

Wi-Fi Based Notification System

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ABSTRACT

Does the idea of using Wi-Fi as a data transmission appeal to u? Then this paper will surely grab your attention. Technology is making many things easier; I can say that our concept is standing example for that. So far we have seen LAN MAN, INTERNET & many more here is concept of “ WI-FI BASED NOTIFICATION SYSTEM ” which makes Wi-Fi as a communication network by name WAN. In today’s world of connectedness, people are becoming accustomed to easy access to information. The main objective of this paper is to introduce a project to develop wireless notice board that displays messages sent from the user. Wired network connection such as Ethernet has many limitations depending on the need and type of connection. So to overcome from it we use a wireless protocol 802.11b (Wi-Fi) for communication. This paper deals about an advanced hi-tech wireless notice board.

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I. INTRODUCTION

In this world everyone needs a comfort living life. Man has researched different technology for his sake of his 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.

Wired network connection such as Ethernet has many limitations depending on the need and type of connection one has. Ethernet is established using single cable, which is shared by all other devices. But the biggest limitation of establishing wired connection is the extensive cabling. To overcome from it the technology switches to wireless communication. People prefer wireless connections because they can interact with their peers and friends wherever they are.

The main objective of this project is to develop a wireless notice board that displays messages sent from the user. Notice Board is primary thing in any institution/ organization or public utility places like bus stations, railway stations and parks. 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 deals about an advanced hi-tech wireless notice board.

The objective of this project is to design a simple, easy to install, user friendly, system which can receive and display the 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.

II. APPLICATION OF IEEE STANDARDS

IEEE 802.11[1]

The need for centralized, easily accessible data in the grocery store environment lead to the need for a pre-established, widespread solution for communication between electronics devices. As a wired system was not feasible for this project, the clearest choice for such an implementation is the IEEE 802.11 standard. Though there were other potential alternatives, the widespread acceptance of Wi-Fi has allowed for it to be easily established in any business. Due to the Wi-Fi’s modular design, the team avoided the costly research and development required to create this sub-system and instead focused on its use. With the ease-of-use provided by the Wi-Fi module, most of the work involving the use of the 802.11 standard was in software. Querying and connecting to local Wi-Fi networks was as simple as giving the module a command to do so. Seamless integration of WEP or WPA encryption allowed for these to be used to protect the private data of the end-user. In this way, the WI-FI BASED NOTIFICATION SYSTEM could be prototyped and tested using a local ad-hoc network or a true centralized Wi-Fi network.

III. PROJECT REQUIREMENTS

Create a bill of materials and order/sample all parts needed for the design. Develop a complete, accurate, readable schematic of the design. Complete a layout and etch a printed circuit board. Populate and debug the design on a custom printed circuit board. Package the finished product and demonstrate its functionality. Provide a keys for user interface to set system function. Device will communicate wirelessly with authenticated given node using the IEEE 802.11 b protocol at a distance up to 400 mtr. Power device with proper supply required. Accurately display of information on LCD which user want to show. Device capability to display the output required by the user as per the application.

IV. SYSTEM IMPLEMENTATION

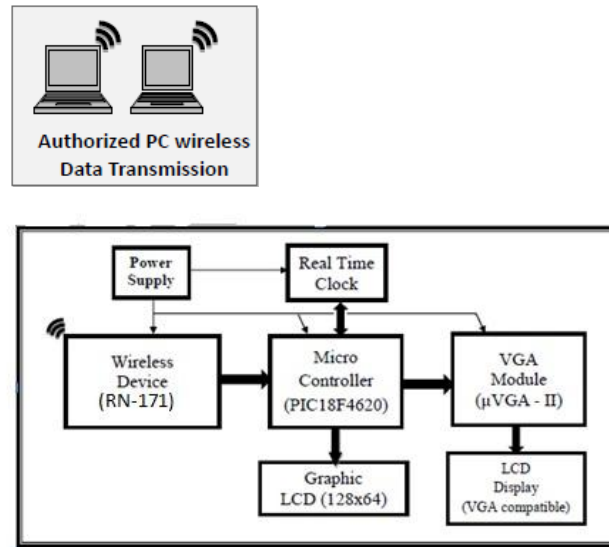


Figure 1 :Block diagram of Wi-Fi Based Notification System

The block diagram of the system is shown above. The system consist of the following elements,

- Wi-Fi Device (RN-171)
- Microcontroller (PICF4620)
- VGA module (µVGA - II)
- RTC (DS1307)
- Graphic LCD(JHD12864E)

Description:-

When an authorised user sends a notice from his system, it is received by Wi-Fi receiver. Wi-Fi is a popular technology that allows an electronic device to exchange data wirelessly over a computer network, including high-speed wireless connections. For this purpose RN-171 chip is being used in this project, which is IEEE Std. 802.11bRF Transceiver chip.

