A MINI PROJECT REPORT ON

"STUDENT ID CARD TRACKING AND ALERT SYSTEM USING GPS"

A Project report submitted in partial fulfilment of requirement for the award of the degree of

BACHELOR OF TECHNOLOGY

IN

ELECTRONICS AND COMMUNICATION ENGINEERING

BY

NAME	REGISTER NUMBER
C. Pavan Kumar	**(19091A04D3)**
P. Venkateswarulu	**(19091A04Q8)**
P. Madhu Sudhan Jayanth	**(19091A0492)**
P. Sai Krishna	**(20095A04H1)**

Under the guidance of

Dr.J.SOFIA PRIYADHARSHINI M.Tech.,Ph.D

Assoc. Professor, ECE Department

ESTD -1995

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

Affiliated to J.N.T.U.A- Anantapuramu,

Accredited by NBA & NAAC of UGC with 'A+' Grade, New Delhi,

Approved by AICTE, New Delhi, Nandyal-518501

Year: 2022-2023

RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING & TECHNOLOGY

Autonomous

Affiliated to J.N.T.U.A - Anantapuramu, Approved by A.I.C.T.E., New Delhi,
Accredited By N.B.A. & NAAC with 'A+' Grade -New Delhi,
NANDYAL –518501, KurnoolDist. A.P.

CERTIFICATE

This is to certify that the dissertation entitled "STUDENT ID CARD TRACKING AND ALERT SYSTEM USING GPS" that is being submitted by C. Pavan Kumar (19091A04D3), P. Venkateswarulu (19091A04Q8), P. Madhu Sudhan Jayanth (19091A0492), P. Sai Krishna (19091A04H1) under the guidance of Dr. J.SOFIA PRIYADHARSHINI M.Tech., Ph.D., **for Mini Project of the award of B. Tech Degree in ELECTRONICS AND COMMUNICATION ENGINEERING in the RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING & TECHNOLOGY, Nandyal (Affiliated to J.N.T.U.A, Anantapuramu) is a record of bonafide work carried out by them under our guidance and supervision.**

Project Guide:

Dr. J. SOFIA PRIYA DHARSHINI

Head of the Department:

Dr. K. MALLIKARJUNA

Signature of the External Examiner
Date:

CANDIDATE'S DECLARATION

We hereby declare that the work done in this Project titled "**STUDENT ID CARD TRACKING AND ALEART SYSTEM USING GPS**" submitted towards completion of mini project in IV Year I Semester of B. Tech (ECE) at the **Rajeev Gandhi Memorial College of Engineering & Technology**, Nandyal. It is an authentic record of our original work done under the guidance of **Dr. J. SOFIA PRIYADHARSHINI, Assoc. Professor**, Dept. of ECE, RGMCET, Nandyal. We have not submitted the matter embodied in this project for the award of any other Degree in any other institutions.

SUBMITTED BY:

C. Pavan Kumar	**19091A04D3**
P. Venkateswarulu	**19091A04Q8**
P. Madhu Sudhan Jayanth	**19091A0492**
P. Sai Krishna	**19091A04H1**

Place: Nandyal

Date:

ACKNOWLEDGEMENT

We manifest our heartier thankfulness pertaining to your contentment over our project guide **Dr. J. SOFIA PRIYADHARSHINI,** Assistant Professor of Electronics and Communication Engineering department, with whose adroit concomitance the excellence has been exemplified in bringing out this project to work with artistry.

We express our gratitude to **Dr. K. MALLIKARJUNA,** Head of the Department of Electronics and communication Engineering department, all teaching and non-teaching staff of the Electronic and communication engineering department of Rajeev Gandhi memorial College of Engineering and Technology for providing continuous encouragement and cooperation at various steps of our project.

Involuntarily, we are perspicuous to divulge our sincere gratefulness to our Principal, **Dr. T. JAYACHANDRA PRASAD,** who has been observed posing valiance in abundance towards our individuality to acknowledge our project work tangentially.

At the outset we thank our honorable **Chairman Dr. M. SANTHI RAMUDU,** for providing us with exceptional faculty and moral support throughout the course.

Finally, we extend our sincere thanks to all the **Staff Members** of ECE Department who have co-operated and encouraged us in making our project successful.

Whatever one does, whatever one achieves, the first credit goes to the **Parents, be it** not for their love and affection, nothing would have been responsible. We see in every good that happens to us their love and blessings.

SUBMITTED BY:

C. Pavan Kumar	**19091A04D3**
P. Venkateswarulu	**19091A04Q8**
P. Madhu Sudhan Jayanth	**19091A0492**
P. Sai Krishna	**19091A04H1**

Abstract

The student attendance and tracking system enable to badge, track, and report on all students entering and leaving the campus. It integrates seamlessly with existing data and computer systems, providing a low cost, easy solution for any medium to large-sized educational setting. Using the system, student attendance with notifications, can be tracked record tardiness and report on entries, exists, can be generated. A smart ID card can be purposed to avoid students escaping from college, bunking the classes, kidnapping bullying etc. of the kids, students ID cards tracking system is a promising solution to all these issues. The system consists of a GSM module and GPS module. The GPS can be provided us the raw data of latitude and longitude. Module can be attached to the student ID card. The system would not be bulky so that it can be easily carried by students. It would help us to keep a track of the location of the student and also sends notification if it senses an anomaly.

