Raspberry Pi 3 based Wireless Electronic Notice Board

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Abstract – Notice boards can change the way communication with each other, using notice boards is a constructive method of promoting important information to a large number of people. Notice board is ideally useful tool for organizing and displaying information, these are used in multitude of businesses such as schools, colleges, hospitals, railway station, bus station, hotels, shopping malls etc. As they can be used over and over again to display important notices or advertise forthcoming events or meeting. In this paper, we proposed an advanced wireless notice board in which according to our need we can display or remove or alter the message according to our need. The main aim of this proposed project is to drastically reduce the cost involved, consume smaller amount of power and help in achieving quality of service. For this we need a computer/laptop as a transmitter, Raspberry Pi 3 as a receiver, Wi -Fi for data transmission and a LCD screen as a display.

Index Terms – Raspberry pi card, Liquid-Crystal Display (LCD), Wireless Fidelity (Wi-Fi).

1. INTRODUCTION

Many new communication technologies have been developed in the last couple of decades. Sharing information is the main motto of any communication technology. Apart from sharing information, technology has evolved in such a way that, the desktops and electronic appliances are accessed remotely. In our day-today life, we are using many notice boards in home, office and public places like airport, bus stands, hospitals etc. For our comfort and convenience. Communication technology helps us to exchange information and also allows monitoring and controlling the machines from remote locations. This controlling is possible with wired or wireless communication.In this world, everyone needs an easy living. In the day and age of connectedness, individuals are getting used to simple access to data. Regardless of whether through the Web or TV, individuals need to be educated about the most recent occasions happening the world over. The wired system association as Ethernet has numerous impediments on the need and the kind of association. These days individuals incline toward remote association since they can cooperate with individuals and invest less energy [1]. The Notice board is utilized as a part of various establishments to indicate notices and these boards are overseen physically. It's a long procedure to put warnings on the Notice board. This expends a lot of assets like paper, printer ink, human vitality and even sat around idly. In this paper, we have proposed a framework that will enable individuals to transmit alarms remotely on Notice boards by means of Wi-Fi. Here we have proposed a system with which only the authorized person can access the bulletin board. It takes less time due to fast data transmission over Wi-Fi. Less costs and savings in resources like paper. Table 1 summarizes the main differences between the three short-range wireless technologies. Wi-Fi offers faster data transmission rates for multimedia access than Zigbee and Bluetooth, which offers lower data transfer rates. Zigbee and Bluetooth are intended for communication (about 10 m), while Wi-Fi is designed for WLAN at around 100 m [2].

Table 1.

Differences and Comparison between Bluetooth, WiFi and Zigbee.

Standard	Bluetooth	Zigbee	Wi-Fi
Application Focus	Cable replacement	Monitoring and control	Web, E-mail and Video
Frequency Band	2.4 GHz	868.915MHz, 2.4GHz	2.4GHz, 5GHz
Max Signal Rate	1Mb/s	250Kb/s	54Mb/s
Nominal Range	10m	10-100m	100m

Channel Bandwidth	1MHz	0.3/0.6MHz, 2MHz	2.2MHz

2. PROPOSED WORK

2.1 Starting of System

1) Connect HDMI cord to your monitor and make sure SD memory card is inserted into the slot properly and fully.

2) Now plug the power cord and power on the board.

3) There will be a welcome screen on monitor and system should start booting process and will give the home screen. 4) A python application developed for full screen notification should be executed after the booting process is over.

2.2 System Execution

1) Once the system is power on and system is loaded we need to display the notice message.

2) Notice messages can be stored on folder which can be read and displayed on screen.

3) Notice messages stored in folder will be read by an application developed in python and executed just after start of operating system.

4) And keep on displaying notices unless stop by authorized person or shut down of the system.

2.3 Objectives

1) To design and develop a notice board using Raspberry Pi that display messages, photos or videos sent from the user side, and

2) To design and develop a simple, lucid, easy to install, user friendly system, which can retrieve the sent data and display notice on the LCD Display. Wi-Fi is the wireless technology that is being used to display the data.

3. HARDWARE COMPONENTS

Block Diagram of Notice Board

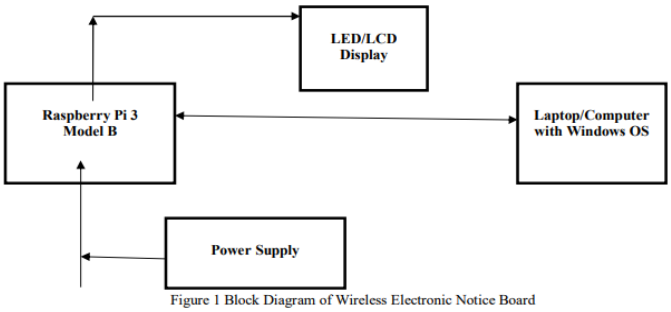


Figure 1 Block Diagram of Wireless Electronic Notice Board

The Figure 1 shows the Block Diagram of Notice Board. In this project, Laptop is used to send the notices, the Raspberry Pi receives the notices and is displayed in the display using Wi-Fi.

