# School Bus Tracking System Using Iot Method

Miss. Sareetha. C[1], Miss. Remya. R[2]
[1,2]*U.G. Student, Computer Science & Engineering Department, Panimalar Engineering College*

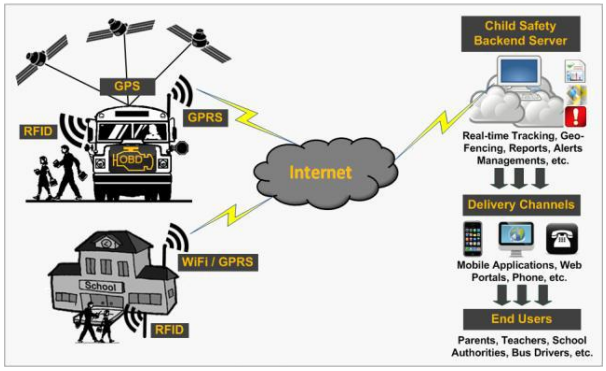
***Abstract*- Millions of children need to be moved from home to school and vice versa every day. For parents, obtaining a safe transport for their children is a critical issue. Many children find themselves locked in a school bus in the bus parking lot after falling asleep on their way to school, miss the bus, step into the wrong bus, or leave at the wrong station with no method to track them. This research tested the applicability of radio frequency identification (RFID) technology in tracking and monitoring children during their trip to and from school on school busses. The child safety system developed in this research utilized the passive RFID tracking technology due to its efficient tracking capabilities, low cost, and easy maintenance. To explore the technical feasibility of the proposed system, a set of tests were performed in the lab and with the public. These experiments showed that the RFID tags were effective and stable enough to be used for successfully tracking and monitoring children using the bus. When asked to give their feedback of the solution through a questionnaire, more than 95% of the parents see that such a solution will take their anxiety and worry away and will provide them a tool to track their kids during commuting to and from their schools.**

***Index Terms*- School buses, passive RFID, child safety, tracking system.**

## I. INTRODUCTION

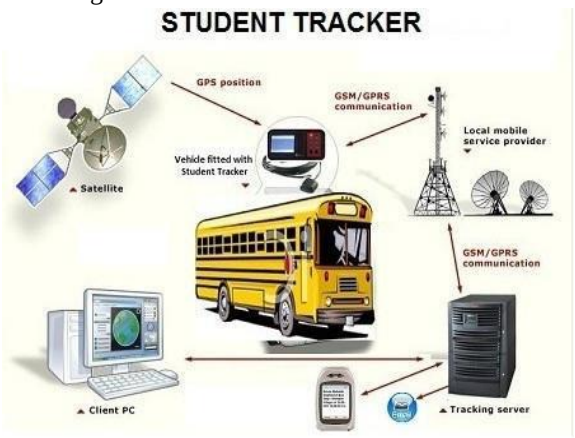
Millions of children need to be moved from home to school and vice versa every day. For parents, obtaining a safe transport for their children is a crucial issue. The students ride their bicycles, take buses, and arrive in vehicles with one purpose getting to and from school safely. A research undertaken by the Scottish Executive Central Research Unit with the purpose of increasing the proportion of non-car travel to school reveals that travelling by bus or coach appears to be by far the safest mode. Statistics suggest that a child travelling by car is seven times more likely to take part or be involved in a road traffic casualty than a child travelling by bus. Statistics from USA, Canada and Australia also confirm that public transport (and school transport in particular) has a high level of safety, just as in Europe. For instance, the Australian College of Road Safety notes that bus travel is the safest form of road transport, at least 14 times safer than the private car, and that the record for school bus travel in particular is very good. Also, the research undertaken by National Highway Traffic Safety Administration in USA notes that when comparing the number of fatalities of children aged 5 to 18 years during normal school transportation hours, from 1989 to 1999 (school years), school buses are 87 times safer than private cars. However, headlines like "Girl dies in bus tragedy" from the May 18, 2010 issue of the Peninsula newspaper in Qatar seems to be repeated several times every year in different places of the world [4]. Many children find themselves locked in a school bus in the bus parking lot after falling asleep on their way to school. Help to avoid frightening and potentially costly mistakes like these, this paper investigates an RFID-enabled solution to help monitor children when they are traveling to and from school on school busses.