Table of Contents

CHAPTER-I
Introduction

1.1 General purpose of this project

In today's world, assuring safety, security, and reliability to students from the moment they step in and out of school or college vehicles is really necessary. By affixing school and college buses with GPS Tracking systems, both the parents and the administration can have a piece of mind knowing that their ward(s) whereabouts are tracked and monitored in real-time constantly.

The number of students enrolled in schools in India is steadily increasing. It has been steady since 2010 at 96.7%. But there has been a decline in children's attendance. From 73.4% in 2007 it has declined to 70.9% in 2011 says an annual report on the state of education in the country. There is a sharp decline in attendance in some states. Figures revealed that enrolment in undivided Andhra Pradesh from Class I to V slipped from 74 lakhs in 2005-06 to 72 lakhs in 2013-14. In Bihar it has declined to 50% from 59% in 2007 and in Madhya Pradesh it was 67% in 2007 and it has declined to 54.5% in 2011. To aid the enrolment, now a days almost every school provides transportation facility to their students. Parents also prefer them so that the children reach the school on time and come back safe in the same bus. As students grow up they find chance to bunk classes. They board the school bus but get down on the way before reaching the school. The students may also get down on the way back home. Even though the school maintains supervisors in the bus, the students find a chance to get their way out. In this project we have developed a system which ensures the students who boarded the bus will get down at school only. the bus at any location. They are tracked with the locations are traced by GPS and are informed to the parent and school.

1.2 Problem Definition

Parent Conformation: -Parent not conform their child is enter in school and also not conform where timing is come back in home. ID card can be purposed to avoid students escaping from college, bunking the classes, kidnapping bullying

Student Security: - It is most important to all student .and parent also want to student security.

Staff conformation: -

Staff also conform their student exact time.

GPS tracking:

GPS Tracking is a method to surveillance a location of a specific item or object remotely with help of artificial satellites. The innovation can pinpoint the longitude, scope, ground speed, and course heading of the objective.

Cost-efficient GPS-equipped devices like smartphones and tablets are widely used for tracking and navigation these days. With it, companies are now able to monitor their employees and educational institutions like schools and colleges are able to track the whereabouts of their students and staff.

The GPS Tracking system is not just made to provide the live location of a vehicle; it can be equipped with many more features. The arrangement is one of a kind extensive framework designed to deal with and provide a solution to day-by-day transportation activities. It brings the administration, the parents, and the transportation personnel together into one ground-breaking application framework.

1.3 Literature Review

1.The Authors Alex Atkin and Dallas Alabama in presented the system to enhance the safety of the school children to and from school. This system is used to detect when the child board or leaves the bus and gives an alert message to parents. The disadvantage of this paper is that we can't track the school bus if the school bus gets late to drop the children at the respective places. This system includes a child module and two receiver modules to track the missed children. It also conveys information about the child cry through text message to parents. It uses Voice Recognizing sensor which senses the cry of the child and when it matches the cry of the child which is stored in school, it sends the message to parents. The main drawback in the whole system is integrated into a small chip and attached to the person body. It May harm the child. Another child tracking system using android based phone for getting information about the missed child is proposed.

2.This application helps parents to monitor their child cell phone activity but also helps in tracking the children location using GPS. The fault in the system is each child and parent might not have the android phone and use of the phone in school is strictly prohibited.

3.The paper focuses on children tracking system which includes a panic button. When the child feels that he is in danger, he presses the panic button. It adopts Bluetooth communication among mobile terminals in every group to collect information and delivers to the respective server using wireless LAN. The child module in the form of chip gets fixed to the ID card. The problem is that the child might never know that he should press the panic button when it

requires.

4. Children tracking system using the Android mobile device in parent's hand and the database is maintained in the control room of the school. This system includes a child module and two receiver modules. If the child goes beyond the coverage area the information is sent to the control room of the school and to their respective parents as well. It uses wireless LAN and Bluetooth device to collect information and cluster head delivers the same through tags to the server at school using wireless LAN. The limitation is the cluster head sends the information about the children group and not about each individual. This makes difficult for the parents to identify their child information.

5.The system is designed to track the children while entering and leaving the bus using RFID and GSM Technology. This helps the driver to know how many children had got into and left the bus. If the students get missed on the school bus the information will be sent to the school. The shortcoming of this paper is only the entry and exit of the student is identified

1.4 Experimental work:

RFID system is now an emerging technology in various fields, which is well known for its compact size, processing speed etc. It also plays a leading role in security and process management. The RFID technology is a means for uniquely. Identifying an object with a wireless radio link, allowing data to be stored on an RFID tag and retrieved in the remote application at a later point in time. The details about the student like his/her name, roll number, boarding place will be recorded in the computerized database and also on the RFID tag. Radio Frequency Identification (RFID) is a common term used to depict a system utilizing radio waves by which the object or person is identified by means of a unique serial number. The microcontrollers are very useful to an extent of communicating with the devices such as displays, sensors, etc. The RFID & GSM based system helps in tracking the vehicles. This security system is simple and cost-effective. RFID technology is a relatively new Technology in road construction field that has widely spread in intelligent transportation systems (ITS). Because of its benefits, construction and transportation industries are researching and implementing RFID technology to improve data acquiring and storage applications.

