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MICROCONTROLLERS AND ITS APPLICATIONS

ECE 3003

WIRELESS ELECTRONIC NOTICE BOARD USING GSM

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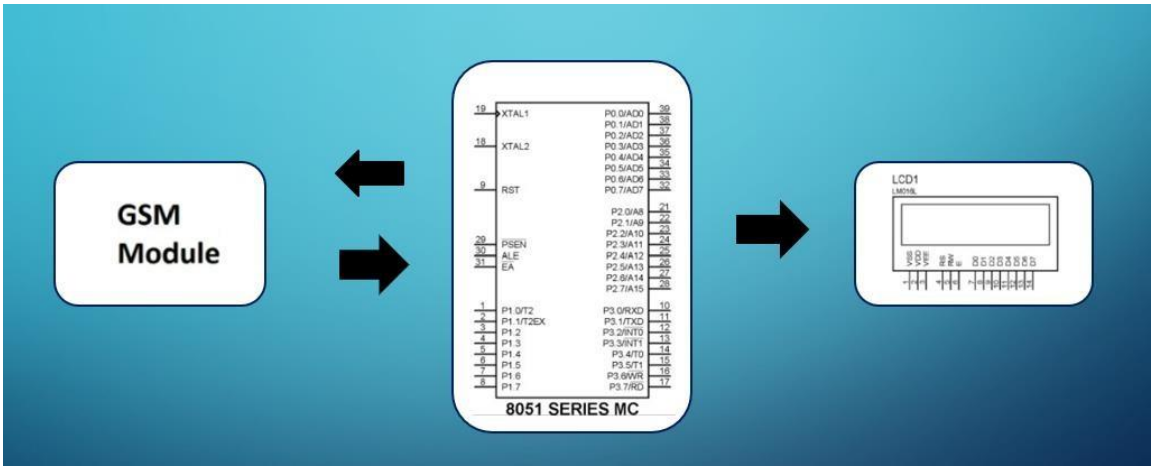
AIM

- To design a wireless electronic notice board using GSM. We know the importance of notice boards in public places like railway stations, bus stations and airports. But changing notices day-to-day is a difficult task. This article explains you how to design a Wireless Electronic Notice Board using GSM technology.
- The project displays the data on LCD and send the info through wireless to the mobile.
- There are many wireless communication technologies like Bluetooth, RF Communication, ZigBee, etc. but GSM Technology based communication allows long range, reliable and secure communication. The Wireless Electronic Notice Board using GSM project is built around GSM Technology as cell phones (that communicate through GSM Technology) have become very abundant, cheap, and easy to use.

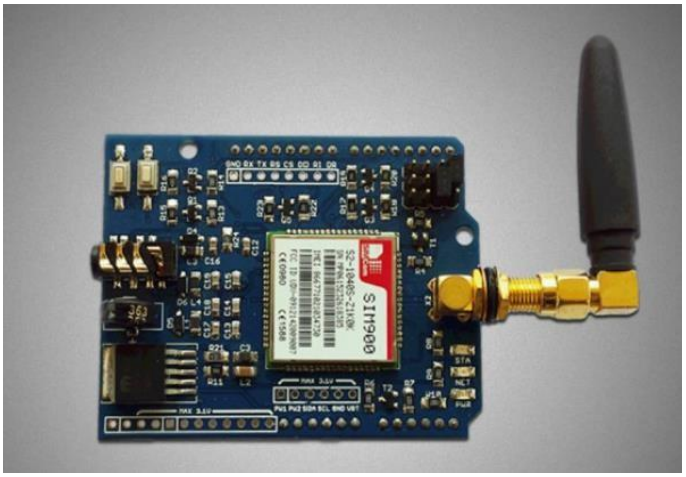
BLOCK DIAGRAM



GSM MODULE

- GSM module is used to establish communication between a computer and a GSM system. Global System for Mobile communication (GSM) is an architecture used for mobile communication in most of the countries. GSM module consists of a GSM modem assembled with power supply circuit and communication interfaces (like RS-232, USB, etc) for computer.
- GSM MODEM is a class of wireless MODEM devices that are designed for communication of a computer with the GSM network. It requires a SIM (Subscriber Identity Module) card just like mobile phones to activate communication with the network.

