

# GSM BASED SMART MESSAGE LED DISPLAY

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**Abstract**—In the last few decades, communication technology has developed by leaps and bounds. The employ of “Embedded System in Communication” has given rise to many appealing applications. -This paper deals with an innovative rather an interesting manner of intimating the message to the people using a wireless Electronic display board which is synchronized using the GSM technology. This will help us in passing any message almost immediately without any delay just by sending a SMS which is better and more reliable than the old traditional way of pasting the message on notice board. This proposed technology can be used in many public places, malls or big buildings to enhance the security system and also make awareness of the emergency situations and avoid many dangers. Using various AT commands is used to display the message onto the display board. GSM technology is used to control the display board and for conveying the information through a message sent from authenticated user. The message will be valid solely when the incoming cell phone number is validated. Authentication result is displayed on LCD whether the number is matched or not matched and the message is finally displayed on moving LED (Light emitting diode) display.

**Index Terms**- GSM modem, Microcontroller, SMS, LED Display

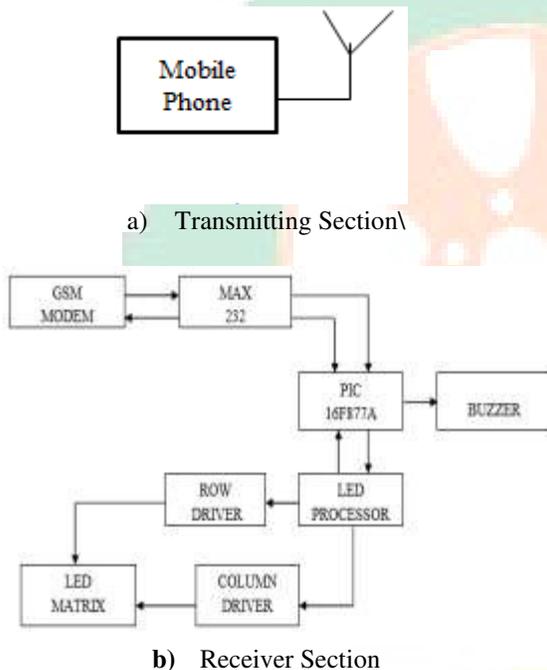
## 1. INTRODUCTION

In today's world of technological advancements communications and management is necessary in any part of the world. Wireless communication has announced its arrival on big scale and the world is going mobile. We want to control everything without really moving and as quick as possible. This control of appliances is possible through Embedded Systems. The novel idea of this project is to receive message through mobile phone and send it to display for display board. Notice boards are one of the widely used ones ranging from primary schools to major organizations to convey messages at large. A lot of paper is been used and which is later wasted by the organizations. This in turn leads to a lot of deforestation thus leading to global warming. Small innovative steps in making use of technology for regular purposes would have an adverse effect on the environment issues which we are presently concerned about. The main aim of this paper is to design a SMS driven automatic display Board which can replace the currently used programmable electronic display and conventional notice boards. It is proposed to design receive cum display toolkit which can be programmed and later be used from an authorized mobile phone. This project is basically a micro controller- based design used to control remote display board. Now- a -days people from different parts of the globe are ready to communicate with one another among fractions of seconds. GSM (Global system for mobile communication) network is among the foremost wide used wireless communication

networks these days for calling or SMS (Short message Service)[3]. Globally, over billion people have recognized the need of GSM for mobile phone applications. The high frequency, 900 MHz and international roaming of the GSM makes the mobile phone users to recognize the technology worldwide. Because of the digitalized signals and speech clarity, the GSM technology is considered as third generation (3G) mobile communication system.[9] This project aims at developing a system that will display the message received by the GSM module. Microcontroller will then control the system by doing verification and thus making it more secure than other display systems. This system is easy to use in day to day life by any-one and at any place (globally). This will overcome the difficulties of latency faced by the previous moving text message display modules using wired entry via computer, keyboard or remote control entry (small distance). EEPROM is available for saving incoming messages so no previous message is lost even when power failure rather than using on chip memory of controller. The numbers in EEPROM will only be stored after password authentication thus, this method also provides security. Whole circuit is connected with battery backup thus system can work if there's no power. Here, we tend to use mobile phones as message sender, causing messages to notice board by sending applicable SMS and receiving SMS whenever there's no problem. A GSM modem is connected to the LED display hardware is employed to receive the SMS and send it to the controller circuit of the LED display.

