ARDUINO BASED WIRELESS ELECTRONIC NOTICE BOARD USING GSM MODEM

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Abstract

The GSM based control system implements the emerging applications of the global system for mobile communication technology.The microcontroller will control the system by using the programming commands and the message will be display on the LCD.In the last of decodes,communication technology has developed by leaps and bounds.In our day-to-day life,we use many such appliances at home,office,and public places for our comfort a convenience. The use of Embedded system in communication has given rise to many interesting application GSM based control system implements the emerging application of the global system for mobile communication. so,by adding wireless communication interface such GSM to these systems,we can overcome their limitations.

***Keywords**:* LCD; SIM Card; Microcontroller

1. INTRODUCTION

The Global system for mobile communication technology was developed in the year 1970.The GSM based are also called campus display system (CDS). 7×5(5 segment display)light emitting diodes display interfaced to the dot matrix controller which converts instructions from a processor in the signal which turns ON or OFF lights in the matrix so that the required display is produced. GSM are used at other public place like schools, hospital, railway stations, garden etc., without affecting the surrounding environment. The notice board is the most important thing in any institution organized but changing different notice day by day is difficult process and consumes more time to overcome these problems here, is a project which deals with an innovative wireless notice board. The main concept of this project is to design a wireless notice board that display various notices sent from the mobile phone. It is further display interfaced to microprocessor powered by a regulated power supply from mains supply of 230 volts ac. [1] In this modern world mobile phones and the related technologies are becoming more prevalent. Various technical area in the field of telecommunication and embedded system and becoming omnipresent in the people.[2]

2.WORKING OF MATERIALS:

2.1. Components:

Microcontroller(8051-IC), GSM Modem, LCD (Liquid Crystal Display) and Arduino nano, SCR, pot, battery.

8051 has 8bit ALU which can perform all the 8-bit arithmetic and logical operations in one machine cycle.GSM can accept any network operator SIM card and card act just like a mobile phone with its own unique phone number.LCD (liquid crystal display) is an electronic device for displaying text or characters.

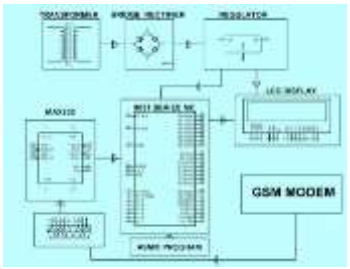

Fig.1 Block diagram of the GSM modem

GSM is combination of TDMA (Time Division Multiple Access), FDMAC (Frequency Division Multiple Access) and frequency hopping.The message received is thus sent to the 8051 microcontrollers. furthermore, that display it on a wireless notice board which is in built with an LCD display. Here LCD display is interfaced with an 8051 microcontroller which is duly powered by an RPS (regulated power supply) from a 230V AC mains supply as shown in fig.1.

Furthermore, designing of this wireless notice board project can be enhanced by providing a message storage facility by EEPROM (NON- VOLATILE MEMORY). This EEPROM is attached to the 8051 microcontrollers for the recovery of old message if needed.

2.2. HARDWARE:

1.Power supply

2. Microcontroller (LPC2148)

3. GSM

4.LCD Board

2.2.1. power supply

AC mains electricity to asuitable low voltage supply for electronic circuits and other devices. A D.C power supply which maintains the output voltage constantirrespective of act mains fluctuations or load variations is known as “Regulated D.C power supply” The power supply is designed to convert high voltage

2.2.2. Microcontroller

Microcontroller (LPC 2148) ARM stands for Advanced RISC Machines. It is a 32-bit processor core, used for high end application. It is widely used in Advanced Robotic Applications.The above circuit of the wireless electronic notice boards using GSM consists of 8051 microcontroller GSM MODULE (MODEM).[3]

Key features:

- 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.

● In-System Programming/In-Application Programming (ISP/IAP) via on-chip boot loader software. Single flash sector or full chip erase

● tracing of instruction execution.