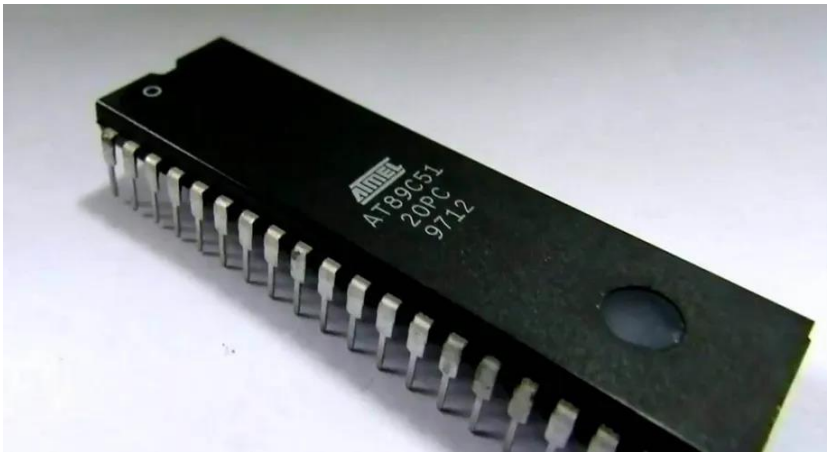
- Also, they have IMEI (International Mobile Equipment Identity) number like mobile phones for their identification. A GSM MODEM can perform operation like Receive, send, or delete SMS messages in a SIM, Read, add, search phonebook entries of the SIM, Make, Receive, or reject a voice call.
- The MODEM needs AT commands, for interacting with processor or controller, which are communicated through serial communication. These commands are sent by the controller/processor. The MODEM sends back a result after it receives a command. Different AT commands supported by the MODEM can be sent by the processor/controller/computer to interact with the GSM cellular network.



8051 MICROCONTROLLER

- 8051 microcontroller is an 8-bit microcontroller created in 1981 by Intel Corporation. It has an 8-bit processor that simply means that it operates on 8-bit data at a time. It is among the most popular and commonly used microcontroller. As it is an 8-bit microcontroller thus has 8-bit data bus, 16-bit address bus. Along with that, it holds 4 KB ROM with 128 bytes RAM.
- A microcontroller is an integrated chip designed under Very Large-Scale Integration technique that consists of a processor with other peripheral units like memory, I/O port, timer, decoder, ADC etc. A microcontroller is basically designed in such a way that all the working peripherals are embedded in a single chip with the processor.
- Any programmable device holds a processor, memory, I/O ports, and timer within it. But a microcontroller contains all these components embedded in a single chip. This single chip manages the overall operation of the device. However, microcontrollers are used where programming is to be performed on the smallest tiny space present.
- A microcontroller holds separate memory locations for both data and program. Microcontrollers find its various applications like in electronic gadgets (like keyboard, mouse etc), automobiles, e-commerce, electronic household items (like ovens, washing machines) etc.

- The AT89C51 is an age old 8-bit microcontroller from the Atmel family. It works with the popular 8051 architecture and hence is used by most beginners till date. It is a 40 pin IC package with 4Kb flash memory. It has four ports and all together provide 32 Programmable GPIO pins. It does not have in-built ADC module and supports only USART communication. Although it can be interfaced with external ADC IC like the ADC084 or the ADC0808.
- The AT89C51 is no longer in production and Atmel does not support new design. Instead, the new AT89S51 is recommended for new applications. But, since the AT89C51 has a strong community support if your motive is to learn embedded then AT89C51 can still be a good choice.
- Atmel microcontroller can be programmed with different software's that is available in the market. Arduino, Keil uVision are the most used platforms to name a few. the Atmel microcontroller we will need an IDE (Integrated Development Environment), where the programming takes place. A compiler, where our program gets converted into MCU readable form called HEX files. An IPE (Integrated Programming Environment), which is used to dump our hex file into our MCUs.



