

A Review: Real Time School Bus Security System with Biometrics, GPS and GPRS using ARM Controller

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Abstract-This paper focuses on safety of children's traveling through school buses. The paper describes the system which gives real time notifications about location of child using GPS. Biometric identification method is used for identification of the child. Existing system uses 89c51 series controller and has limitations. This paper proposes new system design using ARM STM32 controller which overcomes the limitation of existing system and gives better performance and reliability. New system also gives facilities like USB connectivity and self-error checking capability.

Keywords-Real time notification, biometric identification, data acquisition.

I. INTRODUCTION

Time has become an important factor of human's life. Most of the students travel through school bus. Parents have to leave their children to the pick and drop point of school bus. Most of the time parents have to wait at the spot much before arrival of school bus. Parents are always in confusion of location of bus. Same confusion faced by them about the bus route.

There are many more private transporters who work for school bus. Sometimes driver can change the route of bus to sexually abuse child in bus after school timings. Such condition puts finger on safety of child in school bus. Parents need such a device which identifies driver's identity, location of child, status of the bus (Pick or Drop), and route of bus during travels. Some of such devices exist in market which fulfill some of the requirement. Such system has some flaws and limitation. The aim of this project is to eliminate flaws and limitation in existing system and add better advancement in the device.

There are many devices which give GPS location of a vehicle. This GPS location is sent through SMS or Internet. Most of the time, combined communication modem having GPS and GPRS facility is used. For person identification Biometrics module is used. By using this equipment a system can be built which satisfies parents' need in day today life. A driver can register his identity online through biometrics. GPRS module is used for internet connectivity. Similarly Student can also register their identity to show his presence in

bus. Location of bus gets traced by GPS module. All these tasks need to be done in real time. Hence this system needs higher end controller which can handle all tasks and schedule it in real time. There is an existing system which serves the purpose of school bus security. The existing device has some limitations. Redesign in existing device is needed to add new features like RTOS, OTG USB, and Graphics LCD. Also need to improve flexibility, controllability compactness and functionality of existing systems.

There is a system in which GPS location of school bus is traced. Students and driver finger prints are used to login in the system. All data like location of bus, pick and drop points etc. are updated to a server. Parents can see status of their children through an android application. New technology give advance feature such as more memory, more number of input output, software flexibility, advance hardware interface, look and overall cost of system cost of system. To overcome limitations of existing system, new technology need to be adopted with new feature.

The rest of the paper is organized as follows; the section II describes literature survey in short. It includes the existing system and their limitations. Section III describes proposed methodology to overcome limitation of existing system. Conclusion and references are described in section V.

II. LITERATURE SURVEY

A. Data Acquisition

Data acquisition through standard internet protocol suite (TCP/IP) can be used for real time embedded application [2].

B. physical digital identification technology

The digital identification techniques are widely used by two technologies as follows:

I. RFID identification

The smart card is used in various applications for digital identification. Magnetic stripe card or inductance is used for data communication [3].

II. Biometrics identification

Biometric identification is used biometric identifier such as a fingerprint or facial scan. Biometric identification is difficult to copy or missuses so it is considered safe digital identification [3].

C. GPS positioning

Position and timing information is send to server for proper location coordinates of a vehicle. This data further processed to view vehicle location on goggle map [1].

D. Existing system working and methodology

I. Basic hardware

Existing system is based on 8051 series controller. In this system there are two microcontrollers is used as shown in Fig1.as limited resources in 8051. One controller is used to interface GPS and GPRS module through mux. Same controller is also used for LCD and KEYBORD interface. LCD is interface with half data line interfacing method. KEYBORD is used in polling mode. Second controller is used to interface biometrics module. The second controller also interfaces with three buttons, LEDs and buzzer.

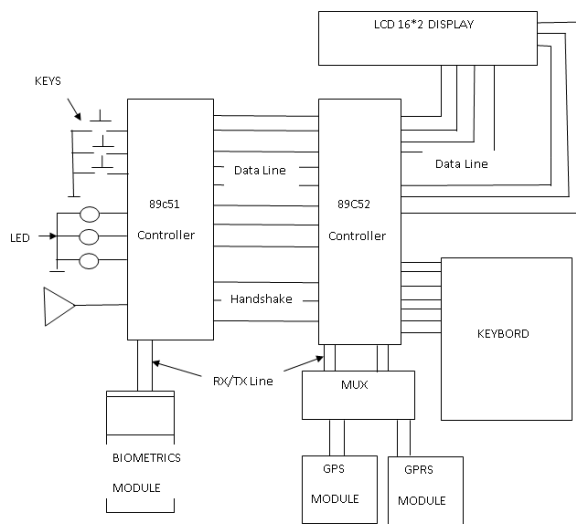


Fig1. Block diagram of Existing System

II. Working principal

As per System requirement when device will start first it initializes the internal setting and check connectivity of all hardware module. If anyone module is missing it displays an Error message. Once hardware is ok then system asks for driver login. For diver login driver have to type 11 digit driver unique ID. And his fingerprint needed to add. Once driver is get login the data is verified through server. Now onwards for system login driver only need to pace finger on biometrics module and enter school ID for system login. System get started to send GPS location to server. Now driver have to select pick or drop option of school bus to indicate the status

of bus. Whether bus is picking up student or dropping out the student. After this selection parents come to know status and location of bus through android application. Now driver can travel through different location to pick up student. while picking student, student have to login in bus with keeping finger on biometric sensor this information of student will be send to server and get verified. Now parents can know status of their children. While dropping out children driver have to select drop option. At drop point student put their finger again on biometric sensor to indicate that student is leaving the bus. All this process is in real time and continuously communicating with server.