1.5 Experimental results:

Each student is given with the RFID tags which contain the details of the student, contact person, and their phone number etc. The RFID reader, kept on the bus, will read the serial number of the tag that contains the details of the Students. The information read is stored in the microcontroller and sent to School/College server via GSM modem. The system consists of a

GSM module and GPS module. The GPS can be provided us the raw data of latitude and longitude. Once the tag is read by the reader simultaneously a message is sent to parents.

1.6 Proposed model:

The System provides parents, school/college authorities, and other users with real-time notifications. Users will be notified whenever a student bunking the classes, kidnapping bullying etc. And, the notifications can be obtained via apps and web server interface. When a student arrives at the assigned location, the first notification will be received. As a student swipes the RFID card in the card reader installed in a college, the second notification will be sent to parents and college administration. Apart from this, users also receive notifications whenever the bunking the classes, kidnapping bullying etc. An RFID tag contains the details of the student and area, it will be used for identification of particular individual student that has been tracked by his parents with this RFID student Id among all cluster of the children. Once the reader reads the tag the information is sent to college server database via GSM modem and a data about the current location of student and board time are sent to the parents/Adminstration on their phone as a notification in the app as app connected to the real-time database to the college.

1.7 Embedded System

Embedded system is a combination of hardware and software, it is also named as “Firm ware”. An embedded system is a special purpose computer system, which is completely encapsulated by the device it controls. It is a computer-controlled system. An embedded system is a specialized system that is a part of a larger system or machine. As a part of a larger system it largely determines its functionality. Embedded systems are electronic devices that incorporate microprocessors with in their implementations. The main purpose of the microprocessors is simplifying the system design and improve flexibility. In the embedded systems, the software is often stored in a read only memory (RAM) chip. Embedded systems provide several major functions including monitoring of the analog environment by reading data from sensors and controlling actuators.

The general-purpose definition of embedded system is that they are devices used to control, monitor or assist the operation of equipment, machinery or plant. “Embedded” reflects the fact that they are an integral part of the system. All embedded systems are including computers or microcontrollers. Some of these computers are however very simple systems as compared with a personal computer. The very simple embedded systems are capable of performing only a simple function or set of function to meet a single predetermine purpose. In

more complex systems an application program that enables the embedded system to the used for a particular purpose in a specific application determines the functioning of the embedded system the ability to have a program means that the same embedded system can be used for variety of different purpose. Controller input comes from a detector or sensor and its output goes to a switch or activator which (for example) may start or stop the operation of a machine.

EXAMPLES OF EMBEDDED SYSTEMS:

Embedded systems are found in wide range of application areas. Originally, they were used only for expensive industrial control applications, but as technology brought down the cost of dedicated processors, they began to appear in moderately expensive applications such as automobiles, communication and office equipment's and television Today's embedded systems are so inexpensive that they are used in almost every electronic product in our life. Embedded systems are often designed for mass production.

Some examples of embedded systems:

- Automatic Teller Machines
- Cellular telephone and telephone switches
- Computer network equipment
- Computer printers
- Disk drives
- Engine controllers and antilock break controllers for automobiles
- Home automation products
- Handheld calculators
- Household appliances
- Medical equipment
- Measurement equipment
- Multifunction wrist watches
- Multifunction printers

CHAPTER-II
SYSTEM STUDY

2.1. FEASIBILITY STUDY

The feasibility of the project is analyzed in this phase and business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. For feasibility analysis, some understanding of the major requirements for the system is essential.

Three key considerations involved in the feasibility analysis are

- ECONOMICAL FEASIBILITY
- TECHNICAL FEASIBILITY
- SOCIAL FEASIBILITY

2.2. ECONOMICAL FEASIBILITY

This study is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus, the developed system as well within the budget and this was achieved because most of the technologies used are freely available. Only the customized products had to be purchased. Once the technical feasibility and market studies are complete, it is time to determine Business Feasibility. The first purpose of this effort is to financially model the venture opportunity and achieve a break-even analysis. In other words, based upon the costs of goods sold, capital costs, and management and administration, how much revenue generated from units sold is required to break-even and over what period of time.

Once a break-even analysis is developed, the entrepreneurs can develop realistic financial projections for best case and worst-case scenarios. These scenarios will be critical in strategic planning, milestone development and venture valuation analysis. The simple objective is to determine what level of revenue is required to satisfy the return on investment demanded by the founder and/or the investors.

2.3 TECHNICAL FEASIBILITY

This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. This will lead to high demands on the available technical

resources. This will lead to high demands being placed on the client. The developed system must have a modest requirement, as only minimal or null changes are required for implementing this system.

Technical feasibility evaluates the technical complexity of the expert system and often involves determining whether the expert system can be implemented with state-of-the-art techniques and tools. In the case of expert systems, an important aspect of technical feasibility is determining the shell in which the system will be developed. The shell used to develop an expert system can be an important determinant to its quality and makes it vital to the system's success. Although the desirable characteristics of an expert system shell will depend on the task and domain requirements, the shell must be flexible enough to build expert reasoning into the system effectively. It must also be easily integrated with existing computer-based systems. Furthermore, a shell providing a user-friendly interface encourages end users to use the system more frequently.

