

INFORMATION DISSEMINATION IN EDUCATIONAL INSTITUTIONS BY USING ELECTRONIC DISPLAY SYSTEM

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ABSTRACT:

The availability of up-to-date information to people is an important requirement in many scenarios such as companies and civil institutions. In this regard, most establishments either use websites, emails or notice boards. However, in developing countries internet access is not available to many people on their mobile devices because of high costs. Moreover, having an electronic notice board requires that people need to go to one place to get the required information thus resulting in long queues as well as inconvenience on the part of the person. In this paper, we propose a system that can be used to provide up-to-date information to students or employees of any institute using latest and most common technology. This is an automated system that utilizes GSM technology along with an embedded server. The system is designed to work independently without the need of any human operator and when a student or employee needs any information, they will need to send an SMS to this system which will respond with the information required by user. The system also has the facility to inform students or employees about any instant update via SMS and it can also be remotely updated with new information. Furthermore, the system has the capability to store previous notifications which have been sent and is designed to work 24/7.

This project uses regulated 5V, 500mA power supply. Unregulated 12V DC is used for relay. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac output of secondary of 230/12V step down transformer.

I. INTRODUCTION

Communication devices such as mobile handsets and similar wireless innovations have become ubiquitous. Multipledomains in the field of Communication and Embedded devices are

being increasingly explored. The use of cell phones has witnessed a rapid increase. Developments in communication technologies have led to the growth of dense networks. As a means of communication, notice boards are widely popular, with its applications ranging from schools, colleges, hospitals to major organizations. Notice boards effectively tackle the global problem of deforestation by conveying messages at large without the use of paper. Such innovative measures will go a long way in regulating the damage to the environment. GSM technology aims to reduce the complexity in sending a message by incorporating SMS (Short Message Service) technology. This technology can be put to use in public areas such as hospitals, schools, multiplexes and buildings to enhance the security system and also to spread awareness in an emergency. The objective of this paper is to review the various proposals and technologies of a SMS controlled wireless display board which may eventually substitute the presently used paper based and programmable notice boards.

II. EXPERIMENTAL SETUP

This system uses a microcontroller and a GSM Modem for analyzing the obtained message and performing the corresponding action. Serial communication is accomplished using RS-232 standards. Various AT commands would be employed for the synchronization between microcontroller and the GSM module.

POWER SUPPLY BLOCKDIAGRAM:

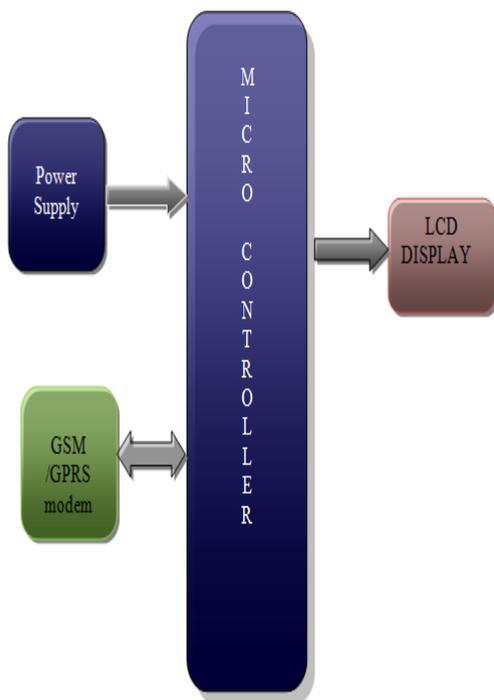
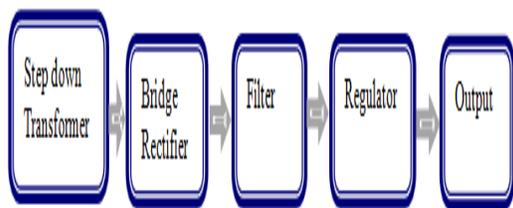


Fig 1: Block diagram of project

III. HARDWARE DESCRIPTION
TECHNICAL SPECIFICATIONS:

HARDWARE:

Micro controller :	ARM7 (LPC2148)
Crystal :	12MHZ
GSM /GPRS modem :	SIM 900
LCD :	HD44780
Driver IC :	MAX 232
POWER SUPPLY	
Transformer :	12V step
down	
Filter :	1000uf/25V
Voltage Regulator :	7805

SOFTWARE:

Keil micro vision
Proteus
UC flash

A. GSM Modem

Using a SIM, a GSM Module can operate as a mobile handset equipped with its distinct mobile number. The benefit of using a GSM modem is that the RS232 port can be used to serially communicate with the system. The modem can be used to make or receive calls, or to send and receive messages.