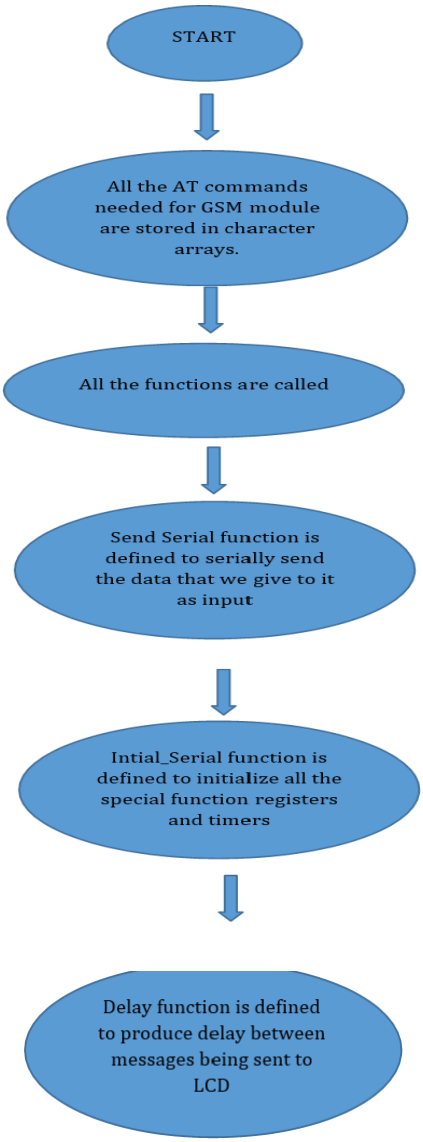
LCD

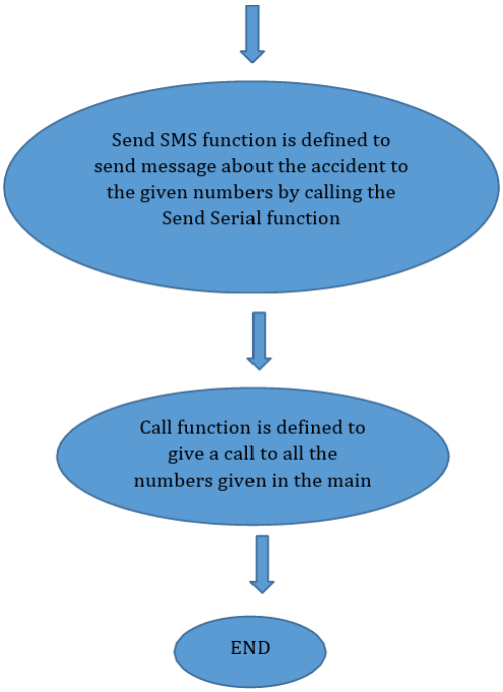
- A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with polarizers. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in colour or monochrome.
- LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden. For instance: present words, digits, and seven-segment displays, as in a digital clock, are all good examples of devices with these displays. They use the same basic technology, except that arbitrary images are made from a matrix of small pixels, while other displays have larger elements. LCDs can either be normally on (positive) or off (negative), depending on the polarizer arrangement.

- An LCD display consists of liquid crystal sandwiched between two pieces of polarised glass (or substrate) and a backlight. The backlight passes through the first layer of glass as electrical currents direct the liquid crystal molecules to move and align. This causes the polarised light (waves of light essentially) to rotate, allowing only specific levels of light to reach the second substrate.

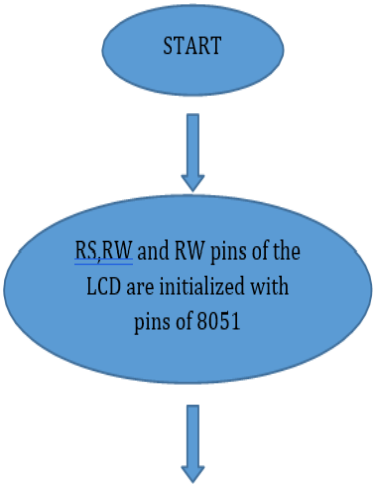
- This light becomes the light source for the hundreds or thousands of RGB (Red, Green, Blue) pixels packed into the display, the combination of which creates the image seen on-screen. However, the quality of the image depends on more factors than just whether the display uses LCD technology. Other concerns to consider the number of pixels in a display, along with what type of LCD the screen uses. For example, IPS LCD displays offer better contrast ratios and viewing angles than TN LCD displays.

