THE STUDENT TRACKING USING RFID TECHNOLOGY

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Abstract-
Ensuring the safety of each and every student in a university has been a challenging factor all throughout the world. Using our idea of Monitoring Systems , we will be able to strengthen the safety aspects of students in an university. Students bypass university rules by finding loopholes in the system. The students are tracked using passive Radio Frequency Identification Devices(RFID) which will be placed in the students ID card. A radio wave transreceiver is used to emit and receive radio waves. A transreceiver transmits a common radio wave which is received by the RFID in the ID card. This radio wave is modified by the RFID's coils and resent to the receiver. The transreceiver can be placed along with the modems of internet. Position of the student can be tracked using three different modems using triangulation method.

Keywords- Radio Frequency-Identification, RFID Tags, Transreceiver

Objective
- To know the movements of student throughout the day.
- To trace the students if he is missing in campus or to contact him easily.
- To reduce time spent on taking attendance.
- To know the number of seminars and workshops attended by students.
- To control the misbehaviour of students while attendance.

Introduction
Tracking devices are classified into two types i.e. those relative to the position with earth(GPS) and those in reference with a source(RFID).
In 1957, two American physicists William Guier and George Weiffenbach, at Johns Hopkins's Applied Physics Laboratory (APL), developed a system called Transit, which was the first satellite navigation system.

During the Cold war arms race, the United States had heavily funded the GPS program which lead to many developments in this field. Navy Transit system were too slow for the high speeds of Air Force operation. In 1960, the Air Force proposed a radio-navigation system called MOSAIC

Another important predecessor to GPS was made by different branch of the United States military. In 1964, the United States Army used its first Sequential Collation of Range (SECOR) satellite for geodetic surveying.

In 1945 Leon Theremin of Soviet Union invented a device used for spying which retransmitted incident radio waves along with audio information. The audio information, was nothing but, sound waves changed the shape of resonator by vibrating a diaphragm, hence modulation of reflected radio frequency. This device is just a listening device and cannot be generally considered as an identification tag, but still it was the roots for discovery of RFID technology because it was similar to passive RFID tags, which uses an external source for its activation[1].
However, Mario Cardullo's invented a passive radio transponder device with memory on January 23, 1973 which is said to be the first true foundation of modern RFID. The initial passive device powered by the interrogating signal was demonstrated in 1971 to the New York Port Authority and other users. It also consisted of a transponder with 16 bit memory for use as a toll device. The original idea of usage was in transportation banking, security and medical
In 1973, Steven Depp, Alfred Koelle, and Robert Frayman had the honour of demonstrating on reflected power RFID tags, both passive and semi-passive, at the Los Alamos National Laboratory. The portable system operated at 915 MHz and used 12-bit tags. Majority of today's UHFID and microwave RFID tags follow the same technique.

In schools
- The first ever school to use RFID technology is believed to be Spring Independent School District near Houston, Texas in US in 2004. Around 28000 students were given RFID tags to record the boarding and alighting of the bus[2]. In 2008 it was then expanded for student location tracking in school premises[3].

- Administrators at a school in Sutter, California, were given a opportunity to test RFID InCom and RFID-chipped ID cards were issued to students[4].
- In 2012, Northside Independent School District, San Antonio, Texas introduced active RFID tags which are kept around the neck of the students[5][6].
- In 2007,RFID tags attached to students' blazers are used in Hungerhill High School, Doncaster, UK[7][8].
- In 2009, German company How To Organize (H2O) GmbH in cooperation with teachers and local police developed a real time location technology over Wi-Fi after a shooting tragedy in Friedrich-von-Canitz School which claimed 16 lives[9][10].
- West Cheshire College introduced active ultra wideband RFID in their new college campuses in Chester in 2010, and Ellesmere Port in 2011, to maintain track record of students and assets using a real time location system (RTLS). Eventually, West Cheshire College withdrew this technology in February 2013[11][12].

System Design And Implementation

As the intake of corporate colleges has increased drastically compared to past, it has become really difficult to manually maintain track of each and every student. To make this job easy and more efficient and easier, "THE STUDENT TRACKING" system should be brought in use. This proposed system uses radio frequency identification technology to keep a record of the approximate position of the students in the campus. Using this technology as the student's position is continuously fed as data to a server or a computer which can be used in different ways like being uploaded to the student's profile. Application of this technology helps the management pinpoint the mischievous students and take disciplinary action against them. This system can be efficiently used to take attendance of students without the fear of proxies taking automation in education system to the next level.

