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Design of Modern GSM for Emergency Alerts Using Proteus

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Abstract - In this paper we have proposed a system which will enable people to wirelessly transmit notices on a notice board using Arduino. In this system only authorized people can give the notice. This paper deals with an innovative rather an interesting manner intimating the message to the people using a wireless electronic display board. It is a primary thing in any institutions or public places like bus stops, railway stations etc. GSM to facilitate the communication of displaying messages on notice board via user's mobile phones. It's operation is based on microcontroller ATMEGA328P programmed in Embedded C. A SIM900A GSM MODEM with a SIM card is interfaced to the ports of the microcontroller with the help of AT commands. When the user sends a SMS from his mobile phone, it is received by SIM900A GSM MODEM at the receiver's end. The message is thus fetched into the microcontroller. The Real time clock is used to store data with respect to time and date. It is further displayed on the electronic notice board which equipped with LCD display. The main advantage of this project is during emergencies it is used to display alert messages or change schedule speedily. It is portable, Easy to operate and consumes less power.

I. INTRODUCTION

Now-a-days advertisement is become a digital thing. Notice board is important thing for organizations and public places. But in today's faster life it is very too difficult to stick many notices on notice board. So the organizations, industries, malls are now-a-days using the digital notice board.

The GSM technology has the capability to send &receive the message from any part of the world. This gives us the idea to use mobile phones to receive message and then display it on an electronic board.

The GSM technology is used.In our system we are going to build a notice board using arduino circuit. If the user wants to display any message, he can send the information by SMS and thus update the LCD display accordingly.

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B. Global System for Mobile Communication

GSM is an - ETSI (European Tele communication Standard Institute) standard for a PAN – European Communication System.GSM system uses carrier frequencies around 900MHZ. GSM MODEM sends and receive message through radio waves.GSM technology is used to control the display board and for conveying the information through a message send from authenticated user. Generally, computers use AT commands to control MODEMS.

C. Arduino

Arduino is an open source platform used for creating or developing an electronic based project. Arduino consists of both physical programmable circuit board and software. Used to codify and modify the computer code to the physical board. The Arduino become popular and good for reason. Instead of using separate hardware piece to load new code we can simply use USB cable. The Arduino board contains of microcontroller ATMEGA328P. It is 8bit AVR RISC based microcontroller. It is programmed in embedded c.

D. Liquid Crystal Display

LCD is an electronic device for displaying text or characters. We are using 18 pin LCD. 20*4 represents 20 characters and 4 line display. LCD's are economical and easily programmable and can easily display special characters.

E. Real Time Clock

Real time clock is a computer clock that keeps track of current time, although the term often refers to the devices in personal computers, servers and embedded system. RTC are present in almost any electronic device which needs to keep accurate time.

II. PROPOSED SYSTEM

This system is designed in order to overcome the drawbacks of the existing system by providing effective surveillance. The surveillance is enhanced by adding an Arduino UNO ATMEGA328P with GSM technology.

A. WIRELESS NOTICE BOARD USING GSM AND ARDUINO

In this system we have proposed a technology which will enables people to wirelessly transmit notice on notice board using arduino UNO. This proposed technology can be used in many public places, enhance the security system and also make awareness of the emergency situations and avoid many dangers.GSM technology has the capability to send and receive message from any part of the world. GSM SIM900A is directly connected to the arduino UNO. Generally computer use AT commands to control the MODEM. Hardware also contains a real time clock DS1307 to maintain track of time. A 20*4 character LCD display is attached to the arduino UNO microcontroller for display.