## II .SYSTEM DESCRIPTION

The functional system consists of two parts: transmitter and receiver. Cell-phone acts as a transmitter which is used to send SMS to the receiver part. The receiver part is an integration of Power supply unit (12V,5V),GSM module (SIM300),PIC 16F877A microcontroller, LCD, Moving LED display, Keypad, Buzzer, MAX232, EEPROM.GSM module operates on 12V power supply. The core part of receiver consists of PIC microcontroller which is energized by 5V power supply.



**Fig.1 Functional block diagram of the system**

The microcontroller is interfaced with GSM Modem to decode the received message and do the required action. The protocol used for the communication between the two is AT command. RS-232 standards are used for the serial communication of binary bits. Various AT commands of call control, data card control, phone control, computer data interface, service, network communication parameter, SMS text mode and SMS PDU mode are used for the communication purpose from microcontroller to the GSM modem.

## III WORKING METHODOLOGY

A wireless GSM MODEM, PIC microcontroller, LED display, Max 232, Memory (EEPROM), Power supply. GSM modem (900/1800 MHz): A GSM

modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves.[5] Like a GSM mobile phone, a GSM modem requires a SIM card from a wireless carrier in order to operate. Generally, computers use AT commands to control modems. Reading of message from the SIM card inserted into the modem is done by sending the appropriate AT command to the modem. In addition to the standard AT commands, GSM modems support an extended set of AT commands. These extended AT commands are defined in the GSM standards.

Command	Description
AT	To check communication between computer and module.
ATD	Dial Command
AT+CBC	Battery charge
AT+CPAS	Phone activity status
AT+CMGR AT+CMGS	Read message Send message
AT+CLIP	Calling line identification presentation
AT+CMGF	Message format

**Fig.2 AT Commands**

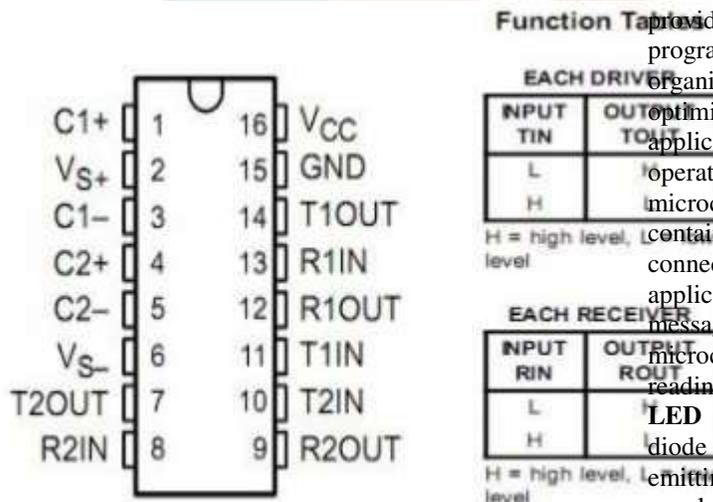
Using “attention commands”(AT Commands) GSM modem operations can be controlled. When a modem is connected to any device (computer, fax, etc.). We need AT commands to direct the modem for its operations. The messages are displayed on the system using high speed techniques, the entire display column is connected to shift register output so that the characters are first shifting to each column and then the microcontroller will switch on the row one by one with small delay. This process is continuing in high speed so the viewer will feel the display in an exceedingly additional brightness.

**Subscriber Identity Module (SIM):** One of the key features of GSM is the Subscriber Identity Module, commonly known as a SIM card. The SIM is a detachable smart card containing the user's subscription information and phone book. This allows the user to retain his or her information after switching handsets.

**PIC Microcontroller (16F877A):** It is high performance RISC. Only 35 single word instructions

to learn. The Operating speed: DC-20 MHz clock input DC-200 ns instruction cycle. It has 8K x 14 words of Program Memory and 368x8 bytes of Data Memory (RAM) 256 x 8 bytes of EEPROM Data Memory. Microcontroller are used to take an action on the signal receiving through the GSM PIC microcontroller- specially designed for performing single task is a computer-on-a chip usually comprises of I/O ports, RAM, ROM and also CPU. Due to simplicity in design and pocket friendly prices, microcontroller is widely adopted for various fields including automobiles, medical science, domestic applications, industrial use, energy management and lots more domains.[5]

**RS232 converter (MAX 232N):** RS-232 stands for Recommend Standard number 232 and C is the latest revision of the standard .The RS-232 converter plays a vital role in GSM LED display.