The reception of data from authenticated user is decoded by this chip, and connected to PIC microcontroller (PIC18F4620) using SPI protocol. The PIC provides the TCP/IP stack for RN-171 with static IP address and it also configures Graphic LCD to display notice. The same output data from PIC is send to µVGA (VGA module) , which displayed on general LCD monitor.

The project is designed in such a way that it can fetch the current time and day by interfacing the microcontroller with a RTC (Real Time Clock). After knowing the day and time, the respective details of the notice will be displayed on the LCD.

V. SYSTEM COMPONENTS

Microcontroller (PIC18F4620):-

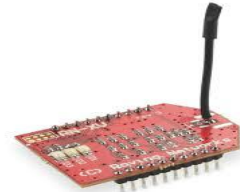
Microcontroller is the heart of the system that is controlling all the processes. The controller PIC18f4620 is used due to its numerous advantages such as large memory size.

Real Time Clock (DS1307):-

Real time clock is used to store data with respect time and date. The RTC DS1307 is used for this purpose which is interfaced with the microcontroller. This device keeps track of date and time and sends this information for displaying on the LCD.

Wi-Fi Device (RN-171):-

The RN-171 is a low-power, 2.4 GHz, IEEE Std. 802.11-compliant, surface mount module. The RN-171 module is approved for use with the integrated PCB meander antenna. This is designed to be used with Microchip's TCP/IP software stack. The software stack has an integrated driver that implements the API that is used in the modules for command and control, and for management and data packet traffic.



VGA Module:-

The μ VGA-II(SGC) module is a compact and cost effective Serial-to-VGA graphics engine powered by the PICASO-SGC graphics controller. It can provide QVGA/VGA/WVGA graphics solution to any embedded project with its powerful graphics, text, image, animation and countless more features built inside the module.



Power Supply:-

This is the important section required for providing necessary working voltages & currents to all the sections of project form mains line (230V). This project uses regulated 5V, 1A 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. And RTC requires 3V lithium battery.

VI. HARDWARE DESIGN

The circuits for the WI-FI BASED NOTIFICATION SYSTEM consist of four systems placed within one primary units: power supply, controller, display and Wi-Fi transceiver . Inside the power supply unit, AC wall power will be transformed, rectified, and then regulated to 3V, 5 V within the system. This voltage is made available on conductive posts by which each functional unit will be placed for working properly.

The unit consists of the power supply management circuit and the functional circuit. The power management circuit will give 5V output and use it to charge the portable modules. Additionally, power is regulated to 3V before being output to the functional circuit. This circuit contains all the operating components including the microcontroller, LCD, and peripheral connections.

The functional circuit was developed using an iterative process with multiple versions and enhancements with each iteration. I/O lines were added for the graphic LCD display , wireless module, and SPI interface. The LCD & VGA display module utilize a standard I/O interface. And the wireless module utilize a standard SPI interface. For the wireless module, Clear-To-Send and Request-To-Send signals have been connected to provide a more complete interface. This enables the 802.11 b (Wi-Fi) communication to happen faster without interrupting a pre-existing operation. The PIC microcontroller has built in SPI protocol. When placed in host mode, the microcontroller can access flash memory to read information.

VII. SOFTWARE DESIGN

A] Simulation Software:

Simulation of circuit was done through software called 'PROTEUS'.

The proteus is used to design the circuit assembly through software. The code was compiled & the HEX file was loaded onto the IC. Proteus has extensive single step and debugging facilities. PROTEUS has a comprehensive and powerful environment for building models and analyzing effects on system. It has high level of built in flexibility. It is a high speed visualization and analysis tool which is useful for error checking.

B] Programming software:

The software used is Mikro C. It supports every level of developer for a number of applications right from the basic level to a more complex level. We can built, compile, debug and test all types of codes in this software.

