Wi-Fi Based Electronic Notice Board

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ABSTRACT

The main objective of this project is to develop a cost effective notice board system using a Wi-Fi based controller card controlled by any Android OS smart phone or through PC. Modern information is gradually shifting from conventional notice board to centralized control system, involving Wi-Fi system. In this paper we have proposed a system through wireless transmit notices on a notice board using Wi-Fi. Wi-Fi can pass information for about 100meter distance. Wi-Fi data rate has 1 or 2 Mbps.

Keywords : Wi-Fi, Android, LED, Microcontroller

I. INTRODUCTION

Living in a digital era, we find the use of stereotype of information display a bit troublesome. Therefore, through the development of this project we intend to display, control and operate the information on a digital platform. Hence the information which is to be displayed is controlled and given only through an authoritative user. Given such an idea, led us to develop a cheapest possible digital display screen that functions on high-end wireless technology. The information to be updated is simply controlled either from a mobile based app or through a flash memory. The notice board includes the LED display board which uses a controller card (HD W 60) and the accessories such as SMPS and sensors. The controller card consists of an inbuilt Wi-Fi module which enables the wireless communication between the controller card and the mobile phone. This process ensures the deduction of paperwork and manually posting the information on the notice board. One of the best-known examples of wireless technology is the mobile phone, also known as a cellular phone.

These wireless phones use radio waves from signal-transmission towers to enable their users to make phone calls from many locations worldwide. They can be used within range of the mobile telephone site used to house the equipment required to transmit and receive the radio signals from these instruments.

A. EARLIER METHODS AND DRAWBACKS:

In GSM method of service we use mobile as a client. It is easy to get started with and not much programming knowledge is needed, but connecting to the internet for sharing the information is slightly difficult. Bluetooth is a wireless means of communication and is developed for the replacement of cable. It has a frequency band width of 2.4 GHz with a speed of 1MB/sec. Its range is about 10 meters only. Transferring speed is slow and large amount of data cannot be transmitted. Zig-bee is an IEEE 802. 15. U - based specification used for high level communication protocols used to create personal area network with small and low power digital radios. It has a frequency bandwidth of 2.4 GHz. Its main use is to monitor & control data. It has speed of 250 kbps.

Transmission speed is very low and is about 250 kbps. Range of communication is very low and it does not connect to the internet. Ignoring the above techniques employees a new technique in which we use "Wi-Fi", Wireless Fidelity. We use this method to overcome the drawbacks such as:

Use of internet connection.

Number of complex connections from interfacing devices.
Low range of communication.
Low speed of communication.
High cost of wireless equipment.

B. OVERVIEW

Wireless data communications allows wireless networking between desktop computers, laptops, tablet computers, cell phones and other related devices. The various available technologies differ in local availability, coverage range and performance. Wi-Fi is a family of wireless networking technologies, based on the IEEE 802.11 family of standards, which are commonly used for local area networking of devices and Internet access. Wi-Fi is a low power wireless communication that is used by various electronic devices like smart phones, laptops, etc. In this setup, a router works as a communication hub wirelessly. These networks allow users to connect only within close proximity to a router. Wi-Fi is very common in networking applications which affords portability wirelessly. These networks need to be protected with passwords for the purpose of security; otherwise it can be accessed by others.

II. SYSTEM DESCRIPTION
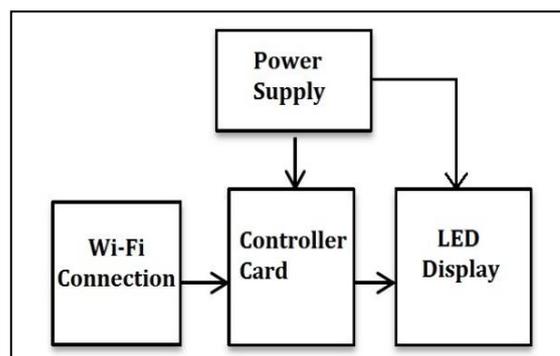
Figure.1 Block Diagram

A. HD W60 CONTROLLER CARD:

W60 is a W-series control card, where W means Wi-Fi, which updates programs through Wi-Fi. In addition, it has a USB port through which the information to be displayed can be updated.
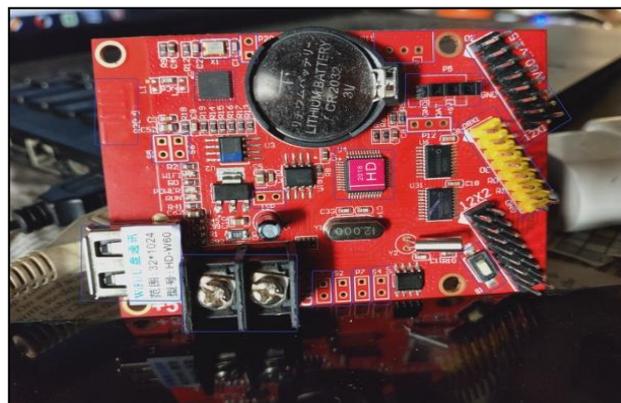

