Digital Notice Board Using Raspberry PI

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Abstract - In today's world LED scrolling displays are in fame for advertisements. These scrolling display boards are used in malls, public transportation, to display traffic signals etc. The major complication with these displays is to carry a computer or special keyboard for generating and sending messages to LED display boards effectively; it is a complex process and also increases the cost if we go for sending messages using wireless technology.To make these LED scrolling message display more mobilize, a GSM mobile phone replaces the keyboard or computer for generating and transmitting messages to LED display board. The text message is transmitted by a GSM-based mobile phone with SMS service to a led display board. GSM modem receives the text message and is forwarded to Raspberry Pi. Then the Raspberry pi verifies the password, if password matches then Raspberry Pi of the LED display filters the message content in SMS and changes the display text in LED display dynamically and also the text received is converted into voice and gets amplified by amplifiers through which it is connected to speakers. By using this SMS service it is possible to change the text on the LED display board from anywhere. The total cost that is required in the conventional LED display boards gets abated and time-saving by implementing this proposal. This proposed model is user-friendly in updating messages on display board. The project uses a GSM modem at the display side to receive SMS. Raspberry Pi and led driver to drive the LED display board. Along with this, a power supply unit and supporting hardware for Raspberry Pi is used.

Keywords—Raspberry pi,GSM moedm,text to voice,LED display board.

I. INTRODUCTION

In today's world of developing technology, people are becoming habituated to easily access to information. People want to get updates of whatever happening in the world within seconds with internet or television. Wired connections have many complications depending on connections. Now today's generation totally depends on the wireless technology because it takes less time. The purpose of this project is to grow up a digital wireless notice board which displays and updates the information which is sent from the user. It is a user-friendly project. But in traditional displays, if people want to display another information or data or to change any style of display format people have to go to setup and connect the display board to PC or laptop and it requires almost 5 minutes to change. We are designing a new technique in this project to access remotely.

In this, the heart of the project is Raspberry Pi 3 model b, used as a controller which is used for controlling LCD display using GSM. To access LCD display through Raspberry Pi, GSM technology of mobile communication network model which uses SIM card to communicate is used. If the user wants to display the message on notice board, the user will send the message through mobile phone by just typing the information. The message sent by the user is updated on LCD display board. The text received is transformed into voice and gets amplified by amplifiers through which it is connected to a speaker. Password is also used for security authentication which is verified by Raspberry pi. Python GUI programming (TKinter) is used for programming to develop the project.

The usage of paper and cost is also reduced by this project. It can be operated by SIM or website is also used for sending the message.

II. SYSTEM MODEL

Notice Board is the prime thing in any educational institutions, public transport like buses and railways, parks. But sticking distinct notices often is a difficult process. Wireless communication is the growing technology and the world is going mobile and security is also main criteria. As we always aim to control everything in this world without moving an inch, notice board need to have wireless access. In this modern digitalized world, the deed of GSM and SMS is in vogue. An advanced display using the GSM technology to access it by communication between Raspberry pi as a controller and mobile would be efficient. Thereby we come to the conclusion to design a GSM based digital Notice board using Raspberry pi such that it can accomplish the obligations such as the less manual operation. The message can be updated from anyplace in the world within seconds. Password and text to voice conversion features are used for better flexibility.

Raspberry Pi is the core of the project. Text to voice conversion is very difficult and system complexity increases if we use microcontroller so Raspberry pi is used as a replacement for a microcontroller. Also, it is a complete solution built-in features like Wi-Fi, Bluetooth which provides huge future scope for more development of this project.GSM modem is interfaced with Raspberry pi and

whenever SMS is received GSM modem communicates with Raspberry pi through AT commands. Then Raspberry pi replaces the previous message with the present message received. Sender ID is choked and only text message is displayed. “espeak” software is installed in Raspberry pi through this the text is converted into voice.

