GPRS BASED WIRELESS NOTICE BOARD USING ARDUINO

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Abstract— The notice boards being used specially at offices and public places to display important news and notices. To make the notice boards easy to use and more technically advance, I have used this prototype of **wireless notice board** where we can display the message by simply sending the message through your cell phone. These display systems are very accurate and easy to control and cheaply available and the most important thing is that they can be operated on low Voltage (Up to 12 Voltage). Arduino is a tool for making computers that can sense and control more of the physical world than your desktop computer. It's an open-source physical computing platform based on a simple microcontroller board, and a development environment for writing software for the board. Our project is designed with the Arduino module and the Android technology.

Keywords— **ATMEGA 328P Microcontroller, Arduino, LCD, LAN board.**

I. INTRODUCTION

Present industry is increasingly shifting towards automation. Two principle components of today's industrial automations are programmable controllers and robots. In order to aid the tedious work and to serve the mankind,today there is a general tendency to develop an intelligent operation.ATMEGA Microcontroller is the heart of the device which handles all the sub devices connected across it. It has flash type reprogrammable memory. It has some peripheral devices to play this project perform. It also provides sufficient power to inbuilt peripheral devices. We need not give individually to all devices. The peripheral devices also activates as low power operation mode. These are the advantages are appear here.
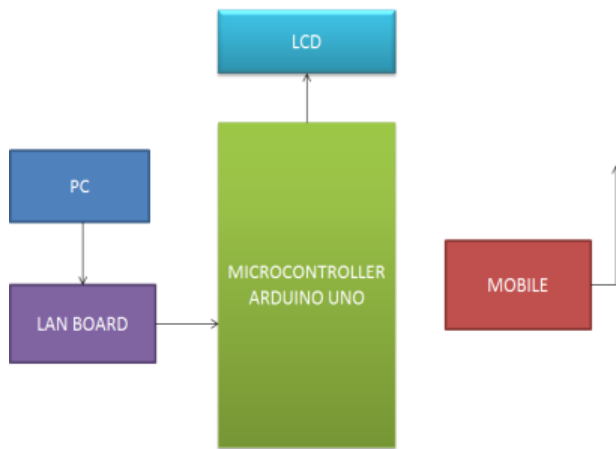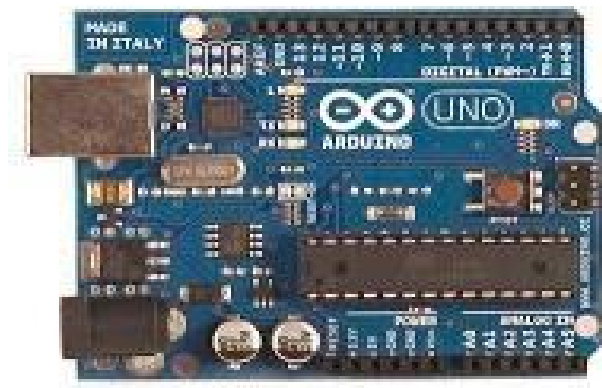
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Figure1. Block Diagram Description

1.1.ARDUINO UNO

The Arduino Uno is a microcontroller board based on the ATmega328(datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The Uno differs from all preceding boards in that it does not use the FTDI USB to-serial driver chip. Instead, it features the Atmega 16U2(Atmega8U2 up to version R2) programmed as a USB-to-serial converter. Revision 2 of the Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.

Revision 3 of the board has the following new features:

1.0 pinout: added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board. In future, shields will be compatible with both the board that uses the AVR, which operates with 5V and with the Arduino Due that operates with 3.3V. The second one is a not connected pin, that is reserved for future purposes. Stronger RESET circuit. Atmega 16U2 replace the 8U2. "Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino,moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform.

Physical Characteristics:

The maximum length and width of the Uno PCB are 2.7 and 2.1 inches respectively, with the USB connector and power jack extending beyond the former dimension. Four screw holes allow the board to be attached to a surface or case. Note that the distance between digital pins 7 and 8 is 160 mil (0.16"), not an even multiple of the 100 mil spacing of the other pins.

Applications of Arduino:

Xoscillo: open-source oscilloscope.

Scientific equipment .