## II.SYSTEM ARCHITECTURE




RFID technology relies on communication between an applied tag and a reader. Two types of RFID tags are in common usage: passive tags, which have no internal power supply and emit a radio frequency signal only in response to a query from a transponder, and active tags which are internally powered and

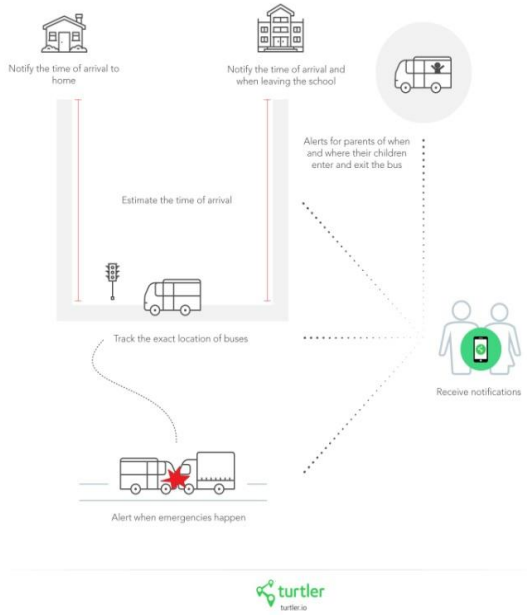
which continuously emit a radio frequency signal. While passive tags are less expensive, active tags have higher reliability and transmission power. Active tags can be read from distances of several tens of meters, while passive tags have a range between tens of centimeters and a few meters. Furthermore, active tags contain more memory and can be integrated with additional sensors, for example, for checking temperature or humidity, and are able to store the history of sensor data. Passive tags, on the other hand, have longer life time, and its cost is significantly lower. The information contained in the signal of either type of tag can be a unique identifier that is then linked to a database (similar to barcode technology), or can include sample data that is programmed into the tag and then broadcast in the signal. The technology consists of two basic elements: RFID tags (or transponder) and RFID readers (or interrogator). The tag exchanges data with the reader using radio waves that are tuned to the same frequency as the reader and within the reading range of the reader. Figure 1 shows a typical passive RFID system configuration and examples of the RFID tags.




The RFID reader consists of an antenna, transceiver, processor, power supply, and an interface for connecting it to a host computer (i.e. via serial port, or Ethernet). The RFID tag has an antenna, a transceiver, and an Integrated Circuit (IC) with memory. The performance of the RFID tag is determined by factors such as IC technology used, the read/write capability, the radio frequency, the read range, and external factors such as the environment and packaging.

## III. WORKING PROCEDURE

Based on the functionality provided by each technology, active and passive RFID, address different, but often complementary, aspects of asset/people visibility. Until now, the attention was focused on people tracking based on active devices transmitting beacon-like signals. In the proposed child safety system, passive RFID tags will be used for the children to carry. Since passive RFID tags are inactive unless powered by the energy radiated by the reader when they are close, the tags pose no harm to the children. Although the operating distance is limited to the reader's range, this will be an advantage for the proposed system to know who are onboard the school bus, and thus filters the detected outlier tags easily. Moreover, passive tags are low cost and do not need battery replacement. The Ultra High Frequency (UHF) RFID readers (868-870 MHz) were mainly selected due to having a longer read range (>3 meter). Moreover, UHF RFID readers have a faster reading speed and a larger memory size.




