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RFID-based System for School Children Transportation Safety Enhancement with Attendance System

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Abstract - *This project presents a system to monitor pick-up/drop-off of school children to enhance the safety of children during the daily transportation from and to school. The system consists of two main units, a bus unit and a school unit. The bus unit the system is used to detect when a child boards or leaves the bus. This information is communicated to the school unit that identifies which of the children did not board or leave the bus and issues an alert message accordingly. The system has a developed web-based database-driven application that facilities its management and provides useful information about the children to authorized personal. A complete prototype of the proposed system was implemented and tested to validate the system functionality. The results show that the system is promising for daily transportation safety.*

Key Words: Safety, Transportation, Web based.

1. INTRODUCTION

Children safety is of utmost importance to their parents. Despite the best safety measures, children, due to their lack of skills to protect themselves, may end up in a situation that endangers their life (e.g. crossing the road without paying attention to traffic). In this project, we focus on a particular risk associated with the daily bus trip to and from school. There have been previous incidents where a child is forgotten in the bus and eventually die because of suffocation. To improve transportation safety, some schools employ a bus supervisor to look after the children inside the bus. Nonetheless, human oversight or supervisor absence may still lead to a heartbreaking ending as in the previously cited stories.

This project presents a system to monitor the daily bus pick-up/drop-off of children to enhance the overall safety of the daily bus transportation to/from school. The system aims at automatically detecting when a child boards or leaves the bus and issue an alert message when a child does not board or leave the bus to reduce the parents' concerns about using the bus for the daily transport of their children without being lost or forgotten.

2. LITERATURE

This section presents the most related work to the problem addressed by this project. In a system is proposed to track the children using a child module that transmits the tracking information to a database and a mobile device. The disadvantages of this system are that the module may not be convenient for children and wide-scale deployment is expensive. Authors in report a tracking system that utilizes Android terminals that communicate among themselves using Bluetooth technology to form clusters. The clusters communicate the relevant information using WLAN. The major drawback of this system is that the deployment cost is high. There are commercial systems for tracking children such as Bluetooth-based tracking devices which are designed to be worn by children as a bracelet or a necklace. In this type of tracking, these devices can be connected with a mobile application and can alert the parents if their child went outside a range specified by them. If the child walked outside this range, the device will send an alert to the parent. In addition, the application sends the location of the child by using a geographical map. One disadvantage of this type of applications is that they work only in a limited range.

Other products may rely on biometric features such as the Kid track biometric system in which the children scan their palms across a palm reader when they enter the bus [6]. It uses an infrared light to image the palm unique pattern. It uses green and red LEDs to ensure the scan works. Then, the scans are sent for cross-referencing against a secure database of pre-registered users' patterns. Based on this, the administration can find the information of that bus, where and when it tracked the child, and where the bus was at that time. The disadvantage of this approach is that it is not automatic and difficult for young children to place their

palms correctly on the scanner. This may lead to inaccurate data if the scanner did not detect a child's palm.

3. EXPERIMENTATION

The procedure adopted in this project is presented in this chapter. In addition, the component used along with the details of their functions is also discussed.

3.1 SCOPE AND OBJECTIVE

This project aims at providing better safety to the school children by means of monitoring their boarding and departure from the transportation vehicle i.e. bus with the help of RFID detectors. This system can be used for providing assurance to the parents about the safety of their children from the schools. Discipline can be instilled in the school children during the transportation which at times is not possible through human supervision alone. The system should provide an economic means for the school transportation system to monitor and enhance the safety of school children during transportation.

3.2 System Design

The system would consist to two units i.e. the Bus unit and the school unit respectively. The bus unit consists of the following components:

1. RFID Tag
2. RFID Reader
3. LCD
4. GSM Modem
5. Microcontroller Atmega 162
6. GPS
7. Keypad

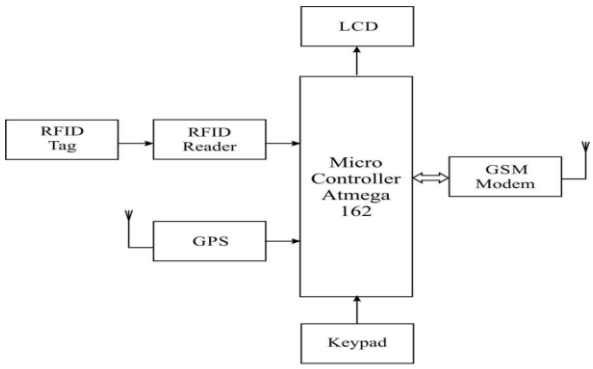

Fig -1: Block Diagram of Bus unit

The School unit consists of the following components:

1. RFID Tag
2. RFID Reader
3. LCD
4. GSM Modem
5. Microcontroller Atmega 162
6. Keypad
7. GSM Modem
8. RS 232
9. PC (VB)

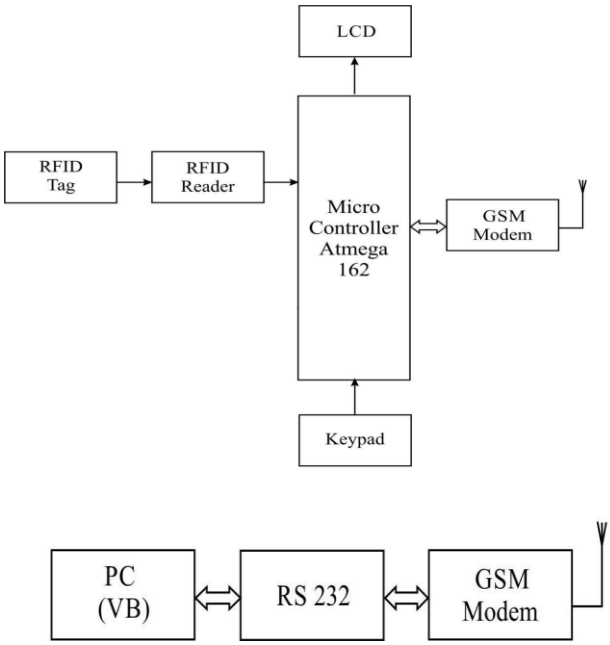

Fig -2: Block Diagram of School unit

In this project when the child boards the bus and places the RFID tag then a message will be transmitted to child's parent as "Ur child inside bus" and at the same time a message will be transmitted to the school server which will display the name of the child, roll no, address, parents name and the status "Child inside bus". Also the Google map will show the location of the bus.

