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LARGE SCREEN WIRELESS NOTICE DISPLAY SYSTEM BASED ON ANDROID APP AND RASPBERRY PI

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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 advertises for the coming events or meeting. In this paper, we proposed an advanced wireless notice board in which at any time we can add or remove or alter the message according to our requirement. 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. Wireless electronic notice boards are a faster alternative to conventional pin-up type notice boards. A major constraint of the methods used so far is the small size of the 16x2 Liquid Crystal Displays (LCD) used to display the notices. This paper proposes a method in which large screens like computer monitors or televisions can be used for displaying notices sent as text messages from an android mobile phone as a transmitter, Raspberry PI 3 model B as a receiver which is heart of this system, Wi-Fi for data transmission and a LED/LCD screen as a display.

Keywords – Android mobile phone application, , Light Emitting Diode (LED), Liquid-Crystal Display (LCD), Raspberry pi card, Wireless Fidelity (Wi-Fi),

I. INTRODUCTION

In today's world of connectedness, people are becoming accustomed to easy access to information. Whether it's through the internet or television, people want to be informed and up-to-date with the latest events happening around the world (J. S. Lee 2007). 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 Wired network connection such as Ethernet has many

limitations depending on the need and type of connection. Now a day's people prefer wireless connection because they can interact with people easily and it require less time.

Smart phones are playing vital role in human life. They are easy to use, promising and durable devices that help in performing day to day tasks. Embedded systems using wireless technologies are widely used for communicating with peripheral devices.

Notice Boards are an important medium for displaying information and keeping people informed. The traditional notice boards involve the pinning up of printed or handwritten information on a board. But this has the disadvantages of dependency on a person for pinning up notices and wastage of paper. The proposed system will help in reducing the human effort, paper, printer ink and cost for manual changing of the notices.

The project aims at designing a LCD Monitor based message display controlled from an Android mobile phone. The proposed system makes use of wireless technology to communicate from Android phone to ARM11 display board. The system has a provision for giving message through text.

Automation is the most frequently spelled term in the field of electronics. The hunger for automation brought many revolutions in the existing technologies.

This project makes use of an onboard computer, which is commonly termed as Raspberry Pi processor. It acts as heart of the project. This onboard computer can efficiently communicate with the output LCD Display Screen and input message from Android mobile phone app modules which are used in this project.

II.OBJECTIVE OF PROPOSED WORK

The objective of this project is to develop a device that allows for a user to remotely control and monitor multiple home/office notices using a cellular phone. This system will be a powerful and flexible tool that will offer this service at any time, and from anywhere with the constraints of the technologies being applied.

1). to develop a wireless digital notice board that display message sent from the user and

2). to design a simple, easy to install, user friendly system, which can receive and display notice in a particular order with respect to date and time which will help the user to easily keep the track of notice board every day and each time he uses the system.

3). and help in reducing the human effort, paper, printer ink and cost for manual changing of the notices.

4). the project aims at designing a LCD Monitor based message display controlled from an Android mobile phone. The proposed system makes use of wireless technology to communicate from Android phone to LCD display board. The system has a provision for giving message through text.

III. LITERATURE SURVEY

It is a tedious process to put up notices on the notice board. This leads to wastage of a lot of resources like paper, printer ink, man power and also loss of time. In this paper we have proposed such a system which enables people to wirelessly transmit notices on notice board using Wi-Fi. Here only the authenticated person can handle the notice board. This system requires less time due to fast data transmission through Wi-Fi, less development cost and helps in saving the resources like paper etc.

Some developments in notice boards, in an attempt to overcome above-mentioned drawbacks, include display of data on a screen using wireless communication. This has been implemented on Liquid Crystal Displays (LCD) and Light Emitting Diode (LED)[1] displays. Some of the available methods use ATmega32 [2], LPC2148 by NXP [3]. The method used by Darshankumar C. Dalwadi.et al [2] can display only one message at a time. In the method used by Nivetha S. R.et al [3], 16x2 character LCD has been used. The disadvantage of this system is that in order to view the message, the observer should be very close to the screen. Use of Field Programmable Gate Array (FPGA) for notice boards is not economically viable [4]. Also, it requires synthesizing MicroBlaze processor on the FPGA for sending Attention (AT) commands [5]. Thus, the parallel processing capability of the

FPGA is not used as it is made to work sequentially.

The GSM based Digital Notice Board was very difficult to design. It was costly as compare to WIFI based notice board. In GSM digital notice board a SIM card was recommended to transmit the data (Notice), hence that each notice was chargeable to send. Also one more thing is, to transmit the video was almost near to impossible so we are here with our concept with very famous/latest technology that is WIFI.

Table 1: Survey on electronics Notice Board

Sr. no	Paper Title	Published Year	Technology Used
1.	Wireless Notice Board	2011	GSM
2.	Display Notice on notice board	2013	GSM
3.	SMS based wireless notice board	2013	GSM
4	Large Screen Wireless Notice Display System	2015 @IEEE	GSM

IV. SYSTEM OF ARCHITECTURE

In our work there are two sections one is transmitter and other is receiver for displaying notices using the Wireless technology.

