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DESIGN AND IMPLEMENTATION OF NOVEL SMART NOTICE BOARD THROUGH GSM AND P10 LED

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ABSTRACT: Notice Board is primary thing in any institution/organization or public utility places like the technology is advancing every day the display board systems are moving from Normal handwriting display to digital display. The Notice board is a common display for effective mode of providing information to the people, but this is not easy for updating the messages instantly. Hence in order to solve these issues, design and implementation of novel smart notice board through GSM and p10 LED is presented in this work. The main objective of this project is to develop a SMS based notice board that displays messages sent from the user. The system is implemented using a GSM Module IC controlled by a Arduino mega 2560 and an LED display. The GSM module receives the message to be displayed as SMS, then transmits the message through the COM port to the Arduino mega 2560 to validate the SMS and then displays the message on the LED display. The results from the testing will show that the SMS based notice board will performs excellently on the various test conducted. This will help us in passing any message almost immediately without any delay just by sending a SMS which is better and more reliable than the old traditional way of pasting the message on notice board.

KEYWORDS: Notice Board, Arduino, Short Message Service (SMS), GSM (Global System For Mobile Communication).

I. INTRODUCTION

The importance of placing notice boards in institutions or organizations and public utility places like airports, bus stations and railway stations to display and pass information can never be overemphasized. Traditional notice boards are very difficult to maintain and involves very tedious process to change notice every time.

This also is accompanied by waste of paper, ink, time, and manpower as well [1]. A notice Board is a place where an authenticated can leave public messages to advertise things, announce events or provides information of general concern for any important issue. A generic pinboard can't be placed anywhere because of the clutter of cables. Earlier, people used paper as a medium to convey messages, and printed paper was displayed on the bulletin. Changing the message displayed on traditional billboards is not easy. It requires a lot of time, resources and workers. Bulletin boards are one of the most commonly used boards to communicate information from elementary schools to large organizations.

As technology improves, efficient, financially affordable and highly productive output becomes an absolute necessity, and this leads us to be more inclined towards using automated control systems. Human intervention, although it offers variety, adaptability and interactivity, could lead to errors, as it is a natural and inevitable result of this variability. Hence, automation of a system is an accepted means to minimize human error and its impact. Applying this to the situation under scrutiny now, the traditional methods of writing/ typing the notice on paper, and having a man/woman

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deliver the notice to the respective groups, or having him/her paste the notice on the notice board, is prone to errors. The person delivering could deliver it to the wrong group, or tamper with the information being sent, etc. With the electronics industry moving at a fast pace, we are able to solve many such problems with digital replacements.

Now-a-days advertisement is going digital. The big shops and the shopping centers use digital displays now. Also, in trains and buses the information like platform number, ticket information is displayed in digital boards. People are now adapted to the idea of the world at its finger-tips. The use mobile phones have increased drastically over years. Control and communication has become important in all the parts of the world [2].

In today's world the wireless technology is getting more and more used technology. Wireless communication has announced its arrival on big stage and the world is going mobile [3]. As humans wish to control everything without moving an inch. The importance of placing notice boards in institutions or organizations and public utility places like airports, bus stations and railway stations to display and pass information can never be overemphasized. However, day-to-day changing of notices in these places is a difficult task [4].

In this modern world, Mobiles and the connected technologies became loads and loads of prevailing that varied the technical arenas among the sphere of Telecommunication and then also the Embedded Systems became the gift amongst the people. The employment of mobiles has quickly increased over the last ten years. Evolution in communication technologies has also been galvanizing the event and growth of very dense network ks.

The e-notice boards are observed at several locations such as shopping malls, educational institutes, traffic control, banks, stoke exchanges etc. These e-notice boards are designed according to customer's requirement. In all these e-notice board the displayed messages are fixed and they are programmed in controller. But in these displays if someone want to change the message, they have to go there and connect the display with PC/Laptop to update the program inside the microcontroller with new code. So the message change process becomes complex. Therefore to overcome these limitations, Design and implementation of novel smart notice board through GSM and P10 LED is presented.

