

Real Time Digi-Notice Board System using IOT

T. Elizabeth Darryl Jacob
UG Student, Department of ECE
Sengunthar Engineering College
Tiruchengode, Tamilnadu, India

K. Indhumathi
UG Student, Department of ECE
Sengunthar Engineering College
Tiruchengode, Tamilnadu, India

Prof. C. Aarthi
Associate Professor / ECE
Sengunthar Engineering College
Tiruchengode, Tamilnadu, India

Abstract— Digital Notice board is used in institution or organization or public utility places like College campus, railway stations etc., but Sending and monitoring various notices every day is a heavy process. A separate person is required to take care of these notices. This paper deals with advanced notice board. Our proposed system will enable people to wireless transmit notices on a notice board using GSM with smart Phone and users get auto notification using parse cloud. Its operation is based on microcontroller ATMEGA 328 Programmed in C language. When the user sends notice via registered smart Phone that message will get display on the notice board simultaneously through the parse cloud other users get auto notification on their smart Phone. We can also make the system compatible with more than one wireless technology. The numbers of notice boards are connected in IOT to get the status of the notice boards automatically to the cellular device.

Key Words: *GSM Module, P10 LED Display, Smart Phone, Parse Cloud, IoT (Internet of Things)*

I. INTRODUCTION

Now-a-days advertisement is going digital. The big shops and the shopping centers use digital displays now. Also, in trains and buses the information like platform number, ticket information is displayed in digital boards. People are now adapted to the idea of the world at its finger-tips. The use mobile P10ones have increased drastically over years. Control and communication has become important in all the parts of the world. This gave us the idea to use mobile P10ones to receive message and then display it on an electronic board.

The GSM technology is used. GSM stands for Global System for Mobile Communication. Due to this international roaming capability of GSM, we can send message to receiver from any part of the world. It has the system for SMS-Short Message Service.

This Paper is a remote notice board with a GSM modem at the receivers end. So if the user wants to display any message, he can send the information by SMS and thus update the LED display accordingly. As engineer's main aim is to make life simple with help of technology, this is one step to simplify real time noticing.

II. PROPOSED WORK

This will be a moving message display, which can be used as the digital notice board, and also a GSM modem, which is the latest technology used for communication between the mobile and embedded devices. This will be can send the information by SMS and thus update the LED display accordingly. As

engineer's main aim is to make life simple with help of technology, this is one step to simplify real time noticing.

System will work like when the user wants to display or update the notice board, the user has to send the message from his mobile defining the message and then the password of the system to the number of the SIM which is inserted in the display system MODEM. Then the MODEM connected to the display system will receive the SMS, the microcontroller inside the system is programmed in such a way that when the modem receives any message the microcontroller will read the message from serial port and verify for the password, if the pass word is correct then it will start displaying the messages in the display system.

The messages are displayed on the LED display. The prototype of the GSM based display toolkit has facilities to be integrated with a display board thus making it truly mobile. The toolkit accepts the SMS, stores it, validates it and then displays it in the led module. The SMS is deleted from the SIM each time it is read, thus making room for the next SMS. The major constraints incorporated are the use of “*message@” as the termination character of the SMS and the display of one SMS as a time. The limitations can be removed by the use of higher end microcontrollers and extended RAM.

The prototype can be implemented using commercial display boards. The use of “Embedded System in Communication” has given rise to many interesting applications that ensures comfort and safety to human life. GSM technology is one of the new technologies in the embedded field to make the communication between microcontroller and mobile.

Now every embedded system is used to communicate with other system using GSM and GPRS technology, in this system the MODEM is used to access the message sent by the user to display on notice board. This system has many important applications and can be used to update the remote notice board from far off places using GSM MODEM by sending SMS between the mobile and the embedded devices (microcontroller 89c51). This remote control of notice board is possible through embedded system. The microcontroller is interfaced with GSM Modem in mobile Phone via MAX232level converter.

The microcontroller system is designed to allow easy use of a mobile Phone to update the notice board at any far location. Using a mobile Phone the development of the notice board is being carried out using SMS, this will update the notice board with the help of the microcontroller modules attached to it, which provides the moving message displayed on the LED using 89c51. The numbers of notice boards are connected in

IOT to get the status of the notice boards automatically to the cellular device.

