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College Activity Addressing System with Real Time Alerts on Wireless Display Boards

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ABSTRACT

Usually notice boards are used to display the information for the students and faculty members for knowing the recent updates. Instead of the paper notice boards we can use electronic notice boards. The advantages of these electronic notice boards are especially in Colleges, displays the activities of the college dynamically of user choice. In this real time paper, we are using total number of two LED Scrolling display units which are wirelessly inter-connected to each other. The main LED scrolling board is connected to a PC using RF 433MHZ communication. In that PC, we will use GUI (Graphical User Interface) to send the messages to display on LED Scrolling units. From that first display unit, other LED scrolling board will connected using wireless technology. We are using RF modules which will work at 433MHz frequency, as wireless modules. An RTC (Real Time Clock) also connected to the main controller module to update the time and to schedule the periods. Whenever the period completes the college bell will automatically ring without any man power.

Keywords: Boards, GSM, LED scrolling display and RF.

1. INTRODUCTION

The wireless technology has been making tremendous progress. The ever increasing use wireless network serves as an indicator of the progress in the area of wireless networks. Notice boards play a vital role mostly in educational institutions. The time table or the schedule of the exams has to be given to the students. This will be done by writing the details on the notice boards. But this process consumes a lot of time to update the news on all the notice boards and there may be chances that the person responsible may commit some mistakes or he may be absent sometimes.

Usually notice boards are used to display the information for the students and faculty members for knowing the recent updates. Instead of the paper notice boards we can use electronic notice boards. The advantages of these electronic notice boards are especially in Colleges, displays the activities of the college dynamically of user choice.

Now a day's providing data security has become very prominent and is increases the quality of communication. If there are no security measures for the data then the data can be easily hacked or diverted which reduces the quality of communication. We see electronic notice boards which store particular information and displays the particular information only till it is provided with new information. In this paper we will look into electronic notice boards which use wireless technology for transferring data by which the new information can be sent. We will see how information is transferred and different types of notice boards are available. 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. This system can also be implemented for the people who are physically challenged. The aim of this paper is to develop a wireless notice board that will be used by the faculty members in order to display latest information regarding various notifications. All electronic notice boards are designed using wired system. The drawback of the design is the system is inflexible in term of placement because of the messy wire. Wireless electronic notice board is designed as a user friendly notice board with wireless concept that offers flexibility to control the notice board within a range of 1kilo meter. The input of the system is PC and the PC is connected to the electronic notice board by using RF technology. Wireless Notice Board has been designed which completely eliminates manual work. The system is divided into two parts; one is hardware and second is software. The LED scrolling board will shows the notice on it using the software part.

In this real time manner, we are using total number of two Led Scrolling display units which are wirelessly inter-connected to each other. The main LED scrolling board is connected to a PC using RF 433MHZ communication. In that PC, we will use GUI (Graphical User Interface) to send the messages to display on LED Scrolling units. From that first display unit, other LED scrolling board will be connected using wireless technology. We are using RF modules which will work at 433MHz frequency, as wireless modules. An RTC (Real Time Clock) also connected to the main controller module to update the time and to schedule the periods. Whenever the period completes the college bell will automatically ring without any man power. In section 2 we will explain the existing approach, problem statement and proposed approach of the notice board. The design and working of Wireless Display Board (WDB) is described in section 3.

2. EXISTING APPROACH AND PROBLEM STATEMENT

In practice, many educational institute uses paper notice board and they appoint particular person to maintain such board. Some other commercial offices and institute also use GSM based notice board but in that system there is no provision to retrieve message after power failure and those system can display garbage message on notice board when SIM receive company's offer or wrong person's message. Everyone who knows that SIM number can access that notice board.