There is a well established system of modems (containing the transreciever) is spread out all throughout campus for internet facility in most of the standard universities. This established network can be used to identify the location of a person as each transreciever can be integrated to associate with that specific location in the sample area. This can be used to locate students present in the vicinity. If a student is located inside a classroom then his location will be shown as in the classroom (the transreciever in the classroom will pick the frequency from the RFID of the student). If the student is not present in the particular class then his location will not be shown as in the class. So whenever a student goes outside the campus without permission it can be noticed immediately and hence action can be taken. This prevents the students from going outside the campus at wrong time and also it will make the process of taking attendance much simpler to the lecturer without wasting much time and with a guarantee of no proxies.
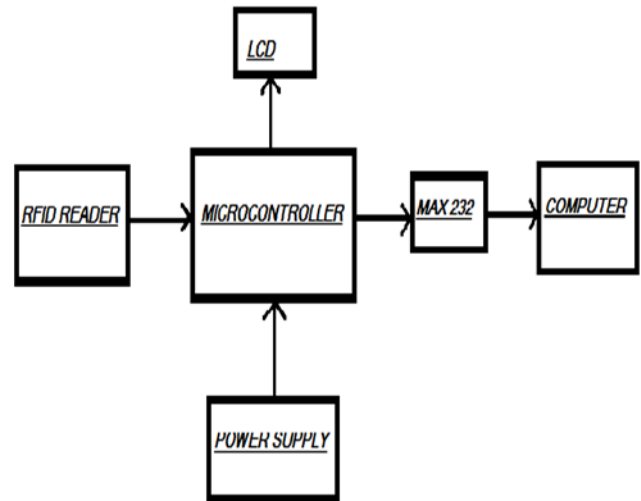

Fig.1. Block diagram of RFID working.

Radio-frequency identification

Radio-frequency identification(RFID)is the wireless use of radio-frequency electromagnetic fields to transfer data, for the purpose of identifying and tracking tags attached to objects. The tags contain electronically stored information. Some tags are powered by and read at short ranges (a few meters) via magnetic fields (electromagnetic induction). Others use a local power source such as a battery, or else have no battery but collect energy from the interrogating EM field, and then act as a passive transponder to emit microwaves or UHFradio waves (i.e., electromagnetic radiation at high frequencies). Battery powered tags may operate at hundreds of meters. Radio frequency identification (RFID) is part of the family of Automatic Identification and Data Capture (AIDC) technologies that includes 1D and 2D bar codes. RFID uses an electronic chip, usually applied to a substrate to form a label that is affixed to a product, case, pallet or other package. The information it contains may be read, recorded, or rewritten.
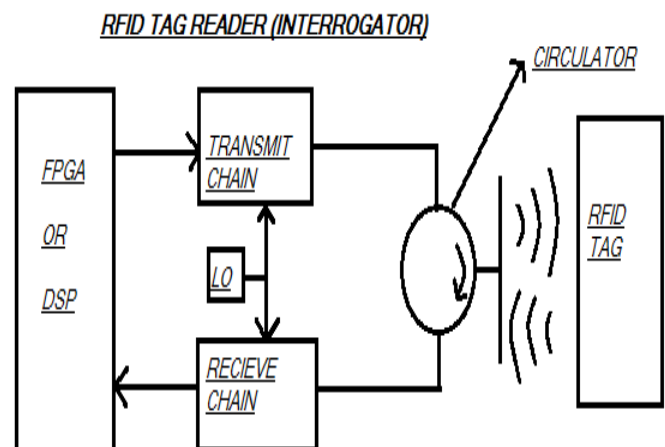

Fig.2. Block diagram of RFID detection.

Signalling

Signalling between the reader and the tag is done in several different incompatible ways, depending on the frequency band used by the tag. Tags operating on LF and HF bands are, in terms of radio wavelength, very close to the reader antenna because they are only a small percentage of a wavelength away. In this near field region, the tag is closely coupled electrically with the transmitter in the reader. The tag can modulate the field produced by the reader by changing the electrical loading the tag represents. By switching between lower and higher relative loads, the tag produces a change that the reader can detect. At UHF and higher frequencies, the tag is more than one radio wavelength away from the reader, requiring a different approach. The tag can backscatter a signal. Active tags may contain functionally separated transmitters and receivers, and the tag need not respond on a frequency related to the reader's interrogation signal.

