Multi Functional Smart Display Using Raspberry-PI

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A B S T R A C T

 Notice Board is primary thing in any institution or public utility places like bus stations, railway stations, colleges, malls, etc. But sticking various notices day to day is a difficult process. A separate person is required to take care of this notices display. This project is about advanced wireless notice board. The project is built around ARM controller raspberry-pi which is heart of the system. Display is obtained on project
tor. A Wi-Fi is using for Data transmission. At any time we can add or remove or alter the text according to our requirement. At transmitter authorized PC is used for sending a notices. At receiving end Wi-Fi is connected to raspberry pi. When an authorized user sends a notice from his system, it is received by receiver. Wireless is a popular technology that allows an electronic device to exchange data wirelessly over a computer network, including high speed wireless connections. The data is received from authenticated user. Then it sends to arm 11 that is raspberry pi. Temperature and Humidity sensor is added to arm 11 to display temperature and humidity. Camera is using for displaying the surrounding or the events happening in surrounding.

Index Terms: ARM 11, Wi-Fi, GSM, LCD Monitor, weather parameter, Camera.

I.   INTRODUCTION

In this world everyone needs a comfort living life. Man has researched different technology for his sake of life. 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). 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. The main objective of this project is to develop a wireless notice board that display message sent from the user and to design a simple, easy to install, user friendly system, which can receive and display notice in a particular manner 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. GSM and Wi-Fi are the wireless technology used. Temperature and humidity monitoring using sensor is also included in our system, and we are using camera for displaying the surrounding events so it is a multipurpose notification system for public and utility places. This paper is organized as follows: In first section we discuss the literature survey of various systems. In the next section we discuss the proposed system and then process flow and then application. In the last section we draw a conclusion out of all the discussion followed by a list of references.

II. LITERATURE SURVEY

Notice Board is used in various institutes to display notices and these boards are managed manually. It is a long process to put up notices on the notice board. This wastes a lot of resources like paper, printer ink, man power and also loss of time. In this paper we have proposed a system which will enable people to wirelessly transmit notices on notice board using wi-fi. Here we have proposed a system by which only

authorized person can accesses the notice board. It require less time due to fast data transmission through wi-fi. Less cost and save the resources like paper. Table-I below summarizes (zigbee series module 2007)the key differences between the three short range wireless technologies. Wi-fi provides higher data rates for multimedia access as compared to both zigbee and bluetooth which provides lower data transfer rates. Zigbee and Bluetooth are intended for communication(about 10m), while wi-fi and zigbee is designed for WLAN about 100m.

TABLE 1. Comparison Of Bluetooth, Zigbee And Wi-Fi Protocols

Standard	Bluetooth	Zigbee	Wi-Fi
Application Focus	Cable replacement	Monitoring and control	Web, Email, 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	22MHz
Data protection	16-bit CRC	16-bit CRC	32-bit CRC
Max number of cell nodes	8	More than 65000	32

III. SYSTEM OVERVIEW

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

A. Transmitter

Authorized PC is used as a transmitter.

B. Receiver:

It consist of following units

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. LCD Monitor

It is used to display the data of any form such as text, images 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).

3. GSM modem (900/1800 MHz) Interface

Semen's GSM/GPRS Smart Modem is a multi-functional, ready to use, rugged unit that can be embedded or plugged into any application. The Smart Modem can be controlled and customized to various levels by using the standard AT commands. The modem is fully type-approved, it can speed up the operational time with full range of Voice, Data, Fax and Short Messages (Point to Point and Cell Broadcast), the modem also supports GPRS for spontaneous data transfer.
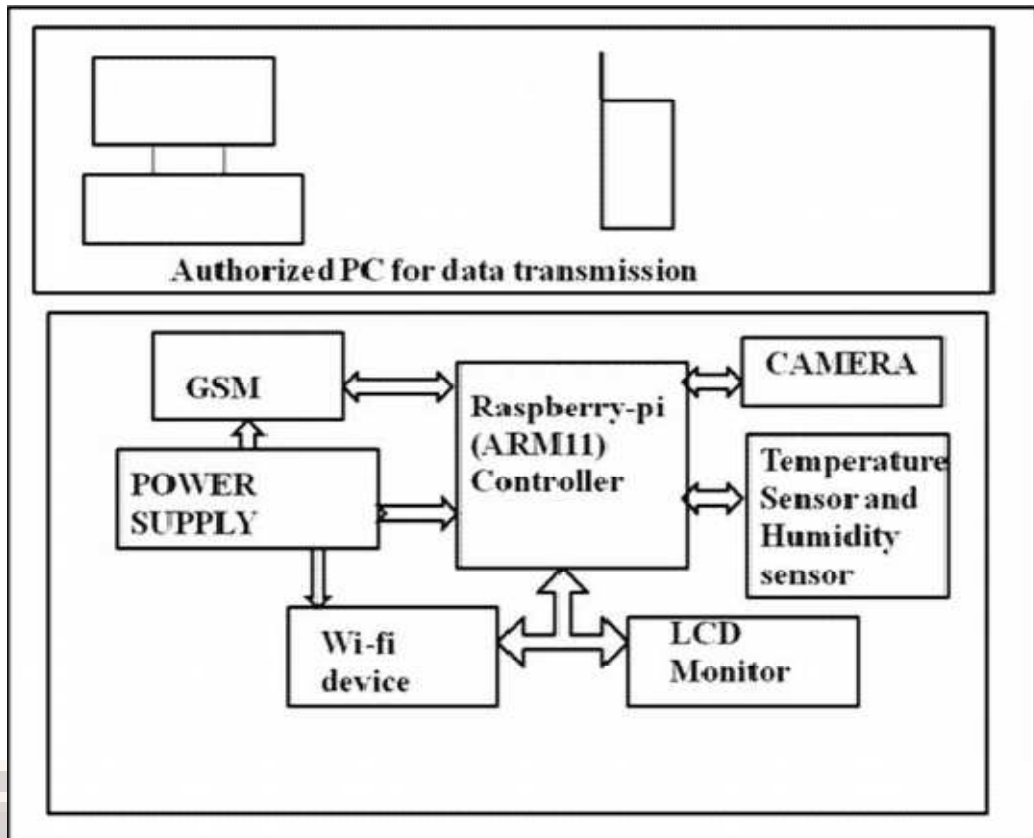
Figure 1. Block Diagram