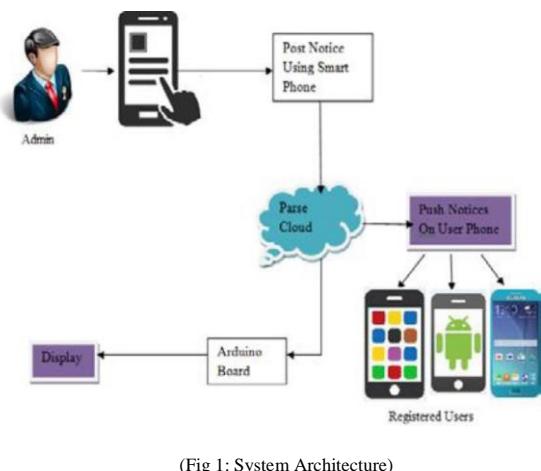
III. BACKGROUND STUDY

SMS application has been used in education to send notification using paperless environment to a group of students in campus pertaining to class cancellation, test announcement and class postponements without pasting information using paper. The advantages of the work includes that the information could be received quickly and it reduces the number of non-notified students. This presents a new way of online communications through mobile to notice board that helps students and lecturers to be always aware of appointments no matter where they are. Among the advantages of the system includes reduced time lag problem.

IV. PROBLEM ANALYSIS

Nowadays every advertisement is going to be digital. The big shops and shopping centers are using the digital moving displays now. In Railway station and bus stands everything that is ticket information, plat form number etc is displaying in digital moving display. But in these displays if they want to change the message or style they have to go there and connect the display to PC or LAPTOP.

Suppose the same message if the person want to display in main centers of the cities, means he has to go there with laptop and change the message by connecting into PC. This system is also useful mainly for police or army. i.e. displays will be connected to all the main centers in city if they want to display messages about something crucial within 5 minute, which they cannot. So keeping this in mind a new display system which can be accessed remotely, using the GSM technology to make the communication between microcontroller and mobile was designed.



V. HARDWARE DESCRIPTION

A. Microcontroller – ATMEGA238

8051 based CMOS controller with dual DPTR, 32 I/O Lines, WDT, PCA, 3 timers/Counters, 7Interrupts/4PriorityLevel64K Bytes ISP FLASH EPROM, 256 Bytes on-chip RAM.

Vital role of micro controller in Remote notice board using GSM with SMS: The microcontroller inside the system is programmed in such a way that when the modem receives any message, the microcontroller will read the message from serial port and verify for the password, if the pass word is correct then it will start displaying the messages on the LED display system. LED is connected to microcontroller as 4 bit data mode, before displaying anything on the LED, initialization has to be done, so microcontroller will control the LED initialization and select the data register and command register according to the purpose. Memory is connected to microcontroller using two pins, it is communicating with the microcontroller through I2C communication.

B. 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. Buzzer is connected to microcontroller port pin, so microcontroller will give high or low to switch on/off buzzer. In this system it is used to define the arrival of the SMS in the form of sound.

(Table1: AT Commands Table)

AT Command	Meaning
+CMGS	SEND MESSAGE
+CMSS	SEND MESSAGE FROM STORAGE
+CMGW	WRITE MESSAGE TO MEMORY
+CMGD	DELETE MESSAGE
+CMGC	SEND COMMAND
+CMSS	MORE MESSAGES TO SEND

C. RS232 converter (MAX232N)

Vital role of RS232converter (Max 232n)in GSM based LED display .RS232 converter is a chip to convert the TTL voltage levels into RS 232 level and vice versa. In this system GSM modem is communicated with the microcontroller using RS232 serial data format. In order to make MODEM serial port compatible with microcontroller serial port the RS232converter is used.

D. GSM modem (900/1800MHz)

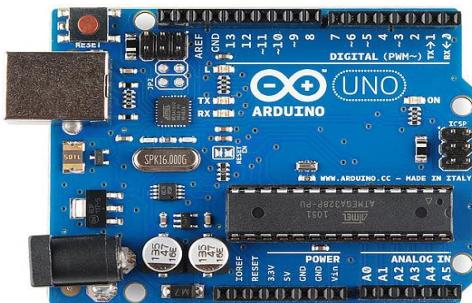
A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives

data through radio waves. Like a GSM mobile P10one, 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 in to 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. Some common basics MS related AT Commands are shown in table below:

E. Arduino UNO Board

Arduino is an open-source platform used for building electronics projects. Arduino consists of both a P10ysical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the P10ysical board.

The Arduino platform has become quite popular with people just starting out with electronics, and for good reason. Unlike most previous programmable circuit boards, the Arduino does not need a separate piece of hardware (called a programmer) in order to load new code onto the board – you can simply use a USB cable. Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program. Finally, Arduino provides a standard form factor that breaks out the functions of the micro-controller into a more accessible package.



(Fig 2: ARDUINO UNO Board)

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

1.0 pinout: added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board. In future, shields will be compatible with both the board that uses the AVR, which operates with 5V and with the Arduino Due that operates with 3.3V. The second one is a not connected pin, which is reserved for future purposes.

