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ARM-7 based e-notice board

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Abstract
The proposed system based on GSM based LED notice board display on ARM 7 processor. Many companies are manufacturing audio/video systems like public announcement system, CCTV, programmable sign board all of them have static message. All the system are complex and wired in nature. In this project the person who wants to send the notice will send an SMS using his mobile which will be displayed on LED display. GSM increase the range over wide area. Also it removes the drawback of conversational system. The ARM LPC2148 is a 32 bit RISC processor which makes the system more energy efficient.

Keywords: LPC2148, UART, GSM, SMS, LED display

1. Introduction
This is an embedded based project. An embedded system is a combination of hardware and software. A Notice Board is a very essential device in any institution / organization or public utility place like bus stations, railway stations and parks. The main aim of this project is to design an SMS driven automatic display which reduces the manual operation. The information can in turn be updated instantly at the location. The message to be displayed is sent as an SMS to a GSM receiver module and message will be displayed on LED through the controller.

2. Component Description
A. LPC2148 ARM Controller
The LPC2148 is an Advanced RISC Machine. It is a 32 bit controller which follows Von Neumann architecture. It has 32KB RAM, Vectored Interrupt Controller, two 10bit ADCs with 14 channels, USB 2.0 Full Speed Device Controller. Two I2C serial interfaces, two 32-bit timers. It has a 3 way pipelining and a memory of 4GB along with two UARTs. Many external peripherals can also be interfaced with ARM if required. We preferred ARM over PIC because of its faster response i.e. it operates at a speed of 60 MHz and also due to its interrupt priority feature. It consumes less power. Since we are using both the UARTs it is necessary to prioritize the event occurring in the controller. A real-time clock which operates at 32 KHz is in-built in the controller.

B. LED Display
The size of LED display is 48x8(384 LEDs) 5mm dot size LEDs in Matrix format (8 LED height and48 LED width). It Operates at 5V and can connect directly to controller through RS232. Static display of characters without scrolling is possible. It operates at 5V supply and required Operating Current is 800 mA Peak. When all LEDs are lit up the display takes 800mA, so have a provision of that much current. If no LEDs are lit up the display take around 100mA which takes very less amount of current. The baud rate the board accepts as serial input string. 9600 – 8 bit data – No parity – 1 stop bit – Handshaking NONE Serial Input, It accepts Serial input baud rate of 3-5V voltage level. Can connect directly to a TXD pins of UART0 of ARM processor.

There are just three pins to use the display.

- **RX-IN = Receive Input:**

Input serial data of 3-5V logic level, usually connected to TXD pin of microcontroller

RS232.

- **+5V** = Power Input: Regulated 5V supply input. Current has to be capable of at least 800mA.
- **GND** = Ground level of power supply. Must be common ground with controller.

Volatile Memory: The display has internal memory for 255 characters. When display is powered off, the memory is cleared. LED Dots: Width are 48 LEDs across Height has 8 LEDs. All LEDs are made on for a brief moment (1sec) during power up so you can test the display Board Dimensions: 362 x 72 mm

C. Sim 300 GSM Module

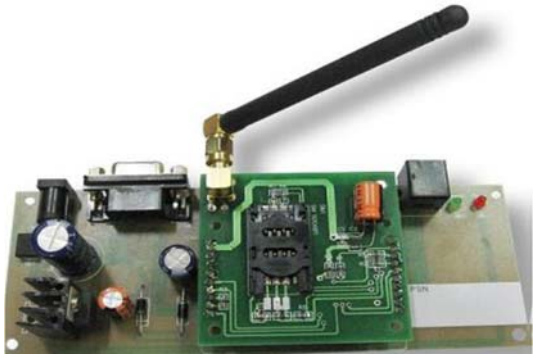

Fig 1: GSM module

A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. It accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone. These GSM modems are most frequently used to provide mobile internet connectivity, many of them can also be used for sending and receiving SMS and MMS messages. We have used SIM300 GSM module. 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. It is an advanced low cost modem for wireless GSM communications which includes sending and receiving text messages.

D. Power Supply

Power supply is a reference to a source of electrical power. 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. This requires step down transformer, rectifier, voltage regulator, and filter circuit for generation of 5v DC power.