Arduinome: a MIDI controller device that mimics the monomer

Ardupilot: drone software/hardware

Arduino phone

Water quality testing platform

1. 2.ATMEGA 328P MICRO CONTROLLER

The ATmega 48PA/88PA/168PA/328P is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega48PA/88PA/168PA/328P achieves throughputs approaching 1 MIPS per MHz allowing the system designed to optimize power consumption versus processing speed The ATmega48PA/88PA/168PA/328P provides the following features: 4K/8K bytes of In-System Programmable Flash with

Read-While-Write capabilities, 256/512/512/1K bytes EEPROM, 512/1K/1K/2K bytes SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible Timer/Counters with compare modes, internal and external interrupts, a serial programmable USART, a byte-oriented 2-wire Serial Interface, an SPI serial port, a 6-channel 10-bit Christo Ananth et al. [5] discussed about Intelligent Sensor Network for Vehicle Maintenance System. Modern automobiles are no longer mere mechanical devices; they are pervasively monitored through various sensor networks & using integrated circuits and microprocessor based design and control techniques while this transformation has driven major advancements in efficiency and safety. In the existing system the stress was given on the safety of the vehicle, modification in the physical structure of the vehicle but the proposed system introduces essential concept in the field of automobile industry. It is an interfacing of the advanced technologies like Embedded Systems and the Automobile world. This "Intelligent Sensor Network for Vehicle Maintenance System" is best suitable for vehicle security as well as for vehicle's maintenance. Further it also supports advanced feature of GSM module interfacing. Through this concept in case of any emergency or accident the system will automatically sense and records the different parameters like LPG gas level, Engine Temperature, present speed and etc. so that at the time of investigation this parameters may play important role to find out the possible reasons of the accident. Further, in case of accident & in case of stealing of vehicle GSM module will send SMS to the Police, insurance company as well as to the family members.

The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning. The Power-down mode saves the RAM contents but freezes the oscillator, disabling all other chip functions until the next interrupt or hardware reset. The device is manufactured using Atmel's high density non-volatile memory technology. The On-chip ISP Flash allows the program memory to be reprogrammed In-System through an SPI serial interface, by a conventional non-volatile memory programmer, or by an On-chip Boot program running on the AVR core. The Boot program can use any interface to download the application

program in the Application Flash memory. By combining an 8-bit RISC CPU with In-System Self-Programmable Flash on a monolithic chip, the Atmel ATmega48PA/88PA/168PA/328P is a powerful microcontroller that provides a highly flexible and cost effective solution to many embedded control applications. The Boot program can use any interface to download the application program in the Application Flash memory. This allows very fast start-up combined with low power consumption.

Even though there are separate addressing schemes and optimized opcodes for register file and I/O register access, all can still be addressed and manipulated as if they were in SRAM. In the ATMEGA variant, the working register file is not mapped into the data address space; as such, it is not possible to treat any of the ATMEGA's working registers as though they were SRAM. Instead, the I/O registers are mapped into the data address space starting at the very beginning of the address space. Additionally, the amount of data address space dedicated to I/O registers has grown substantially to 4096 bytes (000016–0FFF16). As with previous generations, however, the fast I/O manipulation instructions can only reach the first 64 I/O register locations (the first 32 locations for bitwise instructions). In most variants of the AVR architecture, this internal EEPROM memory is not mapped into the MCU's addressable memory space. It can only be accessed the same way an external peripheral device is, using special pointer registers and read/write instructions which makes EEPROM access much slower than other internal RAM.

ETHERNET BOARD FOR LAN

The Arduino Ethernet Shield connects your Arduino to the internet in mere minutes. Just plug this module onto your Arduino board, connect it to your network with an RJ45 cable (not included) and follow a few simple instructions to start controlling your world through the internet. As always with Arduino, every element of the platform – hardware, software and documentation – is freely available and open-source. This means you can learn exactly how it's made and use its design

as the starting point for your own circuits. Hundreds of thousands of Arduino boards are already fuelling people's creativity all over the world, everyday.

- Requires an Arduino board (not included)

- Operating voltage 5V (supplied from the Arduino Board)

- Ethernet Controller: W5100 with internal 16K buffer

- Connection speed: 10/100Mb

- Connection with Arduino on SPI port

The Arduino Ethernet Shield allows an Arduino board to connect to the internet. It is based on the Wiznet W5100ethernet chip (datasheet). The Wiznet W5100 provides a network (IP) stack capable of both TCP and UDP. It supports up to four simultaneous socket connections. Use the Ethernet library to write sketches which connect to the internet using the shield. The Ethernet shield connects to an Arduino board using long wire-wrap headers which extend through the shield. This keeps the pin layout intact and allows another shield to be stacked on top.