- Stronger RESET circuit.
- Atmega 16U2 replace the 8U2.

"Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform.

CHARACTERISTICS	SPECIFICATIONS
Microcontroller	ATmega328
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	6
DC Current per I/O Pin	40 Ma
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB of which 0.5 KB used by bootloader
SRAM	2 KB
EEPROM	1 KB
Clock Speed	16 Hz

(Table 2: Characteristics of ARDUINO UNO)

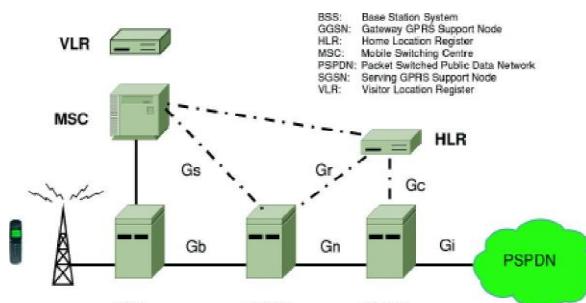
F. GPRS

The General Packet Radio Service (GPRS) is an enhancement to the existing GSM network infrastructure and provides a connectionless packet data service. The same cellular base-stations that support voice calls are used to support GPRS and as a consequence GPRS can be used wherever it is possible to make a voice call. GPRS roaming agreements exist with a large number of countries and this means users can use GPRS devices whilst abroad. GPRS is based on internet Protocols (IP) and enables users to utilize wide range of applications—email and internet and/or intranet resources for instance. With throughput rates of upto 40Kbit/s, users have a similar access speed to a dial-up modem, but with the convenience of being able to connect for many where.

GPRS is classed as being a packet switched network whereby radio resources are used only when users are actually sending or receiving data. Rather than dedicating a radio channel to a mobile data user for a fixed period of time, the available radio resource can be concurrently shared between several users.

This efficient use of scarce radio resources means that large numbers of GPRS users can potentially share the same bandwidth and be served from a single cell. The actual number of users supported depends on the applications being used and how much data is being transferred.

The General Packet Radio Service (GPRS) is an enhancement to the existing GSM network infrastructure and provides a Connectionless packet data service. The same cellular base-stations that support voice calls are used to support GPRS and as a consequence GPRS can be used wherever it is possible to make a voice call. GPRS roaming agreements exist with a large number of countries and this means users can use GPRS devices whilst abroad.



(Fig 3: GPRS System Architecture)

G. Parse Cloud

Parse cloud is used to provide a back-end for an Android application. Parse is one of the most popular Back-end as Service platforms for android application. The service offers three products in one package: 1) Parse Core, 2)Parse Push and 3)Parse Analytics .Parse Core generally handles the saving of data and social media integration. Parse Push cloud is used to send push notifications on smart phone. It enables the developer to customize, schedule and send push notifications to all registered users or either a selected group of users .Parse Analytics enables you to track your application data. You can track usage data such as installations and active users, user retention, push notification open rate etc. Parse API classes used for cloud-storing and manipulating users, data objects, and files for your mobile applications.

H. IoT

The Internet of things (IoT) is the inter-networking of physical devices, vehicles, buildings, and other items—embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data. The IoT allows objects to be sensed or controlled remotely across existing network infrastructure, creating opportunities for more direct

integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention. Here all the digital notice boards are connected through IoT.

VI. SOFTWARE DESCRIPTION

A. Express PCB

Express PCB is free PCB software and is easy to learn and use. Designing circuit boards is simple for the beginner and efficient for the professional. The board manufacturing service makes top quality two and four layer PCBs.

B. Embedded C

Embedded C is used for microcontroller programming. There is a large and growing international demand for programmers with 'embedded' skills, and many desktop developers are starting to move into this important area. Because most embedded project shaves ever cost constraints, they tend to use low -cost processors like the 8051 family of devices considered in this paper.

C. Keil

Keil development tools for the 8051 Microcontroller Architecture support every level of software developer from the professional applications engineer to the student just learning about embedded software development. The Keil 8051 Development Tools are designed to solve the complex problems facing embedded software developers.

VII. P10 SMI- OUTDOOR GREEN COLOR LED MODULE

Features

The P10 SMI- Outdoor Green Color LED has the features of smooth finish, sturdy construction and long lasting in performance.