In Existing GSM based system the system don't have provision to retrieve message and whenever message from company or other person come on that SIM card, system display garbage message on notice board. All this drawback of existing system overcome in proposed system. In the last time, information display boards are mostly paper-based before the invention of LED display board, and this has created inconvenience of showing the targeted people information during rainy days because the papers would be wet and wear out. Besides, it would be the possibility of the paper is not pasted on the board properly and dropped easily. After LED is introduced to the public, it is cleverly used to show information to public. However, again the problem arises when human resources, time and costs are wasted to change the information on display board placed at different locations one by one. Thus, this system is created to improvise the conventional method in such a way that the same messages can be sent to

multiple LED display boards from one main system. The comparison of wireless network for the problem statement is shown in table 2.1

TABLE 2.1 COMPARISION OF WIRELESS NETWORKS

Parameters	ZigBee	WiFi	Bluetooth
IEEE Standard	802.15.04	802.11.a/b/g	802.15.1
Nodes per Master	65535	32	7
Range (meter)	- 30m for indoor - 100m for outdoor	- 32m for indoor - 95m for outdoor	10m
Transfer Rate	250kbps	54Mbps	1Mbps
Battery Life	100-1000days	1-5days	1-7days
Cost	Low	High	Low
Power Consumption	125 to 400µW	Consumes more power	1mW-100mW
Reliability	High	Normal	High
Linking time	30ms	Up to 10s	Up to 3s

In this proposed system, the microcontroller has a flash memory which provides the facility to reprogram. Then by using an input keypad in the transmitter section we can transmit the data and it is sent to the receiver section through RF antenna and it is received in the receiver section and the microcontroller processes the data and transmits it to the LED for displaying. The RF modules which are used for communication are operated at the frequency of 433 MHz. By using this method we can modify the data in the electronic notice automatically by using wireless communication. The RF modules have the capability to form a mesh network by which we can send larger data over shorter distances. By using this method we can transmit the data in a secure manner.

3. WIRELESS DISPLAY BOARDS (WDB)

The block diagram of College Activity Addressing System with Real Time Alerts on Wireless Display Boards in main module and sub-module is shown in Figure 3.1(a),3.1(b),3.1(c)