B. SIM

SIM is the abbreviation for Subscriber Identity Module. It is an on chip card which consists of the owner's details and contact list. Users may change their operator using the same device. In dual SIM handset, two operators can be used on the same handset.

A. Modules and Description

1. LPC2148 Microcontroller

LPC2148 microcontroller board is based on a 16-bit/32-bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combine microcontrollers with embedded high-speed flash memory ranging from 32 KB to 512 KB. A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at the maximum clock rate. For critical code size applications, the alternative 16-bit Thumb mode reduces code by more than 30% with minimal performance penalty. The meaning of LPC is Low Power Low Cost microcontroller. This is 32-bit microcontroller manufactured by Philips semiconductors (NXP). Due to their tiny size and low power consumption, LPC2148 is ideal for applications where miniaturization is a key requirement, such as access control and point-of-sale.

2. Features of LPC2148 Microcontroller

- 16-bit/32-bit ARM7TDMI-S microcontroller in a tiny LQFP64 package.
- 8 KB to 40 KB of on-chip static RAM and 32 KB to 512 KB of on-chip flash memory; 128-bit wide interface/accelerator enables high-speed 60 MHz operation. USB 2.0 Full-speed compliant device controller with 2 KB of endpoint RAM. In addition, the LPC2148 provides 8 KB of on-chip

- RAM accessible to USB by DMA. One or two (LPC2141/42 Vs, LPC2144/46/48) 10-bit
- ADCs provide a total of 6/14 analog inputs, with conversion times as low as 2.44 ms per channel. Single 10-bit DAC provides variable analog output
- (LPC2148 only) Two 32-bit timers/external event counters (with four
- capture and four compare channels each), PWM unit (six outputs) and watchdog. Low power Real-Time Clock (RTC) with independent
- power and 32 kHz clock input

3. Power Supply

All electronic circuits works only in low DC voltage, so we need a power supply unit to provide the appropriate voltage supply for their proper functioning .This unit consists of transformer, rectifier, filter & regulator. AC voltage of typically 230volts rms is connected to a transformer voltage down to the level to the desired ac voltage. A diode rectifier that provides the full wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage. This resulting dc voltage usually has some ripple or ac voltage variation. A regulator circuit can use this dc input to provide dc voltage that not only has much less ripple voltage but also remains the same dc value even the dc voltage varies somewhat, or the load connected to the output dc voltages changes.

4. Transformer

A transformer is a static piece of which electric power in one circuit is transformed into electric power of same frequency in another circuit. It can raise or lower the voltage in the circuit, but with a corresponding decrease or increase in current. It works with the principle of mutual induction. In our project we are using a step down transformer to providing a necessary supply for the electronic circuits. Here we step down a 230volts ac into 12volts ac.

5. Rectifier

A dc level obtained from a sinusoidal input can be improved 100% using a process called full wave rectification. Here in our project for full wave rectification we use bridge rectifier. From the basic bridge configuration we see that two diodes(say D2 & D3) are conducting while the other two diodes (D1 & D4) are in off state

during the period $t = 0$ to $T/2$.Accordingly for the negative cycle of the input the conducting diodes are D1 & D4 .Thus the polarity across the load is the same. In the bridge rectifier the diodes can be of variable types like 1N4001, 1N4003, 1N4004, 1N4005, 1N4007 etc... can be used. But here we use 1N4007, because it can withstand up to 1000v.