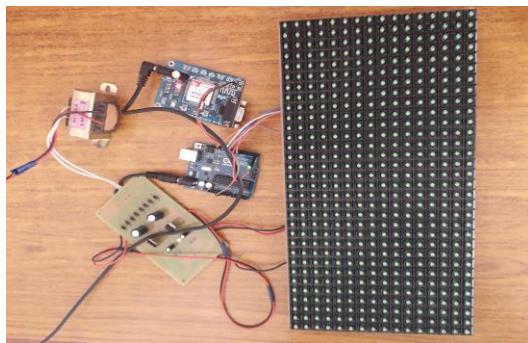
Other information's

The other information of the P10 SMI-outdoor green color LED is, it has P10 Color Display Item Specification Pixel Pitch (mm) 10, Pixel LED, DIP546 ,Pixel Density (dot/m²), 10000PixelConfiguration 1GModule Size (Lmm*Hmm) 320*160,Brightness(CD/m²)4000,Best Viewing Angle, 45°/100°, Drive Mode, Constant Current drive 1/4 scan, Drive IC74HC595,Working Voltage AC110V, 220~240V,50HZ,Environment Temperature.

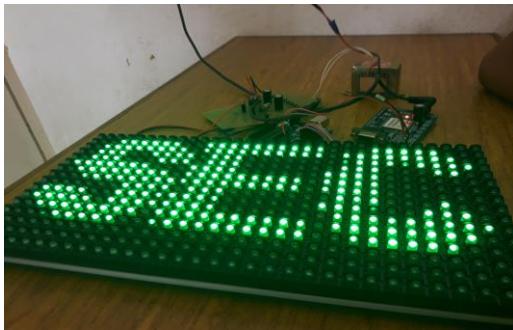
VIII. RESULTS



(Fig 4: Simulation using ARDUINO)



(Fig 5: Real Time Digi-Notice Board interfacing)



(Fig 6: Real Time Digi-Notice Board System)

IX. CONCLUSION

The proposed system accepts the message, stores it, validates and displays it on the LED display. LED displays are used to display messages in Railway stations, shopping malls for displaying advertisement, Educational institution and organizations, managing traffic in smart cities and other public utility places. Cost of printing and photocopying is also reduced because the information can be delivered to a large number of people in a very short time. It provides faster transfer of information and are easy to install and maintain. This paper provides an efficient way of displaying messages on Notice Board and also gets auto notification using Wireless Technology. It also provides user to easily receive the important information or message.

X. REFERENCES

- [1] E. Ferro and F. Potorti, Bluetooth and Wi-Fi wireless protocols a survey and comparison, *Wireless Communications*, IEEE, vol. 12, no. 1, pp.12- 26, February 2005
- [2] J. S. Lee, Y. W. Su, and C. C. Shen, "A Comparative Study of Wireless Protocols: Bluetooth, UWB, ZigBee, and Wi-Fi", *Proceedings of the 33rd Annual Conference of the IEEE Industrial Electronics Society (IECON)*, pp. 46-51, November 2007.
- [3] Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinley, " The 8051 Microcontroller and Embedded System using Assembly and C", second edition, Upper Saddle River, N J Pearson publication, 2006.
- [4] Bhupesh Aneja , Chhavi Srivastav , Kartavya Farashwal , Ajey Aditya "Wireless Electronic Display Board Using GSM Technology", *International journal of advanced technology in Engineering and science*, Volume no 4.Issue no 3, March 2016.
- [5] Mayur R. Bhoyar, Suraj Chavhan and Vaidehi Jaiswal, (2014) "Secure method of updating digital notice board through SMS with PC monitoring system", *IOSR Journal of Computer Science (IOSRJCE)*, e-ISSN: 2278-0661, p-ISSN: 2278-872, pg. 24-29.
- [6] Nivetha S. R., Puritha R., Preethi Selvaraj and Yashvanthini S. M., (2013) SMS based wireless notice board with monitoring system, *International Journal of Advanced Electrical and Electronics Engineering, (IJAEEE)*, ISSN (Print): 2278-8948, Volume 2, Issue 3, pp 58-62.
- [7] Anuradha Mujumdar, Vaishali Niranjane & Deepika Sagne, (2014) "Scrolling LED display using wireless transmission", *International Journal of Engineering Development and Research (ISSN: 2321-9939)*, Volume 2, Issue 1, pp 475-478.
- [8] Gowrishankar Kasilingam , Mritha Ramalingam and Chandra Sekar (2014) "A Survey of Light Emitting Diode (LED) Display Board", *Indian Journal of Science and Technology*, Vol 7(2), 185-188, February 2014.
- [9] Vijay Kumar Garg, Joseph EWilkes, *Principle and Application of GSM*, Upper Saddle River, NJ [u.a.] Prentice Hall PTR, pp. 177-192, 1999