List of Hardware Components

3.1 Raspberry PI 3 Model B

The Raspberry Pi is a series of small single-card computers developed in the United States by the Raspberry Pi Foundation to promote the teaching of basic computing in schools and developing countries [3].

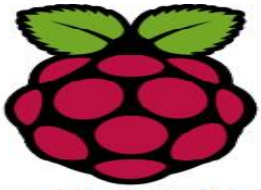


Figure 2 Raspberry Pi Model

Several generations of Raspberry Pi have been released. Its representation is similar to that of a raspberry, as shown in Figure 2. The first generation (Raspberry Pi 1 Model B) was launched in February 2012. This was followed by a simpler and cheaper model A. In 2014, the foundation launched a plate with an improved design on the B + Raspberry Pi 1 model. These cards are approximately the size of a credit card and represent the standard main form factor. The improved A + and B + models were launched a year later. In April 2014, a "calculation module" was launched for integrated applications and, in November, Raspberry Pi Zero was launched with input / output (I / O) functionality and smaller input / output functions (GPIO) and more small size [5]. 2015 for US $ 5. The Raspberry Pi 2, which added more RAM, was launched in February 2015. Raspberry Pi 3 Model B, launched in February 2016, includes Wi-Fi, Bluetooth and integrated USB boot functions. Starting from January 2017, Raspberry Pi 3 model B is the new Raspberry Pi [3].

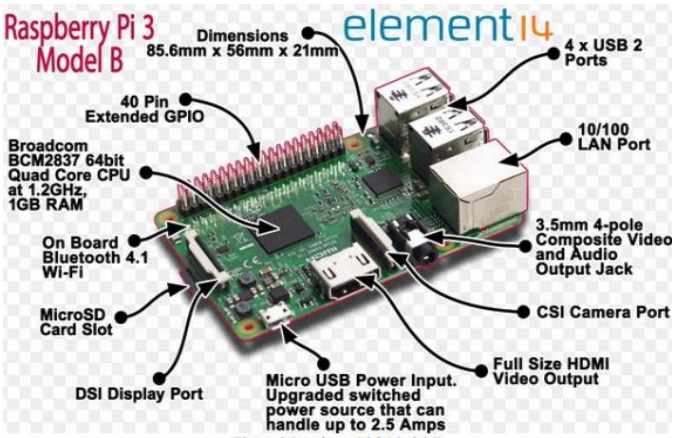


Figure 3 Raspberry Pi 3 Model B

The hardware diagram of Raspberry Pi 3 Model B is shown in Figure 3. A brief description of the components on the Pi is given below. Figure 4 Pin Diagram of GPIO Pins

Figure 4 Pin Diagram of GPIO Pins

Most computers have an I²C bus, presumably for some of the purposes listed by wikipedia, such as interfacing with the RTC (real time clock) and configuring memory. However, it is not exposed, meaning you can't attach anything else to it, and there are alot of interesting things that could be attached -- pretty much any kind of common sensor (barometers, accelerometers, gyroscopes, luminometers, etc.) as well as output devices and displays. We can buy a USB to I2C adapter for a normal computer, but they cost a few hundred dollars. We can attach multiple devices to the exposed bus on the pi **[4].**

3.2 Wi-Fi Router

Wireless fidelity (Wi-Fi). It is a technology that allows electronic devices to connect to a wireless LAN (WLAN) using 2.4 gigahertz (12 cm) and 5 gigahertz (6 cm) SHF radio bands. A WLAN is generally password protected, but it can be opened, allowing any device in its range to access WLAN resources. The Wi-Fi router is shown below in Figure 5.

Wi-Fi Alliance defines Wi-Fi as "WLAN local area network" (WLAN)
Standard of electronic engineers (IEEE) 802.11. However, the term "Wi-Fi" is used in general English as a synonym for "WLAN". since most modern WLANs are based on these standards.
Devices that can use Wi-Fi technology include personal computers, video game consoles, smartphones, digital cameras and tablets computers and digital audio players. Wi-Fi compatible devices can be connected to the Internet via WLAN and wireless networks. access point 20 meters (66 feet) within an extension to the outside. Block radio waves or as large as square kilometers achieved using multiple overlapping access points [5].

