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Wireless Electronic Notice Board Using GSM Technology

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Abstract— With the advancing technology nowadays, the wireless communication is proving its importance in each and every field of today's era. This paper deals with use of one such wireless technology GSM for controlling electronic notice boards using LPC2148 microcontroller IC. The proposed system is a combination of hardware as well as software. The hardware module constitutes of GSM modem, computer interface, microcontroller, monitoring system, and LCD and GLCD display. The software module also consists of MATLAB based GUI so as to monitor the information to be displayed on notice board efficiently as well as enter in the notices through the computer were the GUI is been used.
Keywords— Wireless Communication, Graphical User Interface (GUI), LPC2148, GLCD, Matlab, SIM900 GSM Modem

I. INTRODUCTION

Notice Board is common information sharing medium in any institution or any public place like bus stations, railway stations and amusement parks. But putting on various notices day in and day out is time consuming. Additional man power is required to take care of this notice display board. This paper deals with an advanced electronic wireless notice board.
Electronic notice board is a common device that is used to display information. The information or messages are displayed using LCD's and Graphical LCD's. The wireless system for LCD's is a method using Radio Frequency as transmission medium. The system consists of two modules: transmitter and receiver. The transmitter module is used by a user to place a message through an input module PC/Mobile. The information is then transmitted using GSM technology to the receiver. It then will be decoded and displayed on electronic notice board.

A. Limitations of existing technology

1) Currently we rely on the conventional technique of using paper for notices. This is time consuming method.
2) This leads to wastage of paper. Renovation of the notice needs a new hardcopy.
3) All notice boards presently rely on wired electronic systems. One of the major drawbacks of this design is its inflexibility or its bulkiness. The messy wirings in these systems make it difficult to place anywhere.

To overcome the above limitations we will use GSM Modem which would provide Wireless medium, better reliability and ease of sharing information over a wireless media.

B. Objective of the project

The main objectives of our project are mentioned below:

1) The main objective of this project is to develop a wireless notice board that will be used by the faculty in order to display latest information at its respected institutions.
2) Wireless electronics notice board is developed as user friendly notice board with wireless concept that offers the flexibility to control the notice board within range of GSM Communication System.
3) To reduce the messy wiring of earlier electronic wired model.
4) To increase speed of communication.
5) To promote the reusability of existing design and decrease the area required which will manage the cost factor.

II. LITERATURE SURVEY

With the development of cellular networks in the 1970's for increasing the lack of frequencies in the radiotelephone services which in turn lead to introduction of AMPS (Advanced Mobile Phone System) where the transmission was analog based. This was known to be the first generation in cellular networks. The second generation was based on digital transmission and was called with various abbreviations as GSM (Global System for Mobile communications), ERMES (European Radio Messaging System). Various Cordless telephone standards were also introduced during this time only. The third generation has risen with the unification of different technologies; some of them which are popularly known are FPLMTS (Future Public Land Mobile Telecommunications System), UMTS (Universal Mobile Telecommunication System), and IMT-2000.

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The word GSM stands for Global System for Mobile Communications. Nowadays interest regarding GSM related concepts is increasing. So, we have surveyed a list of various GSM based projects ideas which are having more demand and very interesting to learn. The projects based on GSM technology we surveyed gave us better idea about the GSM technology.

A. GSM based Data Acquisition system: This is a process control system that enables the operator to regulate and monitor that are spread along various places [1]. This project monitors various parameters like light intensity, humidity, wind direction, temperature, rainfall, etc. This system eliminating the need for man power to visit each site for inspection and data collection thus saving money and time. All types of industries are using these systems for example food processing, electrical distribution and security alarms.

B. SMS based teaching and learning system: SMS technology is one the most stable technologies around the world [2]. Most of the students carry mobile phones with SMS facilities that can be used for teaching and learning. This project lets the student know about the topic studied earlier s it gives a review on the topic as well notifies them about the further topics to be studied. This project system is capable of supporting administrative teaching and learning activities through the help of SMS technology.

C. Multiple units GSM controlled devices: The human brain always is in search of information of interest to control systems of its choice [3]. In this modern-age of electronic systems it is very important to be able to manage and acquire as much as information from all places. Remote management of several office appliance and machineries and also homes is a subject of growing interest and in recent times we have seen many such systems giving out such controls. In this system we have developed an interface which is a phone based home-office remote controller equipped with power to turn ON/OFF the appliances and receive status of electrical appliances placed at various positions.

So, studying the above project concepts we came to an understanding that GSM network is widely used today whether it is for calling or SMS or the above discussed topics. Also some places need urgent notices like in school-college, railway stations, airports, stock-market and this notice should be in real-time, so we need a real-time notice board. This project is our experiment to give a start to the era of real-time noticing. This project is about writing the message which is to be displayed in mobile and send it as SMS to other side and we can also use our MATLAB based GUI to send the same message. Also by interfacing a voice data recording IC with Microcontroller we can also do announcements in real-time.