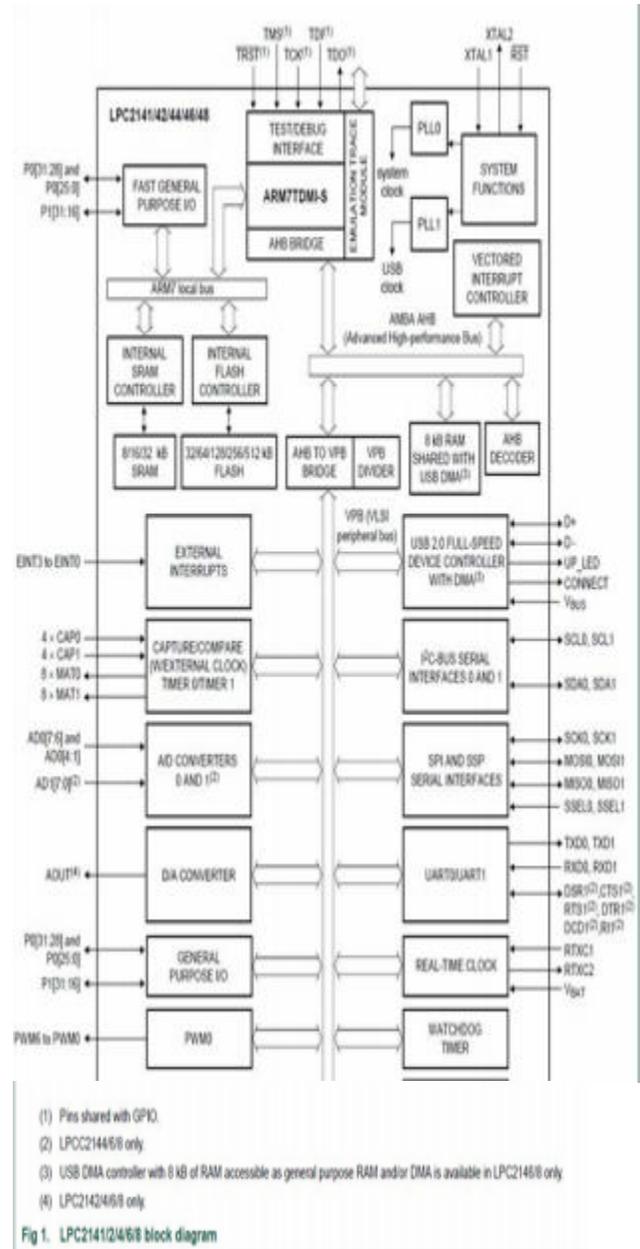


Fig.2. Block Diagram

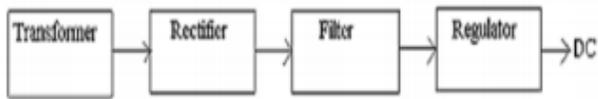


Fig.3. General Block of Power Supply Unit

6. Filters In order to obtain a dc voltage of 0 Hz, we have to use a low pass filter. So that a capacitive filter circuit is used where a capacitor is connected at the rectifier output & a dc is obtained across it. The filtered waveform is essentially a dc voltage with negligible ripples & it is ultimately fed to the load.

7. Regulators The output voltage from the capacitor is more filtered & finally regulated. The voltage regulator is a device, which maintains the output voltage constant irrespective of the change in supply variations, load variations & temperature changes. Here we use fixed voltage regulator namely LM7805. The IC LM7805 is a +5v regulator which is used for microcontroller.

D. Voltage Sensor

1. Description

This module is based on resistance point's pressure principle, and it can make the input voltage of red terminal reduce 5 times of original voltage. The max Arduino analog input voltage is 5V, so the input voltage of this module should be not more than $5V \times 5 = 25V$ (if for 3.3V system, the input voltage should be not more than $3.3V \times 5 = 16.5V$). Because the Arduino AVR chip have 10 bit AD, so this module simulation resolution is $0.00489 V (5V/1023)$, and the input voltage of this module should be more than $0.00489 V \times 5 = 0.02445V$.

2. Gas Leakage Sensor MQ-6

Sensitive material of MQ-6 gas sensor is SnO_2 , which with lower conductivity in clean air. When the target combustible gas exist, the sensor's conductivity is higher along with the gas concentration rising. Please use simple electro circuit, Convert change of conductivity to correspond output signal of gas concentration. MQ-6 gas sensor has high senility to Propane, Butane and LPG, also response to Natural gas. The sensor could be used to detect different combustible gas; it is with low cost and suitable for different application.

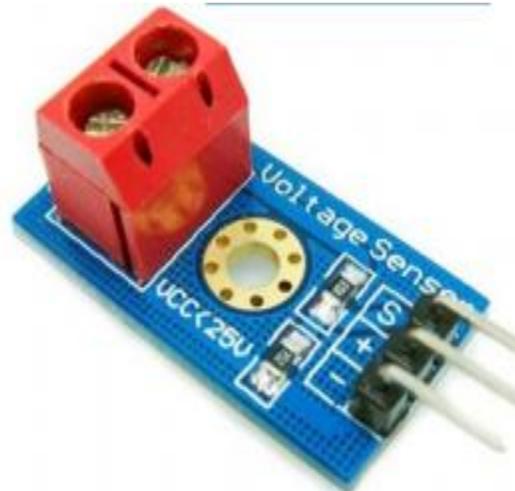


Fig.6. Voltage Sensor

3. Electronic Buzzer



Fig.7. Electronic Buzzer

4. Features

- The PS series are high-performance buzzers that employ uni morph piezoelectric elements and are designed for easy incorporation into various circuits.
- They feature extremely low power consumption in comparison to electromagnetic units.
- Because these buzzers are designed for external excitation, the same part can serve as both a musical tone oscillator and a buzzer.
- They can be used with automated inserters. Moistureresistant models are also available.
- The lead wire type (PS1550L40N) with both-sided adhesive tape installed easily is prepared.