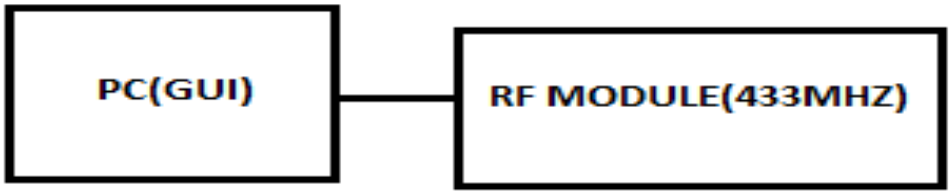

Fig 3.1(a) Main Module of WDB

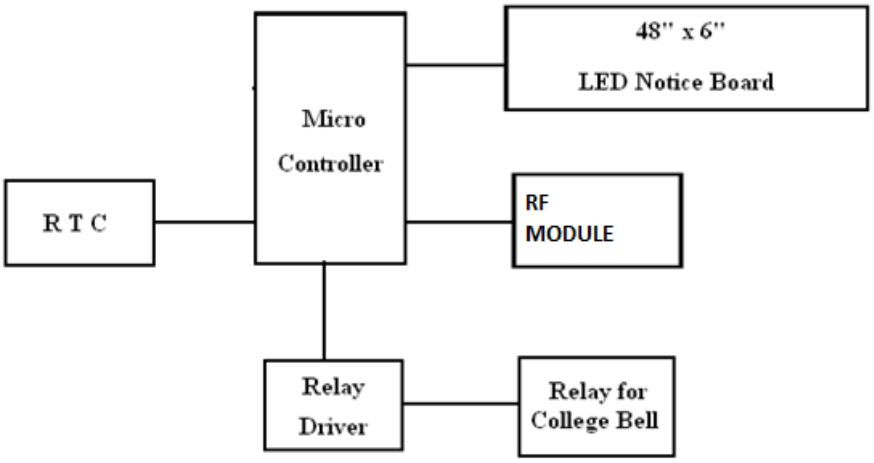

Fig 3.1(b): Block Diagram Of RF Based Wireless Display

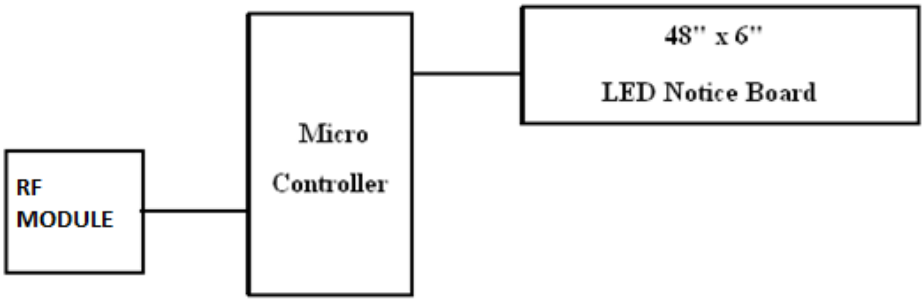

Fig 3.1(c) Sub-module for RF Based Wireless Display

ARM-Advanced RISC Machine is a 32-bit RISC (Reduced Instruction Set Computer) processor architecture developed by ARM Holdings. Many beginners sometimes misunderstood that the ARM is microcontroller or processor but in reality, ARM is an architecture which is used in many processors and microcontrollers. The ARM architecture licensed to companies that want to manufacture ARM-based CPUs or System-on-Chip products. This enables the companies to develop their own processors compliant with the ARM instruction set architecture. For example, the device we are using LPC2148 is ARM architecture based SOC product developed by NXP Semiconductor. Similarly, all major semiconductor manufacturers like Atmel, Samsung, TI etc. they all make ARM based SOCs. ARM7 is most successful and widely used processor family in embedded system applications. So we have decided to choose ARM7 TDMI based NXP controller LPC2148. Also, ARM7 is a balance between classic and new Cortex series. ARM7 is excellent to get start with in terms of resources available on internet and quality documentation provided by NXP. It suits perfectly for beginners to get in-depth idea about hardware and software implementation.

3.1 TRANSMITTER PART

In transmitter part a normal PC with standard keyboard or a laptop is required. PC is connected with the RF transmitter by using USB to RS232 connector. After data reach to the transmitter, it is transmitted to the receiver by

using Air interface. The Graphic User Interface designed can be run in a normal PC, once user want to use it, he/she will be asked enter the password, if the password is correct then the it goes to option menu but if it is incorrect password user will be asked to enter the password again.

On the Main menu option form there are several function can be performed, like check Logs (this is reserved only for administrator), also there is an option for the user to change the password, and the other option is for the last form where by the user will have an option to send the message. Once the message sent it is stored in the System database, so that when any mistake done it will be easy to identify which user did that mistake and at what time. Therefore the message can be transmitted to receiver through air interface (Wireless connection).

3.2 RECEIVER PART

Received data are taken to MCU which check validity of data if data (each letter) received is defined in the program inside its ROM then it will process that data for Display. MCU is the One which drives columns and rows bits for proper display. Note that all the data are sent serially and are also received in serial manner and MCU is programmed such that each letter comes out at a time and once the second letter displayed the first one is shifted and that creates movement until all words displayed. That's why it is called Moving message display.

Once data are taken serially to the microcontroller .This Microcontroller has the program which is capable of translating the ASCII data received. It is this data that used to drive the column and rows of the display. Microcontroller also need a restart switch, so that when there is a jam or any interrupt user has the chance to restart and allow Microcontroller to refresh and receive another message.

3.3. PRODUCT FEATURES

- Long-distance wireless transmission (1,000m in open space/baud rate 5,000bps in the air).
- Working frequency range (433.4-473.0 MHz, up to 100 communication channels).
- Maximum 100mW (20dBm) transmitting power (8gearsofpowercanbeset).
- Three working modes, adapting to different application situations.
- Built-in MCU, performing communication with external device through serial port.
- The number of bytes transmitted unlimited to onetime.
- Update software version through serial port.

3.4 LED NOTICE BOARD

The Dimensions of LED are as follows:
Columns (Height) = 48 LEDs and Rows (Width) = 8 LEDs.