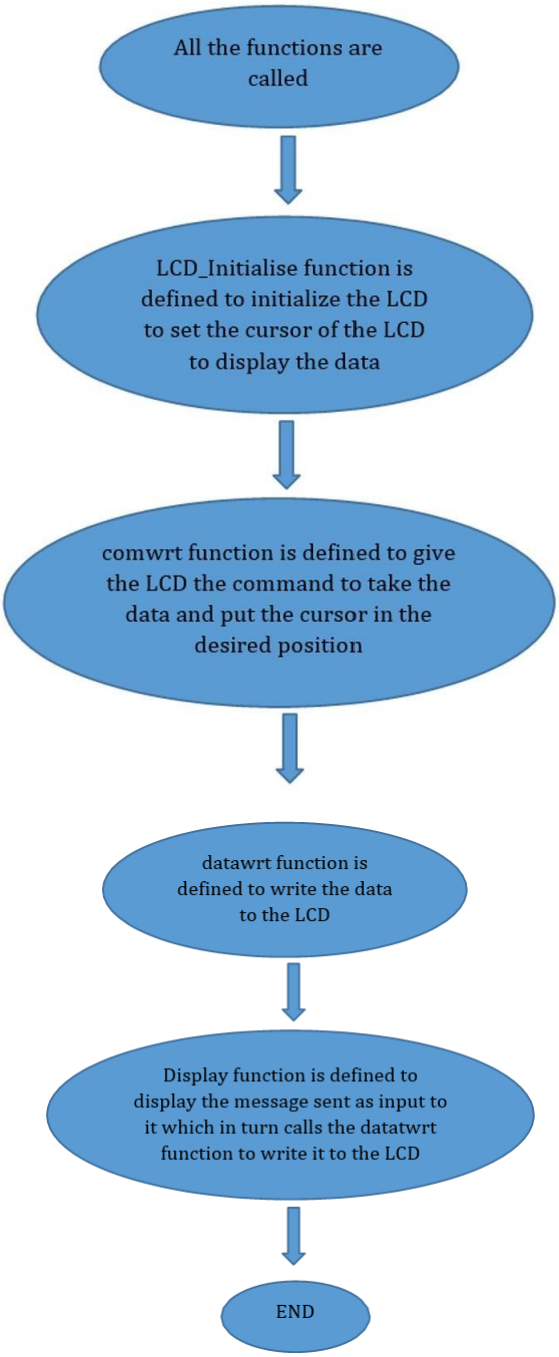
FLOWCHART OF THE GSM CODE





FLOWCHART OF THE LCD MODULE





FLOWCHART OF THE MAIN CODE

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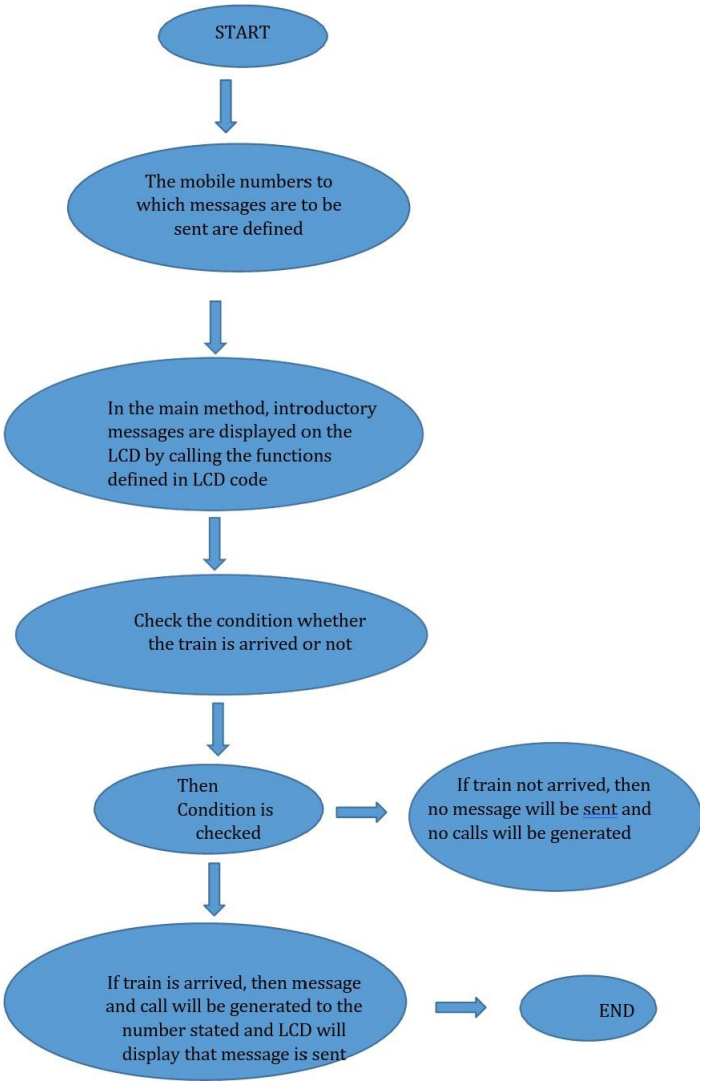


