

Smart Notice Board

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Abstract: With the advent of Digital Technology, it is efficient to represent the information on digital devices. Now-a-days internet is the primary mode of communication everywhere. Notice board plays a vital role to convey the message in any organization. To achieve the green IT, it is mandatory to use the Digital media rather than earlier conventional media like paper printing. In this paper, it has been implemented a Smart Notice Board which uses Raspberry Pi. With the help of this project, an authenticated person can convey the message/notice even from remote place on digital devices like Light Emitting Diode (LED). The proposed system reduces the resources like manpower and time. In this project, aside from displaying the message on the LED, it also speaks the message out through a speaker enabling the blind to receive the message as well.

Keywords: Notice Board, Raspberry Pi, Speaker, LED

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I. Introduction

Notice board is an essential information gathering system in our life. In our day-to-day life we can see notice boards in various places like, educational institutions, railway stations, shopping malls, Bus stations, offices etc. So, we can say that Notice boards are the places to leave public information such as advertise events, announce events or provide attention to the public, etc. Now-a-days a separate person is needed to stick the information on the notice board. It will lead to loss of time as well as usage of man-power. In conventional analog type notice boards paper is the main medium for information exchange. We know that information counts are endless. So, there is a usage of huge amount of paper for displaying those endless counts of information. The problems faced by the wooden or conventional type notice boards are resolved by the implementation of our digital notice board. It will bring an advanced means of passing notices around the world in a much easier and efficient way. We use Raspberry PI and make an efficient notice board which not only displays the message on an LED, but also speaks the message out through a speaker. Also, only respective authority can send information. This system is brought forward to tackle problems like disabilities like not being able to hear or see. Unlike a regular notice board, our system concentrates on providing the information to all kinds of people.

II. Proposed System

In this proposed system, the message sent from an authorized user to the GSM module we open the app and give some message, the GSM module takes that message and sends it to the Arduino which has a code written in it in Embedded C, for the message to go from the GSM to the LED. Arduino converts the message and sends it to the raspberry pi which has a code written in python for text to speech conversion. The message gets stored in the buffer and if it's valid, the message gets displayed on the LED and also comes out through the speaker.

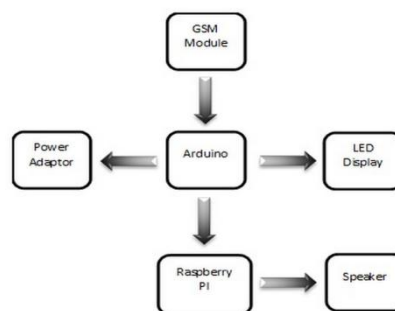


Fig. 1: Block Diagram of the Proposed System

III. Literature Survey

Dharmendra Kumar Sharma and Vineet Tiwari, IEEE 2015[1] introduces a low cost, handheld, wireless electronic notice board by using Atmel's ATmega32 microcontroller and different wireless technologies (Bluetooth and ZigBee) and their performance analysis based on the parameter such as range, BER (bit error rate), RSSI (Received signal strength indicator), signal attenuation and power consumption. The board receives serial information from wireless module receiver and shows it on the graphical liquid display. We have realized a common communication receiver hardware for notice board having compatibility with both wireless modules i.e. Bluetooth and ZigBee.

AniketPramanik, Rishikesh and Vikash Nagar, IEEE 2016[2] During this project, a hardware capable of controlling home appliances and displaying notices electronically using an android application has been built. So, the hardware can perform broadly two functions. In order to display notices, a user can use the same application to type a notice and click on the send button to get it displayed. Both the functionality can be used only if enough balance amounts is left in the user's SIM card since each access transacts a fixed amount for SMS. The hardware consists of an ARM based microcontroller LPC2148 that communicates to the application through a GSM mobile communication network module which uses a SIM card to receive messages.

Neeraj Khera and DivyaShukla, IEEE 2016[3] has developed a simple and low-cost Android based wireless notice board. They proposed system uses either Bluetooth or Wi-Fi based wireless serial data communication. For this purpose, Android based application programs for Bluetooth and Wi-Fi communication between Android based personal digital assistant devices and remote wireless display board are used. At receiver end, a low-cost microcontroller board (Arduino Uno) is programmed to receive and display messages in any of the above communication mode. Using the developed system, two different applications for displaying messages on a remote digital notice board and wireless person calling has been implemented. The developed system will therefore aim in wirelessly sharing the information with intended users and helps in saving the time and the cost for paper and printing hardware.