LED dot matrices are very popular means of displaying information as it allows both static and animated text and images. This kind of display can be used at gas stations displaying the gas prices, or in the public places and

alongside highways, displaying advertisements on large dot matrix panels. In this project monochrome type of LED dot matrix display (single color) is used and its interface with a microcontroller to display dynamic (moving) characters and symbols. The LED Dot matrix connection as shown below Fig 3.2

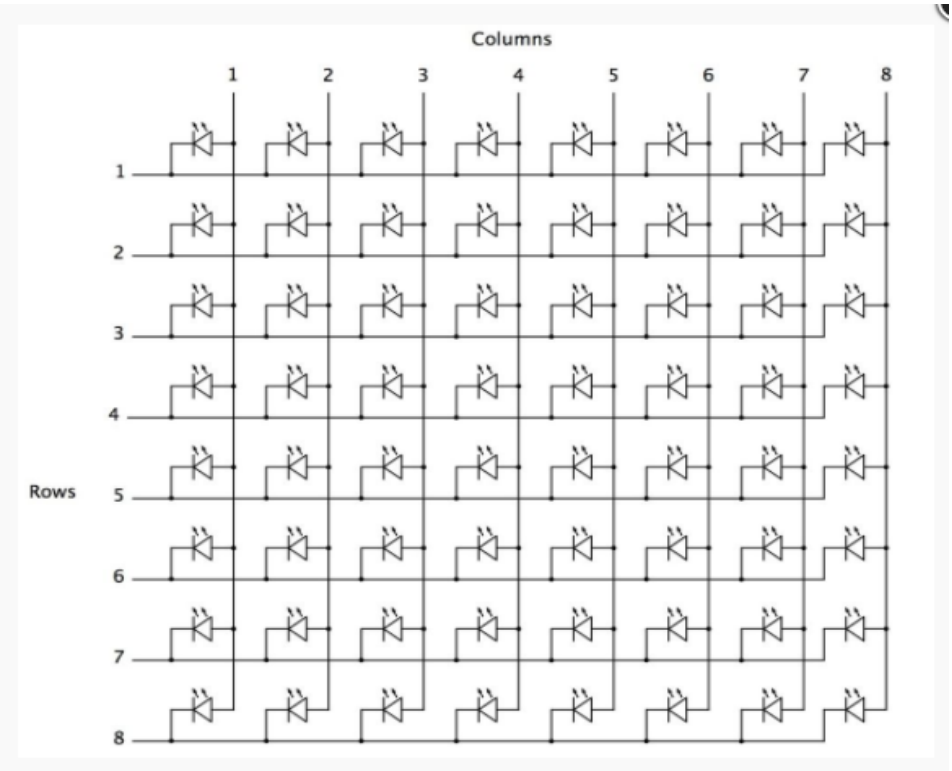

FIG.3.2 LED Display Dot Matrix Connection

It mainly consist of following blocks

1. 48 x 8 Matrix LEDs

We have to display characters in the messages, for this purpose we are going to use 48 X 8 matrix of LEDs. A single matrix consists of 48 columns and 8 rows. The actual physical dimension of single matrix is 360 mm by 60 mm.

2. Control Unit

This unit is used to select the matrices sequentially, control unit gets input from Microcontroller and then gives output to individual matrix. Only one matrix is selected at a time so as to display a character.

3. Microcontroller

This is the CPU (central processing unit) of our project. We are going to use a microcontroller which belongs to the 8051 family. The various functions of microcontroller are like:

I. Reading input from Keypad and store it into EEPROM

II. Sending data to Data bus so that it displays characters on the Matrix.

III. Storing the data into EEPROM memory and display it later using Matrix.

IV. Receiving data from the computer using serial port.

4. EEPROM

We are going to use EEPROM memory, it is electrically erasable programmable read only memory. EEPROM interfacing with 8051 is done using I2C communication protocol. It stores the data even if power supply is disconnected. This is used to the characters which have to be displayed on the Matrix display.

5. PC Interfacing

We are going to use max 232 IC for pc interfacing, the values of message to be diplayed on Matrix LEDs will be received from PC.