III.BLOCK DIAGRAM & DESCRIPTION

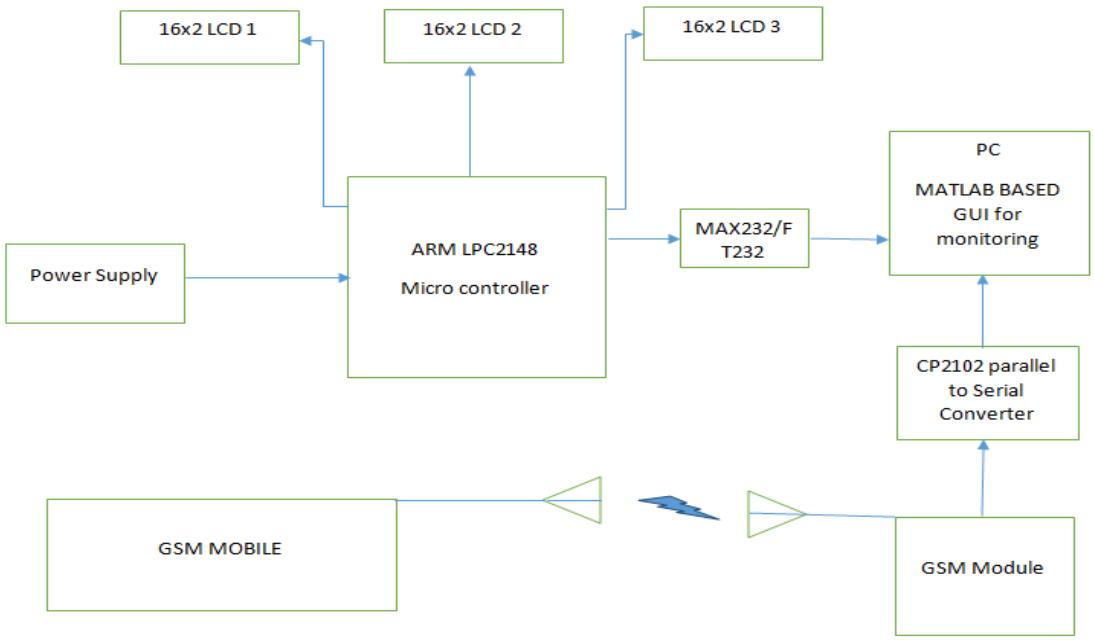


Fig. 1. Block diagram of the proposed system.

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A. GSM Modem

A GSM modem [5] is a wireless modem which works with a GSM wireless network. It behaves like a dial-up modem. The major difference between them is that a dial-up modem sends and receives data through a fixed telephone line whereas a wireless modem sends and receives data through medium of radio waves. Just like a GSM cell-mobile phone, a GSM modem needs a SIM card from a wireless carrier in order to operate. This is a compact and portable terminal that can satisfy various data communication needs over GSM. It can be connected to a computer with the help of a standard RS232C serial port. It offers features like SMS, Data Services, Fax Services and Web Browsing. Data File transfer and remote login is also supported by GSM Modems. This is perfect equipment for construction sites, dams, factory plants and resorts where wired connectivity is neither practicable nor available. Both Dial-up Modems and GSM modems support a common set of standard AT commands. GSM modem can be used just like a dial-up 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. Extended AT commands give you the following options:

1) Read, write and delete messages.
2) Send messages.
3) Signal strength monitoring.
4) Battery charging and monitoring status.
5) Read, write and search phone book entries.

COMMANDS	MESSAGE
+CMGS	SEND MESSAGE
+CMSS	SEND MESSAGE FROM MEMOR
+CMGW	WRITE MESSAGE TO MEMORY
+CMGD	DELETE MESSAGE
+CMGC	SEND COMMAND
+CMMS	MORE MESSAGE TO SEND

TABLE 1. BASIC AT COMMANDS

B. Microcontroller LPC2148

The LPC2148 microcontrollers are based on a 32/16 bit ARM7TDMI-S CPU with real-time emulation and embedded gateways and protocol converters, software modems, voice recognition and low end imaging, providing both large buffer size and high processing power[5]. Various 32-bit timers, single or dual 10-bit ADC, 10-bit DAC, PWM channels and 45 fast GPIO lines with up to nine edge or level sensitive external interrupt pins make these microcontrollers particularly 1suitable for industrial control and medical systems. The microcontroller is programmed in such a manner so as to continuously scan the transformer and update the parameters at a particular time interval. The parameter values sensed by the microcontroller are transmitted through the GSM transmitter connected to the microcontroller unit.

