Essen RFID

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ESSEN

Premier school in Nigeria pilots a RFID-based STUDENT TRACKING SYSTEM

Automated tracking of students boarding and exiting from the school bus

Vehicle route tracking and live data transmission through GPRS

Safe and secure transportation of children

Authentication and SMS alerts to parents

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TECHNOLOGY

Solution:
EPC Gen2 compliant
personnel tracking solution
GPS based remote vehicle tracking

Tag Type:
Personna™ UHF Passive

Reader/Antenna:
Xtenna Hybrid™
Xtenna Proximity™
Porta™
Strada™

Method:
Multiple Tracking via Integrated
Reader/Antenna modules
Vehicle Tracking via On-board
Tracking device

Integration Platform:
  RFID Middleware:
    Xtenna™ WebToolkit
    Xtenna™ Studio
  Application: Essen RFID's
    Student Tracking System
  Database: SQL Server 2005 Exp. ed.

Tag Manufacturer/Supplier:
Essen RFID, with US based chip inlay

Reader/Antenna Manufacturer:
Essen RFID, with US based module

Systems Integrator:
Essen RFID

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Xtenna™ Integrated RFID Antenna/Reader

CASE STUDY

KEY REQUIREMENTS:

When both parents are at work, there will always be increased concerns for their children regarding their whereabouts and safety. At a premier school in Abuja, Nigeria, it was found essential for the school to have a system in place that gave the school authorities as well as parents live information about whether their children had reached school safely, were within the school premises and whether they had returned home safely.

Main challenges in implementation:
- Identifying children boarding school buses and verifying the boarding time and place of each student into the bus.
- Locating and verifying the disembarking point and time for each student.
- Sending information alerts to parents that their children have safely reached school or home.
- Alerting the bus driver if any student tries to board the wrong school bus.
- Alerting the bus driver if any student is left behind in the bus.
- Monitoring the live location and path of each school bus on its daily trips.

SOLUTION:

Essen RFID suggested RFID technology for tracking students entering or exiting the school bus and confirming their entry into the school premises. Along with this, a GPS based vehicle tracking solution was proposed that allowed remote tracking of current location of school buses by the school authorities.

IMPLEMENTATION:

Xtenna Hybrid™ antenna-readers configured to be remotely programmable through Wi-Fi are mounted at the door of each school bus. Each student is issued a PERSONNA™ RFID tag as an identity card. Tags are registered using a Xtenna Proximity™ reader. Controller devices are installed in each bus, which interface with the mounted RFID reader. A Strada™ vehicle tracking device is fitted inside each school bus, which communicates with the central server located in the school. A Porta™ RFID portal device is mounted at the entrance gate of the school premises. PERSONNA™ tags are also issued to parents to authenticate them while picking up their children. The system uses SQL Server as a backend database with .NET software as a frontend interface.

WORKING:

Essen RFID's Student Tracking system was developed for tracking students as they entered and exited the school bus, along with an integrated school bus remote monitoring system.

CASE STUDY

Working Steps:

1. **Registering students:**
   Information required of each student is entered into the database and in the master record of the school. This consists of data such as student's address, age, class year, parents' details, etc. Similarly, data of new students is collected and entered into the school master and database, as and when a new student takes admission in the school. Each individual student data is associated with a PERSONNA™ tag issued to the student.

2. **Registering parents:**
   This includes information regarding parents, consisting of linking with their children's data and entering their own contact details and mobile phone numbers. A PERSONNA™ tag is issued to each parent, which is mapped with that of their child. A parent is required to carry a tag in order to pick up their child from the school bus.

3. **Assigning school bus to students:**
   School buses are provided to students based on their address locations appearing along the bus route. Based on its route, the bus is assigned to each student for traveling from home to school and back home. Each student's PERSONNA™ tag is assigned in the database to the Xtenna Hybrid™ mounted on the relevant bus.

4. **Bus routes and student pick-up:**
   A bus route is created for each school bus along with pick-up points on that particular route. Details of pick-up and dropping location are entered with their GPS co-ordinates into the database. These pick-up and dropping points are made available to the bus driver.

5. Bus route tracking:
   A Strada™ vehicle tracking device is fitted on each school bus and assigned to that bus in the database. This device gives out the precise GPS co-ordinates of the school bus, which are utilized for exact pick-up and dropping off along the route. The device also enables real time location of the bus and its tracking by the administrator on a map.

6. Uploading data from server through Wi-Fi network:
   The school premises have Wi-Fi connectivity. When the school bus enters the Wi-Fi network area, data from the server gets uploaded. The updated data is available at the local database.

Working Process:

1. Tracking the student entering/exiting the bus:
   Each student wears a RFID-enabled ID card containing a PERSONNA™ tag. When a student's tag ID is read by the twin antennas of Xtenna Hybrid™, if the tag is detected first by antenna A and then by antenna B, this indicates that the student has entered the bus. If the tag is detected first by antenna B and then by antenna A, then the student is exiting from the bus.

2. Child picked up by school bus:
   Xtenna Hybrid™ on the bus entrance checks if the student is registered for that particular bus route. If the tag ID is not found then a pop up alert is displayed, whereas if the registered ID is found then the system is updated along with co-ordinates from the Strada™ vehicle tracking device. This confirmation of pick-up with location name, date and time is also sent via SMS to the parent. If a child registered for pick-up is not found then the parent gets a message that the child has missed the stop.

3. Child reaching school:

   SMS

   Respected Sir/Madam,
   Your son Sam has reached school safely at 8:00 am.
   Thanks and regards,
   School Administrator

   When the bus reaches school, the PERSONNA™ tags are read by the Porta™ portal reader at the school entrance and the entrance time is registered. The Xtenna Hybrid™ on the bus registers the child leaving the bus by detecting his tag first by antenna B and then by antenna A, and a corresponding entry is made into the system. A confirmation SMS is sent to the parent indicating that the child has reached school.
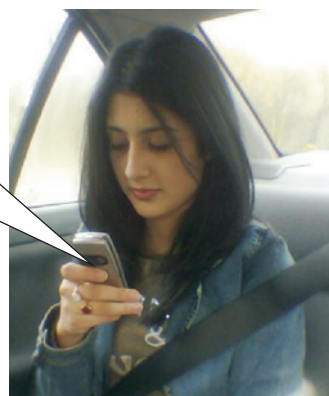
CASE STUDY

4. Child boarding the wrong bus when leaving school:
   If a student tries to board the wrong bus when leaving school for home, then the Xtenna Hybrid™ on the bus detects the tag ID and pops up an alert on the screen. This alerts the driver who prevents the child from getting into the wrong bus.

5. Child dropped off from school at destination:
   The student is dropped off at his destination mapped with the exact GPS co-ordinates obtained by Strada™ and registered in the database. At drop-off the PERSONNA™ ID card of the parent is authenticated before they can receive the child. No person can receive the child without their ID and permission of parents is required if PERSONNA™ tags are to be issued to another authorized person such as a relative or household staff. Tags of both, student and guardian are read and a confirmation SMS is sent to parent with location name, date and time and receiving person's name.

6. Child dropped off at different location:
   In case a student is to be dropped off at a different location for some reason, then the Strada™ device on the bus sends these co-ordinates to the server and this location name, date and time is alerted by SMS to the parents.

7. Child remains in bus:
   If a child is not dropped off and is still in the school bus, then the driver gets an alert that the student is still remaining in the bus.

8. Bus has not reached in time (Bus Tracking):
   The Strada™ vehicle tracking device continuously sends GPS co-ordinates to the central server database. The system administrator can select each bus for tracking and viewing its current position on the route in real time. This enables strict monitoring of the school bus as to its schedule and whether it is having any stoppage or breakdown or is running late. The driver can then be contacted over his mobile phone for the reason. SMS updates or alerts can also be sent to parents if there is any change in timings.
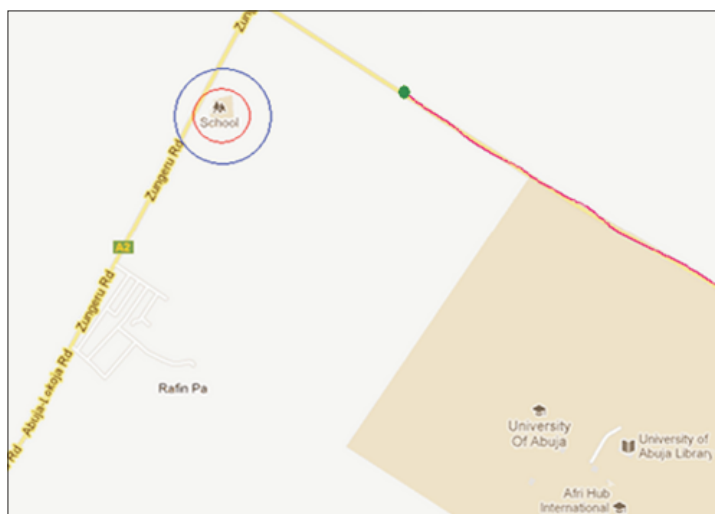
CASE STUDY

BENEFITS:

- Data transmission in real-time through GPS technology.
- Safe and secure transportation of the child.
- Parent authentication when child is dropped off at destination.
- No child is left unattended on the school bus.
- Eliminates chances of student getting on the wrong bus, getting off at the wrong stop or being left behind after the route has been completed.
- SMS alerts to parents when children arrive at school or are dropped off.
- Ensures that the child is not left behind sleeping in the bus.
- Live tracking of school bus location along its route.

LINKS:

Hardware:

Xtenna Proximity™

Xtenna Hybrid™

PORTA™

STRADA ™

Tags:

PERSONNA™

Software:

Xtenna WebToolkit™

Xtenna Studio™

Reference Example:

http://www.essenrfid.com/Mailer/persontracking-flash-demo.pdf