6. Keypad

Various operations of keypad are as following:

I. Start / Stop display.

II. Select message to be displayed.

III. Receive data from the Computer.

3.5 RELAY

Relays are remote control electrical switches that are controlled by another switch, such as a horn switch or a computer as in a power train control module. Relays allow a small current flow circuit to control a higher current circuit. By using this method we can modify the data in the electronic notice automatically by using wireless communication. The RF modules have the capability to form a mesh network by which we can send larger data over shorter distances and we can transmit the data in a secure manner.

3.6 METHODOLOGY

The PC interfacing with RF module and interfacing of microcontroller with RF main module and sub-module is shown in Fig 3.3. (a)Fig 3.3 (b), Fig 3.3 (c)

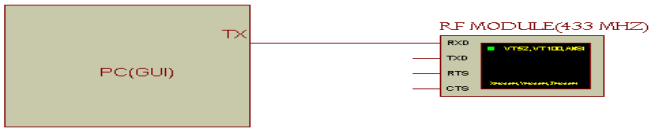

Fig 3.3. (a) :PC Interfacing With RF Module

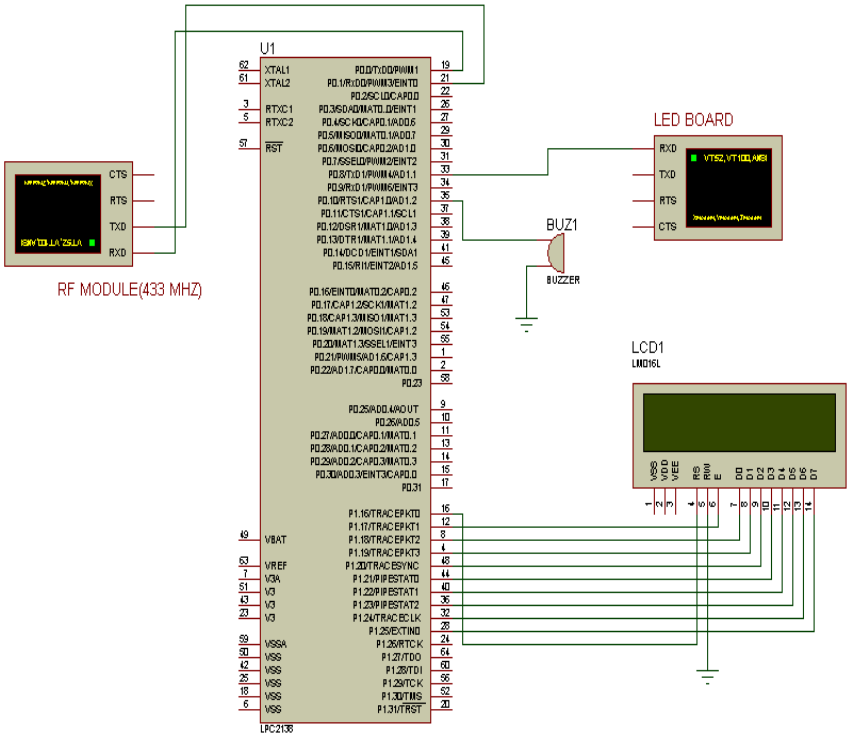

Fig 3.3. (b): Main Module which interfaces LED, LCD with LPC2148MicroController

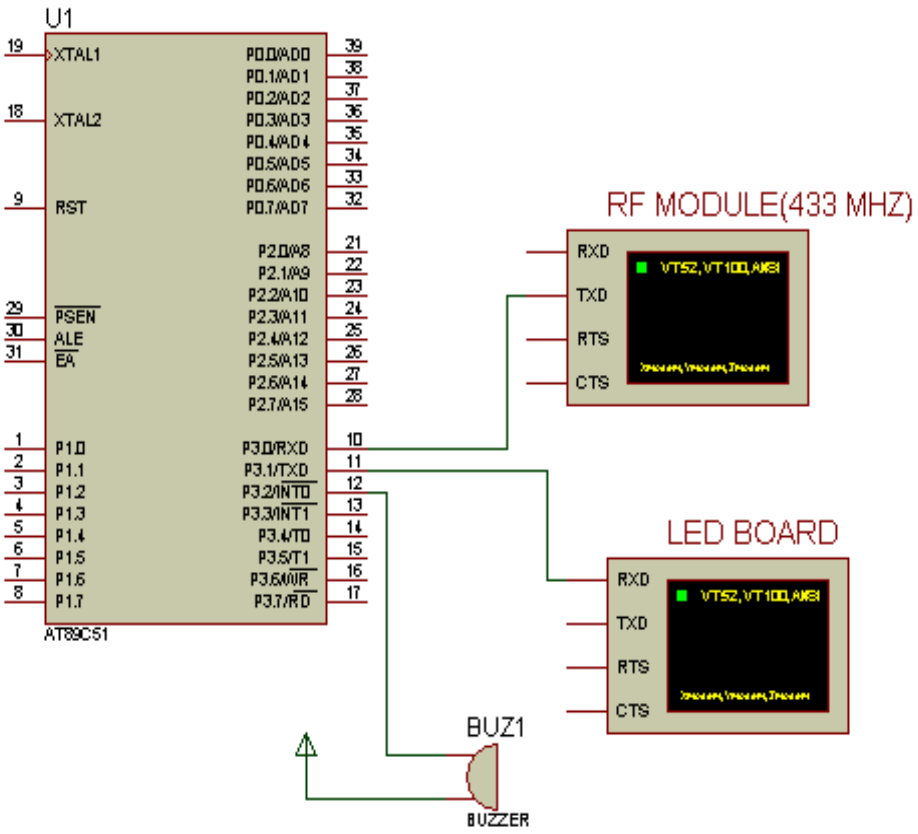

Fig 3.3. Sub-Module which Interfaces LED with 8051 microcontroller

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3.7 WORKING PROCEDURE

Wireless Notice Boards have been designed which completely eliminates the manual work. Data Security is primary concern for every communication system. There are many ways to provide security data that is being communicated. However, what if the security is assured irrespective of the hackers are from the noise. This Project describes a design of effective security for data communication by designing standard algorithm for encryption and decryption. R.F. is a PAN technology based on the IEEE 802.15.4 standard. Unlike Bluetooth or wireless USB devices, R.F. devices have the ability to form a mesh network between nodes. Meshing is a type of daisy