● USB 2.0 Full-speed compliant device controller with 2 kB of endpoint RAM.

● In addition, the LPC2146/48 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 as per channel.

● Single 10-bit DAC provides variable analog output (LPC2142/44/46/48 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.

● Multiple serial interfaces including two UARTs (16C550), two Fast I2C-bus (400 kbit/s),

● SPI and SSP with buffering and variable data length capabilities.

● Vectored Interrupt Controller (VIC) with configurable priorities and vector addresses.

● Up to 45 of 5 V tolerant fast general purpose I/O pins in a tiny LQFP64 package.

● Up to 21 external interrupt pins available.

● 60 MHz maximum CPU clock available from programmable on-chip PLL with settling time of 100 as.

● On-chip integrated oscillator operates with an external crystal from 1 MHz to 25 MHz

● Power saving modes include Idle and Power-down.

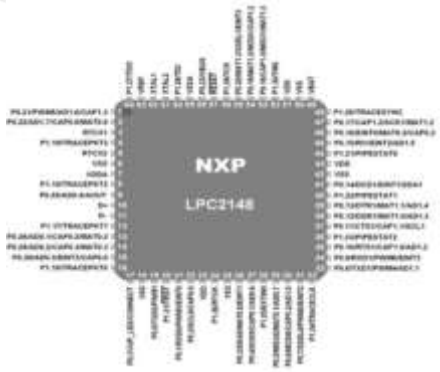

Fig.2 NXP LPC2148 Microcontroller

2.2.3. GSM Modem

This is a GSM/GPRS-compatible Quad-band cell phone, which works on a frequency of 850/900/1800/1900MHz and which can be used not only to access the Internet, but also for oral communication (provided that it is connected to a microphone and a small loud speaker) and for SMSs. Externally, it looks like a big package (0.94 inches x 0.94 inches x 0.12 inches) with L-shaped contacts on four sides so that they can be soldered both on the side and at the bottom. Internally, the module is managed by an AMR926EJ-S processor, which controls phonecommunication, data communication (through an integrated TCP/IP stack), and (through an UART and a TTL serial interface) the communication with the circuit interfaced with the cell phone itself as shown in fig.3. The processor is also in charge of a SIM card (3 or 1,8 V) which needs to be attached to the outer wall of the module. [4]

Fig.3 GSM Modem

Features

-Uses the extremely popular SIM900 GSM module

-Provides the industry standard serial RS232 interface for easy connection to computers and other devices

-Provides serial TTL interface for easy and direct interface to Microcontrollers -Optionally available USB interface for easy interface to laptops, computers, etc.,

-Onboard MIC and Speaker circuits and 3.5mm audio connectors for direct connection to mics and speaker

-All pins of the SIM900 module can be tapped into for expansion using onboard expansion holes. GPIO pins, Serial communication pins, 2 PWM pins, I2C pins and ADC pins are broken out to standard 0.1" spaced holes for easy expansion -Power, Status and Network LEDs for easy debugging

-Can be used for GSM based Voice communications, Data/Fax, SMS, GPRS and TCP/IP stack -Can be controlled through standard AT commands 36

-Module's operation mode can be controlled through the PWR Key connected to the PWRKEY pin (refer the SIM900 datasheet for more information)

-Comes with an onboard wire antenna for better reception. Board provides an option for adding an external antenna through an SMA connector

-The SIM900 allows an adjustable serial baud rate from 1200 to 115200 bps (autobaud by default) -Modem a low power consumption of 0.25 A during normal operations and around 1 A during transmission

-Operating Voltage: 7 – 15V AC or DC (board has onboard rectifier)

2.2.4. LCD Board

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 sand witched in between them. The inner surface of the glass plates is 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.

One each polarizer is pasted outside the two glass panels. These polarizers 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 polarizers 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 polarizers, 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 were electroniccircuits, and can be powered for long durations.