5. Application

Electric ranges, washing machines, computer terminals, various devices that require speech synthesis output.

6. Light-emitting diode (LED)



Fig.8. Red, Pure Green and Blue Leds of the 5mm Diffused Type

7. LCD Display

Liquid crystal displays (LCDs) have materials which combine the properties of both liquids and crystals. Rather than having a melting point, they have a temperature range within which the molecules are almost as mobile as they would be in a liquid, but are grouped together in an ordered form similar to a crystal. An LCD consists of two glass panels, with the liquid crystal material sandwiched in between them. The inner surface of the glass plates are coated with transparent electrodes which define the character, symbols or patterns to be displayed. Polymeric layers are present in between the electrodes and the liquid crystal, which makes the liquid crystal molecules to maintain a defined orientation angle. On each polariser is pasted outside the two glass panels. This polariser would rotate the light rays passing through them to a definite angle, in a particular direction. When the LCD is in the off state, light rays are rotated by the two polarisers and the liquid crystal, such that the light rays come out of the LCD without any orientation, and hence the LCD appears transparent. When sufficient voltage is applied to the electrodes, the liquid crystal molecules would be aligned in a specific direction.

The light rays passing through the LCD would be rotated by the polarisers, which would result in activating / highlighting the desired characters. The LCD's are lightweight with only a few millimeters thickness. Since the LCD's consume less power, they are compatible with low power electronic circuits, and can be powered for long durations. The LCD does not generate light and so light is needed to read the display. By using backlighting, reading is possible in the dark. The LCD's have long life

and a wide operating temperature range. Changing the display size or the layout size is relatively simple which makes the LCD's more customer friendly. The LCDs used exclusively in watches, calculators and measuring instruments are the simple seven-segment displays, having a limited amount of numeric data. The recent advances in technology have resulted in better legibility, more information displaying capability and a wider temperature range. These have resulted in the LCDs being extensively used in telecommunications and entertainment electronics. The LCDs have even started replacing the cathode ray tubes (CRTs) used for the display of text and graphics, and also in small TV applications.



Fig.9.LCD Display

8. GSM (Global System for Mobile Communication)

GSM, reigns as the world's most widely used cell phone technology. Cell phones use a cell phone service carrier's GSM network by searching for cell phone towers in the nearby area. Global system for mobile communication (GSM) is a globally accepted standard for digital cellular communication. GSM is the name of a standardization group established in 1982 to create a common European mobile telephone standard that would formulate specifications for a pan-European mobile cellular radio system operating at 900 MHz. It is estimated that many countries outside of Europe will join the GSM partnership.



Fig.10. GSM Unit

9. General Features

- Tri-band
GSM/GPRS900/1800/1900Mhz
- GPRS multi-slot class 10
- GPRS mobile station class –B
- Complaint to GSM phase 2/2+
- -class 4(2W @900MHz)
- -class 1(1W @/18001900MHz)
- Dimensions: 40x33x2.85 mm
- Weight: 8gm
- 7. Control via AT commands
- (GSM 07.07, 07.05 and SIMCOM enhanced ATcommands) SIM application tool kit
- supply voltage range from 3.5 to 4.5 v
- Low power consumption
- Normal operation temperature: -20 °C to +55 „C
- Restricted operation temperature : -20 °C to -25 „C and +55 °C to +70 „C
- storage temperature: -40 „C to +80 „C

IV. RESULTS:



V. CONCLUSION

Various papers have been analyzed, and the prototype of the GSM based display device has been effectively studied. A comparative evaluation of the papers and their proposed technologies has been tabulated, and the outcomes, advantages and shortcomings of each paper have been drawn out. GSM technology is a vast field, and provides immense opportunity for innovation and development. Wireless notice boards using GSM eliminates the shortcomings of paper based conventional systems. A typical board consists of an embedded system, which communicates with the GSM modem, and displays the message on a display. This notice board would be highly effective in spreading information, and due to the low cost and wide range of GSM, the device can be installed and operated from anywhere. Further modifications and prototypes in this technology would be immensely fruitful.

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