LITERATURE REVIEW

In this technical paper explains how a reliable and an authentic wireless communication could be easily developed between a mobile phone and microcontroller using GSM (Global System for Mobile Communication) MODEM (Modulator Demodulator). This technical paper explains GSM based electronic notice board which can be widely used for multitude of applications including educational sector, traffic control, banks, public advertisements, stoke exchanges etc. Moreover, we can also learn as well as modify some of the common applications of GSM MODEM as per the requirements and needs of the user

In this proposed system the idea of wireless Electronic Notice Board Using GSM Technology has been presented. So, our main aim is to reduce paperwork and time. In this paper we are trying to implement our system in such a way that it can display message to the users from authorized user using GSM module which is located on the notice board. So, at same time this message will be sent to different users' mobile numbers that are stored in microcontroller memory. So, spreading of important message or notice will be takes place within very short span of time to respective mobile numbers Means user or registered person can be able to receive the message from anywhere and this message sent will be on LCD display.

Notice Board is the most uniform and primary apparatus in any university, schools or public places like bus stations, railway stations and parks. But fixing and changing various notices of instruction on a day-to-day is a difficult process. The main objective of this project is to develop a wireless electronic notice board that displays messages to the user's mobile. When a user receive a message, it is sent by a SIM inserted in GSM modem at the receiver unit. The GSM modem interfaced with level shifter IC to Microcontroller. The message sent by the GSM is sent to the microcontroller that further displays it on an electronic notice board. The Notice board is an LCD display interfaced to a microcontroller, powered by a regulated power supply from main supply of 230 volt AC supply

GSM modem is a specific type of modem which accepts a SIM card. It operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone. A GSM modem exposes an interface that allows applications such as Now SMS for sending and receiving messages over the modem interface. At the time you install your GSM modem, or when connecting your GSM mobile phone to the computer, be sure about installing the appropriate Windows modem driver from the device manufacturer. The Now SMS & MMS gateway can concurrently support various multiple modems, provided that your computer hardware has the accessible communications port resources.

