

# Cost Effective Smart Transport System for Educational Institution

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**Abstract:** In this research paper, it deals with a smart way of transportation for educational institutions in a cost-effective manner. In present scenario, the transport system in educational institutions has few electronic modules inbuilt in the vehicle for effective communication, which are bit expensive. To overcome the economical barrier, we propose a cost effective intelligent way of transport system, using GSM module with RFID tag which makes the fleet management easier. The features of this system are accurate, robust, economical as well as flexible. Here we are using two modules, GSM and RFID. The Candidate who misses the bus, need to enquire the current location of that bus. The GSM based transport system provides the solution to this problem without calling or disturbing the person travelling in the bus. It consists of accident detection system in which the vibration sensor is used to detect the occurrence of the accident; the information will be communicated to the transport management of the institution which helps to overcome the problem. The college bus student's information, their entry and exit are kept in record. Thus, at server side, whole information about buses and the respective student's details are stored in database, with minimum technologies, our idea is to develop a user-friendly educational institutions transportation system which abides the rules and regulations of institution.

**Keywords:** GSM, RFID card and reader, vibration sensor, IR sensor and buzzer

## I. INTRODUCTION

The role of transportation system is rapidly changing, becoming more challenging and diverse. The need for tracking of the bus, allocation of seats, alert about the status of the bus are the challenges to be met in a responsive manner. We are attempting to employ new ideas and approaches to understand issues, solve problems and design solution in a reachable manner. The educational institutions provide transportation facilities to the student for their better security and management of time. It ensures the safety and security of students by getting the real-time information. The bus will be fitted with RFID reader at the entrance and students are given with the smart cards. While entering inside the bus the students are supposed to display the card to the RFID reader so that information regarding student source point can be noted and even while getting down the student need to display the card to the reader so that the destination reached message will be sent to management immediately which can also be used for attendance verifying purpose.

up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves. GSM is an open and digital cellular technology used for used for transmitting mobile voice and data services it operates at EGSM 900 MHz, DCS 1800 MHz.



*Figure 1-GSM module*

## II. SOFTWARE AND HARDWARE SPECIFICATIONS

➤ **GSM module:** GSM stands for Global System for Mobiles. This is a world-wide standard for digital cellular telephony, Digital Mobile Telephones. A GSM modem is a wireless modem behaves like a dial-up modem. The main difference between them is that a dial-

➤ **Atmega 328:** The Atmega is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega48PA/88PA/168PA/328P achieves throughput approaching 1 MIPS per MHz allowing the system designer to optimize power consumption.

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**Fig.2 microcontroller**

- It has 8-Bit Microcontroller, Advanced RISC Architecture, and Powerful Instructions. Most of it uses Single Clock Cycle Execution, 32x8 General Purpose Working Registers. The operation is static, up to 20 MIPS throughput of 20 MHz On-chip it consists of 2-cycle Multiplier which has High Endurance and Non-volatile Memory Segment, and a Self-Programmable Flash program memory.
- **LCD:** LCD stands for Liquid Crystal Display. LCD is finding wide spread use by replacing LEDs (seven segment LEDs or other multi segment LEDs) because of the following reasons: 1. LCDs are inexpensive. 2. The ability to display numbers, characters and graphics.



**Fig.3 LCD display**

- This is in contrast to LEDs, which are limited to numbers and few characters. 3. Incorporation of a refreshing controller into the LCD. The task of refreshing is done in LCD, thereby relieving the task of CPU. In contrast, the LED must be refreshed by the CPU to keep displaying the data. 4. Ease of programming for characters and graphics.

- **Buzzer:** A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or keystroke. Mechanical - A joy buzzer is an example of a purely mechanical buzzer. Electromechanical - Early devices were based on an electromechanical system identical to an electric bell without the metal gong. Similarly, a relay may be connected to interrupt its own actuating current, causing the contacts to buzz. Often these units were anchored to a wall or ceiling to use it as a sounding board. The word "buzzer" comes from the rasping noise that electromechanical buzzers made. Piezoelectric - Piezoelectric disk beeper. A piezoelectric element may be driven by an oscillating electronic circuit or other audio signal source, driven with a piezoelectric audio amplifier. Sounds commonly used to indicate that a button has been pressed are a click, a ring or a beep.
- **Power supply:** A power supply is an electronic device that supplies [electric energy](#) to an [electrical load](#). The primary function of a power supply is to convert one form of electrical energy to another. As a result, power supplies are sometimes referred to as [electric power converters](#). Some power supplies are discrete, stand-alone devices, whereas others are built into larger devices along with their loads. The power supply circuit is built using filters, rectifiers, and voltage regulators. Rectifiers are used for AC to DC conversion. The voltage is step down to 12V by step down transformer.
- **Arduino:** The Arduino version used in this system is 1.0.4. Arduino is open-source electronic prototype which is flexible and easy-to-use. It's intended for artists, designers, hobbyists, and anyone interested in creating interactive objects or environments. Arduino can sense the environment by receiving input from a variety of sensors and can affect its surroundings by controlling lights, motors, and other actuators. The micro controller on the board is programmed using the Arduino programming language (based on Wiring) and the Arduino development environment (based on Processing). Arduino project can stand alone or they can communicate with software running on a computer. Arduino designed to make, the process of using electronics in multidisciplinary projects more accessible. The hardware consists of a simple open hardware design

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for the Arduino board with an Atmel AVR processor and on-board input/output support. The software consists of a standard programming language compiler and the boot loader that runs on the board.