2.4 SOCIAL FEASIBILITY

The aspect of study is to check the level of acceptance of the system by the user. This includes the process of training the user to use the system efficiently. The user must not feel threatened by the system, instead must accept it as a necessity. The level of acceptance by the users solely depends on the methods that are employed to educate the user about the system and to make him familiar with it. His level of confidence must be raised so that he is also able to make some constructive criticism, which is welcomed, as he is the final user of the system.

CHAPTER -III
HARDWARE DESCRIPTION

3.1 Arduino UNO

Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, 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 an AC-to-DC adapter or battery to get started.

"Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards.

3.2 Programming:

Each of the 14 digital pins on the Nano can be used as an input or output, using pinMode(), digitalWrite(), and digitalRead() functions. They operate at 5 volts. Each pin can provide or receive a maximum of 40 mA and has an internal pull-up resistor (disconnected by default) of 20-50 kOhms. In addition, some pins have specialized functions: Serial: 0 (RX) and 1 (TX). Used to receive (RX) and transmit (TX) TTL serial data. These pins are connected to the corresponding pins of the FTDI USB-to-TTL Serial chip. External Interrupts: 2 and 3. These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. See the attachInterrupt() function for details.

PWM: 3, 5, 6, 9, 10, and 11. Provide 8-bit PWM output with the analogWrite() function.

SPI: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins support SPI communication, which, although provided by the underlying hardware, is not currently included in the Arduino language.

There is a built-in LED connected to digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off. The Arduino Nano can be programmed with the Arduino software (download). Select "Arduino Diecimila, Duemilanove, or Nano w/ ATmega168" or "Arduino Duemilanove or Nano w/ ATmega328" from the Tools > Board menu (according to the microcontroller on your board). For details, see the reference and tutorials.

The UNO has 8 analog inputs, each of which provide 10 bits of resolution (i.e. 1024 different values). By default they measure from ground to 5 volts, though is it possible to change the upper end of their range using the analogReference() function. Additionally, some pins have specialized functionality:

- I2C: 4 (SDA) and 5 (SCL). Support I2C (TWI) communication using the Wire library (documentation on the Wiring website).

There are a couple of other pins on the board:

- AREF. Reference voltage for the analog inputs. Used with analogReference().
- Reset. Bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields which block the one on the board.

The Arduino UNO can be programmed with the Arduino software (Version higher than 1.o was suggested). Select "Arduino Duemilanove or UNO w/ ATmega328" from the Tools > Board menu (according to the microcontroller on your board). The ATmega328 on the arduino Nano comes pre burned with a bootloader that allows you to upload new code to it without the use of an external hardware programmer. You can also bypass the bootloader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header.

TX& RX Pins other Usage:

The Elecrom Arduino also breakout the TX&RX pins of FTDI IC, this makes the Nano can working as a normal USB-UART convertor. If you needs a USB-UART convertor in your application, for example, you want to connect your zigbee module to PC via the USB connector, you can connect the TX pin of Zigbee to the TXD breakout hole and connect the RX pin of zigbee to RXD breakout hole. In this way, the FTDI IC on Elecrom Arduino Nano converts the USB signal to UART signal, the zigbee can communicate with the PC. Resistors are added to avoid signal confusion, when these two pins were connected to other module, the UART signal would not be affected by the Atmega328 on Elecrom Arduino Nano. Notice: “TXD” on Elecrom Arduino Nano means: UART side sent signal and USB side receive; while the “RXD”means: UART side receive signal while USB side sent

3.3 PCB:

A printed circuit board (PCB) mechanically supports and electrically connects electrical or electronic components using conductive tracks, pads and other features etched from one or more sheet layers of copper laminated onto and/or between sheet layers of a non-conductive substrate. Components are generally soldered onto the PCB to both

electrically connect and mechanically fasten them to it. Printed circuit boards are used in all but the simplest electronic products. They are also used in some electrical products, such as passive switch boxes.

Alternatives to PCBs include wire wrap and point-to-point construction, both once popular but now rarely used. PCBs require additional design effort to lay out the circuit, but manufacturing and assembly can be automated. Electronic computer-aided design software is available to do much of the work of layout. Mass-producing circuits with PCBs is cheaper and faster than with other wiring methods, as components are mounted and wired in one operation. Large numbers of PCBs can be fabricated at the same time, and the layout only has to be done once. PCBs can also be made manually in small quantities, with reduced benefits.

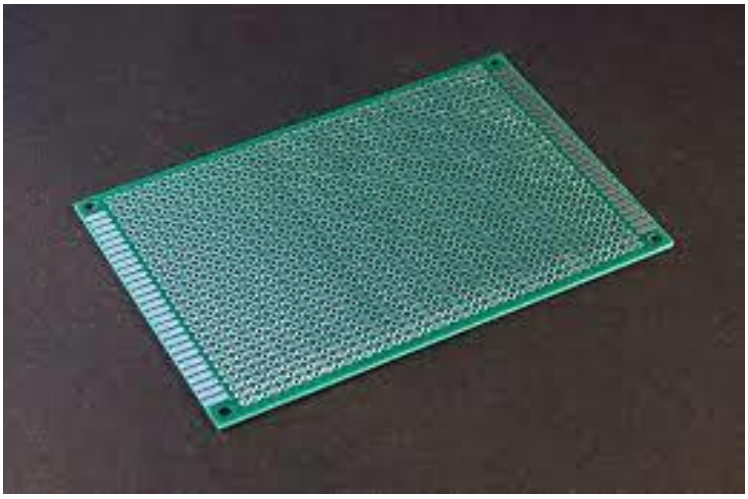
PCBs can be single-sided (one copper layer), double-sided (two copper layers on both sides of one substrate layer), or multi-layer (outer and inner layers of copper, alternating with layers of substrate). Multi-layer PCBs allow for much higher component density, because circuit traces on the inner layers would otherwise take up surface space between components. The rise in popularity of multilayer PCBs with more than two, and especially with more than four, copper planes was concurrent with the adoption of surface mount technology. However, multilayer PCBs make repair, analysis, and field modification of circuits much more difficult and usually impractical.