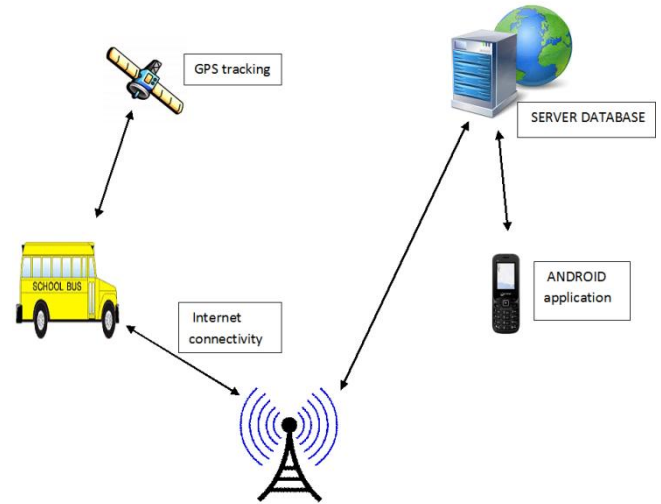


Fig2. System working overview

III. Limitation of existing System

Existing system is composed with two Eight bit microcontroller controllers. The controller is interfaces with biometric sensor, GPS, GPRS, LCD display, 4*4 dome shape button interface and hardware interrupt buttons.

1. Eight bit microcontroller 89c51RD2

This microcontroller has less RAM round 40 Byte. 40 byte of RAM is not sufficient to run complex program. Because of less RAM no RTOS can run on this controller. The second limitation is number of ports available. Also this controller has only one UART available. So for interfacing biometrics sensor and GPRS device need multiplexer IC in existing System.

2. Separate GPS and GPRS modem SIM900

GPS and GPRS module are separate in existing system. Separate module increases Space in System. Also due to separate devices power consumption also increases. Power consumption factor is considerable for battery operated devices.

3.LCD display 16*2

In commercial market look of device plays major role. As technology changes new feature and new appearance of system must be consider. 16*2 lcd may not satisfy those requirements hence need to change it with graphics LCD.

III. PROPOSED SYSTEM

Proposed system are consists of four basic key bloks as shown in Fig.3. Biometric sensor is used for finger print identification. GPS and GPRS module is used for vehical location and internet connectivity ,USB OTG is introduced for USB interface. Also graphics lcd is interfaced with System. power full ARM cortex M series controller is used in praposed system.

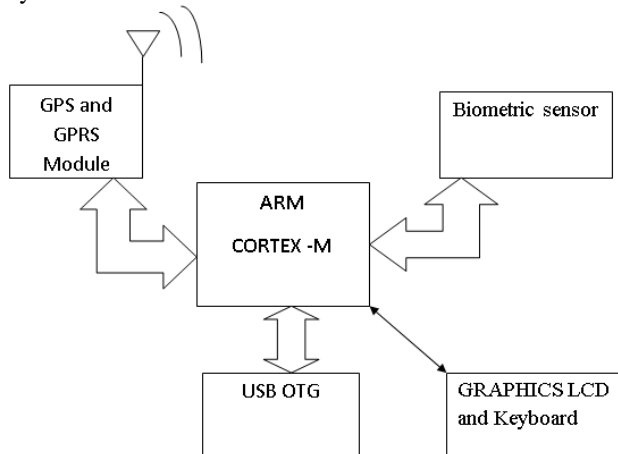


Fig.3 Praposed block diagram

Proposed system is consists of all above mentioned modules. This device gives certain advantages to the system. Some specific advantages of system is given below

- Large memory for fingerprint storage (around 768).
- Internet connectivity.
- Easy to use.
- USB connectivity.
- Battery operated.
- Self-error checking capability.
- Attractive look.

IV. RESULTS AND CONCLUSIONS

Existing system is studied and finds out there limitation. To overcome limitation of existing system new system is purposed. This proposed system will increases the performance and reliability of school bus security system. Also proposed system is facilitating with USB OTG and graphics LCD for good performance and reliability.

Proposed system will overcome the limitations such with memory, cost of system, performance, power consumption, reliability, compactness and good look.

With such system parents can know route of bus, location of bus and pick drop point of their children status, without any trouble. Hence need of such system in modern busy life is very essential.

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V. REFERENCE

- [1] Mohammad A. Al-Khedher "Hybrid GPS-GSM Localization of Automobile Tracking System" International Journal of Computer Science & Information Technology (IJCSIT) Vol 3, No 6, Dec 2011. pp75 -85.
- [2] Manivannan M, Kumaresan N "Design of On-line Interactive Data Acquisition And Control System for Embedded Real Time Applications" PROCEEDINGS OF ICETECT 2011, pp 551-556.
- [3] Peter Topalovic, Vino Vinodrai, and Gail Krantzberg "How Can a Person's Digital Identity be Managed and Protected?" communication technology and public police. SEP 2007, pp 1-41.
- [4] Gao Guohong, Zhang Baojian, Li Xueyong, Yan Shitao "Design of Embedded Network Interface Based on ARM" ETP/IITA Conference on Telecommunication and Information 2010, pp 25-27.
- [5] ARM® Cortex™-M4 Processor Technical Reference Manual.
- [6] SM630 Fingerprint Verification Module User Manual, 2008-07-01.
- [7] SIMCON, SIM 900 -TTL UART GSM/GPRS Modem User Manual.