chaining from one device to another. This technique allows the short range of an individual node to be expanded and multiplied, covering a much larger area. The source information is generated by a key pad and this will be encrypted and is sent to destination through R.F. modules. The receiving system will check the data and decrypt according to a specific algorithm and displays on the LED. This module 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. This uses the wireless communication RF. The RF modules used here are 433MHZ.The RF transmitter will be present at the principal or the person related to the issues to be displayed on the notice board .PC keyboard is used as the input device, Whenever the user wants to send the news updated to the notice board ,he types that particular message using keyboard and the same data will be transmitted through RF transmitter. At the receiving end the RF receiver will be fixed at the display panel. The receiver receives the data coming from the transmitter and the same data will be received by the microcontroller at the receiver end. The microcontroller sends this data to the display unit and thus the message given by the user at the transmitter end will be displayed. By using this method we can modify the data in the electronic notice automatically by using wireless communication. The RF modules have the capability to form a mesh network by which we can send larger data over shorter distances. By using this method we can transmit the data in a secure manner.

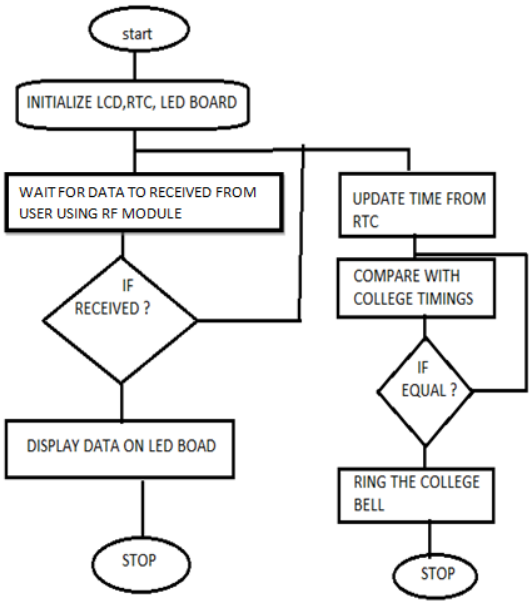

Fig 3.4.(a) Flow Chart for analysis of Main Module of WDB

3.8 FLOW CHART

The Analysis of data transferring or notices that has to be displayed on LED can be understand by the following flowcharts which are as follows in Fig 3.4 (a) and (b). The analysis of data transferring in Sub-Module of WDB can be understood by following Fig 3.4.(b)