A basic PCB consists of a flat sheet of insulating material and a layer of copper foil, laminated to the substrate. Chemical etching divides the copper into separate conducting lines called tracks or circuit traces, pads for connections, vias to pass connections between layers of copper, and features such as solid conductive areas for electromagnetic shielding or other purposes. The tracks function as wires fixed in place, and are insulated from each other by air and the board substrate material. The surface of a PCB may have a coating that protects the copper from corrosion and reduces the chances of solder shorts between traces or undesired electrical contact with stray bare wires. For its function in helping to prevent solder shorts, the coating is called solder resist or solder mask.

A printed circuit board can have multiple copper layers. A two-layer board has copper on both sides; multi layer boards sandwich additional copper layers between layers of insulating material. Conductors on different layers are connected with vias, which are copper-plated holes that function as electrical tunnels through the insulating substrate. Through-hole component leads sometimes also effectively function as vias. After two-layer PCBs, the next step up is

usually four-layer. Often two layers are dedicated as power supply and ground planes, and the other two are used for signal wiring between components.

A PCB may be "silkscreen" printed with a legend identifying the components, test points, or identifying text. Originally, an actual silkscreen printing process was used for this purpose, but today other, finer quality printing methods are usually used instead. Normally the screen printing is not significant to the function of the PCBA.



A minimal PCB for a single component, used for prototyping, is called a breakout board. The purpose of a breakout board is to "break out" the leads of a component on separate terminals so that manual connections to them can be made easily. Breakout boards are especially used for surface-mount components or any components with fine lead pitch. Advanced PCBs may contain components embedded in the substrate.

3.3.1 Characteristics:

The first PCBs used through-hole technology, mounting electronic components by leads inserted through holes on one side of the board and soldered onto copper trace's on the other side. Boards may be single-sided, with an un plated component side, or more compact double-sided boards, with components soldered on both sides. Horizontal installation of through-hole parts with two axial leads (such as resistors, capacitors, and diodes) is done by bending the leads 90 degrees in the same direction, inserting the part in the board (often bending leads located on the back of the board in opposite directions to improve the part's mechanical strength), soldering the leads, and trimming off the ends. Leads may be soldered either manually or by a wave soldering machine.

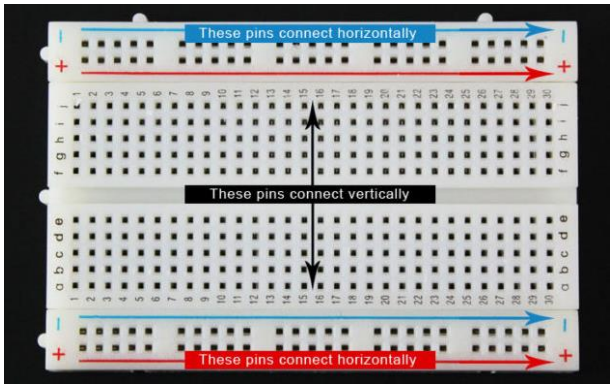
1.1. Through-hole manufacture adds to board cost by requiring many holes to be drilled accurately, and it limits the available routing area for signal traces on layers immediately below the top layer on multi-layer boards, since the holes must pass through all layers to the opposite side. Once surface-mounting came into use, small-sized SMD components were used where possible, with through-hole mounting only of components unsuitably large for surface-mounting due to power requirements or mechanical limitations, or subject to mechanical stress which might damage the PCB (e.g. by lifting the copper off the board surface).

3.4 Arduino Power Supply

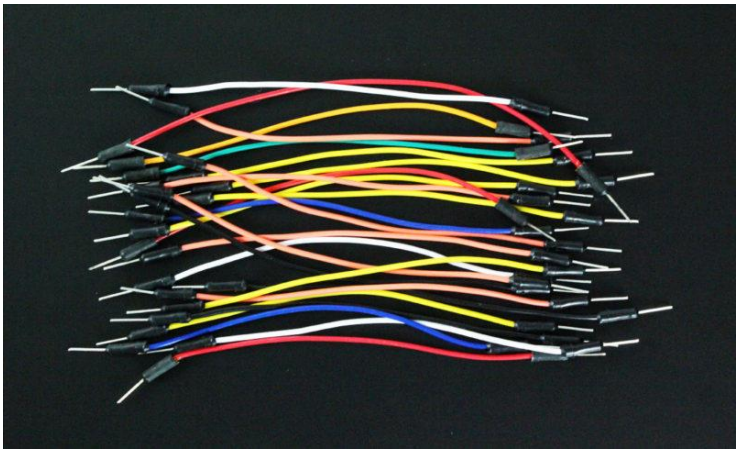
The Arduino Uno needs a power source in order for it to operate and can be powered in a variety of ways. You can do what most people do and connect the board directly to your computer via a USB cable. If you want your project to be mobile, consider using a 9V battery pack to give it juice. The last method would be to use a 9V AC power supply.