A. Transmitter

Authorized Smart phone is used as a transmitter.

1. Android application

Android application is an application built in the android platform. All smart phone most widely uses the android application(apps). The android applications built in JAVA language. A signal is generated on clicking a specific buttons on the android application which allows the raspberry pi to display the notice according to message.

Here, Android application being the command center of the notice board. The instruction is passed to the notice board through android java and Raspberry Pi.A software development ki (SDK) is typically a set of software development tools that allows the creation of applications for a certain software package, software framework, hardware platform, computer system, video game console, operating system, or similar development platform. It may be something as simple as the implementation of one or more application programming interfaces (APIs) in the form of some libraries to interface to a particular programming language or to include sophisticated hardware that can communicate with a particular embedded. A typical Android app is designed for a Smartphone even for a tablet PC running on the Android OS. Android apps are written in the Java programming language and use Java core libraries.

Fig.1.Smart phone

B. Receiver:

It consists of following units:

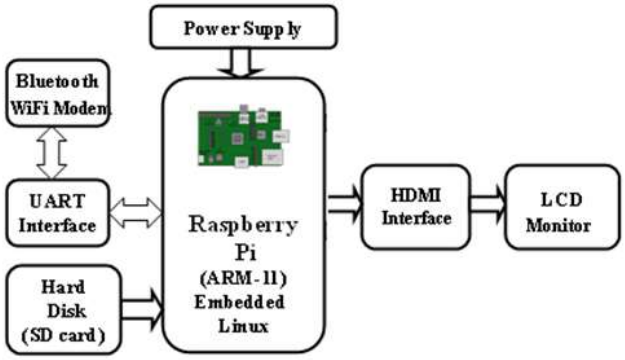

Fig.2.System block diagram

1. Wi-Fi Module

Wi-fi is a high performance, cost effective WLAN USB module which connects the raspberry-pi low cost computer, to a wi-fi local area network. Wi-pi uses the latest 802.11n wireless technology, and can support data rates up to 150Mb/s, compared with the older 54 Mb/s 11g products. It also benefits from a higher wireless LAN bandwidth, making data transmission more efficient.

2. Raspberry-pi

The Raspberry Pi is a credit-card-sized single-board computer developed in the UK by the Raspberry Pi Foundation. The Raspberry Pi has a Broadcom BCM2835 system on a chip (SoC), which includes an

ARM1176JZF-S 700 MHz processor, Video Core IV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded to 512 MB. It does not include a built-in hard disk or solid-state drive, but uses an SD card for booting and long-term storage. The raspberry-pi model B is having cost about 35$. 700 mA power ratings. GPIO are provided for external devices.

First Time Setup

1. Connect the Ethernet cable from the Ethernet connector of the raspberry-pi to router. Internet connection should be working. We need to do this only first time when setup raspberry-pi, so tha program can update itself to the latest version. Updates are enabled by default and can be disabled later when we want.

2. Connect the HDMI cable from the HDMI connector on raspberry-pi to the HDMI connector on TV or LCD desktop screen..

3. Plug the SD card into slot on the slot on the underside of the raspberry-pi. SD card should push all the way in so that it is making a good contact with the connectors.

4. Plug the wireless adaptor from keyboard & touchpad media controller into a USB port on raspberry-pi. Finally, insert the micro USB power supply. This will automatically boot the raspberry pi up. It shows raspberry-pi logo after successful installation..

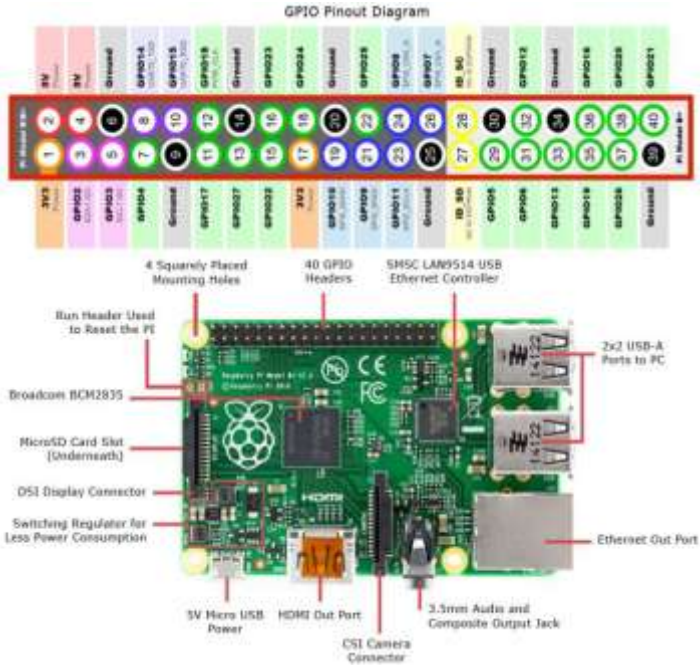

Fig.3.Raspberry pi 3 model B

3. Processor

The SoC used in the first generation Raspberry Pi is somewhat equivalent to the chip used in older smartphones (such as iPhone / 3G / 3GS).