Often more than one tag will respond to a tag reader, for example, many individual products with tags may be shipped in a common box or on a common pallet. Collision detection is important to allow reading of data. Two different types of protocols are used to "singulate" a particular tag, allowing its data to be read in the midst of many similar tags. In a slotted Aloha system, the reader broadcasts an initialization command and a parameter that the tags individually use to pseudo-randomly delay their responses. When using an "adaptive binary tree" protocol, the reader sends an initialization symbol and then transmits one bit of ID data at a time; only tags with matching bits respond, and eventually only one tag matches the complete ID string.

Sample Of Developed Work

Fig.3. Login screen.

Fig.4. Enter the Code of RFID tag.

Fig.5. Submit the code of RFID tag.

Fig.6. Location of tracked RFID tag.

Fig.7. Enter another RFID tag code.

Fig.8. Location of RFID tag with corresponding code number.

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Future Scope Of Studies

1) This system can also be used to track objects like books or important office files

   (i) Books that have been taken from the library are usually not placed back in the same location every time. Students sometimes place the book in wrong sections making it difficult for other students to find it. This problem can be avoided using RFID TRACKING SYSTEM.

   (ii)Important documents sometimes get misplaced or go missing when they are moved between locations (department blocks). Or sometimes can't be found in store areas, this can be eliminated using appropriate tracing system.

2) Ragging has become a major problem in many colleges, even after implementing many laws and measures this problem still prevails. So this practice can be controlled to some extent using RFID TRACKING SYSTEM, as the students who have ragged the victim can be recorded in the vicinity.

3) It can also be extended for Hostel safety. Where students who have been involved in undisciplinary activities like drinking or drugs can be caught.

4) The implementation of RFIDs in hi-tech costly instruments like scanning microscopes etc can be used to monitor the usage of these instruments by research scholars and can be used to catch the person involved during any mishaps.

Outside Campus Uses

1) This kind of TRACKING SYSTEM can be used in Malls and Multiplexes for tracking visitors and observing each and every visitor's movements to catch hold of suspicious matters in that particular malls.

2) This application can also be extended to other crowded places like Temples, exhibitions etc where children missing from their parents is regular happening and whereabouts of missing children can be noticed.

3) Generally international matches, it may be football, cricket etc, are main attractions of large number of people around the world. Security in such places is always a doubt. In such places security can be enhanced by using this TRACKING SYSTEM where once again any suspicious movements can be brought under notice.

Conclusion

The main aim of this project is to find a way to ensure safety of students and also controlling the misbehaviour of the students. In order to achieve that we have constructed and RFID based tracking system which suits the requirements and achieves the objectives of this project. Based on the research we have done we found out that this method is suitable for the purpose of tracking the students in college premises and each and every movement of the student can be judged and hence action can be taken

References

1. Getting started with rfid, maker media inc.,2012
2. "In Texas, 28,000 Students Test an Electronic Eye". Nytimes.com. Retrieved 2013-10-17.
3. "RFID Used for Student Security and Attendance Reporting". Spring ISD. 2010-10-11. Retrieved 2013-10-12.
4. Schofield, Jack (2005-02-10). "School RFID Plan Gets an F | Technology". theguardian.com. Retrieved 2013-10-12.
5. "US Pupil Andrea Hernandez Loses 'Mark Of The Beast' Tracking Badge Appeal". Huffingtonpost.co.uk. Retrieved 2013-10-12.
6. "The Rutherford Institute". Rutherford.org. Retrieved 2013-10-12.
7. Christopher Williams. "Schoolkid chipping trial 'a success' - A big brother for every kid". Theregister.co.uk\accessdate=2013-10-17.
8. "School puts a chip on pupils". Doncaster Free Press. 2007-10-18. Retrieved 2013-10-12.
9. "MI-Motion Guard". www.how-to-organize.de. Retrieved 2013-10-17.
10. "Ekahau : Case Study" (PDF). Ekahau.com. Retrieved 2013-10-17.
11. "West Cheshire College Tracks Whereabouts of Students, Staff - RFID Journal". Web.archive.org. Archived from the original on 2012-09-15. Retrieved 2013-10-12.
12. Mary Catherine O'Connor. "RFID Journal". Rfidinschools.files.wordpress.com. Retrieved 2013-10-17.
13. https://www.rfidjournal.com/whitepapers/download?295.
14. https://www.rfidjournal.com/whitepapers/download?431.