KruthikaSimha, Shreya and Chethan Kumar, IEEE 2017[4] developed a wireless electronic board that offers the flexibility to manage data display within a given range on multiple displays. The notice board can show data being transmitted to that from a central dominant unit, employing a serial communication protocol. As technology improves, efficient, financially affordable and extremely productive output becomes an absolute necessity, and this leads us to be more inclined towards using automated control systems. Human intervention, though it offers selection, ability and interactivity, could lead on to errors, as it is a natural and inevitable result of this variability. Hence, automation of a system is an accepted means that to attenuate human error and its impact.

S. Rubin Bose and J. Jasper Prem IJRIER 2017[5] In GSM based LED scrolling display board, GSM modem communicates with the microcontroller through asynchronous serial communication. The microcontroller transmits a set of AT commands to read the message sent by the user. The quick display of message using wireless data transfer in smart notice board. The GSM based system offers flexibility to display faster than the programmable system. This system is easy, robust, to use in normal life by anyone at anyplace with less errors and maintenance. The paper titled as design and implementation of multiple LED notice boards by using ZIGBEE Technology states that the proposed system is handled by numerous transmissions and the message feeds on only one receiver. Microcontroller controls multiple LED's to enhance the message pattern. Here the distance of wireless communication is limited, and this method is not suitable for long distance communication.

M. Arun, P. Monika and G. Lavanya IJCAT 2017[6] The Raspberry Pi2 system acts as the central server of the proposed system and the Notice boards are accessible only by logging in with the proper credentials within the raspberry-pi server. Raspberry Pi2 acts as the server for this e-Notice board system. It's connected to internet employing a correct IP Address, so a certified user of this system can login from anyplace. Raspberry Pi is connected to the intranet network additionally. The display system in school area one will be having an Arduino board with an Ethernet Shield and an LCD Display hooked up with it. With the help of the Ethernet shield the display node is connected to the computer network. In school area two, the Arduino relates to a Wi-Fi shield and an LCD Display and this node are also connected to the intranet through Wi-Fi. These devices will also have a valid IP address assigned towards them.

Uma UllasPradhan, Suma.N, SeemaRamachandra and Shilpa S kulkarni [7] Notice board is the most common and primary apparatus in any institution. This project deals with a wireless notice board. To develop a wireless notice board that display message sent form the user's mobile. The notice board is an LCD display interfaced to a micro controller (Arduino).

Fizza Hamid, Nusrat Hamid shah IJESRT [8] It is time consuming and tedious process to manually write down the different notice every now and then to overcome the problem the idea of wireless digital display board has been proposed in the paper. The received message is then displayed on the wireless notice board making the whole process easy and fast.

IV. Hardware Module

The main components of this Smart Notice Board are the following:

A. RASPBERRY PI

The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python. It's capable of doing everything you'd expect a desktop computer to do, from browsing the internet and playing high-definition video, to making spreadsheets, word-processing, and playing games. What's more, the Raspberry Pi has the ability to interact with the outside world, and has been used in a wide array of digital maker projects, from music machines and parent detectors to weather stations and tweeting birdhouses with infra-red cameras. We want to see the Raspberry Pi being used by kids all over the world to learn to program and understand how computers work.

B. ARDUINO

An Arduino microcontroller board can be thought of as a user-friendly, open-source input-output system. An input can range from anything from a finger pressing a button to a change in light intensity, and outputs can range from lighting up a simple LED light to sending out a Twitter message.

There are several features of Arduino that truly make it stand out from the rest of the microcontrollers on the market. For example, the software is open source, so you can "look under the hood" so to speak, and is free to download, modify, and re-use (which is always a plus for more advanced developers). Even the basic plans for the Arduino are open source, so users can build their own without having to buy one. There are several companies that make the Arduino boards, too, and you can buy full kits breadboards, wiring sensors, and more. Even fully assembled, Arduino is on the lower end of the cost spectrum, and is compatible with Windows, Mac, and Unix systems. Most importantly for beginners, perhaps, is the fact that the development environment for the Arduino is aimed at people with little to no microcontroller experience, but powerful and flexible enough for experienced users. There is a great deal of quality information out there to help even the most inexperienced user navigate the Arduino and put it to use in exciting and creative ways. In short, it had made microcontrollers accessible to everybody, even those with a minimal computer background, regardless of age. To work with the Arduino, we need a laptop, desktop, or tablet that you can download the Arduino development environment onto. It is written in Java, and can be downloaded on Windows, Mac OS X 10.7 Lion or newer, and Linux 32 or 64 bit. To connect your board with your computer, you will need a USB data cable. Unlike USB charging or syncing cables, they have a square, blocky-shaped interface instead of a small interface like the micro usb. To work with the Arduino, we need a laptop, desktop, or tablet that you can download the Arduino development environment onto. It is written in Java, and can be downloaded on Windows, Mac OS X 10.7 Lion or newer, and Linux 32 or 64 bit. To connect your board with your computer, you will need a USB data cable. Unlike USB charging or syncing cables, they have a square, blocky-shaped interface instead of a small interface like the micro usb. It is recommended that, unless you are a well-established electronics hobbyist with tons of cool sensors and the like lying around, you invest in a kit. These vary in price, and can save you time and money by helping you obtain the electronic components that are compatible with your board – and they usually come with tutorials and source code. For testing and prototyping, your laptop provides the power for the Arduino via the USB data cable. However, for laptop independent projects you will probably want to provide an independent, portable power source for your project. A link is provided under online resources that shows how to use battery power for your Arduino.