3.3 SD Card

A SD Card is necessary to install the OS and save the data received from sender.

3.4 Liquid-Crystal Display (LCD)

A liquid crystal display (LCD) is a flat screen or other electronically modulated optical device that uses liquid crystal light modulation. Liquid crystals do not emit light directly, but use a backlight or reflector to produce color or monochrome images.

Figure 7 LCD Display

LCD screens are available to display arbitrary images, or still images with low-cost content, which can be displayed or hidden, such as preset words, digits and 7-segment displays, such as a digital clock. , Others that have larger elements. Any HDMI / DVI monitor and any TV shown in Figure 7 should work as a screen for Raspberry Pi [2].

3.5 USB Keyboard and USB Mouse

The USB Keyboard and USB Mouse are used initially for installing the OS into SD Card.

3.6 Laptop/Computer with Windows OS

Here only a laptop/Computer with Windows OS can be used as transmitter because the File-Zilla software supports only Windows OS on the Server side.

3.7 Power Supply

The power shown in Figure 8 is an important requirement for the project work. The required DC power source for the base unit and the unit is derived from the power line. The 12V-012V central padded secondary transformer is used for this purpose. Get a 5V source from this transformer. In this case, the +5 V output is a regulated output and is designed with a positive voltage regulator 7805. This is a 3-pin voltage regulator. current up to 800 milliamps. Grinding is a process of converting an alternating current or a voltage into a one-way current. The component used for rectification is called 'rectifier'. A rectifier allows the AC voltage to be applied. Therefore, a pulsed continuous current is obtained to obtain the CC power filter circuits without problems. The power supply consists of a step-down transformer, full-wave rectifier, capacitive filter, 7805 regulator.

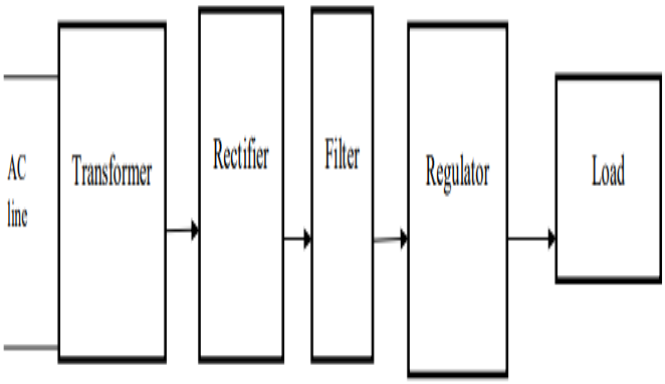


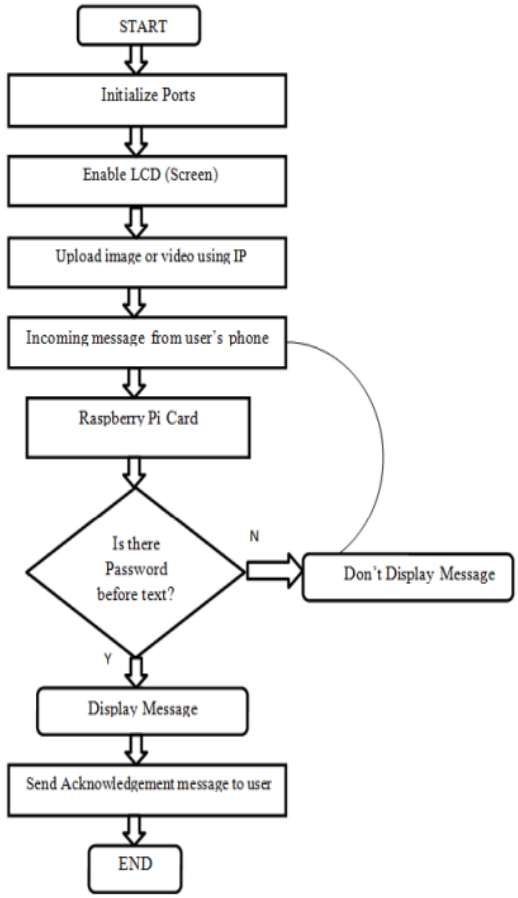
Figure 8 Block Diagram of Power Supply

3.8 HDMI to VGA

A premium, practical and compact device that converts Raspberry Pi digital HDMI signals into analog signals necessary for large portable VGA displays that are still commonly used. It is an easy to use device that is style within the style of a tiny low adoptive parent and short cable complete with HDMI plug for association to HDMI socket on Raspberry Pi. It does not need any external power provide for plug and play. Input to the device is via the integrated Type- A HDMI plug, and outputs to a typical VGA female port.