III. PROBLEM STATEMENT

Presently we depend on the popular technique of using paper for notices. This is a time-consuming method. This leads to wastage of paper. All notice boards now depend on wired electronic systems. One of the major drawbacks of this design is its inflexibility or its bulkiness. The existing model also contains a system which uses GSM modem and microcontroller to display the message on LCD display. To add any features like text to voice conversion or voice to voice conversion, more components are to be interfaced which increases cost and bulkiness of the system .Code complexity also increases if more features are added

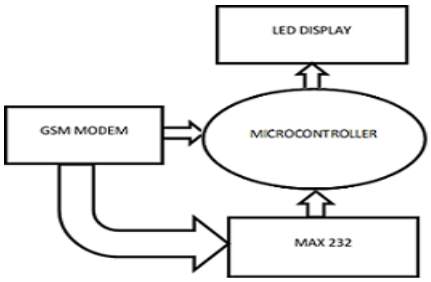

Fig.3.1 Block diagram of existing model

IV. PROPOSED MODEL

This project is developed as convenient notice board with a wireless approach that offers the resilience to control the digital notice board within the limit of GSM Communication System. To reduce the messy wiring of an earlier electronic wired model. For security, purpose password is used. Text to voice conversion feature, buzzer is also added to this project. Code building is also easy by using Raspberry pi.

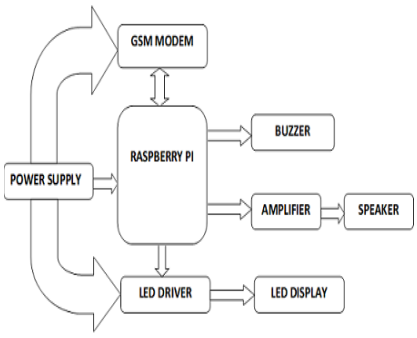

Fig 3.2 Block diagram of Digital notice board using Raspberry pi

DESIGN OVERVIEW:

The above block diagram represents digital notice board using Raspberry pi. Here Raspberry pi is the main block which controls the total system. GSM modem at the receiver receives SMS sent to the respective SIM inserted in GSM modem. Now this message is sent to Raspberry pi where verification process takes place and Raspberry pi check whether SMS is from authenticated transmitter if it is so then Raspberry pi send this message to led display board. A Led driver is used to drive the display and message is scrolled using74HC595 shifter. Whenever SMS is received buzzer is triggered which drags the attention of people that a new message is updated. One more interesting feature in this project is that the text message received by the GSM modem is converted into voice by the Raspberry pi in which espeak software is installed. As the amplitude of this voice signal is low, an amplifier is used to strengthen voice signal and is given as input to speaker so that it is audible to many people.

V. SYSTEM ARCHITECTURE

- GSM MODEM:

A GSM modem is a remote system for passing on versatile information and voice administrations which are worked by utilizing a SIM card.It works at 850MHZ, 1800MHZ and1900MHZ recurrence groups. GSM framework was set up utilizing TDMA method. The GSM modem will digitize the got information and diminishes the information for every client as per assigned time slots, the data is sent through channels. It works in light of the AT commands send by the client. It utilizes encryption procedure for security reason and it has enhanced range effectiveness.

Fig. 5.1 GSM modem

- RASPBERRY PI

Raspberry Pi is the core of the project. Text to voice conversion is very difficult and system complexity increases if we use microcontroller so Raspberry pi is used as a replacement for a microcontroller. Also, it is a complete solution built-in features like Wi-Fi, Bluetooth which provides huge future scope for more development of this project.GSM modem is interfaced with Raspberry pi and

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Fig. 5.2 Raspberry pi

Fig. 5.3 Interfacing GSM to Raspberry pi

LED DRIVERS:

Display board requires many LEDs to display the information or data so led drivers are used to drive and protect LEDs from voltage or current fluctuations.ULN2803A integrated chip which consists of an array of Darlington transistors which provides high current that permits to interface TTL signals. It is rated at 50v and 500mA which is quite sufficient to drive led display board. For more noteworthy current capacity more Darlington sets can be participated in parallel to cluster.