The remaining work is organized as follows: The section II describes the literature survey. The section III demonstrates the design and implementation of novel smart notice boars through GSM and p10 LED. The section IV evaluates the result analysis of presented approach. Finally the work is concluded in section V.

II. LITERATURE SURVEY

Gaurav Shukla, Chandra Prakash, Radhika Ganeriwal, Anuj Poudel, Mr. Mahesh Kumar Singh et. al., [5] presents "GSM-Based Scrolling Message Display E-Notice Board. In this approach, they presents the development of an SMS controlled E-notice board which can be updated automatically and remotely. The results from the testing show that the E-notice board performs excellently on the various test conducted although there are some challenges that can be taken as further research. This will help us in passing any message almost immediately without any delay just by sending a SMS which is better and more reliable than the

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old traditional way of pasting the message on notice board.

Ajayi Smart Emmanuel Abiodun, Bello Oluwaseyi Olawale et. al., [6] describes GSM Based Wireless Electronic Notice Board using PIC18F2550 Microcontroller. This work deals with advanced notice board. It presents an SMS based notice board incorporating microcontroller PIC18F2550. A GSM module SIM 800L is interfaced to the ports of the microcontroller PIC18F2550. When the user sends a SMS via a registered number from his mobile phone, it is received by a SIM loaded GSM modem at the receiver unit. The GSM modem is interface to the control unit to receive messages from the user. The message received is sent to the microcontroller that further displays it on electronic notice board which is equipped with a display unit interfaced to a microcontroller.

Sayidul Morsalin, Abdur Rahman, Md Abu Bakar Siddiqe, Prattay Saha, Md. Reduanul Halim et. al., [7] describes Password Protected Multiuser Wireless Electronic Noticing System by GSM with Robust Algorithm. This paper elucidates a wireless digital noticing system to provide information in an innovative and smart way. The proposed notice board is a multiuser password-protected SMS based system fabricated with an LCD. The communication and information transfer between the authentic user and the LCD display unit is done via GSM to ensure remote display facilities, so any notice can be displayed on the electronic board from the user's mobile SMS from distant places.

Foram Kamdar, Anubbhav Malhotra and Pritish Mahadik et. al., [8] describes Display Message on Notice Board using GSM. Its operation is based on microcontroller ATMEGA32 programmed in assembly language. A SIM300 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 via a registered number from his mobile phone, it is received by SIM300 GSM modem at the receiver's end. SIM300 is duly interfaced through a level shifter IC MAX32 to the microcontroller. The messaged is thus fetched into the microcontroller. It is further displayed on an electronic notice board which equipped with LCD display interfaced to microprocessor powered by a regulated power supply from mains supply of 230 volts ac.

Nivetha S. R, Pujitha. R, Preethi Selvaraj and Yashvanthinin S.M et. al., [9] SMS based Wireless Notice Board with Monitoring system. Multiple displays along with a decoder are used to select a particular display and the corresponding information is sent through an ARM controller by using GSM technology. The entries can be documented and a record may be maintained for future use by using visual basic. The controller has internal a real time clock used for synchronization of data. A resistive touch screen is used to access the previous notices and also progress details. The monitoring system consists of an image sensor which captures the images for the specified amount of time and the images can be transferred through an USB port to a PC for storage purposes.

III. DESIGN AND IMPLEMENTATION OF NOVEL SMART NOTICE BOARD

In this section, Design and implementation of novel smart notice board through GSM and P10 LED is presented. The block diagram of presented design is shown in Fig. 1. This system is based on GSM modem. Colleges/Institutes can display

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notice SMS on P10 LED DISPLAY using GSM modem. Through ARDUINO MEGA 2560, anyone and anything can display SMS at P10 LED DISPLAY on notice board. This system is controlled by ARDUINO MEGA 2560, using GSM modem. By the disadvantage raised in the existing system that is manually displaying the information at that particular location will be overcome by using GSM modem.
The Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.