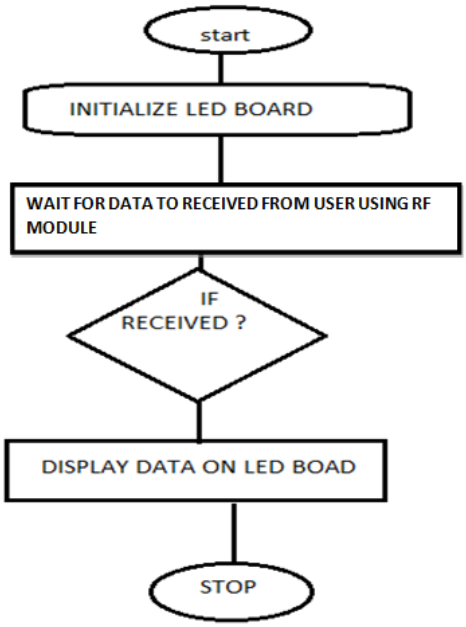

Fig 3.4.(b) Flowchart for analysis of Sub Module of WDB

4. IMPLEMENTATION RESULTS

The application window is prepared in the Visual studio 2010 which shows as follows

STEP 1

This form is the login form in which user asked to enter its username and password. Only if username and password are matched with the stored data in the database will be considered as the correct one then the main menu form will be opened, unless user will be asked to enter the correct information again.th form will be as shown in Fig 4.1

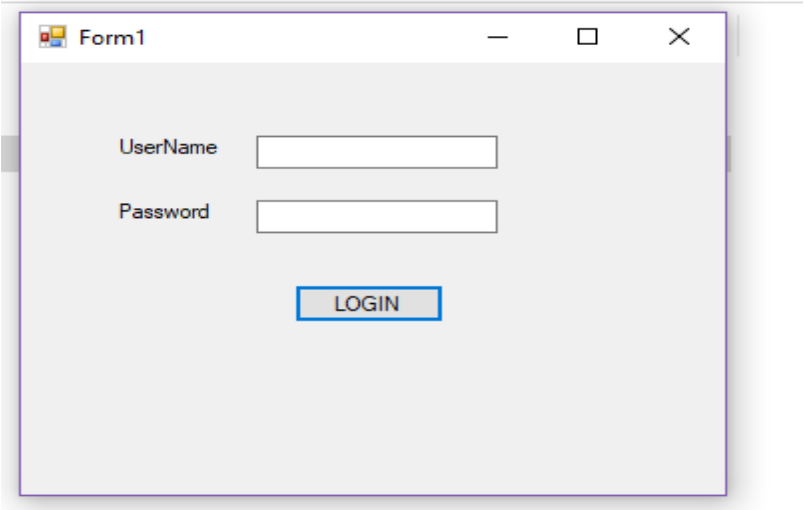

Fig 4.1: Log –in Form

STEP 2

This form is the main menu form in which the serial communication port (comport), Baud Rate is directly updated if we install CP2102 driver, unless user has to install driver then the process has to be repeated from step1. The form will be as shown in Fig 4.2

