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Finger Print Based Monitoring System for Children Transportation

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ABSTRACT
This paper 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.
Keywords: Fingerprint, GPS, Database program, GSM, Sensors.

I. 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 paper, 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 [1-2]. 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.

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- Abstract
- Introduction
- Main reason for using finger print based monitoring system.
- Finger print based monitoring system for children transportation.
- Working of exsisting system.
- Implementation
- Conclution
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II. MAIN REASON FOR USING FINGER PRINT BASED TRANSPORTATION MONITORING SYSTEM.

The system is divided into two main units: bus unit located inside the school bus, and a school unit located inside the school. The bus unit is responsible for detecting the child when he boards or leaves the bus and then this information is sent to the school unit. The school unit is the central unit where it collects data from all the buses, adds them to the system database, checks if there are missing children, and it sends a text message notification to their parents. The proposed architecture is shown in figure 1
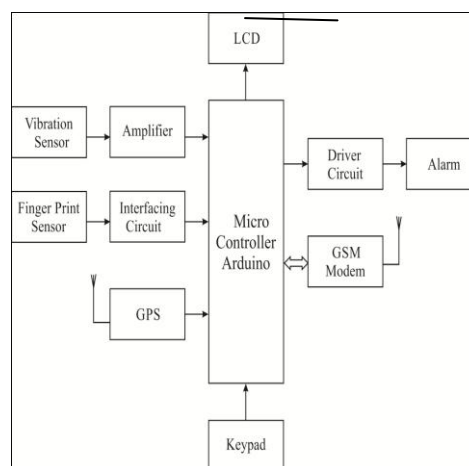
III.   FINGER PRINT BASED MONITORING SYSTEM FOR CHILDREN TRANSPORTATION:

Finger print authentication based voting machine is an intelligent system which is having a real time clock module, master key verification and the rapped keys to caste the vote for the candidates.

It is a 100% error free operation which we have a plan to submit to the government to go for a cost effective and efficient voting system.

In the present system there is a master key with the polling officer. After the Verification of the voter identity he has to press the master key to enable the voter to cast his vote. This present system has lot of drawbacks few of them are

1. The voter ID can be a fake one.
2. The polling officer might to some mall practice
3. There is no real time clock, In case a polling officer and both officer have an agreement they can caste 100 votes in 10 or 15 minutes.

Working Of Existing System.

The system is divided into two main units: bus unit located inside the school bus, and a school unit located inside the school. The bus unit is responsible for detecting the child when he boards or leaves the bus and then this information is sent to the school unit. The school unit is the central unit where it collects data from all the buses, adds them to the system database, checks if there are missing children, and it sends a text message notification to their parents. The proposed architecture is shown in figure .
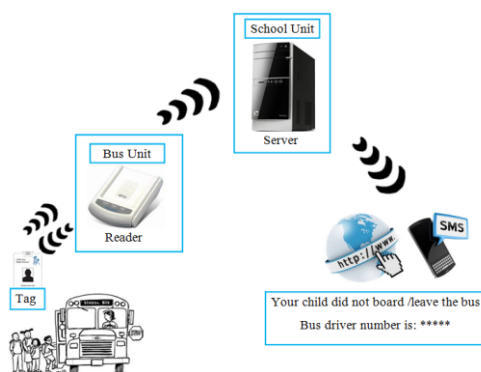

Fig.1: The Proposed System Architecture

A. Our proposed system provides the following advantages*:*

- The system uses RFID tags for children detection which is not harmful since it uses frequency ranges that are safe and legally approved.
- The deployment cost is reasonable.
- The system is automatic and user friendly.

A.   The Bus Unit Description

The bus unit will detect the children when they board/leave the bus. It will use RFID technology to achieve this purpose. This technology consists of a reader and tags. There are three types of RFID readers based on their frequency ranges, low frequency, high frequency and ultra-high frequency. We chose to use UHF RFID reader, because it has a faster data transfer than the others. . Also, the distance can be controlled to be short or long as required [7].

The RFID reader will be located inside the school bus by the entrance. It will be positioned where it will only detect the children when they are inside the bus. But if the child was outside near the bus, the reader will not detect him. Each child will wear a card with RFID tag attached to it. The bus unit is responsible for sending relevant tag information to the school unit where it will be stored and processed. Based on the received information, other related child's information can be retrieved from the database for further processing (e.g. texting the parent).

