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Unguided bulletin board using digital cellular technology

Ramya.K.V¹, Surya devi.K², Prasanth.V³, Tamil Prabhu.G⁴, Monica.R⁵

1,2,3,4, Students, Department of ECE, Nandha Engineering College, Tamil Nadu, Erode, India

5, Assistant professor, Department of ECE, Nandha Engineering College, Tamil Nadu, Erode, India

suryadevik96@gmail.com

ABSTRACT:

This project deals with displaying information's in colleges on electronic notice board by sending SMS through mobile phones. It is a wireless transmission system which has very less errors and maintenance since, wireless transmission medium is used for data transmission in various areas. The hardware board contains Raspberry pi which is programmed by python. The Raspberry pi is interfaced with GSM Modem and a monitor. Any authorized user can send a message from mobile phone; this message will be received by GSM receiver Modem which is placed at the receiver side. GSM SIM900 sends the message to the raspberry pi and this message will be finally displayed in the notice board through monitor. This method is almost a fastest way to display the information instantly.

Keywords: GSM module, Raspberry pi, Python

1. INTRODUCTION:

The aim of this project is to develop a wireless notice board that will be used to

display latest information regarding various notifications. This system can be implemented in many important places where latest information can be displayed. For example if implemented in colleges all information for students can be displayed. It is very convenient for students and college management to display any information. In the existing method the message is sent and received by RF technology that offers flexibility to control the notice board within a range of 25 meters. The input is connected to the electronic notice board by using RF technology. GSM which is an easily available wireless technology suitable for short, medium and long range wireless communication. It emphasizes the method of transmitting a notice in the form of short message service via mobile and receiving

that message by Raspberry pi through GSM module hardware and displaying the received message. This project, with an aim to increase the usability of electronic notice boards, it deals with wireless reception and display of messages using Raspberry pi. Practically, all output resolutions are supported. The font size is customizable and it can display multiple notices at a time.

Wireless e-notice board is a perfect replacement of paper notice board providing easy maintenance, portability and access. Also, the wired communication faces a lot of shortcomings such as need of hard wiring, BER (bit error rate) at high transmission speed due to wire line capacitance, high cost, high maintenance and short coverage.

2. PROPOSED SOLUTION:

The system is comprised of both software and hardware. Software area includes the python programming. The hardware area includes the development of receiver hardware using Raspberry pi and its configuration with GSM modules. The developed system reflects the minimum requirements to realize the wireless notice board. The notice to be displayed is sent as a Short Message Service (SMS). The Global System for Mobile Communications (GSM)

network is digital. This makes it immune to noise. Also, GSM networks are relatively free of errors.

The system has the following sections-

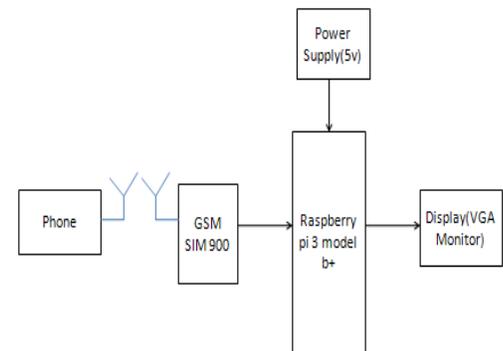


Fig 2.1: Block diagram

1. Since GSM network is being used, the information can be sent from any location and it will be displayed on the screen.
2. This SMS is received by the GSM modem and it is stored in the Subscriber Identity Module (SIM) memory. The GSM modem is polled at regular intervals by the Raspberry pi for a new message.
3. This is accomplished by the means of establishing serial communication between the Raspberry Pi and the GSM modem.

4. The GSM modem has an RS232 port while the Raspberry pi has a USB port. The conversion of signal from RS232 levels to USB compatible levels is done using integrated circuit Microchip MCP2200.
5. To interact with computers (Raspberry pi in this case), modems need Attention (AT) commands. The Raspberry Pi sends AT commands to the GSM Modem.
In response, the SMS stored in the SIM memory is transmitted by the GSM modem. The Raspberry pi after decoding the received data sends it to the display.
6. The Raspberry pi has two video output options – composite (Radio Corporation of America - RCA) and High-Definition Multimedia Interface (HDMI).
7. Display screens with VGA port can also be used by using HDMI OUT of the Raspberry pi with a HDMI to Video Graphics Array (VGA) convertor.
8. Therefore, the proposed method is versatile with respect to display options.
9. The operating system used in Raspberry pi is Raspbian.

10. The most popular programming language for Raspberry Pi is Python. It is a high-level language and thus lesser coding effort is needed as compared to using assembly language for other microcontroller boards.

11. Thus, the method proposed in this paper has several advantages over the prevalent methods used to offer the same functionality.

3. SYSTEM OVERVIEW:

1. HARDWARE MODULE:

GSM Based Digital Notice Board has following blocks

- A. Mobile phone
- B. GSM MODEM
- C. Raspberry pi 3 model B+
- D. Power Supply
- E. Monitor

1. GSM Modem:

GSM Modem with Sim900 module is built with Dual band GSM/GPRS. It works on frequencies 900 1 1800 MHz. It has a variable baud rate with range from 9600 to 115200. Baud rate can be configurable using AT commands. It operates on 12V regulated power supply. It has a SIM card slot to insert SIM and a receiving antenna to receive network signals. It has RS232 interface which allows it to connect devices like PC,

Raspberry Pi, microcontroller etc. This module can perform the basic functions of a mobile phone like receiving and sending SMS, voice calls, and TCP/IP communication over GPRS based on various AT commands.