Design Requirements

Between the microcontroller, wireless module, and the LCD, custom firmware is an essential. Without a single unifying language, a protocol had to be established to enable devices to communicate between each other. The main software flow calls a succession of functions based on the user's choice. A custom communication protocol had to be established between each module and the PIC utilizing C language. Additionally, the Wi-Fi module needed to be able to send SQL commands to the database. Without specializing the input from the database, parsing would have been close to impossible. The LCD had similar needs, where specific bytes are expected at certain instances within the program flow.

Functional Overview

The microcontroller oversees the total operation of the system. Protocols were established to ensure that data is sent back and forth between devices at expected times. The microcontroller's internal RAM was heavily utilized for data handling while the ROM was comprised mostly of code memory. The microcontroller contained several parsing functions and LCD page controls. All information received from a particular database query is split and parsed into usable data for the LCD. The Wi-Fi module's transfers data between the microcontroller and database over the 802.11b protocol. As items are changed in the database, the wireless data will deliver a real-time snapshot of inventory without so much as a system restart. In a professional setting, the customer would provide the database to interface with the wireless module.

Communication Protocol

Two separate custom protocols were developed to interface the different modules. For the VGA, serial Tx-Rx flow was controlled by user input, and for Wi-Fi module SPI protocol is being used. All operation is designed to take the user step-by-step through the process of accomplishing a task, whether that be adding an item to the virtual shopping list, or connecting to a specific SSID with the WiFi module.

VIII. APPLICATION

Educational Institutions and Organizations: Currently we rely on putting up papers on notice boards to inform people of events. This method can be discarded by using wireless notice boards to display information in real time.

Railway Station: Instead of announcing trains schedule, we can directly display the information on LCD.

Advertisement: In shopping malls we get to hear the offers on various products from time to time. Instead we continuously display the information regarding the products and related offers on electronic display boards.

Crime Prevention: Display boards put up on roads will display tips on public security, accident prevention, information on criminals on the run. The board will help flash messages such as vehicle thefts as and when they occur.

Managing Traffic: In metropolitan cities we frequently come across traffic jams. One way to avoid this would be inform people beforehand to take alternate routes. A wireless notice board serves well for this purpose.

IX. CONCLUSION

The WI-FI BASED NOTIFICATION SYSTEM demonstrates the successful integration of a microcontroller with its peripherals, including communication with an external database over the IEEE 802.11 protocol. Using this transceiver, we succeeded in achieving communication in accordance with IEEE 802.11 through one to the other destination. While our immediate objective is to implement a notification system supporting wireless communication.

X. ACKNOWLEDGEMENT

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REFERENCES

- [1] *Wireless Networking Basics* by NETGEAR, Inc. 4500 Great America Parkway Santa Clara, CA 95054 USA.
- [2] A Message Proliferation System using Short-Range Wireless Devices Department of Information Systems and Media Design, Tokyo Denki University
- [3] WIH-Based IEEE 802.11 ECG Monitoring Implementation, Biomedical Engineering Faculty, Sciences and Researches Campus, Azad University, Tehran, Iran
- [4] PIC Microcontroller and Embedded Systems-By Rolin D. McKinlay, Danny Causey, Pearson International Edition

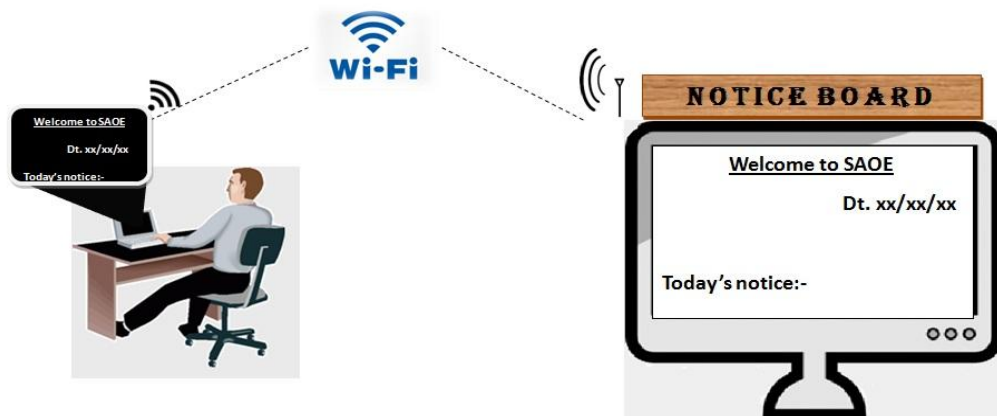


Figure 2: Virtual Design of Wi-Fi Based Notification System