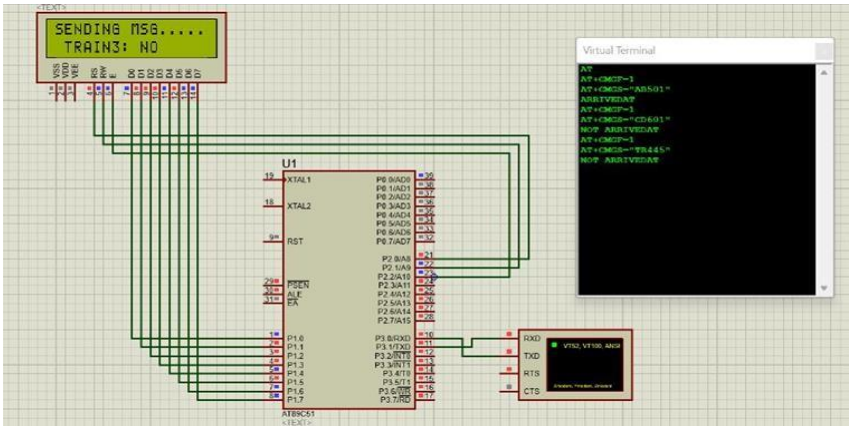
AT command

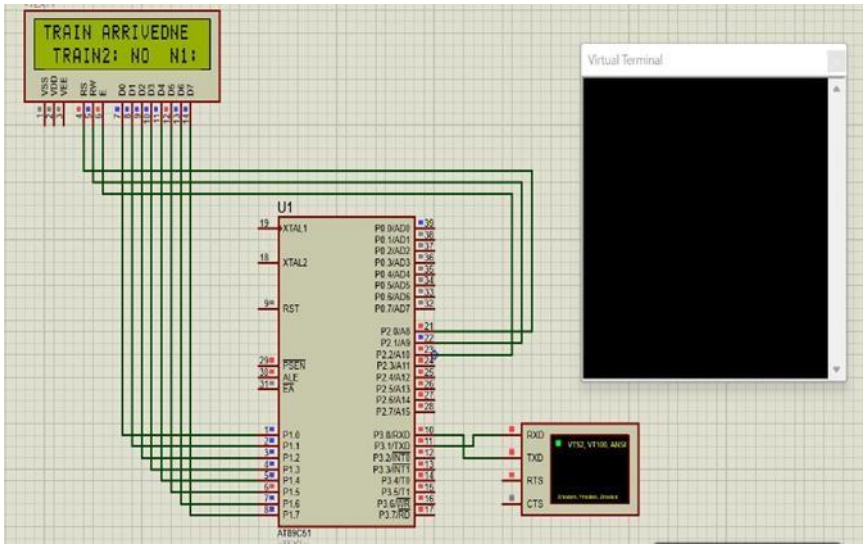
AT commands are instructions used to control a modem. AT is the abbreviation of AT tension. Every command line starts with "AT" or "at". That's why modem commands are called AT commands. Many of the commands that are used to control wired dial-up modems, such as ATD (Dial), ATA (Answer), ATH (Hook control) and ATO (Return to online data state), are also supported by GSM/GPRS modems and mobile phones. Besides this common AT command set, GSM/GPRS modems and mobile phones support an AT command set that is specific to the GSM technology, which includes SMS-related commands like AT+CMGS (Send SMS message), AT+CMSS (Send SMS message from storage), AT+CMGL (List SMS messages) and AT+CMGR (Read SMS messages)