Now when the bus reaches the school, again the child will place the tag while leaving the bus in the bus unit and a message will be transmitted to the child's parent as "Ur child reached school" and at the same time a message will be transmitted to the school server which will display name of the child, roll no, address, parents name and the status "Child reached school". Also the Google map will show the location of the bus.

When the child enters the school then again he/she will place the same tag in the school unit and the LCD will display the name of the child and will send a message to the school server which will display the name of the child, roll no, date and time in the same VB form, this will be the IN time and this will be saved in the Microsoft office access database.

Again when the child places the tag in the school unit then the LCD will display the name of the child and will send a message to the school server which will display the name of the child, roll no, date and time in the same VB form, this will be the OUT time and this will be saved in the Microsoft office access database.

So in all we have two modules in our project. The first module is the bus unit which will transmit the message to the school server as well as to the parents.

But the second module which is the attendance unit will transmit message only to the school server in the same VB form.
The VB Form is given below:

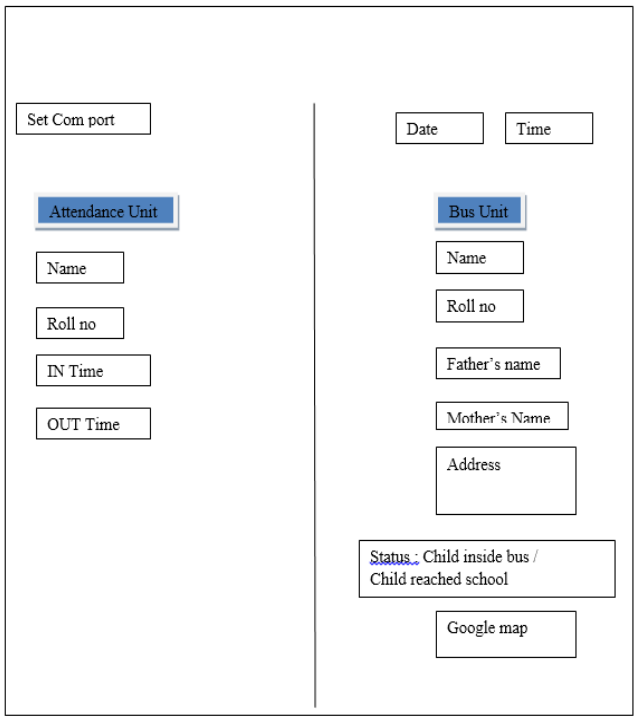

Fig -3: VB Form

3.3 Circuit Diagram:

The measuring cell is a specially designed double walled cylindrical vessel for maintaining the temperature of the liquid constant during the experiment. Water can be circulated through the annular space between the two walls for maintaining the temperature of the liquid in the cell. Inner wall of the cell is corrugated to prevent wall reflections. A vertical electrode coming from a solid base makes the electrical contact to the lower face of the crystal. The side screw makes the fitting of the cell in solid base. The reflector is connected with the cylindrical plunger. A fine digital micrometer screw, having a least count of 0.001 mm is employed at the top, which can lower or raise the reflector plate in the cell through known distance. Hence, the position of the reflector can be accurately measured with the help of digital micrometer. The distance of 25mm is available for the movement of the micrometer screw.

3.4 System Engineering Requirements

Our system is designed with the following engineering requirements:
•The system should recognize each child and detect when every child boards or leaves the bus.
•The system should have a database to store student's information.
•The system should be easy to re-configure.
•The communication should be reliable.

3.5 Design Constraint

The constraints are the restrictions on the design. They are imposed by the environment and the customer. The constraints considered in our system are:
•The system should not be harmful for human beings or the environment.
•The device should hurt the child in any way.
•The system should provide an option to choose between different Languages.
•Children's information should be available for authorized personal.

3.6 System Database

The database of the system has to meet certain business rules. A business rule is "a brief, precise, and unambiguous description of a policy, procedure, or principle within a specific organization". It helps to determine entities, attributes and relationships of the database. The business rules of the database of our system are:
•A child can be in only one bus, but a bus may have many children.
•A child has one or many relatives.
•A relative may have many children registered at the school.
•A bus may be driven by one or more drivers, but a driver can drive only one bus.
•A child may have many attendance records, but an attendance record has one child.

3. CONCLUSIONS

The integration of RFID and GSM technologies for safety and security purpose is very important nowadays due to increase in accidents of children gets missed out at the bus which may lead to death due to suffocation. In this project, bus safety system for school children has been developed. Using this system, concerned authorities, bus driver can be alerted as it's visible from the RFID card. At the same time, in case if there was a student on the bus, the system will send an SMS message to the management of the school to take the right decision. The paper shows that that RFID technology based

tracker system is still acts as one of the best solution to enhance the safety in the school buses, which will reduce the accidents of forgetting the students inside the bus. If all the students were wearing seat belts mean, it will allow bus driver to start the bus for safety precaution.

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