C. MAX232

IC MAX232 converts signals from an RS-232 serial port to signals suitable for use in TTL compatible digital logic circuits [5]. The MAX232 is a dual driver-receiver and typically converts the RX, TX, CTS and RTS signals. The drivers provide RS-232 voltage level outputs (approx. ± 7.5 V) from a single + 5 V supply through on-chip charge pumps and external capacitors. This makes it useful for implementing RS-232 in devices that otherwise do not need any voltages outside the 0 V to + 5 V range, as power supply design does not need to be made more complicated just for driving the RS-232 in this case.

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D. LCD Display

In our project we are using GLCD (128x64) as well as basic LCD (2x16) displays. The basic LCD requires 3 control lines as well as 4 or 8 I/O lines for the data bus. The user may select whether the LCD is to operate with a 4-bit data bus or an 8-bit data bus. If a 4-bit data bus is used the LCD will require a total of 7 data lines (3 control lines plus the 4 lines for the data bus). If an 8-bit data bus is used the LCD will require a total of 11 data lines (3 control lines plus the 8 lines for the data bus). Whereas for the GLCD we require 5 control lines and 8 data lines

E. Power Supply

Power supply is an electrical power source to the whole system. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others. Here in our application we need a 5v DC power supply for all electronics involved in the project [5]. This requires step-down transformer, rectifier, voltage regulator, and filter circuit for generation of 5v DC power. An additional 12v adapter provided with the GSM modem is used for its power supply.

F. GSM Modem and PC Interfacing

GSM Modem is used to receive message from the authorized user. This GSM modem requires a SIM card from a wireless carrier in order to operate. This SIM number is contact number of the receiving section. PCs use AT commands to control modems. Although GSM modem is interfaced with PC through Bluetooth using a MATLAB program, a GSM modem can be tested before actually implementing into the system. The MS HyperTerminal is a used for to testing the GSM device. First type “AT” A response "OK" should be returned from the mobile phone or GSM modem. Now we will type "AT+CPIN?" this is used to query whether the mobile phone or GSM modem is waiting for a PIN (personal identification number, i.e. password). If the response is "+CPIN: READY", it means the SIM card is ready for use. After this, various AT commands depending on the used modem’s instruction set are send to modem and responses are received.

G. Graphical User Interface(GUI)

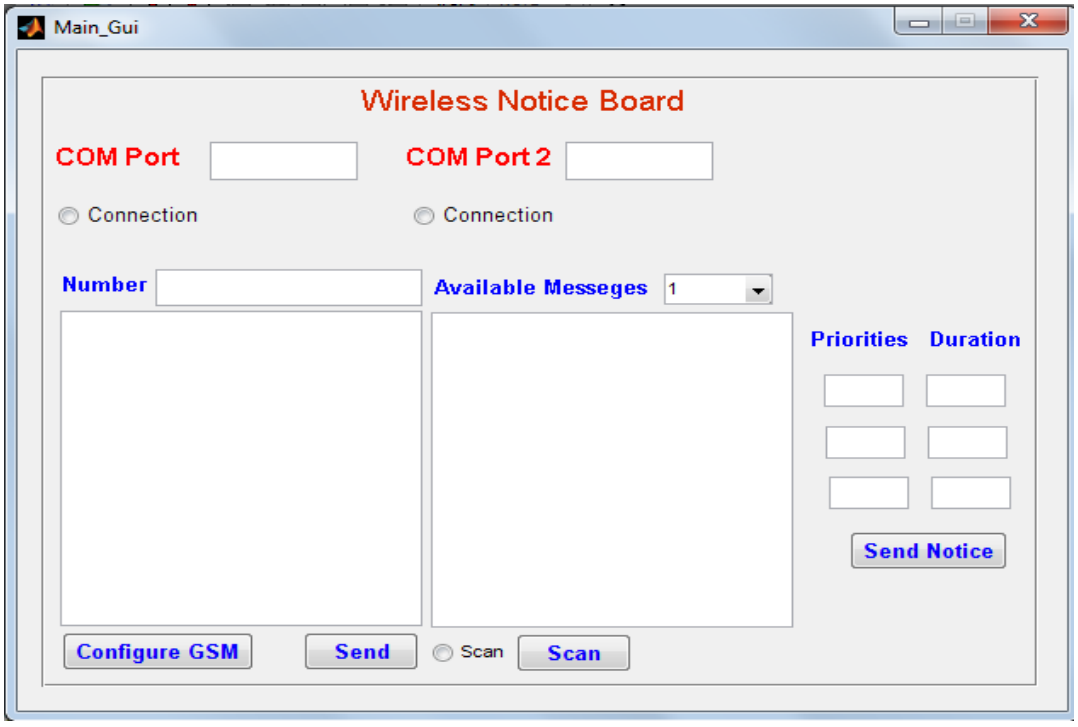


Fig. 2. GUI for the system

H. Algorithm

1) START
2) Type notice on mobile and send it over a GSM Network via SMS.
3) Message is received at receiver side at GSM modem

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4) Check for the new message
5) Check the sender's number. Is it valid or not (for Authentication).
6) If not then keep displaying old message (notice).
7) Else check for the priority of message.
8) If higher in priority, replace old/previous message with new one.
9) Else keep displaying old/previous message.

