

# Wireless LED Signage Board using Internet of Things (IoT) Technology

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## ABSTRACT

In the real world, the researcher and engineer have to actively think about new technology that are advance in many aspects such as communication, business, study and many more. The technology evolved rapidly and thanks to the existence of Internet of Things (IoT) that make thing seen as impossible decade ago, possible for us nowadays. In this rapid growing technology, it is the necessity to have a signage that can be control easily by using smartphone. By using this wireless LED signage board, the cost and time in maintaining the signage board is reduced. User can control and send information to the wireless LED signage by using the smartphone that had connect to internet.

**Keywords** :— LED Signage Board, Notice Board, Wireless, Arduino Mega, Remote XY apps.

## I. INTRODUCTION

Signage board or notice board is one of tools used to convey information to public. Nowadays, many notice boards appeared at various places like educational institutions, shopping malls, restaurants, rail way stations, hospitals and many other places. Thus, we assume that this kind of board is an essential medium for spreading information to public [1]. We noticed that the traditional signage or notice board has fixed information displayed and the information cannot be altered as shown in Fig. 1. Therefore, we need to buy a new signage to display new information that we want.

In some other cases, we need to make a custom-made signage according to our information that we want to display as depicted in Fig. 2. The information can be altered if the signage's seller gives the programming to user. However, every time the user wants to change the information to be display at the signage, user need to save the information first in the USB drive, then put it at the signage. It is quite difficult to the user if the signage is place at high position.

This project aims to create a wireless LED signage board that can display multiple information that is control wirelessly by the owner of the signage to the targeted people using their smartphone. As we know, the traditional signage has been sold a lot at the electronic shops all over Malaysia. However, this wireless LED signage board is easy to use with lower cost of installation and maintenance.

It will be more effective if any shops, hospitals or centres want to use this wireless LED signage board, they do not have to contact the maintenance to change the existing information. They can change the information to be displayed on that wireless LED signage board only by using their smartphone. In this project, we apply the concept of Internet of Things (IoT) to change the information to appeared on the wireless LED signage board.



Fig. 1 Fixed announcement signage board



Fig. 2 Custom-made announcement signage board

## II. LITERATURE REVIEW

Wireless notice board basically reduces manpower, paperwork and time of individual [2]. In this paper, a personal computer and android application are used as a transmitter

while Wi-Fi module is used as a receiver. The sender and the receiver are interfaced through a wireless network. A webpage with an IP address is needed to generate a notice at LED screen. However, only user with network name and password can access the webpage before sending the notice. This project used NodeMCU which act as IoT module based on ESP8266 Wi-Fi module.

S. Arulmurugan et. al [3] has proposed a system to share notices through notice board that uses Wi-Fi as medium of transmission. This Wi-Fi can share information for 100 m distance with data rate of 1 or 2 Mbps. As there is no password required, so anyone can share notice through this notice board. The researchers used ARM CORTEX-ATMEGA (328) as the brain of the project.

Papers [4] and [5] designed based Short Message Service (SMS) notice board using GSM module with Arduino and Microcontroller LPC2148 respectively. A registered Subscriber Identity Module (SIM) card is needed in order for the respective person to send notice to others. Both of researchers used LCD display to display the notice.

Research by Divyashree M et.all [6] said that the internet of things belief system can be looked as an exceptionally unique and radically distributed network system composed of a very large number of identifiable smart objects. They also use raspberry PI as a main controller of their project. They do not use an application as their medium to change the message but the use web server. To display their output, they use graphic LCD. There are also other researchers used raspberry PI and IoT technology for their project [7][8].

### III. METHODOLOGY

#### A. Flow Chart

Fig. 3 shows the flow chart of wireless LED signage board. First of all, when the LED signage board is turn on, the original information is displayed. This original information is already program in the software. If the user wants to give a new information to the targeted people, the user can type the information in their smartphone. Every time new information is entered, a buzzer will beep once. This indicator just to make sure people alert with a new information. The user is also notified after certain time either they want to maintain the new information to be keep display or not. If no, the original information is display again on wireless LED signage board.

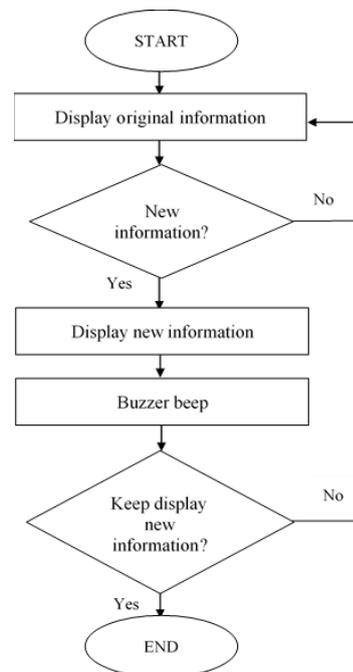


Fig. 3 Flow chart of wireless LED signage board

#### B. Block Diagram

The block diagram of this project is illustrated in Fig. 4. Some components needed are power supply, ESP8266 Wi-Fi module, Arduino Mega microcontroller and LED signage board. 5 V power supply is needed in order to make microcontroller to operating. User’s smartphone is connected to ESP8266 Wi-Fi module that has a connection with Arduino Mega. User’s smartphone that connect to Wi-Fi give a command to Esp8266 Wi-Fi module so that it can ask microcontroller to display the output at LED signage board. Every time new information is detected, the buzzer will beep once to notify the targeted people. For this project, we developed the LED signage board using 30x9 LED strips.