- **Embedded c:** Embedded C is a set of language extensions for the C Programming language by the C Standards committee, to address commonality issues that exist between C extensions for different embedded systems. Historically, embedded C programming requires nonstandard extensions to the C language in order to support exotic features such as fixed-point arithmetic, multiple distinct memory banks, and basic I/O operations. In 2008, the C Standards Committee extended the C language to address these issues by providing a common standard. It includes a number of features which are not available in normal C, such as, named address spaces, and basic I/O hardware addressing. Embedded C use most of the syntax and semantics of standard C, e.g., main () function, variable definition, data type declaration, conditional statements (if, switch. case), loops (while, for), functions, arrays and strings, structures and union, bit operations, macros, unions, etc.
- **RFID reader, card:** Radio-frequency identification (RFID) uses electromagnetic fields to automatically identify and track tags attached to an object. RFID is not a replacement for the [barcoding](#), but a complement for distant reading of codes.



*Fig.4 RFID reader*

The technology is used for automatically identifying a person, a package or an item. Unlike a bar code, the tag does not need to be within line of sight of the reader and may be embedded in the tracked object. RFID tags are used in many industries. An RFID tag attached to an automobile during production can be used to track its

progress through the assembly line.

- **IR sensor:** An infrared sensor is an electronic device that emits light in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as to detect the motion. These types of sensors measure only infrared radiation, rather than emitting the radiation, which is called as a passive IR sensor.



*Fig.5 IR sensor*

Usually in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes that can be detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, the resistance and the output voltages changes in proportion to the magnitude of the IR light received.

- **Vibration sensor:** This is a type of sensor whose internal structure is like a metal ball that is fixed in a special spring as pole; around it there is another pole. When the vibration gets to an extent, the two poles are connected so as to judge the shock occurred. Vibration sensor output is digital signal. This sensor buffers a piezoelectric transducer. As the transducer is displaced from the mechanical neutral axis, bending creates strain within the piezoelectric element and generates voltage.



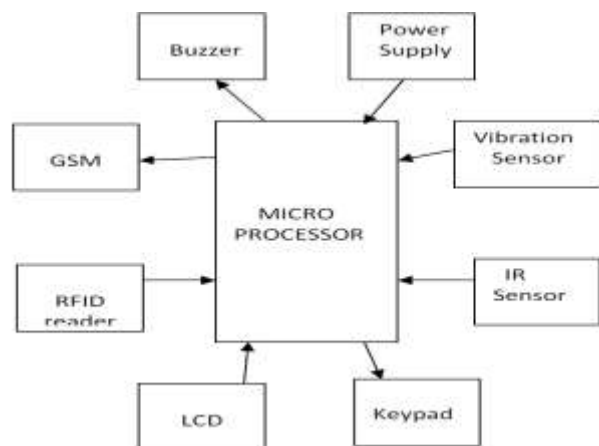
*Fig.6 vibration sensor*

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The Vibration Sensor Detector is designed for the security practice. When Vibration Sensor Alarm recognizes movement or vibration, it sends a signal to control panel. A new type of Omni-directional high sensitivity Security Vibration Detector is developed with Omni-directional detection.

### III. BLOCK DIAGRAM & ITS WORKING

The RFID card will play a role of college bus pass. The RFID card carries the information of student, route number, source point and their mobile number. The IR sensor is fitted near door step of the college bus therefore it senses if there is any obstacle. The rays from the sensor are reflected back; therefore it allows RFID reader to read the card when it is displayed to it. The entry of the student will be noted in the database.



**Case 1:** A mechanical vibration is created in such a way to depict the bus is in motion, if the vibration stops for some particular time, the notification will be sent to the management saying that “There is some problem occurred in the bus”. Hence this makes the management aware of the problem and necessary steps can be taken to overcome it.

**Case 2:** When the student enters the bus, he must display the RFID card to the reader and it verifies the student’s data in the database. Once the datas are compared, only the authorized student can enter into the bus. The LCD displays his/her name with a welcome message. If the datas compared yields to be unmatched, the buzzer in the system turns ON and LCD displays as “unauthorized person”.

**Case 3:** If the student misses the bus at the point, the GSM notification is sent to the student as bus can be expected in the

next stop.

**Case 4:** If the student catches the bus in next stop, the LCD displays his/her name with a “welcome” message.

**Case 5:** While the student gets down he/she must display the card to the reader. If there is any miss of student in the destination, the missed student name will be sent to management. This will also be helpful in attendance cross verification.

**Case 6:** If the student has due, the LCD displays as “payment due” and the name of the student will be sent, which can be noticed by the management.

### IV. ADVANTAGES

By making use of this system, the problem of manual checking of bus passes will be reduced as every person who travels in the bus must carry RFID card.

- The problem of seat allocation will be avoided as there will be information in the database of students who are allowed to travel in respective bus, other bus students/outsideers will not be allowed.
- The notifications about the missed bus from a stop can be sent to the person via GSM without any charges.
- Attendance cross verification can be done by institution using this system.
- Usage of RFID card makes reusability in ease.



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**V.CONCLUSION**

The smart transportation for educational institutions presented in this paper. The operation would be fully automated, efficient, enhanced and cost-effective. The proposed system can also be implemented in other places like bus ticketing and others. The efficiency of the RFID system, as mentioned in this paper, would make the implementation practical and effective.

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