The most recent revision of the board exposes the 1.0 pin out on rev 3 of the Arduino UNO board.The Ethernet Shield has a standard RJ-45 connection, with an integrated line transformer and Power over Ethernet enabled. There is an onboard micro-SD card slot, which can be used to store files for serving over the network. It is compatible with the Arduino Uno and Mega (using the Ethernet library). The onboardmicroSD card reader is accessible through the SD Library. When working with this library, SS is on Pin 4. The original revision of the shield contained a full-size SD card slot; this is not supported.

The shield also includes a reset controller, to ensure that the W5100 Ethernet module is properly reset on power-up. Previous revisions of the shield were not compatible with the Mega and need to be manually reset after power-up.The current shield has a Power over Ethernet (PoE) module designed to extract power from a conventional twisted pair Category 5 Ethernet cable:

- IEEE802.3af compliant
- Low output ripple and noise (100mVpp)
- Input voltage range 36V to 57V
- Overload and short-circuit protection
- 9V Output
- High efficiency DC/DC converter: type 75% @ 50% load
- 1500V isolation (input to output)

The shield does not come with the PoE module buildin; it is a s eparate component that must be added on. Arduino communicates with both the W5100 and SD card using the SPI bus (through the ICSP header). This is on digital pins 10, 11, 12, and 13 on the Uno and pins 50, 51, and 52 on the Mega. On both boards, pin 10 is used to select the W5100 and pin 4 for the SD card. These pins cannot be used for general I/O. On the Mega, the hardware SS pin, 53, is not used to select either the W5100 or the SD card, but it must be kept as an output or the SPI interface won't work.

Note that because the W5100 and SD card share the SPI bus, only one can be active at a time. If you are using both peripherals in your program, this should be taken care of by the corresponding libraries. If you're not using one of the peripherals in your program, however, you'll need to explicitly deselect it. To do this with the SD card, set pin 4 as an output and write a high to it. For the W5100, set digital pin 10 as a high output.The shield provides a standard RJ45 Ethernet jack.The reset button on the shield resets both the W5100 and the Arduino board. The shield contains a number of informational LEDs:

PWR: indicates that the board and shield are powered.

LINK: indicates the presence of a network link and flashes when the shield transmits or receives data

FULLD: indicates that the network connection is full duplex

100M: indicates the presence of a 100 Mb/s network connection (as opposed to 10 Mb/s)

RX: flashes when the shield receives data

TX: flashes when the shield sends data

COLL: flashes when network collisions are detected

The solder jumper marked "INT" can be connected to allow the Arduino board to receive interrupt-driven notification of events from the W5100, but this is not supported by the Ethernet library. The jumper connects the INT pin of the W5100 to digital pin 2 of the Arduino.

LCD DISPLAY

Liquid crystal displays (LCDs) have materials which combine the properties of both liquids and crystals. An LCD consists of two glass panels, with the liquid crystal material sand witched 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.

III. OPERATION OF GPRS BASED WIRELESS NOTICE BOARD USING ARDUINO

WIRELESS NOTICE BOARD USING ARDUINO:

The world is going mobile phones and each person wants to control everything without moving an inch. For the past few years, the general idea of a notice board has been   to

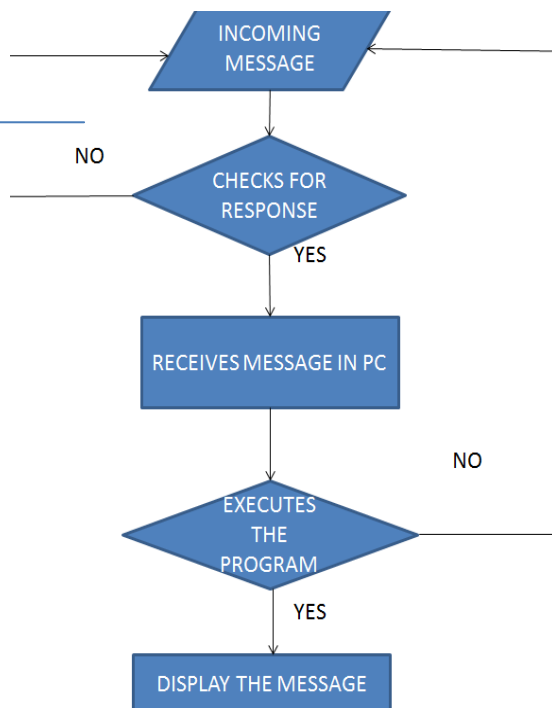display information written or printed on Papers, pinned to a notice board.

Fig 2.

This involved man power, i.e., manually changing information every time in order for the information to be updated and sometimes there is also delay in updating the information. But as the technology in the embedded field developed, there have been various improvisations in the types of notice boards and the way of updating information in them.