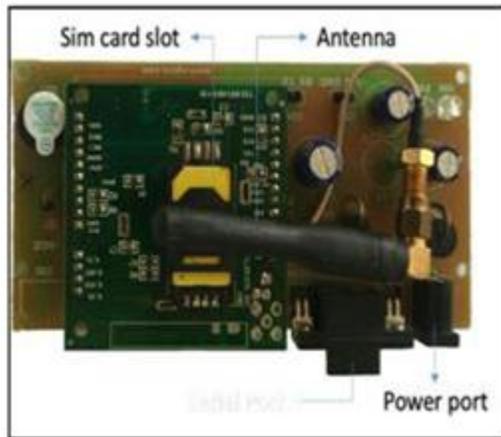


Fig 2: GSM SIM900

Fig 3.1. Raspberry pi 3 model B+:

Raspberry Pi is a single board computer. This board is as small as a credit card size, cost effective when compared to an actual computer, uses power rating of 5V, 700mA and it weighs not more than 50g. Raspberry Pi board [11] comes in three models A, B, B+. B+ is the advanced version of the three. B+ model comes with 512 MB RAM. It runs on ARM 11 processor typically operates at 700MHz frequency. It has a SD card slot for installing a bootable Operating System using SD card. Operating Systems like Raspbian, Pidora, Raspbmc etc can be installed. It has four USB2.0 ports to connect to devices like

keyboard, mouse, Wi-Fi adapter etc., according to our use to make it a full size computer. It has an Ethernet port to connect to network. GPIO pins are used to interface and control LEDs, switches, sensors and other devices. With the help of HDMI port, all kinds of monitors like LCD screens, projectors, TVs also can be connected.



Fig 3.2: Raspberry pi 3 model B+

3. Power supply:

Power supply is the source of electrical power. Normally any electronic circuit uses +5v DC power for its regular working .User can directly built +5v Dc power supply using 4 diodes, filter capacitors and regulator IC-7805(Integrated Circuit)or can directly purchase a +5v DC power adopter from the local market.

4. Monitor:

A computer monitor or a computer display is an electronic visual display for

computers. A monitor usually comprises the display device, circuitry, casing, and power supply. The display device in modern monitors is typically a thin film transistor liquid crystal display (TFT-LCD) or a flat panel LED display, while older monitors used a cathode ray tubes (CRT). It can be connected to the computer via VGA, DVI, HDMI, DisplayPort, Thunderbolt, LVDS (Low-voltage differential signaling) or other proprietary connectors and signals.

2. SOFTWARE:

It mainly consists of programming language used for coding the Raspberry Pi board and GSM modem. Python language is used for coding raspberry pi board and AT commands is used to operate GSM modem.

A. Python

B. AT commands

A. Python:

Python is a widely used general purposed high level programming language. Its design philosophy emphasizes code readability. It is used to code raspberry pi model

B. AT Commands:

AT commands are used to control MODEMs. AT is abbreviation for attention. These commands come from Hayes commands used by Hayes smart modems.

The dial up and wireless MODEMs need AT commands to interact with computers. In this project it is used to operate the GSM.

AT Command	Meaning
+CMGS	SEND MESSAGE
+CMSS	SEND MESSAGE FROM STORAGE
+CMGW	WRITE MESSAGE TO MEMORY
+CMGD	DELETE MESSAGE
+CMGC	SEND COMMAND
+CMSS	MORE MESSAGES TO SEND

Table 3.1: AT Commands

4. FLOW CHART OF E-NOTICE BOARD:

The operational flowchart of GSM based e-notice board is as follows:

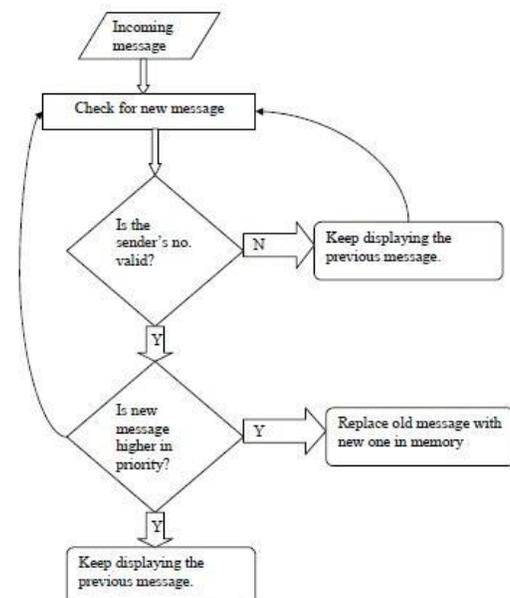


Fig 4: Flow chart

5. ADVANTAGES:

1. Digital notice board can reduce use of papers and hence deforestation can be turned into afforestation.
2. It can reduce physical effort of printing and distributing paper based notices.
3. It can spread among more people in lesser time since large screen display is used.

6. CONCLUSION:

This paper presents a way to display messages in Monitor. It offers an edge over other notice boards because of features such as customizable font size, color and background color. The size of the screen, a major limitation of other methods, is overcome by this system.

7. Future Work:

Message is displayed in text format in the proposed system. Future work includes the display of message in the image format and documents in the monitor.

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