4. WORKING FLOWCHART

When we setup the entire project, the following steps are involved in displaying the text, image or video onto the LCD Screen. The flowchart is as follows:



5. EXPERIMENTAL SETUP AND RESULTS

The proposed project was fully developed and tested and the objectives were achieved. In this paper, we have used the laptop as transmitter to send the notices and Raspberry Pi 3 model is used as receiver. When both the transmitter and receiver are connected to the same network, then the notices are displayed on the monitor.

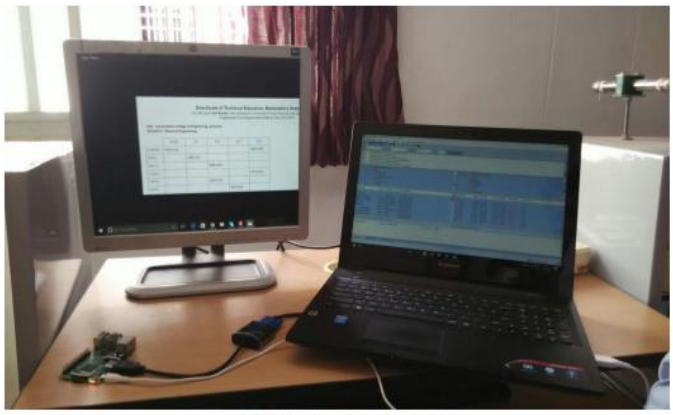


Figure 14 Experimental Setup

Experimental Setup They are displayed one after the other after 5 seconds time gap. We can add or remove the notice at any time. The software which is used in this project is Filezilla. The screenshots of the experimental setup is given in Figure 14.

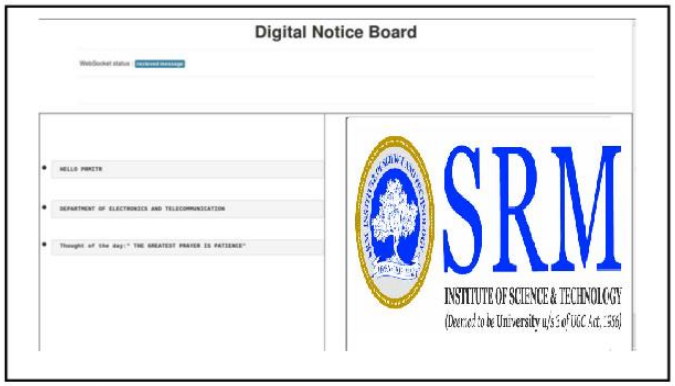
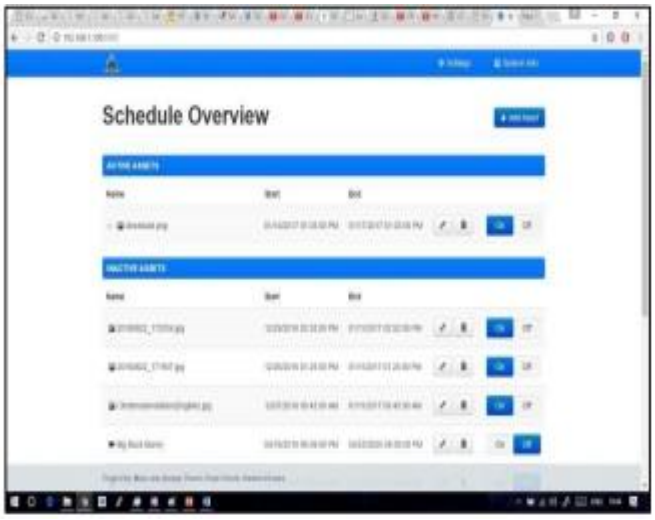


Fig. Display of Multiple notices in the form of text and images on the LCD screen.



The Raspberry Pi is connected to the monitor through HDMI to VGA converter. The supply to the Raspberry Pi is also provided. Initially keyboard and mouse are used to operate the monitor display.

The output screenshots of the Login page and first screen of the LCD Display is shown.

6. CONCLUSION AND FUTURE SCOPE

A. Now that the world is moving towards automation, then in this world, if we want to make some changes to the system used previously, we must use the new techniques.

B. Wireless operation ensures fast transmission through long-range communication.

C. Save resources and time. Data can be sent from a remote location. User authentication is provided. Previously, the notie board that used GSM was used because there was a message limit, but in our system the multimedia data can be stored on a chip or on an SD card. Text messages and multimedia data can be seen when we want to see.

D. The proposed system can further be extended to provide the notices from longer distances by providing the internet connectivity which will allow the system to update notices anywhere in the world.

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