The main aim of this project is to design an GPRS driven automatic display. Notice board is a primary device in any institution/organization or public utility places like bus stations, railway stations and parks. So the proposal is used to design a notice board using Arduino such that it can fulfil the requirements such as less manual operation, same notice board can be displayed in various places at the same time, he notice board display should be visible from maximum area or distance, compact compatible and easy handling .The message to be displayed is sent through SMS to a GPRS modem using Arduino and the message will be displayed on LCD display.

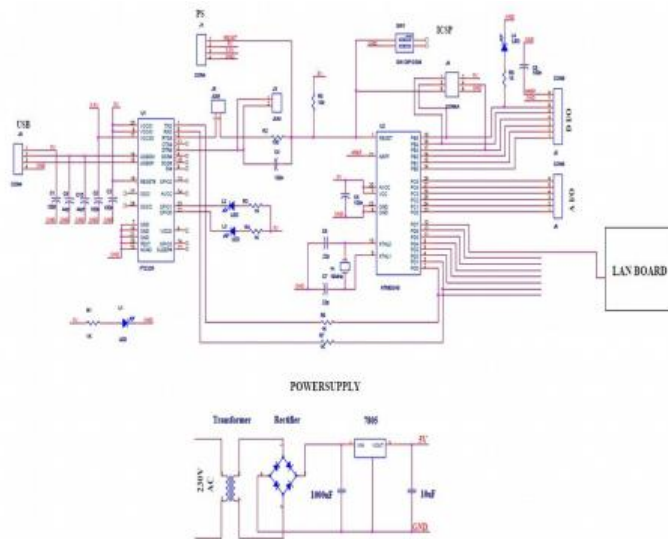## IV.CONSTRUCTION OF GPRS BASED WIRELESS NOTICE BOARD USING ARDUINO

Fig 3.

The proposed design is a receiver come display board which can be programmed from an authorized mobile phone. The message to be displayed is sent as an SMS from an authorized transmitter. The Arduino receives and reads the SMS, validates the sending message and displays the desired information on in the LCD display. Looking into current trend of information transfer in the campus, it is seen that important notice takes time to be displayed in the notice board using GPRS modem` interfaced with Arduino. This latency is not expected in most of the cases and must avoided.The below app is used to upload data in the notice board.Once data is typed datas are displayed in tha notice board.

Fig.4.Android app

Fig.5. RESULT

The main components required for the purpose include an Arduino, GPRS modem and LCD display. The GPRS modem receives the SMS from an authorized user.The modem transmits the stored message through the COM port to the PC. The message stored in PC and it reads the message with the help of Arduino. The Arduino validates the SMS and then displays the message in the LCD display board.

TABLE 1

VARIOUS PARAMETER MEASUREMENT

S.NO	Parameters	Range
1.	Microcontroller ATmega328 Operating Voltage Input Voltage (recommended) Input Voltage (limits)	5V 7-12V 6-20V

2.	Digital I/O Pins 14 (of which 6 provide PWM output) DC Current per I/O Pin DC Current for 3.3V Pin	40 mA 50 mA
3.	Flash Memory	32 KB
4.	SRAM	2 KB
5.	EEPROM	1 KB
6.	Clock Speed	16 MHz
7.	Length	68.6 mm
8.	Weight	25 g
9.	Width	53.4 mm

Advantages:

- Low power consumption
- More flexible
- Smaller in size
- Easy to handle

V.CONCLUSION

The progress in science and technology is a non-stopping process. New things and new technology are being invented. As the technology grows day by day we can imagine about the future in which thing that may occupy every place. The proposed system based on ATMEGA microcontroller is found to be more compact, user friendly and less complex which can readily be used in order to perform. Several tedious and repetitive tasks. Though it is designed keeping in mind about the need for industry, it can extended for other purposes such as commercial and research applications. Due to probability of high technology (ATMEGA microcontroller) used this GPRS BASED WIRELESS NOTICE BOARD USING ARDUINO system is fully software controlled with less hardware circuit. The feature make this system is the base for future system. The future scope of this project can be extended to many different fields for commercial purpose also, with slight variations according to the application which it is

to be designed for some of the examples are as follows **to Manage Traffic** Metropolitan cities are prone to high traffic congestion. One way to avoid this would be to inform people beforehand to take alternate routes. A wireless notice board using arduino serves well for this support. **Crime Prevention** Display boards can be put on roads to display tips on public security, accident prevention, and information on criminals on the run and also to flash messages regarding vehicle thefts as and when they occur. This project can be implemented in offices, colleges, schooles etc…

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