A Survey on Child Security in School Bus System

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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 three main units, a bus unit, parent 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 parent unit as well as school unit that identifies which of the children did and did not board or leave the bus and issues an alert message accordingly. The notification or SMS like the students whose next stop is, that is sent to the parent unit who stays on the next stop. Also the students reached the school or the student is leaving from school notification or SMS is sent to the parent unit.The system has developed an android as well as web-based database application that facilities its management and provides useful information about the children to the parents and authorization.**

Keywords: **child security**

1. Introduction

School bus transfers millions of children daily in various countries around the world. An increased concern amongst parents today is the safety of their children on the way to school and back home. Children Tracking system is widely used all over the world to assure parents. While there many issues that might disturb the parents regarding the travel safety of school going children, the paper intends to look into introducing access safety in respect of school buses through bus tracking system that will help the school children's transportation in a secure and safer way. GPS tracking systems are used to track anyone and anything these days. Technology has rapidly advanced in the past few years and it has become very easy for the average person to use a tracking system.

2. Literature survey

School bus transfers millions of children daily in various countries around the world. An increased concern amongst parents today is the safety of their children on the way to school and back home. Children Tracking system is widely used all over the world to assure parents. While there many issues that might disturb the parents regarding the travel safety of school going children, the paper intends to look into introducing access safety in respect of school buses through bus tracking system that will help the school children's transportation in a secure and safer way. GPS tracking systems are used to track anyone and anything these days. Technology has rapidly advanced in the past few years and it has become very easy for the average person to use a tracking system.

3. Component details

A. Arduino MEGA controller

Fig. 1. Arduino MEGA controller

Arduino is a tool for making computers that can sense and control more of the physical world than your desktop computer. It's an open-source physical computing platform based on a simple microcontroller board, and a development environment for writing software for the board. Arduino can be used to develop interactive objects, taking inputs from a variety of switches or sensors, and controlling a variety of lights, motors, and other physical outputs. Arduino projects can be stand-alone, or they can communicate with software running on your computer (e.g. Flash, Processing, Max MSP.) The boards can be assembled by hand or purchased preassembled; the open-source IDE can be downloaded for free.

The Arduino Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.
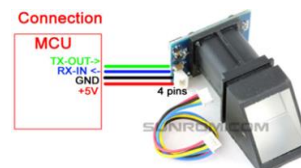
B. Fingerprint module

Fig. 2. Fingerprint module

318

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Optical biometric fingerprint reader with great features and can be embedded into a variety of end products, such as: access control, attendance, safety deposit box, car door locks.

C. Features

- Integrated image collecting and algorithm chip together, All-in-One.
- Fingerprint reader can conduct secondary development, can be embedded into a variety of end products.
- Low power consumption, low cost, small size, excellent performance.
- Professional optical technology, precise module manufacturing techniques.
- Good image processing capabilities, can successfully capture image up to resolution 500 dpi.

D. Wi-Fi module - ESP8266

The ESP8266 is a low-cost Wi-Fi chip with full TCP/IP stack and MCU (microcontroller unit) capability produced by Shanghai-based Chinese manufacturer, Espress if Systems. The ESP8266 Wi-Fi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much Wi-Fi-ability as a Wi-Fi Shield offers (and that's just out of the box)! The ESP8266 module is an extremely cost-effective board with a huge, and ever growing, community.
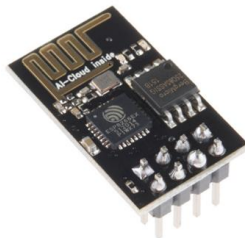

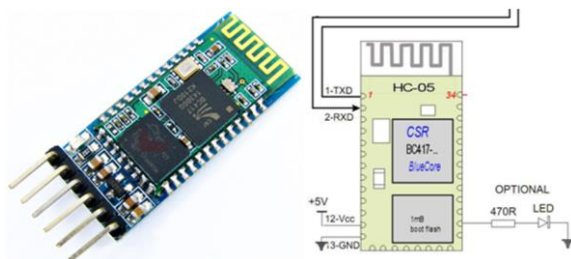Fig. 3. Wi-Fi module - ESP8266

E. Bluetooth module(HC-05)

Fig. 4. Blue tooth module (HC-05)

Description:

Bluetooth is a specification for a small form-factor, low cost

radio solution providing links between mobile computers, mobile phones and other portable handheld devices, and connectivity to the Internet. It will enable users to connect a wide range of computing and telecommunications devices easily and simply, without the need to buy, carry, or connect cables.

It is a wireless technology that operates on an unlicensed radio spectrum. There is no charge for communicating between two Bluetooth devices. Bluetooth is intended to get around the problems that come with both infrared and cable synchronizing systems. The hardware vendors, which include Siemens, Intel, Toshiba, Motorola and Ericsson, have developed a specification for a very small radio module to be built into computer, telephone and entertainment equipment. From the user's point of view, there are three important features to Bluetooth:

- Its wireless. When you travel, you don't have to worry about keeping track of a briefcase full of cables to attach all of your components, and you can design your office without wondering where all the wires will go.
- It's inexpensive.
- You don't have to think about it. Bluetooth doesn't require you to do anything special to make it work. The devices find one another and strike up a conversation without any user input at all.

F. LCD - 16x2

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.
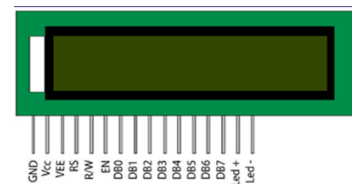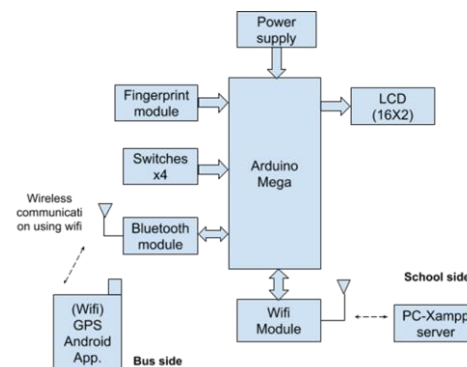

Fig. 5. LCD - 16x2

Fig. 6. Block diagram

4. Proposed system

We are presenting a bus safety management system which is designed to control the entering and exiting of students to and from the bus. This system does several tasks, including identifying personal information of each student using which will exchange the data with the GPS system This will let the driver to know the number of students entered the bus and the students who departed from the bus. Moreover, the system has an emergency system that will alert in case if there is a child inside the bus after the bus stops at the destination by sending a Notification to the School Unit as well Bus Unit. In addition, if the bus departs and arrive successful from the source to destination, it will inform the management through a notification about its successful departure and arrival is done. In addition, if the bus crosses the speed limit while traveling the bus, the alert notification message will be send directly to the School Unit. School Unit will have the web application and the android application where it will notify each and every moment of the bus to the admin. There is also one more unit proposed in this system i.e. the Parent Unit, in the Parent Unit when a child successfully arrived and departed from source to the destination the Notification is sent to the Parent Unit (Example: "Your child is arrived into the bus" with the name and time when he arrived). In addition, when the bus is at one source or the stop then the Notification is send to the Parent Unit staying at the next source.

5. Conclusion

Combining Fingerprint, GPS and android advances for safety and security reason is incredibly vital. Presently, as a result of increase in mishaps of kids getting out at wrong stations or children getting missed out at the bus this may lead to demise due to suffocation. This proposal shows that android based school bus tracking technology is a feasible alternative for supervising and tracing the children's during their drive to and from school.

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