Fig. 5.4 LED driver

- SHIFTERS:

The shift register receives serial data and delivers a parallel output. To display the message, characters need to be scrolled so shifters are preferred according to the user's flexibility in terms of direction.74HC595A shifter accepts 8-bit serial input and generates serial or parallel output. Shift clock is given as input at pin 11 and latch clock input is given at pin 12.whenever pin 11 is pulled from 0 to 1, the data at serial input pin is shifted to an 8-bit shift register. Serial data is given as input at pin 14 and parallel output is collected at pins 15, 1,2,3,4,5,6,7 respectively.

Fig. 5.5 Shift register

- BUZZER:

To grab the persons attention whenever the message is exposed on the digital display board buzzer is used. Inside the buzzer, there is a piezo element which contains a central ceramic disc bounded by a vibration disc metal, whenever current is supplied to the buzzer. The ceramic disc gets contract or expands which makes the vibration disc to vibrate and then produces a beep sound at output. The resultant sound pitch hangs on vibration speed. If frequency of buzzer is changed then the vibration speed changes which results in change of pitch of resultant sound.

Fig.5.6 Buzzer

FLOWCHART:

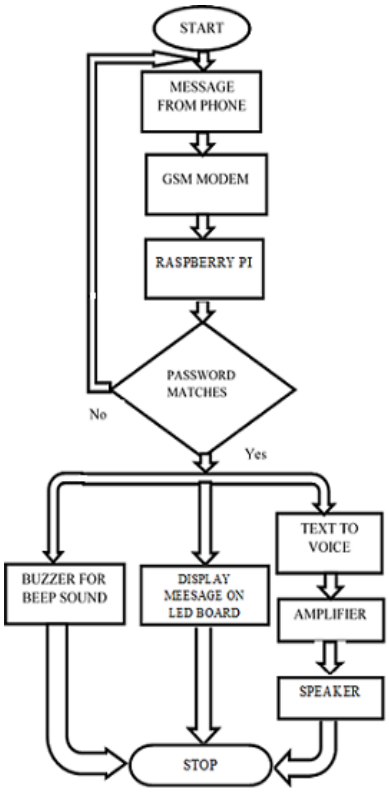

Fig3:Flow chart

VI. RESULTS

When the text message, for example VERSION 2.1 is sent through mobile phone from anywhere in the world. When that text message is received then buzzer makes a beep sound to make everyone in the premises alert that is new message is received and message VERSION 2.1 is displayed on the board. Parallelly the text is converted to voice and played through speaker connected to Raspberry pi. So that people who are blind and illiterate can understand the message. This LED display board supports alphabets, numerical and special characters. At once it can display 18 uppercase or 22 lowercase characters .It can receive 160 characters and message gets scrolled through shifters.

Fig 10: Final output on LED display

VII. APPLICATIONS

a. Universities, colleges, schools:

At present we are using circulars and announcements to convey any information to students which is very much time taking and paper consuming. These scrolling display boards wipe out the limitations of this conventional process. E.g. submission dates, holiday information, placement news, etc...

b. Hospitals:

To display currently available doctor's details, the number of berths available, patient details, etc...

c. Advertisement purpose:

These display boards play a crucial role in an advertisement. For example, to display offers available on that particular day and every day offer details can easily be changed, different products information can be displayed which makes customers easy to know about the product, etc...

d. Restaurants:

To display their special dishes, costs, and also restaurant name as the led's grasp attention of people passing by.

VIII. CONCLUSION

The present generation is digital generation everything is getting digitalized. Using of paper for advertisements and notices is replaced by digital display boards. This system is widely used in markets transportation, hotels. GSM technology is employed in this board to make it wireless for faster and efficient communication and user-friendly. These boards are generally used in super markets as welcome boards and also to display costs of the product. In railway and bus stations these boards are used to show details of next arriving train. Text to voice conversion enables the message to understand to people who cannot read. Authentication feature makes this model more secure.

IX. FUTURE SCOPE

As the Raspberry pi has many features, in future mail can also be used to update the message on the display board. Voice messages and voice to text conversion is also possible. Raspberry pi can also be interfaced through Wi-Fi and Bluetooth to transfer the data which has to be displayed.

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