B. DESIGN LAYOUT

The block diagram of the system is shown below. The system consist of the following elements,

- Arduino UNO ATMEGA 328P
- GSM (SIM900)
- RTC(DS1307)
- LCD

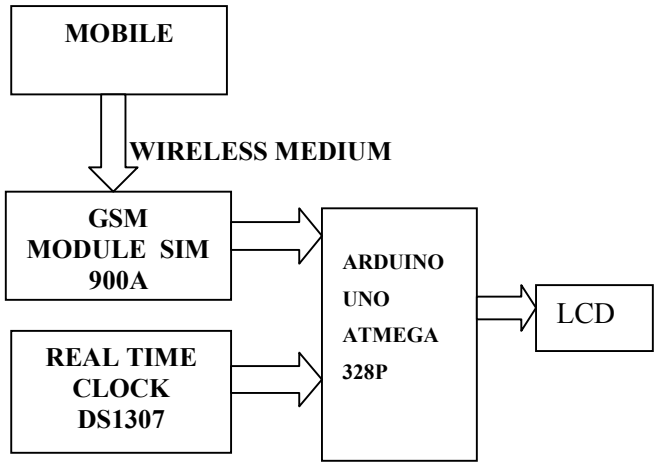

Fig. 1 Block Diagram of Wireless Notice Board

III. HARDWARE SPECIFICATION

The hardware used in this system is Arduino UNO ATMEGA328P, SIM900A GSM module, DS1307 Real Time Clock, LM044L 20*4 LCD Display, Power supply.

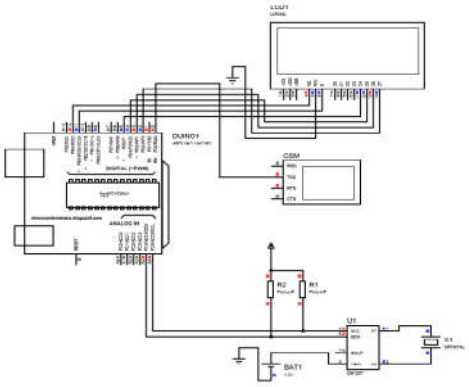

Fig.2 Schematic Representation of Hardware Design

A. ARDUINO UNO ATMEGA328P

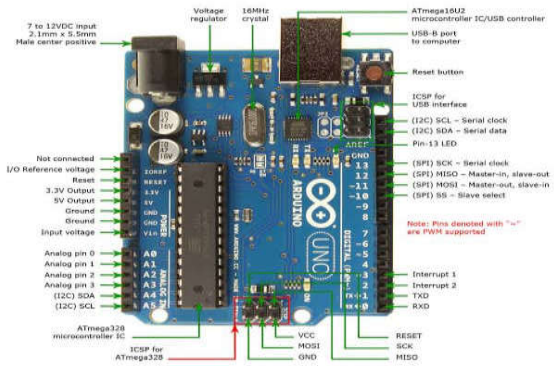

Fig.3 Arduino UNO Board

Arduino Technology

An Arduino board is a one type of microcontroller based kit. The designer thought to provide easy and low cost board for student, hobbyist and professional to build Devices.Arduino

technology is used in many Operating devices like communication or controlling.

Arduino UNO ATMEGA328P

A Typical example of the arduino board is arduino UNO. It includes an ATMEGA328P microcontroller and it has 28 pins.The pin configuration of the arduino uno board is shown in the above.It consist of 14 digital i/o pins.

ATMEGA328P Pin Configuration

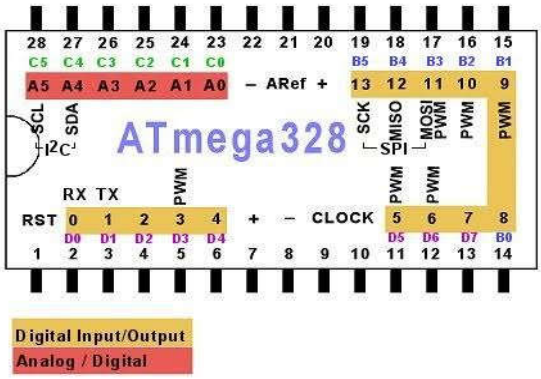

Fig. 4 Pin diagram of ATMEGA328P

Arduino Architecture

Basically the processor of the Arduino board is uses the hardware architecture where the program code and program data have separate memory. It consist of two memories such as program memory and data memory and code is stored in the flash a program memory. The AT MEGA328P Microcontroller has 32kb of flash memory, 2kb of SRAM 1kb of EPROM and operates with 16MHZ clock speed.

