stop, reaches school, on the way back home he get downs at a place other than his bus stop. Below pictures show the above instances.

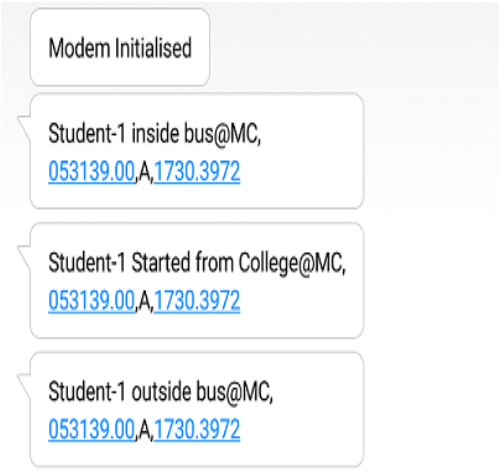
Fig 5: student 1 boarded bus at his bus stop

Fig 6: Student 1 reached college

Fig 7: Student 1 back home from college

Fig 8: Student 1 got down at a different bus stop

SMS will be sent to the parent and school authorities in every case. The snap shot of the SMS is shown below.



Case 2:

A student boards the bus from his bus stop and get down from the bus at a place before reaching the school. Below pictures shows the snapshot of the different stages.

Fig 9: Student 2 boarded bus at his bus stop

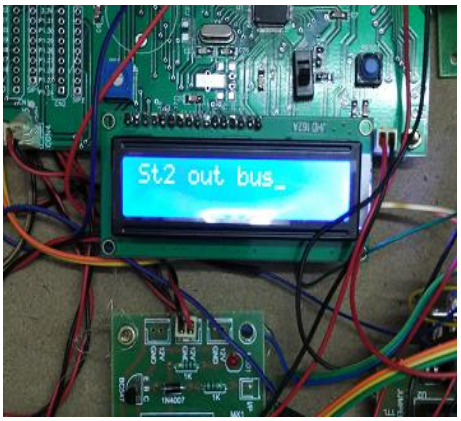
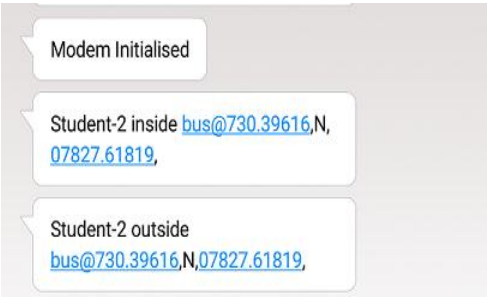


Fig 10: Student 2 got down of bus before reaching college

SMS will be set to the parent and school authorities at each instance. A screen shot of the SMS sent is given below:



The table below shows the output. The row marked in red indicates the student got down before reaching college (row 4) or he got down the bus at a different location before reaching home (row 6). The location details is send in sms. The below table shows an example of a particular bus route. The cell named *other* indicates the child got down at a place other than the college or his home.

Table 1: Details of the student boarding and de-boarding bus from home and college

Student	Boarding	De-boarding	SMS

id	Place	Time	Place	Time	received
101	Home	8.00 am	College	4.00 pm	Yes
536	Home	8.15 am	College	4.15 pm	Yes
236	home	8.30 am	College	4.30 pm	Yes
342	***Home***	***8.40 am***	***Other***	***4.30 pm***	***Yes***
101	College	3.30 pm	Home	4.50 pm	Yes
536	***College***	***3.30 pm***	***Other***	***4.50 pm***	***Yes***
236	College	3.30 pm	Home	5.00 pm	Yes