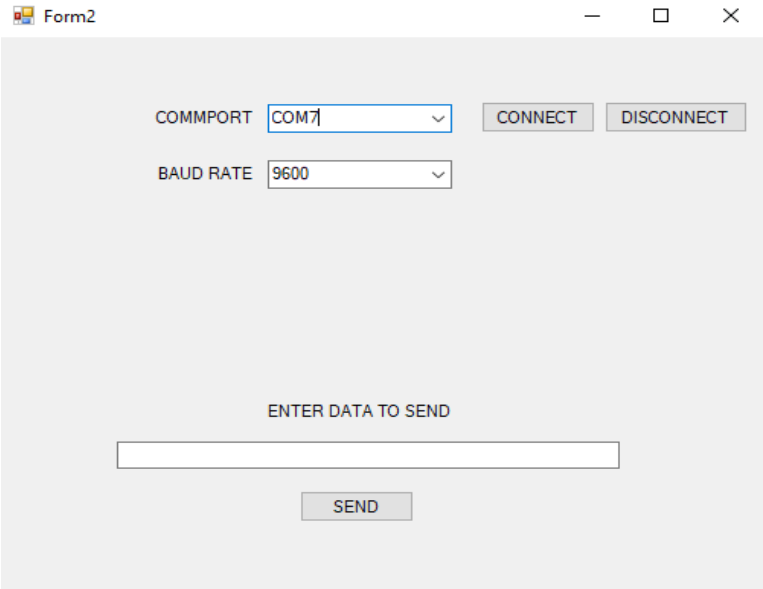

Fig 4.2: Main menu Form

STEP 3

For the sending of the data we have to click on connect option then type the data that to be displayed on the LED in the enter data to send and then click on send option. The form will be as shown in Fig 4.3

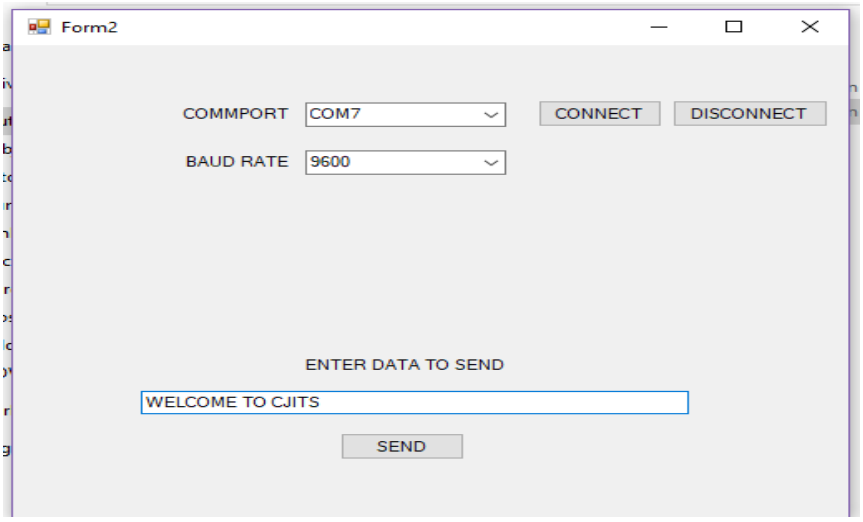

Fig 4.3: Main Menu Form with data to be sent

STEP 4

The data which is sent is displayed on the LED as a scrolling message as shown in Fig 4.4 and Fig 4.5

Fig 4.4:Data scrolling on LED board

Fig 4.5: LED board with a data scrolling

5. CONCLUSION AND FUTURE SCOPE

5.1 CONCLUSION

In this Paper by introducing the concept of wireless technology in the field of communication we can make our communication more efficient and faster, with greater efficiency we can display the messages with less errors and maintenance. We use the RF modules for wireless communication. With the use of storage memory notice message is saved and retrieved from storage after power failure. The main objective of this is to make faster and efficient notice display system.

5.2 FUTURE SCOPE

Electronic Notice Board is one of the applications where RF can be used effectively. It can also be used in Malls and Highways for Advertisement purpose. A moving display with variable speed can also be used in place of static

display. It can be improved by adding WIFI to the system where it can be connects to the cloud. When the module connects to the cloud user can send data from anywhere in the world.

Below are some of the areas which need to be improved in the future enhancement of this system:

1. Multiple displays – Sometimes a user might need to display one message in different location. So on the next designing someone might consider that as the challenge, and not only multiple displaying a single message but also system must be able to display different message in different display in real time.
2. Type of display – The one used in this system can only display letters and numbers. In next design, designer must think of using the better display which is able to display static pictures and video for better advertisement.
3. Feedback – In the current design the system has no feedback, which means if there is any kind of failure in receiving the message, sender will never no and since display is very far it is not even simple to go and check.

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