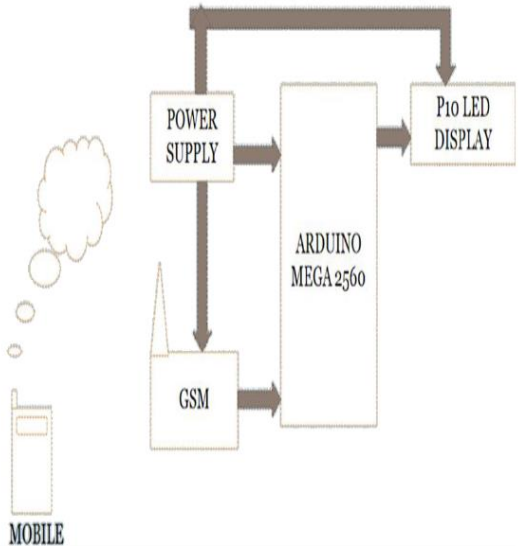

Fig. 1: Block Diagram

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 Mega 2560 board is compatible with most shields designed for the Uno and the former boards Duemilanove or Diecimila.

A P10 LED Display Module is the most suitable for designing any size of outdoor or indoor LED display advertisement board. This panel has a total of 512 high brightness LEDs mounted on a plastic housing designed for best display results. Any number of such panels can be combined in any row and column structures to design an attractive LED signboard. The 32*16 module size means that there are 32 LEDs in each row and 16 LEDs in each column. So there is a total of 512 numbers of LEDs present in each module unit.

GSM is a plug and play GSM Modem with a simple to interface serial interface. Use it to send SMS, make and receive calls, and do other GSM operations by controlling it through simple AT commands from micro controllers and computers. It uses the highly popular SIM900 module for all its operations. It comes with a standard RS232 interface which can be used to easily interface the modem to micro controllers and computers. The modem consists of all the required external circuitry required to start experimenting with the SIM300 module like the power regulation, external antenna, SIM Holder, etc.

Global System for Mobile Communication (GSM) is a cellular standard for mobile phone communications to cater to voice services and data delivery using digital modulation where short message service (SMS) has a profound effect on society. Using GSM for displaying SMS on LCD notice boards through wireless communication has been used in many ways. By using GSM networks, it is possible to decode the received SMS on the mobile phone to function in a particular way as necessary.

Firstly interface GSM module and Arduino Mega 2560 by connecting receiver, transmitter, ground pins of GSM module

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to transmitter, receiver and ground pins of Arduino mega 2560 respectively. Provide power supply to all the components. With the help of Arduino IDE, execute the program Load the program into Arduino mega 2560 controller using USB cable. Insert the SIM (Subscriber Identity Module) into SIM slot in GSM module. Send an SMS (Short Message Service) to the GSM module using mobile app.

Now people can observe the same message on the output display board. Sending messages from any of the remote area to the distant located SMS based notice board using GSM. For sending the text message from remote area, mobile phone is need to be interfaced with GSM. For developing some of GSM based applications we need to have some commons peripherals including GSM MODEM, SIM, Arduino board, LED, power supply and connecting wires.

AT commands are used to control MODEMs. AT is the abbreviation for Attention. These commands come from Hayes commands that were used by the Hayes smart modems. The Hayes commands started with AT to indicate the attention from the MODEM. The dial up and wireless MODEMs (devices that involve machine to machine communication) need AT commands to interact with a computer. These include the Hayes command set as a subset, along with other extended AT commands. AT commands with a GSM MODEM or mobile phone can be used to access following information and services: Information and configuration pertaining to mobile device or MODEM and SIM card; SMS services; MMS services; Fax services and Data and Voice link over mobile network.

An SMS sent form a mobile phone to GSM modem is received by the GSM and stores it through AT (Attention) commands. Using microcontroller it is possible to retrieve the stored message in GSM and display it on a LCD display using embedded programming languages. Short information can be sent from a mobile phone as SMS and made display until the next one.

The User interacts with the system by sending a message to the system for it to display. Once the system receives the message it verifies the user identification (MIN) with his number. If the validation proves to be authentic the message is stored and proceeds to display the message. Denial of authentication (wrong MIN) results in discarding the message. Admin is granted with the responsibility of addition to the authenticated list, deletion of users from the list and also has the ability to change the access code (MIN).