3.5 Arduino Breadboard:

Another very important item when working with Arduino is a solderless breadboard. This device allows you to prototype your Arduino project without having to permanently solder the circuit together. Using a breadboard allows you to create temporary prototypes and experiment with different circuit designs. Inside the holes (tie points) of the plastic housing, are metal clips which are connected to each other by strips of conductive material.



On a side note, the breadboard is not powered on its own and needs power brought to it from the Arduino board using jumper wires. These wires are also used to form the circuit by connecting resistors, switches and other components together.



Here is a visual of what a completed Arduino circuit looks like when connected to a breadboard.

Communication:

The Arduino Uno has a number of facilities for communicating with a computer, another Arduino board, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The 16U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on Windows, a .inf file is required. Arduino Software (IDE) includes a serial monitor which allows simple textual data to be sent to and from the board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer (but not for serial communication on pins 0 and 1). A Software Serial library allows serial communication on any of the Uno's digital pins.

3.6 GPS Module

GPS receiver module gives output in standard (National Marine Electronics Association) NMEA string format. It provides output serially on Tx pin with default 9600 Baud rate. This NMEA string output from GPS receiver contains different parameters separated by commas like longitude, latitude, altitude, time etc. Each string starts with '$' and ends with carriage return/line feed sequence.

3.7 Automatic (software) reset:

Rather than requiring a physical press of the reset button before an upload, the Arduino/Genuino Uno board is designed in a way that allows it to be reset by software running on a connected computer. One of the hardware flow control lines (DTR) of the ATmega8U2/16U2 is connected to the reset line of the ATmega328 via a 100 nanofarad capacitor. When this line is asserted (taken low), the reset line drops long enough to reset the chip.

This setup has other implications. When the Uno is connected to a computer running Mac OS X or Linux, it resets each time a connection is made to it from software (via USB). For the following half-second or so, the bootloader is running on the Uno. While it is programmed to ignore malformed data (i.e. anything besides an upload of new code), it will intercept the first few bytes of data sent to the board after a connection is opened.

3.8 Wires

A jump wire (also known as jumper, jumper wire, jumper cable, DuPont wire, or DuPont cable – named for one manufacturer of them) is an electrical wire or group of them in a cable with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.

3.9 GSM Module

Sim800L Module is low cost, low form factor GSM module based on Simcoms SIM800L chipset. Sim800L module supports quad-band GSM and GPRS network. This breakout board is perfect for application where size and cost is a constraint. Sim800l gsm module also supports quad band which means that it can work anywhere in the world. This low cost module is perfect for launching your next IoT project. Using this module you can almost make your own cellphone.

The main drawback of this module is works on 3.7 to 4.2 volts so you cannot power it directly through Arduino or Raspberry Pi. Moreover the sim800L GSM and GPRS module requires upto 2 ampere current so accordingly design your power supply. You can use a 3.7 volt lipo battery to directly power the GSM module. You can communicate with SIM800l module via UART port, supports command including 3GPP TS 27.007, 27.005 and SIM COM enhanced AT Commands

CHAPTER-IV
Software Description

4.1 Arduino IDE:

Arduino is an open-source prototyping platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing. Over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments. A worldwide community of makers - students, hobbyists, artists, programmers, and professionals - has gathered around this open-source platform, their contributions have added up to an incredible amount of accessible knowledge that can be of great help to novices and experts alike.

The IDE (Integrated Development Environment) is a special program running on your computer that allows you to write sketches for the Arduino board in a simple language modeled after the processing (www.processing.org) language. It is designed to introduce programming to artists and other newcomers unfamiliar with software development. It includes a code editor with features such as syntax highlighting, brace matching, and automatic indentation, and is also capable of compiling and uploading programs to the board with a single click. A program or code written for Arduino is called a sketch. Arduino programs are written in C or C++. The Arduino IDE comes with a software library called “Wiring” from the original Wiring project, which makes many common input/output operations much easier. The basic structure of the Arduino programming language is fairly simple and runs in at least two parts. These two required parts or functions enclose blocks of statements.

Code:

```
void setup()
{
statements;
}
void loop()
statements;
```

}

Where setup() is the preparation, while loop() is the execution. Both functions are required for the program to work. The setup function should follow the declaration of any variable at the very beginning of the program. It is the first function to run in the program, it runs only once and is used to set pin Mode or initialize serial communication. The loop function follows next and includes the code to be executed continuously – reading inputs, triggering outputs, etc. This function is the core of all Arduino program and does the bulk of the work.