3. Software Used

A. KEIL µ vision 4 IDE

Keil µVision 4 IDE (integrated development environment) is the windows based front end for the C- Compiler and Assembler. KEIL µvision 4 is used for writing embedded C-programs. Embedded C is a high level language which includes many aspects of the ANSI (American National Standard Institute) C-Programming language. The µvision IDE from Keil combines project management make facilities, source code editing, program debugging, and complete simulation in one powerful environment. The µvision development platform is easy –to-use and helping you quickly create embedded programs that work. The µvision editor and debugger are integrated in a single application that provides a seamless embedded project development environment.

B. Flash Magic

Flash magic provides a clear and simple user interface to these features.

- erasing the flash memory (individual blocks or the whole device)
- programming the flash memory
- reading flash memory
- reading and writing the security bit

Under windows, only one application may have access the COM port at any one time, preventing other applications from using the COM port. Flash magic is a PC tool for programming flash based microcontroller from NXP using a serial or Ethernet protocol while in the target hardware.

4. Operation

In the below system the ARM LPC2148 micro-controller is interfaced with LED Display unit and GSM.

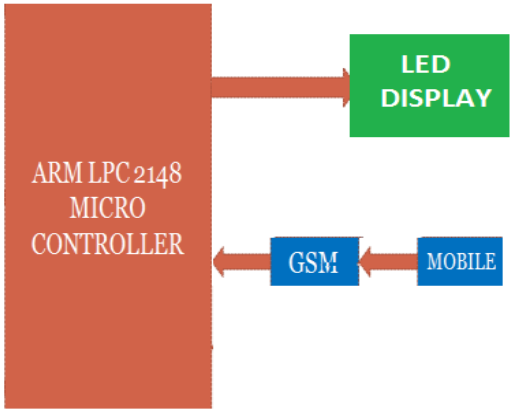

Fig: Block Diagram

The displaying unit consists of LED display. The LED display is interface on UART1 of ARM LPC2148 microcontroller. Similarly the GSM is interface on UART0.The system is very simple and easy to use. The message for this unit comes from an authorized mobile phone using GSM technology. Initially the authorized mobile user will send the message containing information. Once the message is received by the GSM it is process by the ARM

processor and display it on LED display through UART1.GSM SIM 300 is used for receiving a message.

Steps performed in system:

Step 1: Incoming message

Step 2: Check for new message

Step 3: If new message

- YES: Replacing the old message with new message.
- NO: keep displaying the old message.

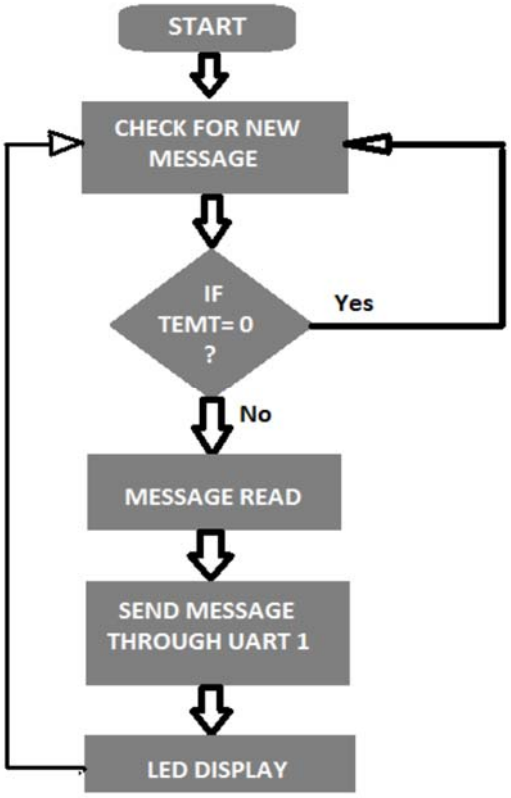

Fig: Flow Chart

5. Conclusion

By introducing the concept of wireless technology in the Field of communication we can make our communication more efficient and faster, with greater efficiency we can display the messages and with less errors and maintenance. This system can be used in college, school, offices, railway station and commercial as well as personal use.

6. Future Enhancements

- The system can be able to display multiple message at a time.
- The project can be further enhance to control different electrical appliances.
- The message can be secured for the fixed number to avoid misuse.

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