IV. CONCLUSIONS

The prototype of the proposed GSM based electronic notice board is successfully designed. It can be easily integrated with all general purpose display board thus proving its mobility. The system accepts the message to be displayed in the form of Short Message Service (SMS), stores it, checks for its validation and then displays it on the display unit if it from an authorized user. This system supports only one message at a time. This limitation can be tackled by use of higher end microcontroller and extended RAM. The proposed system can be efficiently used for transfer of message instantly in the campus.

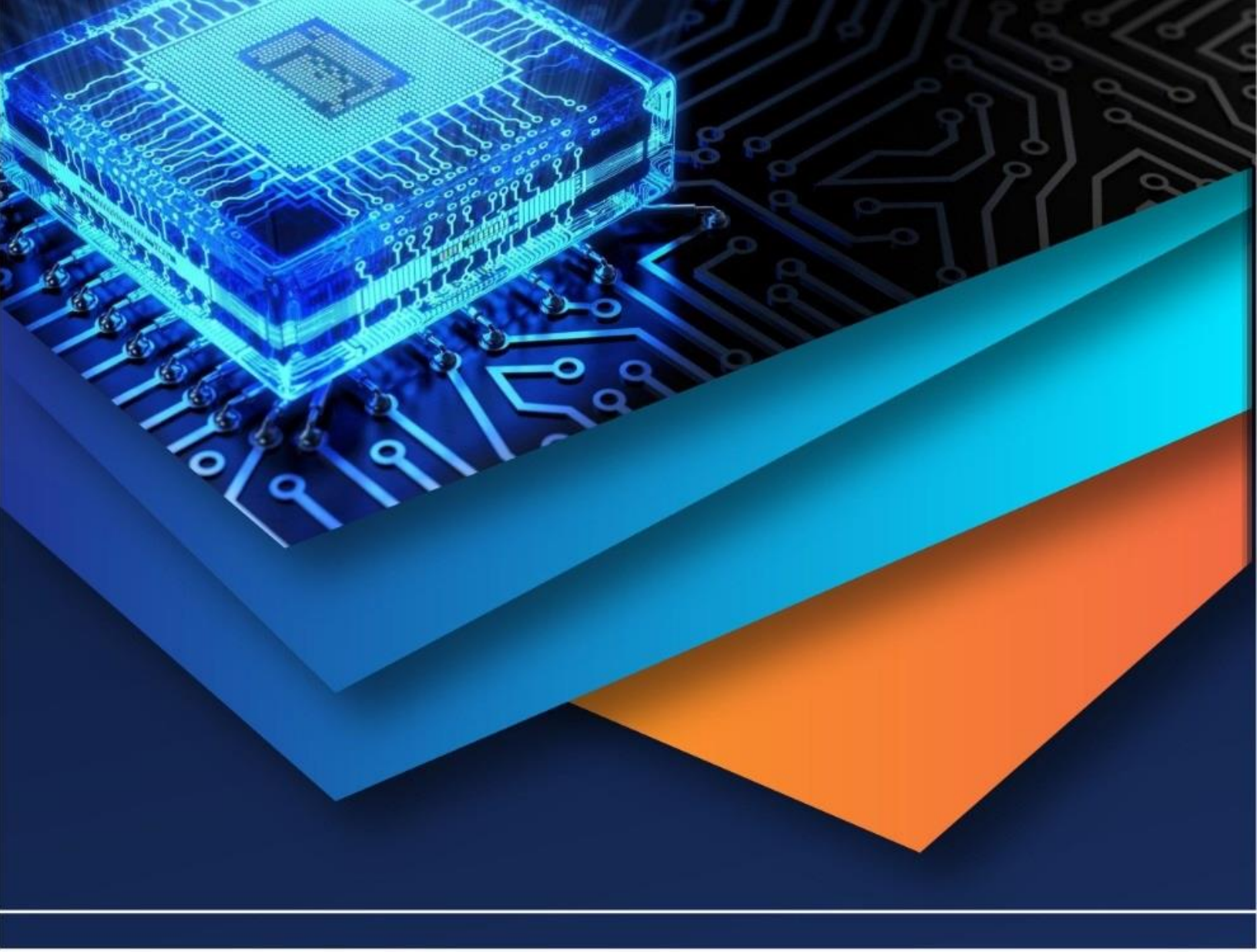
V. ACKNOWLEDGMENT

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