LED (Light Emitting Diode) is enabled and the baud rate is set. The program module points out the AT commands that has to be executed by the GSM. When micro reads these AT commands, it is sent to the GSM module where the commands are processed. At this instance the messages are sent to the micro so it can be displayed. The updating of messages is checked and if the sender is valid the messages are stored. Any operation pertaining to the present result is performed. Once the operations are performed the acknowledgement is sent. In the worst case scenario if there are no new messages the loop of checking for new messages continues until the new one arrives.

VI. RESULT ANALYSIS

In this section, Design and implementation of novel smart notice board through GSM and P10 LED is implemented. The result

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analysis of presented design is discussed here. The Fig. 2 shows the implemented novel smart notice board through GSM and P10 LED.

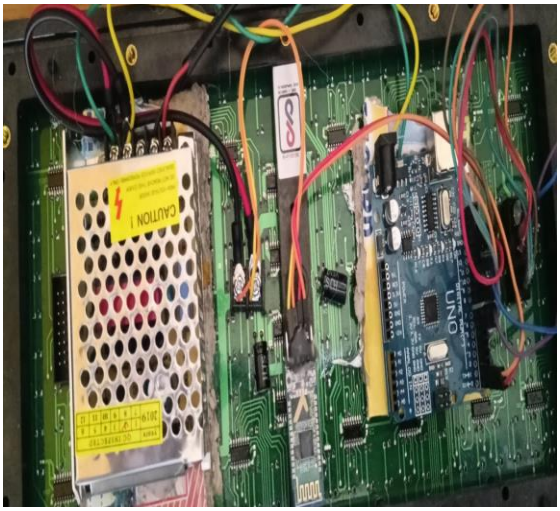

Fig. 2: Implemented novel smart notice board through GSM and P10 LED

The Fig. 3 shows the results of presented Design and implementation of novel smart notice board through GSM and P10 LED.

Fig. 3: Results Screen

This approach help us in passing any message almost immediately without any delay just by sending a SMS which is better and more reliable than the old traditional way of pasting the message on notice board. The Fig. 4 displays the message i.e. sent through the GSM.

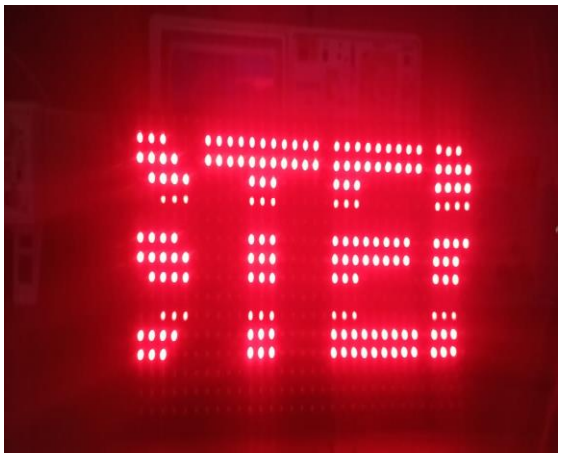

Fig. 4: Messages on Presented Notice Board

This presented technology can be used in many public places, malls or big buildings to enhance the security system and also make awareness of the emergency situations and avoid many dangers. Using various AT commands are used to display the message on the display board. GSM technology is used to control the display board and for conveying the information through a message sent from authenticated user.

V. CONCLUSION

In this work, Design and implementation of novel smart notice board through GSM and P10 LED is presented. The aim of this project is to design a novel smart notice board to which data can be sent through SMS. The main modules employed in this system are ARDUINO MEGA 2560, GSM mode, SIM card, P10 LED display. The SMS sent form mobile phone to GSM modem is received by the GSM and are stored through AT (Attention) commands. The microcontroller retrieves the stored message and displays it on a LCD display using embedded programming languages. AT commands is used to display the message onto the display board. GSM technology is used to control the display board and to convey the information via a message sent from authenticated user. This implemented design will be used in practical use in various companies like in

construction and research area railways, colleges etc. This system can avoid paper work, reduce human efforts in different areas.

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