The LCD's don't 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. 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 23 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 smallTVapplications.

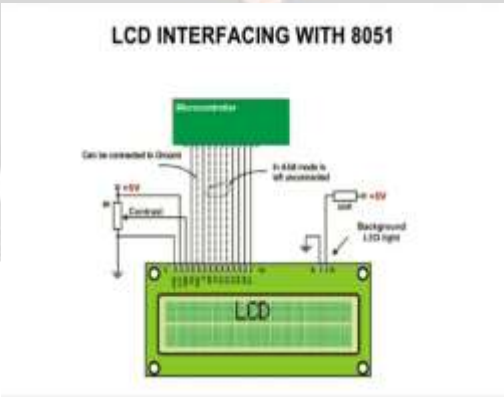

Fig. 4 LCD interfacing with 8051

LCD Operation

In recent years the LCD is finding widespread use replacing LEDs (seven-segment LEDs or other multi-segment LEDs). This is due to the following reasons. [2]

1. The declining prices of LCDs.

2. The ability to display numbers, characters and graphics. This is in contract to LEDs, which are limited to numbers and a few characters. Light is produced when the particles that carry the current (know as electrons and holes) combine together within the semiconductor material.[6]

3. Incorporation of a refreshing controller into the LCD, there by relieving the CPU of the task of refreshing the LCD. In the contrast, the LED must be refreshed by the CPU to keep displaying the data.

4. Ease of programming for characters and graphics.

Uses

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 eligibilities wireless communication is designed for audience for audience working in the communications and networking communities.[5] The 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.

3. SOFTWARE:

Embedded set of language extensions form the c programming language by the c standards committee to address commonality issues that exist between c extensions for different embedded systems.such ass fixed -point arithmetic, multiple distinct memory banks,distinct memory banks, and basic operations as shown fig 5.

Fig.5 LCD Operation

4. APPLICATIONS:

Education Institutions and organizations: currently we rely on putting up papers on notice boards to notice to inform people of events. This method can be discarded by using wireless notice boards to display information in real time [8]

Advertisement: In shopping malls we get to hear the offers on various products from time to time.Instead, we continuously display the information regarding the products and related offers on electronic display boards.

Railway station: Instead of announcing the delay in arrival of trains we can display the information.

4.1. MERITS:

User friendly: Messages are only to be typed on a mobile or a computer, which in turn are displayed wirelessly on the display unit.

Eliminate use of printers: since we don't use papers to display information, printers are also of use in this system.

Long range: As long as we have the requirement network coverage we can from any part of the world.

PROGRAM:

```
int pot = A7;
const int ENA = 6;
void setup ()
{
pin Mode (A7, INPUT);
Serial. Begin (9600);
pin Mode (ENB, OUTPUT);
}
void loop ()
{
//int pwm = analogRead(pot);
//Serial.println(pwm);
//pwm = map(pwm,1,1023,1,255);
//Serial Print
//Control Speed
analogWrite(ENB, 200);

}
```

5. RESULT AND DISCUSSION:

A commercial model should be able to display more than one message at a time currently in this project we are using on board RAM memory to save a single message. The uses of microcontroller in a place of general-purpose computer allows us to theorize on many further improvements on this project prototype the message is board cast by the mobile switching centre for a continuous time period during which as a many possible display board MODEMS catch the message and display it as per the constrains of validation. Using the principle of AT commands, we can put ON or OFF this appliance remotely

Fig.6 Explaining the circuit

6. CONCLUSION:

This project is remote notice board with modem connected to it, so if the user wants to display some messages, he will send the messages in SMS format. The SMS is deleted from the SIM each time it is read, thus making room for the next SMS. This project can be used mainly for police or army to display something crucial within a matter of seconds so keeping mind we are designing a new display system. We can access remotely, thus utilizing GSM technology. In this case it solves the problem of instant information transfer in the campus.

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