4.2 Arduino Code:

```
#include <TinyGPS++.h>
#include <SoftwareSerial.h>
#include<LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x27,16,2);
static const int RXPin = 5, TXPin = 6;
static const uint32_t GPSBaud = 9600;
// The TinyGPS++ object
TinyGPSPlus gps;
int temp=0,i;
// The serial connection to the GPS device
SoftwareSerial ss(RXPin, TXPin);
String stringVal = "";
void setup(){
  Serial.begin(9600);
  ss.begin(GPSBaud);
  lcd.begin();
  pinMode(13,OUTPUT);
  digitalWrite(13,LOW);
  lcd.print("location Tracking");
  lcd.setCursor(0,1);
  lcd.print("    System      ");
  delay(2000);
  gsm_init();
  lcd.clear();
```

```
  Serial.println("AT+CNMI=2,2,0,0,0");
  lcd.print("GPS Initializing");
  lcd.setCursor(0,1);
  lcd.print("  No GPS Range  ");
  delay(2000);
  lcd.clear();
  lcd.print("GPS Range Found");
  lcd.setCursor(0,1);
  lcd.print("GPS is Ready");
  delay(2000);
  lcd.clear();
  lcd.print("System Ready");
  temp=0;
}

void loop()
{
serialEvent();

     while(temp)
     {
       while (ss.available() > 0)
       {
         gps.encode(ss.read());
              if (gps.location.isUpdated())
              {
               temp=0;
               digitalWrite(13,HIGH);
               tracking();
              }
         if(!temp)
         break;
       }
     }
```

```
    digitalWrite(13,LOW);
}
void serialEvent()
{
  while(Serial.available()>0)
  {
    if(Serial.find("location"))
    {
     temp=1;
     break;
    }
    else
    {
    temp=0;
    }
  }
}
void gsm_init()
{
  lcd.clear();
  lcd.print("Finding Module..");
  boolean at_flag=1;
  while(at_flag)
  {
    Serial.println("AT");
    delay(1);
    while(Serial.available()>0)
    {
      if(Serial.find("OK"))
      at_flag=0;
    }

    delay(1000);
  }
```

```
lcd.clear();
lcd.print("Module Connected..");
delay(1000);
lcd.clear();
lcd.print("Disabling ECHO");
boolean echo_flag=1;
while(echo_flag)
{
  Serial.println("ATE0");
  while(Serial.available()>0)
  {
    if(Serial.find("OK"))
    echo_flag=0;
  }
  delay(1000);
}
lcd.clear();
lcd.print("Echo OFF");
delay(1000);
lcd.clear();
lcd.print("Finding Network..");
boolean net_flag=1;
while(net_flag)
{
  Serial.println("AT+CPIN?");
  while(Serial.available()>0)
  {
    if(Serial.find("+CPIN: READY"))
    net_flag=0;
  }
  delay(1000);
}
lcd.clear();
lcd.print("Network Found..");
```

```
  delay(1000);
  lcd.clear();
}
void init_sms()
{
  Serial.println("AT+CMGF=1");
  delay(400);
  Serial.println("AT+CMGS=\"+917013236139\"");   // use your 10 digit cell no. here
  delay(400);
}
void send_data(String message)
{
  Serial.print(message);
 delay(200);
}
void send_sms()
{
  Serial.write(26);
}
void lcd_status()
{
  lcd.clear();
  lcd.print("Message Sent");
  delay(2000);
  lcd.clear();
  lcd.print("System Ready");
  return;
}
void tracking()
{
    init_sms();
    send_data("Student Tracking Alert:");
    Serial.println(" ");
```

```
    send_data("Student Current Location is:");
    Serial.println(" ");
    Serial.print("Latitude: ");
    Serial.print(gps.location.lat(), 6);
    Serial.print("\n Longitude: ");
    Serial.println(gps.location.lng(), 6);

   //https://www.google.com/maps/@8.2630696,77.3022699,14z
   Serial.print("https://www.google.com/maps/@");
   Serial.print(gps.location.lat(), 6);
   Serial.print(',');
   Serial.print(gps.location.lng(), 6);
   Serial.print(",14z");
    send_sms();
    delay(2000);
    lcd_status();
}
```

CHAPTER-V
Testing

5.1 System Testing

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, sub-assemblies, assemblies and/or a finished product It is the process of exercising software with the intent of ensuring that the

Software system meets its requirements and user expectations and does not fail in an unacceptable manner. There are various types of test. Each test type addresses a specific testing requirement.

5.2 Types of Tests:

Unit testing:

Unit testing involves the design of test cases that validate that the internal program logic is functioning properly, and that program inputs produce valid outputs. All decision branches and internal code flow should be validated. It is the testing of individual software units of the application .it is done after the completion of an individual unit before integration. This is a structural testing, that relies on knowledge of its construction and is invasive. Unit tests perform basic tests at component level and test a specific business process, application, and/or system configuration. Unit tests ensure that each unique path of a business process performs accurately to the documented specifications and contains clearly defined inputs and expected results.

Integration testing:

Integration tests are designed to test integrated software components to determine if they actually run as one program. Testing is event driven and is more concerned with the basic outcome of screens or fields. Integration tests demonstrate that although the components were individually satisfaction, as shown by successfully unit testing, the combination of components is correct and consistent. Integration testing is specifically aimed at exposing the problems that arise from the combination of components.

Functional test:

Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation, and user manuals. Functional testing is centered on the following items:

Valid Input: identified classes of valid input must be accepted.

Invalid Input: identified classes of invalid input must be rejected.

Functions: identified functions must be exercised.

Output: identified classes of application outputs must be exercised.

Systems/Procedures: interfacing systems or procedures must be invoked.

Organization and preparation of functional tests is focused on requirements, key functions, or special test cases. In addition, systematic coverage pertaining to identify Business process flows; data fields, predefined processes, and successive processes must be considered for testing. Before functional testing is complete, additional tests are identified and the effective value of current tests is determined.

5.3 System Test

System testing ensures that the entire integrated software system meets requirements. It tests a configuration to ensure known and predictable results. An example of system testing is the configuration-oriented system integration test. System testing is based on process descriptions and flows, emphasizing pre-driven process links and integration points.

5.4 White Box Testing

White Box Testing is a testing in which in which the software tester has knowledge of the inner workings, structure and language of the software, or at least its purpose. It is purpose. It is used to test areas that cannot be reached from a black box level.

5.5 Black Box Testing

Black Box Testing is testing the software without any knowledge of the inner workings, structure or language of the module being tested. Black box tests, as most other kinds of tests, must be written from a definitive source document, such as specification or requirements document, such as specification or requirements document. It is a testing in which the software under test is treated, as a black box. you cannot “see” into it. The test provides inputs and responds to outputs without considering how the software works.

5.6 Unit Testing:

Unit testing is usually conducted as part of a combined code and unit test phase of the software lifecycle, although it is not uncommon for coding and unit testing to be conducted as two distinct phases.

Test strategy and approach:

Field testing will be performed manually and functional tests will be written in detail.

Test objectives:

- All field entries must work properly.
- Pages must be activated from the identified link.
- The entry screen, messages and responses must not be delayed.

Features to be tested:

- Verify that the entries are of the correct format
- No duplicate entries should be allowed
- All links should take the user to the correct page.

5.7 Integration Testing

Software integration testing is the incremental integration testing of two or more integrated software components on a single platform to produce failures caused by interface defects.

The task of the integration test is to check that components or software applications, e.g. components in a software system or – one step up – software applications at the company level – interact without error.

Test Results: All the test cases mentioned above passed successfully. No defects encountered.

5.8 Acceptance Testing:

User Acceptance Testing is a critical phase of any project and requires significant participation by the end user. It also ensures that the system meets the functional requirements.

Test Results: All the test cases mentioned above passed successfully. No defects encountered.

CHAPTER-VI
CONCLUSION

6.1Conclusion:

This system gives overall for school/college students to avoid students escaping from college, bunking the classes, kidnapping bullying etc. The system identifies student and entry, exit time with RFID that notifies parents and school in the form of notification simultaneously GPS gets all coordinates from satellite and send it your database server by using GSM/GPRS service module with highly precise and encryption format. Somewhere due to any reason this system starts broadcasting alert notification to both authorities for consideration of the situation, it has live identity adder with the master card, adding, deleting and erasing function also taken place in this advanced system. The system gives a high level of security for students as well as an educational institute.

References:

[1] Thompson A., Goodridge W, Bus Coming: A Service for Tracking Buses in Rural Areas based on Passenger Locations, GEOProcessing 2012: The Fourth International Conference on Advanced Geographic Information Systems, Applications, and Services, ISBN: 978-1-61208-178-6, Valencia, Spain, February 2012, pp.23-27

[2] Manini Kumbhar, Meghana Survase, Pratibha, Mastud, Avdhut Salunke, Shrinivas Sirdeshpande, "Real Time Web Based Bus Tracking System" International Research Journal of Engineering and Technology (IRJET), e-ISSN: 2395 -0056 Volume: 03 Issue: Feb-2016.

[10] Mr. Pradip Suresh Mane, Prof. Vaishali Khairnar, "Analysis of Bus Tracking System Using Gps on Smart Phones" IOSR Journal of Computer Engineering (IOSRJCE), ISSN: 2347–8586, Vol.3, Issue 3, 2015, Page.1057-1061. [11] Javapoint.com, „What is Android" 2012. [Online].

[3] L. I. U. Chun-Yan, Z. O. U. Cheng-Ming, W. U. Pei, "A task scheduling algorithm based on genetic algorithm and ant colony optimization in cloud computing", in 13th International Symposium on Distributed Computing and Applications to Business, Engineering and Science, 2014, pp. 68-72.

[4] Z. Liao. "Real-time Taxi Dispatching using Global Positioning Systems". Communications of the ACM, 46(5):81-83, 2003

[5] Z. Liao. "Taxi Dispatching via Global Positioning Systems", IEEE Transactions on Engineering, 48(3):342- 347, 2001.

[6] ST Electronics, "Fleet Management Solution Wins The award", Electronics Review, 20(2), 2007.

[7] Z. Xiang, S. Song, J. Chen, H. Wang, J. Huang, and X. Gao. "A Wireless LAN-based Indoor Positioning Technology", IBM Journal of Research and Development, 48(5/6), 2004.

[8] W. M. Yeung, J. K. Ng. "Wireless LAN Positioning based on Received Signal Strength from Mobile device and Access Points", 13th IEEE Int. Conf. on Embedded and Real-Time Computing Systems and Applications, pp. 131- 137, 2007.

GPS positioning accuracy". 3rd IEEE International Conference on Microwave and