RFID tags have also been used in the transportation field for different reasons. Rajbhandari and Villa designed and deployed an RFID technology based system to measure wait times, and crossing times of U.S. bound commercial vehicles at the Pharr-Reynosa International Bridge in Pharr, Texas. Araujo and Araujo designed a self-positioning system using RFID tags, smart phones and smartcards, as well as real time image and ID recognition. Trucks, drivers and even cargo content are managed by a control

center which provides scheduling commands, visual and ID monitoring, and real time incident avoidance. Ergen and Akinci provided a vision of tracking intelligent transportation infrastructure components and materials through knowing their identities and locations. The authors proposed streamlining information flow through a supply chain by utilizing RFID tags [10]. Rajbhandari and Villa used an RFID system at one of the major land border-crossings, in El Paso, Texas to automatically and accurately collect, archive and disseminate crossing times for commercial vehicles. Schwartz. C. and J. Khan used the RFID technology to implement a practical way to record truckload of hot-mix asphalt leaving the production plant and eventually deposited along the roadway. Ross et al. tested the applicability RFID technology to track the progress of construction materials being tested within the Georgia Department of Transportation's Office of Materials and Research (OMR) to track thousands of construction samples each year that used to be tracked with a paper-based system. The main objective of this research is to investigate the applicability of the RFID technology in a new area of the transportation field, which is the tracking and monitoring of school children during their trip to and from school on school busses.

## IV.CONCLUSION

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, fleet owners and parents to keep track of the bus online, helping transporters and authorities to plan and manage the bus routes better, saving money and ensuring smooth and quick rides to the different destinations.

## REFERENCES


[1] S. Granville, A. Laird, M. Barber, and F. Rait. (September 2002). Why Do Parents Drive Their Children to School? Transport Research Series, *Scottish Executive Central Research Unit*. [Online]. Available: http://www.scotland.gov.uk/Resource/Doc/46737/0030598.pdf

[2] Australian College of Road Safety. School Buses-ACRS Policy Position. [Online]. Available: http://acrs.org.au/about-us/policies/safe-vehicles/school-buses/.

[3] South Carolina Department of Public Safety. School Bus Safety. [Online]. Available: http://www.scdps.gov/szs/school_bus_safety.htm

[4] The Peninsula Newspaper. (May 2010). Girl Dies in a Bus Strategy. [Online]. Available: http://www.thepeninsulaqatar.com/qatar/3526-girl-dies-in-bus-tragedy.html.

[5] K. Finkenzeller, "RFID Handbook: Radio-frequency identification fundamentals and applications," John Wiley & Sons, 2000.

[6] "RFID: Opportunities and challenges in implementation," Department of Commerce Washington D.C, April 2005.

[7] R. Want, "An introduction to RFID technology," *IEEE Pervasive Computing*, vol. 5, no. 1, pp. 25–33, January-March 2006.

[8] R. Rajbhandari and J. Villa, "Implementation of radio frequency identification system to measure crossing and wait times of U.S. bound commercial vehicles at land border crossings," presented at the 91st Annual Meeting of the Transportation Research Board Washington, D.C., January 22-26 2012.

[9] M. Araujo and C. Araujo, "An ITS self-positioning system using rfid-based wide area multi-layer scheduling to monitor and manage development traffic on a highly constrained mountain highway corridor," presented at the 88th Annual Meeting of the Transportation Research Board Washington, D.C., January 11-15 2009.

[10] E, Erge and B. Akinci, "Utilization of radio-frequency identification tags (RFID) for transportation infrastructure management: tracking engineered- to-order elements and materials throughout their life-cycles," presented at the 86th Annual Meeting of the Transportation Research Board Washington, D.C., January 21-25 2007.

[11] R. Rajbhandari and J. Villa, " Deployment of RFID system on the U.S.-Mexico border to measure crossing times of commercial vehicles," presented at the 90th Annual Meeting of the Transportation Research Board Washington, D.C., January 23-27 2011.

[12] C. Schwartz and J. Khan, "Tracking HMA placement using RFID technology," presented at the 88th Annual Meeting of the Transportation Research Board Washington, D.C., January 11-15, 2009.

[13] W. Ross, S. Burns, P. Wu, and D. Jared, "RFID tracking technology applied to testing of transportation construction materials," presented at the 88th Annual Meeting of the Transportation Research Board Washington, D.C., January 11-15, 2009.

[14] A. B. Smith, C. D. Jones, and E. F. Roberts, "Operational considerations in simulation and deployment of RFID systems", Journal, Publisher, Location, Date, pp. 1-10.

[15] P. R. Foster and R. A. Burberry, "Antenna problems in RFID Systems," presented at IEE Colloquium on RFID Technology Conference, 25 October, 1999.