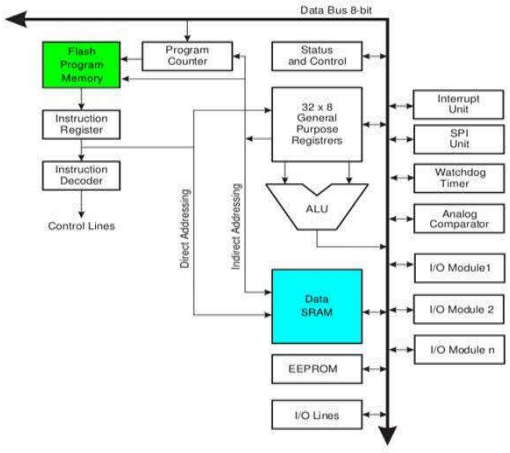

Fig. 5 Architecture Of Arduino UNO

B. Real Time Clock DS1307

The DS1307 is a low-power clock/calendar with 56 bytes battery backed SRAM. The clock/calendar provides seconds, minutes, hours, days, date, month and year information. The date at the end of the month is automatically adjusted for months with fewer than 31days including correction for leap year.

Pin Description

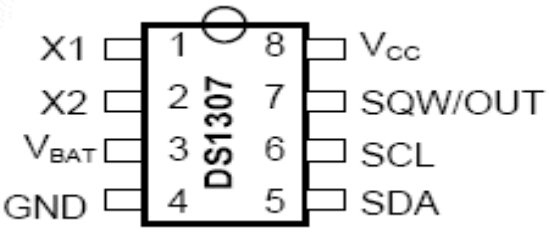

Fig. 6 RTC Pin Configuration

C. SIM900A GSM MODEM

SIM corn presents an ultra compact and reliable wireless module. The SIM900A is a complete dual band GSM/GPRS module in a SMT type which is designed especially for Chinese market, allowing you to benefit from small dimension and cost effective solutions.

Fig. 7 GSM MODEM

D. LIQUID CRYSTAL DISPLAY

LCD -Liquid crystal display is an electronic device for displaying text or characters. We are using 18 pin LCD. 20*4 represents 20 characters and 4 line display. LCD's are economical and easily programmable and can easily display special characters.

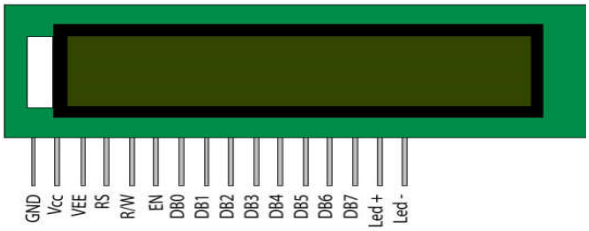

Fig. 8 LCD Display

IV. SOFTWARE SPECIFICATION

A. PROTEUS

Proteus (Processor for text easy to use) is a fully functional procedural programming Language created in 1998 by Zanella. Proteus incorporates many functions delivered from several other Languages: C, Basic Assembly, Clipper /d Base.

Proteus includes hundreds of function for

- Accessing file system
- Sorting data
- Manipulating dates and strings
- Calculating logical and mathematical expression.

Two types of regular expression are supported

- Extended (Unix like);
- Basic (does like, having just the wildcards"?"and "*")

Both types of expressions can be used to parse and compare data.

B. ARDUINO SOFTWARE (IDE)

The open-source Arduino software(IDE) makes it easy to write code and update it easy to write code and upload it to the board. It runs on windows, Mac OS X and linux. This software can be used with any arduino board.

C. SIMULATION RESULT

- Open the PROTIUS 7.7 software.
- From file select type of the new project.
- To place the required component on root sheet click the Pick from library button.
- Enter the required component in keyword.