Description of the interfaces

The modem comprises several interfaces:

- LED Function including operating Status
- External antenna
- Serial and control link
- Power Supply
- SIM card holder

4. Raspberry-pi

The raspberry-pi model B is having cost about 35$.system on chip is broadcam BCM 2835. ARM11 core, 700 MHz frequency. Memory 512 Mb. There are 2 USB ports. Composite video HDMI output. Onboard

storage is provided with the help of SD card. 700 mA power ratings. GPIO are provided for external devices.

First Time 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.
- 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..

5. Temperature Monitoring

Using temperature and humidity sensor we can monitor temperature and humidity at the end of the system. In this project we are using DHT11 sensor. DHT11 Temperature and Humidity sensor complex with a calibrated digital signal output. By using exclusive digital-signal-acquisition technique and temperature & humidity sensing technology, it ensures high reliability and excellent long term stability. This sensor include a resistive type humidity measurement component and an NTC temperature measurement component, and connects to high performance 8-bit microcontroller, offering excellent quality, fast response, anti-interface ability and cost effectiveness.

Each DHT11 element is strictly calibrated in the laboratory that is extremely accurate on humidity calibration. The calibration coefficients are stored as programs in the OTP memory, which are used by the sensor's internal signal detecting process. The signal-wire serial interface makes system integration quick and easy. Its small size, low power consumption and up to 20 meter signal transmission making it the best choice for various application, including those most demanding ones. The component is 4 pin single row pin package. It is convenient to connect and special packages can be provided according to user's request.

6. Camera

It is included in the Raspberry pi module.

IV. PROCESS FLOW

A. System Setup
- Format SD memory card (preferable 4 GB)
- The Raspberry pi will not start without a properly formatted SD card, containing the boot-loader and suitable operating system.
- Insert the card before powering pi, and shutdown pi before unplugging the card
- Download a distribution (including Raspbian, Pidora and two flavours of XBMC)
- Download zip of any OS from above and extract it into the memory card
- Insert SD card into memory slot of raspberry-pi

B .Starting of System

- Connect HDMI cord to your monitor and make sure SD memory card is inserted into the slot properly and fully
- Now plug the power cord and power on the board
- There will be a welcome screen on monitor and system should start booting process and will give the home screen
- A python application developed for full screen notification should be executed after the booting process is over
- Also the wi-fi should be initialized.

C.   System Execution

- Once the system is power on and system is loaded we need to display the notice message
- Notice messages can be stored on some Rich text/ Document file which can be read and displayed on screen
- Notice messages stored in a rich text/Document file will be read by an application developed in python and executed just after start of operating system.
- And keep on displaying notices unless stop by authorized person or shut down of the system

D. Wi-Fi Connectivity

- To provide access to the authorized user we can provide wi-fi connectivity
- For this purpose we need a wi-fi module/dongle.
- Driver software is also needed to be able to access the wi-fi module/dongle by system
- Once the driver software are installed we can create the wi-fi network.
- This wi-fi network only access by authorized user through password access restriction.
- Once logged in user and modify the notice board file and update the notice displaying on screen

V. ADVANTAGES

- It is a wireless system
- Text can be entered from remote place
- Data can be stored in the memory so it will not be lost in power failure condition
- A lot of interaction and information sharing occurs
- printing and photocopying cost not require
- save time, energy and resources
- GSM can be used for long distance data transmission.

VI. APPLICATION

- In Educational institutions and organizations for displaying the notices
- In crime prevention: Display boards put up on the roads will display tips on public security, accident prevention.
- Information on criminals on the run
- In metropolitan cities for managing traffic
- Advertisement: In shopping malls
- Railway stations: Instead of only announcing the delay in arrival of trains we can display the information

- Temperature and humidity monitoring
- Use as a CCTV camera

VII.CONCLUSIONS

Now the world is moving towards automation, so in this world if we want to do some changes in the previously used system we have to use the new techniques. Wireless operation provides fast transmission over long range communication. It saves resources and time. Data can be sent from remote location. User authentication is provided. Previously the notice board using GSM was used in that there was the limit of messages but in our system Multimedia data can be stored on chip or on SD card. Text messages and multimedia data can be seen whenever we want to see. we are using temperature monitoring and using CCTV camera in the same system.

VIII. ACKNOWLEDGEMENT

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