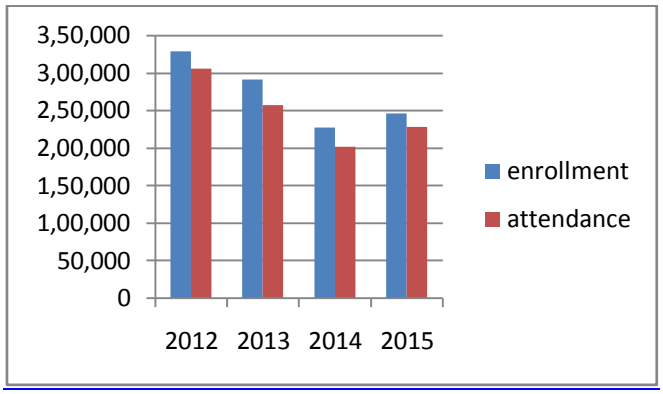


Fig 11: Figure showing enrollment and attendance from years 2012 to 2015

Table 2: Enrollment vs attendance

year	2012	2013	2014	2015
enrollment	328359	291078	226994	246522
attendance	305345	256894	201758	227904

In the above figure the blue bar indicates the students enrolled for a particular course in a state and the red bar the attendance of the students attending classes regularly.

V. Conclusion

The proposed system was successfully executed. The results and graphs are shown in the above section. This unit tries to detect the students who starts from home but dont reach the college. Whenever a students get down from the bus, a message is sent to the parent and the school informing the location obtained through the GPS unit. Parents can use the coordinates given in the message and use any map application to identify where the student is. So the parent can keep an eye on the actions of their children after leaving for the schoo.l

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REFERENCES

[1] Shu, C., "Guardian Uses Bluetooth Low Energy Tech To Keep Your Child Safe" Available at: http://techcrunch.com/2013/10/09/guardian-uses-bluetooth-low-energy-tech-to-keep-your-child-safe/

[2] Coxworth, B., "Kidtrack biometric system keeps track of kids on school buses" Available at: http://www.gizmag.com/kidtrack-biometric-school-busscanner/26723/

[3] Anwaar Al-Lawati, Shaikha Al-Jahdhami, Asma Al-Belushi, Dalal Al-Adawi, Medhat Awadalla and Dawood Al-Abri, "RFID-based System for School Children Transportation Safety Enhancement", 8th IEEE GCC Conference and Exhibition (GCCCE), Muscat, Oman, pages 1-6, February, 2015

[3]Nikitin, P. V., "Antennas and Propagation in UHF RFID Systems", University of Washington, Electrical Engineering. Available at: http://www.ee.washington.edu/faculty/nikitin_pavel/papers/RFID_2008.pdf

[4] http://www.asercentre.org/#g335q

[5] "4 year old, forgotten in a school bus, dies". Available at: http://www.muscatdaily.com/Archive/Oman/4-year-oldforgotten-in-a-school-bus-dies [Accessed: 11 Aug. 2014] [2] Toumi, H., "Four-year-old girl left alone in school bus dies". Available at: http://gulfnews.com/news/gulf/qatar/four-year-old-girl-left-alone-in-school-bus-dies-1.628394 [Accessed: 11 Aug. 2014]

[6] Cisco, "RFID Tag Considerations", May 2008, Available at: http://www.cisco.com/en/US/docs/solutions/Enterprise/Mobility/wifich6.pdf

[7] Nikitin, P. V., "Antennas and Propagation in UHF RFID Systems", University of Washington, Electrical Engineering. Available at: http://www.ee.washington.edu/faculty/nikitin_pavel/papers/RFID_2008.pdf

[8] Saranya, J.; Selvakumar, J., "Implementation of children tracking system on android mobile terminals," Communications and Signal Processing (ICCSP), 2013 International Conference on , vol., no., pp.961,965, 3-5 April 2013.

[9] Mori, Y.; Kojima, H.; Kohno, E.; Inoue, S.; Ohta, T.; Kakuda, Y.; Ito, A, "A Self-Configurable New Generation Children Tracking System Based on Mobile Ad Hoc Networks Consisting of Android Mobile Terminals," Autonomous Decentralized Systems (ISADS), 2011 10th International Symposium on , vol., no., pp.339,342, 23-27 March 2011.

[10] Cisco, "RFID Tag Considerations", May 2008, Available at: http://www.cisco.com/en/US/docs/solutions/Enterprise/Mobility/wifich6.pdf

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