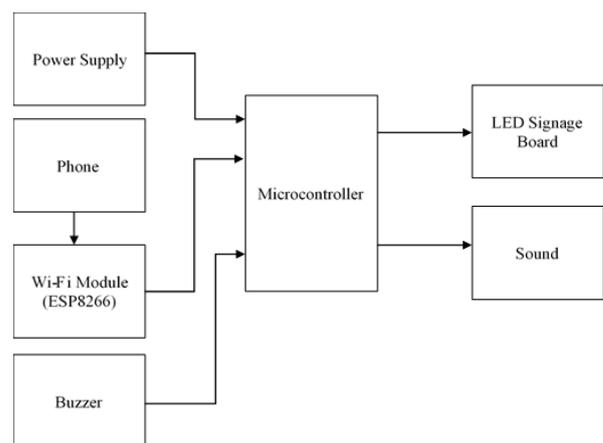


Fig. 4 Block diagram of wireless LED signage board

#### C. Schematic Diagram

Fig. 5 illustrate the schematic diagram of wireless LED signage board. Before proceed with the hardware, we simulate

this project circuit first in order to see whether all the connections between components are correct or not.

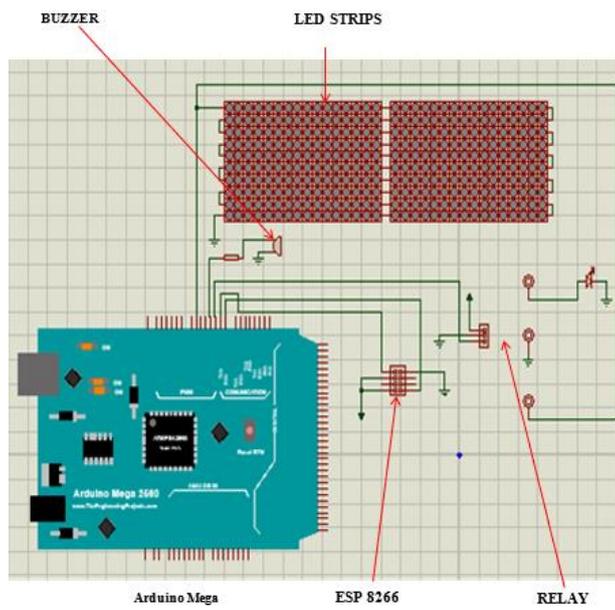


Fig. 5 Circuit simulation for wireless LED signage board

#### IV. RESULT AND DISCUSSION

For this project, the software used are Proteus and Arduino 1.8.8 where Proteus is used to simulate circuit and create the PCB layout meanwhile the Arduino 1.8.8 is used to write a coding for Arduino Mega. Other than that, we use Remote XY application which is installed on a smartphone to write a multiple information that will be displayed at the wireless LED signage board.

In Arduino 1.8.8, we already set the original information, "NOTICE BOARD" that will be displayed on this wireless LED signage board every time the board is turned on as depicted in Fig. 6. This original information will keep rolling on the LED signage board unless the LED signage board is turned off or the original information is deleted from the coding.



Fig. 6 Original information displayed on wireless LED signage board

On the other hand, the message that the user can add on the spot is by using the Remote XY application which is installed on the user's smartphone. In the Remote XY application, we try to add a new message "5 MINUTES MORE" as shown in Fig. 7. Then, we

simulate again the coding and the outcome displayed at the wireless LED signage board as in Figure 8.



Fig. 7 New information entered in Remote XY application



Fig. 8 New information displayed at wireless LED signage board

#### V. CONCLUSION

The function of the notice board that has been used today has limited options such as the message display on the notice board cannot be changed. By using this wireless LED signage board, the content can be changed through an application that is connected to the internet. The time and manpower can be saved when the user wants to change the message. If we use the conventional notice board, we need to buy another notice board that needs to be customized by the shop according to the message that we want to display. Due to this, we need to wait for the notice board to be ready first and will waste time and not be efficient if we want to share multiple information to the customer. Thus, this wireless LED signage board gives more advantages for the user and will attract many people to have this signage board in the future.

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