The Raspberry Pi is based on the Broadcom BCM2835 system on a chip (SoC), which includes an 700 MHz ARM1176JZF-S processor, Video Core IV GPU, and RAM.

It has a Level 1 cache of 16 KB and a Level 2 cache of 128 KB.

The Level 2 cache is used primarily by the GPU. The SoC is stacked underneath the RAM chip, so only its edge is visible.

4. Power supply

This project uses regulated 5V, 500mA power supply. 7805 three terminal voltage regulator is used for voltage Regulation. Bridge type full wave rectifier is used to rectify the ac output of secondary of 230/12V step down transformer.

5. LCD display

We use LCD Monitor as display. LCD is used in a project to visualize the output of the application. LCD can also be used in a project to check the output of different modules interfaced with the Raspberry pi module. Thus, LCD plays a vital role in a project to see the output**.**

It is used to display the data of any form such as text, images, videos etc. Wi-fi will check the authorization of user and raspberry-pi will convert the message that will be displayed into LCD format (Badri M. A 2008).

Fig.4. LCD display

V.SYSTEM IMPLEMANTATION

Hardware Setup

- Connect the Ethernet cable from the Ethernet connector of the raspberry-pi to router. Internet connection should be working. We need to do this only first time when setup raspberry-pi, so that program can update itself to the latest version. Updates are enabled by default and can be disabled later when we want.
- Connect the HDMI cable from the HDMI connector on raspberry-pi to the HDMI connector on TV or LCD/LED monitor.

Fig.5. System assembly

- Plug the SD card into slot on the slot on the underside of the raspberry-pi. SD card should pushed all the way in so that it is making a good contact with the connectors.
- Plug the wireless adaptor from keyboard touchpad media controller into a USB port on raspberry-pi.

Finally, insert the micro USB power supply. This will automatically boot the raspberry pi up. It shows raspberry-pi logo after successful installation.

Fig. 6. Raspberry pi connections

2. Software Requirement

2.1 Android

Android provides a application platform that allows us to build the applications and games for mobiles in Java Programming language. The documents listed in the left navigation provide details about how to build apps

using Android's various APIs. Apps provide multiple entry points Android apps are built as a combination of distinct components that can be invoked individually. For instance, an individual activity provides a single screen for a user interface, and a service independently performs work in the background. From one component you can start another component using an intent. You can even start a component in a different app, such as an activity in a maps app to show an address. This model provides multiple entry points for a single app and allows any app to behave as a user's "default" for an action that other apps may invoke. Apps adapt to different devices Android provides an flexible application platform that allows you to provide special resources for different device configurations. For example, you can generate different XML layout files for different screen sizes and the system decides which layout to apply based on the current device's screen size.

2.2 Python

Python is a widely used general-purpose, high-level programming language.Its design philosophy emphasizes code readability, and its syntax allows programmers to express concepts in fewer lines of code than would be possible in languages such as C++ or Java.The language provides constructs intended to enable clear programs on both a small and large scale.Python supports multiple programming paradigms, including object-oriented, imperative and functional programming or procedural styles. It features a dynamic type system and automatic memory management and has a large and comprehensive standard library. Python interpreters are available for installation on many operating systems, allowing Python code execution on a wide variety of systems.

2.3 JSON

JSON (JavaScript Object Notation) is a data structure format. The data are considered as objects with properties and sub-properties. This formalism is close enough is based on XML and JavaScript.

2.4 MySQL

MySQL is a relational database management system (RDBMS). It is distributed under a dual GPL and proprietary license. It is one of the database management software most used in the world.

VI.EXPERIMENTAL SETUP AND RESULTS

The proposed system was fully developed and tested to demonstrate its feasibility and effectiveness. In this paper, we have used the Android smart phone 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. They are displayed one after the other after 5 seconds time gap. We can add or remove the notice at any time.

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Fig. 7. Notice borad screen s output

The screenshots of the Notice board developed has been presented in Figure 7. The Raspberry Pi is connected to the monitor through HDMI to VGA converter as shown in the figure. The supply to the Raspberry Pi is also provided.

n fig.7A,B, and C shows results in Multiple notices, Different background colours, different font size, heading and message/ notice are distinguish by different colour and space.

Fig.7A

Fig.7B

Fig.7C

VII. CONCLUSION

Wireless operations allow services, such as long-range communications, that are impossible or impractical to implement with the use of wires. It provides fast transfer of information and It is cheaper to install and maintain. This paper provides an efficient way of displaying messages on Notice Board using raspberry pi. It also provides user authentication in order to avoid any misuse of the system.

In this paper the technological advancement of the notice board is proposed that will help in saving time and resources and making the information available instantly to the intended person. The system is simple, low cost and easy to use that interacts with the intended users instantly. This system can be used in various applications like banking, schools, restaurants offices, hospitals, score boards for sports etc. The voice calling feature can be

added with the proposed system as a further enhancement for using the system in railways, airport or bus stations.

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