C. GSM

GSM is a mobile communication modem; it stands for global system for mobile communication (GSM). The idea of GSM was developed at Bell Laboratories in 1970. It is widely used mobile communication system in the world. GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands. GSM system was developed as a digital system using time division multiple access (TDMA) technique for communication purpose. A GSM digitizes and reduces the data, then sends it down through a channel with two different streams of client data, each in its own particular time slot. The digital system has an ability to carry 64 kbps to 120 Mbps of data rates.

1) GSM Architecture

A GSM network consists of the following components:

- **A Mobile Station:** It is the mobile phone which consists of the transceiver, the display and the processor and is controlled by a SIM card operating over the network.

- **Base Station Subsystem:** It acts as an interface between the mobile station and the network subsystem. It consists of the Base Transceiver Station which contains the radio transceivers and handles the protocols for communication with mobiles. It also consists of the Base Station Controller which controls the Base Transceiver station and acts as a interface between the mobile station and mobile switching center.
- **Network Subsystem:** The basic part of the Network Subsystem is the Mobile Service Switching Centre which provides access to different networks like ISDN, PSTN etc. It also consists of the Home Location Register and the Visitor Location Register which provides the call routing and roaming capabilities of GSM. It also contains the Equipment Identity Register which maintains an account of all the mobile equipment wherein each mobile is identified by its own IMEI number. IMEI stands for International Mobile Equipment Identity.

The security strategies standardized for the GSM system make it the most secure telecommunications standard currently accessible. Although the confidentiality of a call and secrecy of the GSM subscriber is just ensured on the radio channel, this is a major step in achieving end-to-end security. A GSM modem is a device which can be either a mobile phone or a modem device which can be used to make a computer or any other processor communicate over a network. A GSM modem requires a SIM card to be operated and operates over a network range subscribed by the network operator. It can be connected to a computer through serial, USB or Bluetooth connection. A GSM modem can also be a standard GSM mobile phone with the appropriate cable and software driver to connect to a serial port or USB port on your computer. GSM modem is usually preferable to a GSM mobile phone. The GSM modem has wide range of applications in transaction terminals, supply chain management, security applications, weather stations and GPRS mode remote data logging.

D. LED

Capable of displaying the generic messages, the Dynamic LED Display Model 96 can be used for advertising and notification purposes. The signs can also be connected to an RDS/RBDS decoder or other measurement equipment to display the measurement results. The 1.5U rack mount fit, makes the LED Display a perfect addition to station studios and control rooms or in showrooms where high-visibility is a desired result.

V. Applications

- Gardens – Helps in displaying the temperature and pollution levels in the surroundings
- Banks – Enables customers to make informed decision regarding products and services of the bank and be aware of their rights as also the obligations of the bank to provide certain essential services
- Railway stations – To display the arrival and departure time of various trains including their numbers.
- Bus stands – To display the places at which the bus is going to stop.
- Colleges – Helps in displaying the upcoming events and updates
- Hospitals – Helps in displaying important notices and to call the patients in a serial order.
- Industries– Notice boards can be used to display individual or company certifications and accomplishments, thus helping to boost the morale of employees in an organization.

VI. Advantages

- An authenticated user can send the message/notice from anywhere
- This system will reduce the manpower as well as the human work.
- It also saves the resources like time, printer, printing ink and paper.
- It is the most secure, reliable and confidential as the administrator is provided with username and password.
- Apart from the administrator no one else can manipulate/change the notice.
- It includes high data transmission rate, better message quality, less waiting time etc.
- This system provides first step to achieve paperless community. Due to the reduced usage of paper in a community which make the community environment friendly.

VII. Conclusion

The proposed system deals about the design of smart and efficient notice board which overcomes the disadvantages of the existing notice system. It accepts the message, stores it, and displays it on the LED screen and also gives out voice announcements. It is an eco-friendly design which uses less man power to display important information. It gives quick exchange of data and is less expensive to introduce and keep up. This project gives an effective method for showing messages on Notice Board utilizing Wireless Technology. It likewise gives client validation to maintain a strategic distance from any abuse of proposed framework. With the usage of latest technology like Raspberry Pi, a very high output accuracy can be achieved.

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