**Fig.3 Pin diagram of MAX 232**

The RS232converter is a chip to convert the TTL voltage levels into RS232 level and vice versa. In this system GSM modem is communicated with the microcontroller using RS232serial data In order to make MODEM serial port compatible with microcontroller serial port the RS232 converter is used. The serial ports on most computers use a subset of the RS-232C standard.

**Power supply:** Power Supply is an important part of a circuit. It provides required supply to different blocks of the circuit from input 230 V AC. The main blocks include transformer, rectifier circuit, filter circuit, and regulator circuit. Voltage regulator IC LM7805 is used as a voltage regulator The microcontroller and other devices get power supply

from AC to DC adapter through7805, 5 volts regulator. The adapter output voltage will be 12V DC non regulated. The 7805/7812 voltage regulators are used to convert 12 V to 5V/12V DC.

**SMS (Smart Message Service):** SMS is a kind of service of saving and transmitting. In other words, SMS is not directly sent to the receiver by the sender; instead, it is transmitted through SMS center all the time. The users send or receive words or data information in 160 English words or numerical characters or 70 Chinese characters for one time through mobile phone or other telecom terminal. SMS can be sent initially by mobile communication terminal, short message platform server of mobile network operators, and network SP (including ICP, ISP, etc.) interconnected by short message platform of mobile network operators.[7]

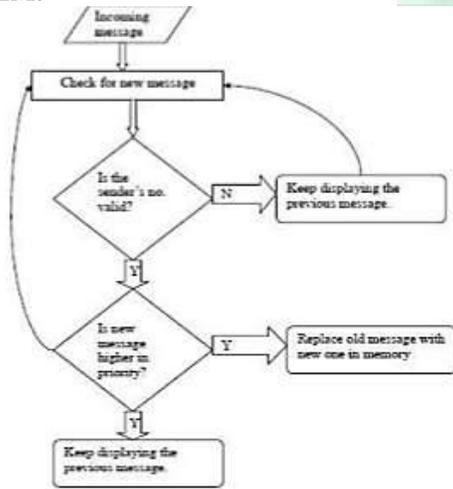
**EEPROM memory:** These memory devices are used to store the data for off line process. The AT24C02 provides 2048 bits of serial electrically erasable and programmable read only memory (EEPROM) organized as 8192 words of 8 bits each. The device is optimized for use in many industrial and commercial applications where low power and low voltage operation. EEPROM is communicating with the microcontroller using 12C communication i.e. it contains one data pin and clock pin, these device are connected as slave to the microcontroller. The main application of memory in this project is to store the message coming from user mobile, when the microcontroller is doing the operation of writing and reading to memory.

**LED Display:** An LED display, or light emitting diode display, is a flat panel display that uses light emitting diodes as the video display. An LED display panel can be either a small display or part of a larger display. [4] LED diodes are used in order to make up an LED display. LED displays are also used in billboards and store signs. An LED panel consists of several LEDs, whereas an LED display consists of several LED panels. LEDs used in order to make up LED displays offer several advantages in comparison to other light emitting sources. A light emitting diode is made up of a semiconductor chip which is surrounded by a transparent plastic case. The plastic case allows the light to pass through it. The emission of different colors including ultraviolet and infrared light depends on the semiconductor material which is used in the diode.

**Buzzer:** Buzzer is controlled by the microcontroller using single pin. Sometimes it can be interchanged according to the transistor used to drive the device. The buzzer subsystem produces a 2 KHz audible tone when powered. The buzzer will sound when the signal coming into the driver is high. It must be

connected to a Darlington transistor or transducer driver subsystem .The buzzer is connected between the supply rail (+V) and the input signal. This acts as load on the driver. When the input signal coming into the buzzer subsystem is low, a potential difference across the buzzer causes current to flow. It is this flow of current that causes the buzzer to sound.

**IV .FLOW CHART OF SMS DRIVEN DISPLAY SYSTEM:**



**Fig.4 Flow chart of SMS driven display system**

The above flow chart shows that the controlling action taken by GSM and sender valid number checks if it's not right then the previous message will be display for some time ,then message will be change when message will change and the message are given an according to the priority message will be display. If given message will be changes with message send given according to priority.