For example:

- Enter the arduino from which we can select the particular type of arduino as per requirements.
- After placing all the required component connect the pins as per the circuit diagram.

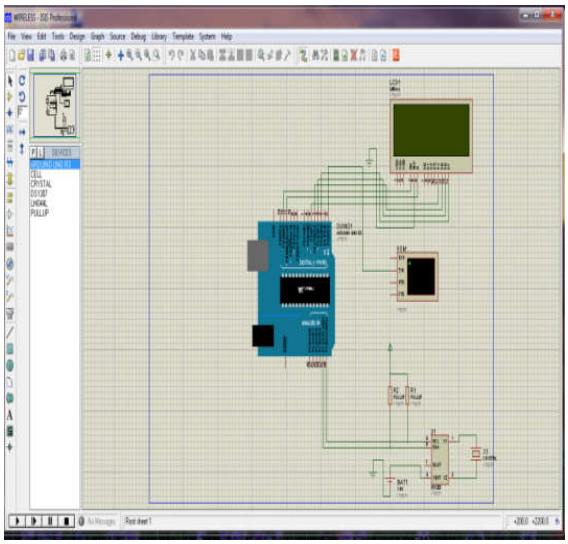

Fig. 8 Schematic diagram of wireless notice board using GSM and Arduino

- To load the program into arduino double click the arduino placed in root sheet.
- The edit component window will be open. In which we can load the program in program files.Click the ok button.
- Click the play button on the button the root sheet.
- Because of real time clock the time and date will be displayed on the LCD
- The another window called virtual terminal is the GSM debugging tool. Using this window we can display the massage whatever typed by user.

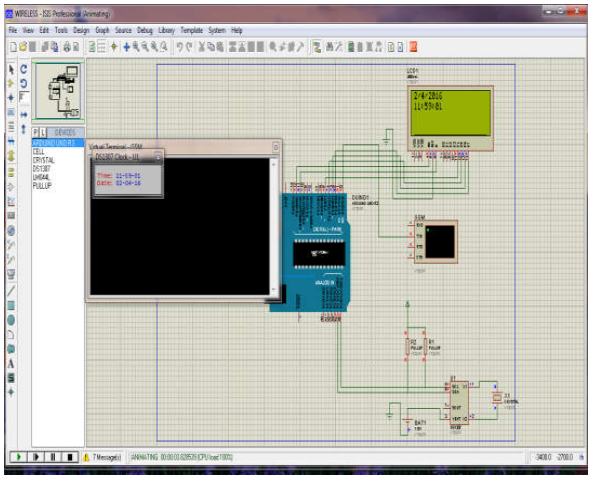

Fig. 9 simulation output

CONCLUSION

Wireless operations permit services, such as long-range communications, that are impossible or impossible or impractical to implement with the use of wires. It provides fast transfer of information and are cheaper to install and maintain. This paper provides an efficient way of displaying messages on notice board using wireless technology. Which eliminates both the unnecessary wired connections and the task of manual reprogramming of the microcontrollers whenever a new message has to be displayed. The design utilized the advantages of arduino microcontroller to reduce the size of the design and built the entire system in a lot more compact and mobile form. This proposed system has many upcoming applications in educational institutions and organizations, crime prevention, traffic management, railways, advertisement etc. This proposed methodology we can enhance the security system and also make awareness of the emergency situations and avoid many dangers.

FUTURE ENHANCEMENT

- This technology could be further modified and more upgraded as per individual need and interest.
- Temperature display during periods wherein no message buffers are empty is one such theoretical improvement that is well possible.
- Alphanumeric loss has a limitation, on size as well as no of characters. These can be replaced with large LED display boards which are not only eye catching but display characters in a moving fashion one after the other.
- In our project we are sending message via GSM network and displaying on a LCD by utilizing AT commands. The same principle can be applied to control electrical appliances at distant location.
- Robots can be controlled in a similar fashion by sending the commands to the robots. This can be used for spy robots at distant locations, utilized by the military to monitor movement of enemy troops.

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