There are two types of RFID tags, passive and active tags. We chose passive RFID tags since they have a short reading range which fit our requirement to detect the child when he is close to the reader (i.e. when s/he boards or leaves the bus). Moreover, they are cheaper than active RFID tags and need no maintenance in contrast to active tags that need maintenance and regular replacement of battery

The School Unit Description

The school unit consists of a server interfaced with GSM modem to receive data from the bus. The server simultaneously acts as database server and web server to host the web-application developed to manipulate the system setting, update, and query the system database. In addition, the server communicates with an SMS gateway to send notification in case a child is detected missing.

B.   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" [9]. 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.

The Entity-Relationship (ER) diagram of the database is shown in figure 2.

C. The System Web-based Application

One essential part in our system is the database-driven web-based application to manipulate the system, update, and query the database. There are two options to log into the website, as a parent or as an administrator. The administrator can add, modify, delete or view information about students and their relatives, buses and drivers. On the other hand, each parent can view the status of his/her children if they board/leave the bus in the morning and afternoon.

Gsm Modem

At first, GSM modems connectivity was tested using TMAS GSM-GPRS modem test program with the AT commands that are responsible for sending and receiving SMS and calling.

IV.   IMPLEMENTATION

A prototype of the system is implemented and tested. Testing is very crucial part to validate the functionality of the proposed system. It should be designed to increase the likelihood of finding an error and checking the functionality of the proposed system. The units were implemented individually at first and they were tested to check if they were working properly. Then, they were integrated and configured as required for the system. The unit test was held for all the units in our system finger reader and tags, GSM modems and school server.

4.1 Bus Unit

The bus unit consists of an finger reader, a GSM modem and a control unit as shown in figure 3. The RFID reader detects the children when they board/leave the bus. It is located inside the bus. The GSM modem is used to send this data to the school unit. A microcontroller is used to interface the RFID reader with the GSM modem.

Fig.3: Bus Unit

| RFID Reader | Microcontroller | GSM Modem |

4.1.1 The Finger print Reader

Finger print authentication based voting machine is an intelligent system which is having a real time clock module, master key verification and the rapped keys to caste the vote for the candidates.

It is a 100% error free operation which we have a plan to submit to the government to go for a cost effective and efficient voting system.

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To avoid all these systems we plan to go for a finger print based system. It has a verification and identification time of just one second.

The sensed image of fingerprint will be sent to the microcontroller and these we process for the verification with the algorithm. Then the verification result will be displayed. After the verification only the master key will enable after pressing the master key only the voting key will be enabled. Then the voter can cast his vote. It is a hundred percent secured one. In this project we plan to go for an arm processor as a backend processor and 89C51 as a front end controller.

Microcontroller (At mega 328)

ATmega32 microcontroller is used to interface the reader and the GSM modem in the bus unit for data exchanging as shown in figure 5. The reader communicates with microcontroller using serial communication interface RS232. However, due to the difference in voltage levels, a max232 chip is used to convert signals from RS232 serial port to signals suitable for use in TTL compatible digital logic circuits (power range: 0 V to + 5 V). A C-program was written to exchange the data between the RFID reader and the GSM modem through a microcontroller to verify that they interfaced properly. The flow chart is shown in figure 6. If the microcontroller reads the data from the RFID reader, the LED will be turned on to indicate the successful read of the tag number.
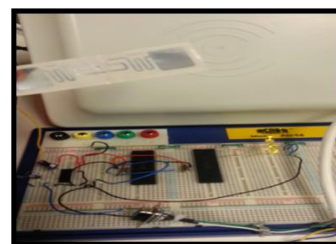

Fig.5: Reader-microcontroller interface circuit

GSM Modem

At first, GSM modems connectivity was tested using TMAS GSM-GPRS modem test program with the AT commands that are responsible for sending and receiving SMS and calling.

V. CONCLUSION

The system for monitoring the pick-up/drop-off of school children to enhance the safety of children during the daily transportation from and to school..here using finger print reader for detecting the students. 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.

VI. PROJECT SCOPE

It is useful for colleges, schools and companies to perform their task. This is fully automated system which works with less man power And user can perform the following things:
➢ Finger print scanner is used to detect the students.
➢ It help to provide location of the vehicle.
➢ It provide safe transportation .
➢ In vehicle a vibration sensors is placed for detecting the accidents.

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