**V .RESULTS**

As shown in below figure 5 the message is sent as “@hello cbit#” because when @ is received the message reading starts and when # is received the message reading stops so whatever the message we want to display is kept in between @ and #.



**Fig.5 LED board displaying the message sent**

The message is received by the GSM module and is passed onto the microcontroller using serial communication. The GSM module uses the AT commands presented in a proper syntax. The GSM module receives the message and stores in the memory available in the SIM card. When the command AT+CMGR is executed in the microcontroller the message is transferred to the microcontroller. The GSM is connected to microcontroller board through serial communication using RS232 cable (DB9 pins). The LED display board is connected to microcontroller board by pins directly as shown in figure 4. The TxD and RxD of display board are connected to P3.0 and P3.1 of microcontroller board.

**VI. CONCLUSION**

The proposed system employing the concept of wireless technology within the field of communication we are able to create our communication more economical and faster, with greater efficiency. Here we can display the message using LCD. The messages are displayed in the LCD for a particular time period. The system consists of GSM MODEM, PIC microcontroller, LCD display. The future model can be able to display more than one message at a time and we can save the message in a system. In our system the LED displays can be used instead of LCD display. Based on the priority condition the message can be displayed.The incoming messages will be notify by using buzzer.

Micro controller receiver the 20 MHz from the crystal oscillator at OSC-1and OSC-2 pin.



**Fig 5.Atmega 8 Controller board**

In fig 8 shows the Atmega 8 controller hardware

**V. RESULT AND CONCLUSION**

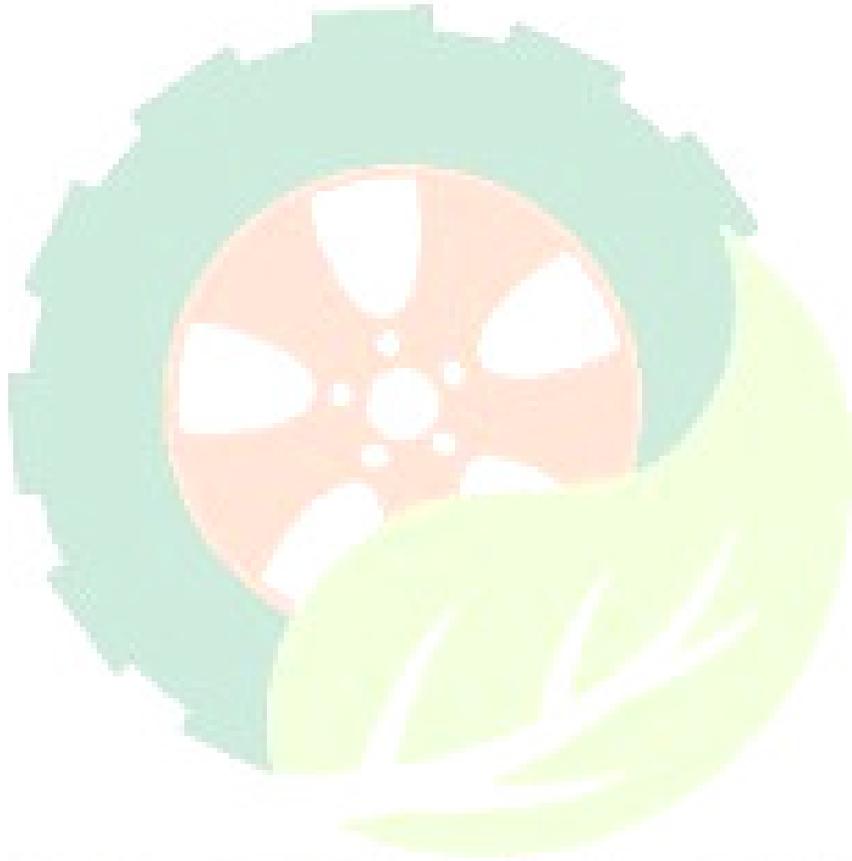
This project is reduced the possibilities of traffic jams, caused by high red light delays and provides the clearance to the emergency vehicle to an extent and successfully. The proposed system also gives importance to the ambulance and vip vehicle. Emergency vehicle is detected by using RFID technology. Here we designed the system with the purpose to clear the traffic in accordance with priority. We use LDR sensor to find traffic density. When the LASER beam cut in any one of the roads that road considered higher density traffic road. this proposed system build a smart city so less traffic jams it also help the emergent vehicle to reach in time to the destination.

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