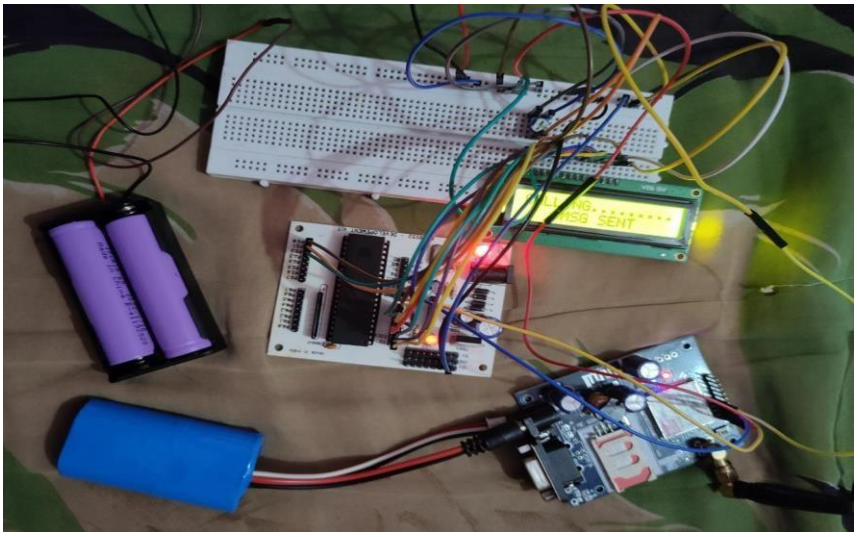
SOFTWARE MODULE

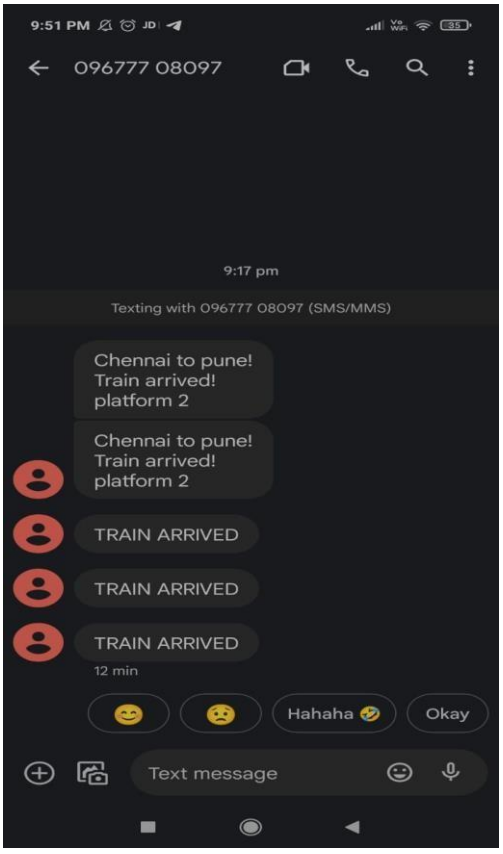
The Kiel C51 C Compiler for the 8051 microcontroller is the most popular 8051 C compiler in the world. It provides more features than any other 8051 C compiler available today . The C51 Compiler allows you to write 8051 microcontroller applications in C that, once compiled, have the efficiency and speed of assembly language. Language extensions in the C51 Compiler give you full access to all resources of the 8051. The C51 Compiler translates C source files into reloadable object modules which contain full symbolic information for debugging with the µVision Debugger or an in-circuit emulator. In addition to the object file, the compiler generates a listing file which may optionally include symbol table and cross reference information.

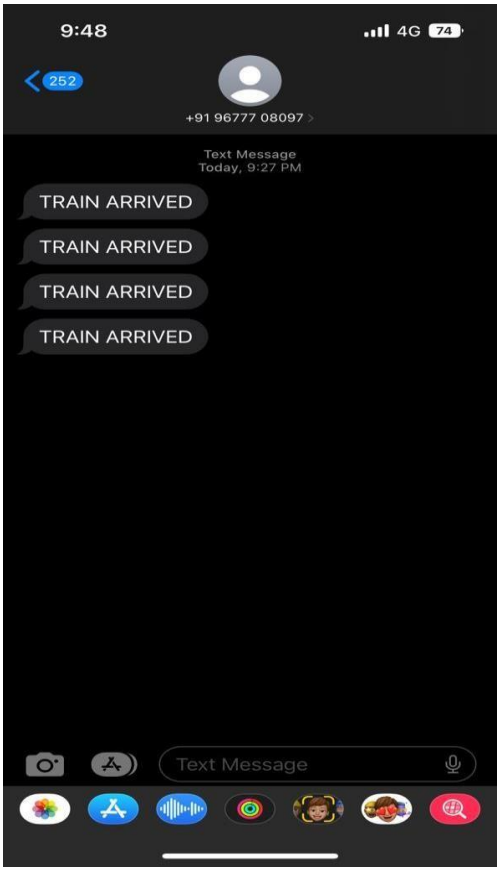
SIMULATION AND HARDWARE:






SMS SENT


9:51 PM
096777 08097
9:17 pm
Texting with 096777 08097 (SMS/MMS)
Chennai to pune!
Train arrived!
platform 2
Chennai to pune!
Train arrived!
platform 2
TRAIN ARRIVED
TRAIN ARRIVED
TRAIN ARRIVED
12 min
Hahaha
Okay
Text message



PROS OF WIRELESS NOTICE BOARD SYSTEM

- Using GSM we can send message to any distant locations, from any part of the World
- As it's a GSM wireless transmission system it has very less errors and needs less maintenance
- Prevents unauthorized access of notice board (password)
- No printing and photocopying costs. Thus, saves time, Energy and finally environment
- It is very easy to operate and consumes less power The circuit of the wireless notice board is portable.

CONS OF WIRELESS NOTICE BOARD SYSTEM

- When there is a network problem, GSM won't work
- There are more possibilities for a glitch to take place which makes the circuit to not work
- Wireless notice board will not work well if there is a interfere with other nearby device
- Everything connected wirelessly requires password-based authentication. The biggest disadvantages associated with wireless security arise from its password protection methods.

- Default passwords built into routers and access points have been discovered by hackers which will be allowing them to get onto the network without permission.
- All the control panel components are battery-powered, such as sensors, motion detectors, and other components. Batteries can become exhausted with time, leaving the system useless.

PROJECT DEMONSTRATION: