TECHNICAL DETAILS

For

RFID based Student tracking solution &
Other value added services.

Submitted by

1.0 INTRODUCTION:

The safety of children on their way to school and back home is a cause for increased concern especially amongst working parents. Schools are finding it essential to have a system in place that will give the school authorities as well as parents live information about whether their children had reached school safely, and whether they had returned home safely.

1.1 Main challenges in implementation:

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- 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 message updates 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.
- Alert to driver if bus has been replaced for any reason.
- Alert to new driver if any driver is absent.
- Monitoring the live location and path of each school bus on its daily trips.

2.0 SOLUTION:

We propose the use of 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 can be proposed that allows remote tracking of current location of school buses by the school authorities. With the help of long range readers and tags and highly efficient software application, the solution provides updated information about the student.

Our hybrid antenna-readers configured to be remotely programmable through Wi-Fi are mounted at the door of each school bus. A RFID tag is issued to each student as an identity card. The RFID Proximity reader is used for registering tags into the database. Controller devices are installed in each bus, which interface with the mounted RFID reader. A vehicle tracking device is also attached to this controller, which communicates with the central server located in the school. The system uses SQL Server as a backend database along with .NET software for the frontend interface.

3.0 WORKING METHOD:

The Student Tracking system was developed for tracking students as they entered and exited the school bus, along with driver alerts and an integrated school bus remote monitoring system.

3.1 Registering students:

Information regarding each student is entered into the database from the master record of the school. This data consists of student's address, age, class year, parents' details, etc. Data of new students is also 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 tag issued to the student.

3.2 Registering parents:

Data regarding parents consists of linking with their children's data and entering their own contact details and mobile phone numbers.

3.3 Assigning school bus to students:

School buses are provided to students based on their address locations and pick-up points appearing along the bus route. Based on its route, the bus is assigned to each student for travelling from home to school and back home. Each student's tag is assigned in the database to the Hybrid reader mounted on the relevant bus.

3.4 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.

3.5 Bus drivers:

Driver data and associated routes are maintained in the database. If a bus driver is absent, then the new driver gets all alerts associated with that route.

3.6 Bus route tracking:

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

3.7 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.

3.8 Tracking the student entering/exiting the bus:

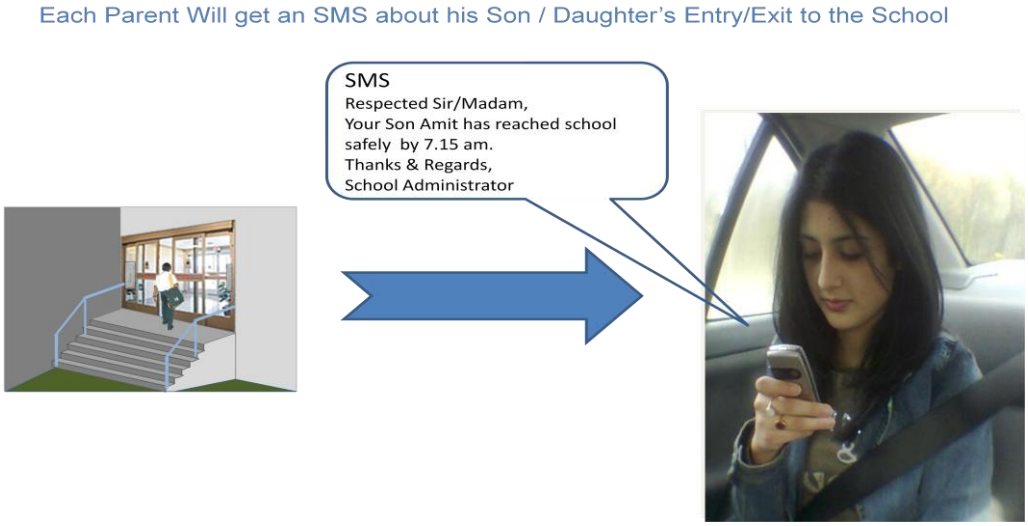
Each student wears a RFID-enabled ID card. When a student's tag ID is read by the twin antennas of the hybrid reader, if the tag is detected first by antenna A and then by antenna B, this indicates that the student has entered the bus. If the tag is detected first by antenna B and then by antenna A, then this indicates that the student is exiting from the bus.

3.9 Student picked up by school bus:

The Hybrid reader on the bus entrance checks if the student is registered for that particular bus route. If the tag ID is not found then a alert SMS is send to driver, whereas if the registered ID is found then the system is updated along with co-ordinates from the 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 at a defined time is not found then the parent gets an alert message that the child has missed the stop and has not boarded the school bus.

3.10 Student reaching school:

When the bus reaches school, the Hybrid reader on the bus registers the student exiting the bus by detecting his tag first with antenna B and then with antenna A, and a corresponding entry is made into the system data. The system then automatically sends a confirmation SMS to the parent indicating that their child has reached school safely, along with the time of arrival.



3.11 Student boarding the wrong bus when leaving school:

If a student tries to board in wrong bus when leaving school for home, then the hybrid reader on the bus detects the student's tag ID as not assigned to that bus route and sends an alert to the driver. This alerts the bus driver who prevents the child from getting into the wrong bus.

3.12 Student dropped off from school at destination:

The student is dropped off at his destination mapped with the exact GPS co-ordinates obtained by vehicle tracking device and registered in the database. At drop off, the exiting student's tag ID is read by the Hybrid reader on the bus and a confirmation SMS is sent to the parent with location name, date and time of drop-off.

3.13 Student remains inside bus:

If a student is not dropped off and still in the school bus beyond the assigned time, then the driver gets an alert that the child is still remaining in the bus.

3.14 Students total count once the bus has left the school:

The system can be configured in such a way that the driver will get a message regarding the total number of students present in the bus in comparison with the actual numbers, once the a pre defines time interval is over from the set departure time of the bus.

3.15 Bus replacement:

If a particular school bus is not available because of maintenance or any other reason, then the driver assigned to that bus will receive a SMS alert that he has been assigned a replacement bus. However his assigned route remains unchanged. The change takes place at the backend server where the new bus will be associated with the route of the old bus. The parents of the students assigned with that bus also will get the SMS regarding the change of their bus number.

3.16 Driver replacement:

If a particular driver is absent, then the replacement driver will receive a SMS alert regarding the bus assigned to him, and all data and alerts associated for that bus route will now be sent to him.

3.17 Stay back of the students:

In some cases, the students will be staying back in the school beyond the normal working hours of the school for some special sessions, practice session etc. In such cases, there will be a provision in the application to update this data in the morning so that a report can be generated and made available in the system about the stay back of the students. After the school hours, the administrator can verify if any student is in the campus other than those who are allowed stay back. The stay back information will be send to the driver and the parents as well.

3.18 Bus has not reached in time:

The tracking device sends GPS co-ordinates of the moving bus to the central server database. The system administrator can select each school bus for tracking and viewing its current position on its route in real time. Thus there is strict monitoring of the bus as to its schedule and whether it is having any stoppage or is running late. SMS updates or alerts can also be sent to parents if required. System will also alert the administrator if the bus deviates from its defined route.

3.19 Master display at control room:

As part of the solution, we also propose a master display in the control room which can be a LCB display system, which will display key information that should be brought to the immediate notice of the school authorities. It will be possible to configure what information should display on the dash board. Any exception report can be configures on the display. For eg : any deviations or late running of the buses will appear on the screen along with SMS to key personnel of the admin side. If there are device failures in the bus by any reason the message will appear on the display regarding the same.

4.0 OTHER VALUE ADDED FEATURES WITH RFID CARD:

The RFID card issued to the students can be used as a common card for library management and canteen management as well. By using the software solution provided by us, the canteen and the library function can be automated.

4.1 Library Management

- RFID enabled ID cards that are given to all the students and staff will be used as their library membership card.
- When a book has been issued or returned, the system would automatically record that the book has been checked out/in thus preventing manual data recording.
- Every time a student wishes to get a book issued, his / her RFID enabled library card will be read by the reader placed at the appropriate place in the library and the details will be read and updated instantly.

4.2 Canteen Management:

- Student ID card as issued will now act as Debit card based on amount pre-paid by Parent.
- Whenever a student desires to purchase something, he will be asked to select the items he wants from a list of items available and as soon as he selects the items and places his pre- paid card, the amount corresponding to that item will get deducted from the card, provide parents have placed no restrictions on the same.

- An optional ordering history can be made available to parents to ensure that child does not order food which is unhealthy or allergic to child.

- Parents will receive the SMS about the amount balance in the card and the used amount.

- This card can be recharged like any other pre-paid card against cash or cheque etc.

4.3 Attendance management

If the school wishes to have a hour wise attendance of the students, it can be achieved by providing a hand held scanner to the teacher. Every hour when the teacher walks into the class, he can scan the class and check the attendance which will get update into the central database instantly. The system will display how many students were present in the earlier hours and the current strength. This will enable the school, authorities if the students cut the classes for any specific hours.

4.4 Access control

If the access to specific areas should be restricted, (for eg : entry to chemical labs or IT labs), the RFID card can be sued to operate the magnetic lock that can be provided by us. This will prevent unauthorised students or staff entering the restricted areas.