Figure. 2 HD W60 Controllers

The controller card HD W60 has the following IC's embedded on it:

1) **HD 2018 Microcontroller:**

Figure. 3 HD 2018 Microcontrollers

The controller used is a system on chip containing processor core with memory and programmable I/O peripherals. The controller is interfaced with adjustable linear regulator, integrated Wi-Fi module, serial I/O interface flash memory device, a 3–state non inverting transceiver that is used for 2–way asynchronous communication between data buses and the data ports which are connected to the LED panels. It consists of a Universal Asynchronous Receiver/Transmitter block which makes it possible for receiving and transmitting data over the serial lines. The microcontroller has the capability to communicate with Universal Serial Bus and the data ports with Serial Peripheral Interface.

2) ESP8266EX (Wi-Fi chip):
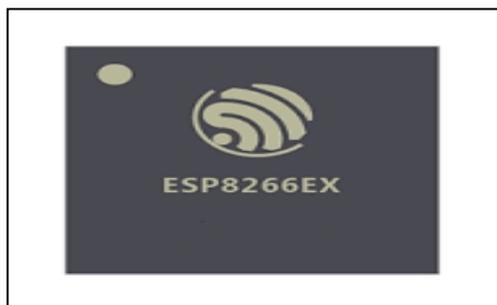
Figure.4 E4SP8266EX

ESP8266EX delivers highly integrated Wi-Fi SoC solution to meet users' continuous demands for efficient power usage, compact design and reliable performance. ESP8266EX integrates antenna switches, power amplifier, low noise receive amplifier, filters and power management modules. It has a 32-bit processor and on-chip SRAM. It can be interfaced with external sensors and other devices through the GPIOs. Software Development Kit provides sample codes for various applications. An externally generated clock is available with the frequency ranging from 24 MHz to 52 MHz for the function of radio. The ESP8266EX radio consists of 2.5GHz receiver and transmitter. The antenna for the function of Wi-Fi is externally traced on PCB, has IPEX Connector and is made of Ceramic Chip.

3) 74HC245(Communication chip):
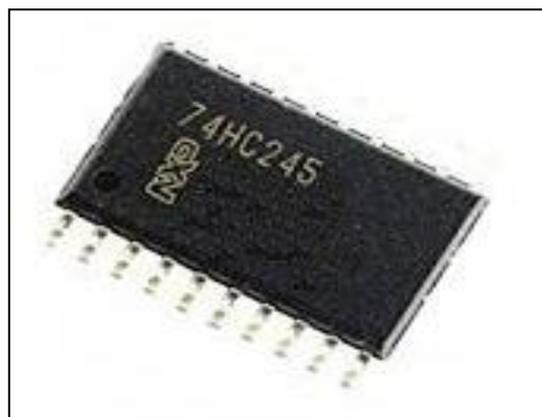
Figure.5 74HC245 (Communication chip)

The HC245 is a 3–state non inverting transceiver that is used for 2–way asynchronous communication between data buses. The device has an active–low Output Enable pin, which is used to place the I/O ports into high–impedance states. The Direction control determines whether data flows from A to B or from B to A.

FUNCTION TABLE		
Control Inputs		
Output Enable	Direction	Operation
L	L	Data Transmitted from Bus B to Bus A
L	H	Data Transmitted from Bus A to Bus B
H	X	Buses Isolated (High–Impedance State)

X = don't care

Table 1

4) AMS1117(Voltage Regulator):

Figure.6 Voltage Regulator

The AMS1117 is a low dropout three-terminal regulator with 1A output current capability. This device has been optimized for low voltage where transient response and minimum input voltage are critical. On-chip thermal limiting provides protection

against any combination of overload and ambient temperatures that

would create excessive junction temperatures. Unlike PNP type regulators where up to 10% of the output current is wasted as quiescent current, the quiescent current of the AMS1117 flows into the load, increasing efficiency. The three-terminal adjustable or fixed low dropout regulator used on this controller card is of 3.3v. It supplies low voltage to devices such as sensors and is also mainly used for motherboard clock supplies.

5) P25Q16H (Flash Memory Chip):
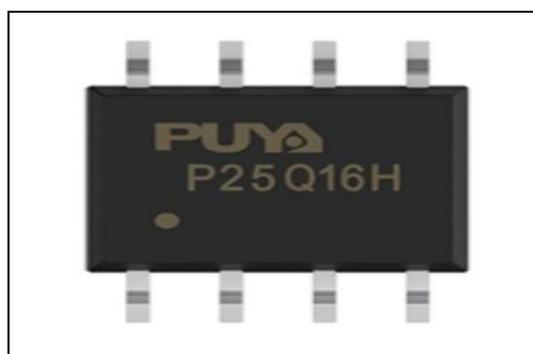
Figure .7 Flash Memory Chip

The P25Q16H is a serial interface Flash memory device designed for use in a wide variety of high-volume consumer based applications in which program code is shadowed from Flash memory into embedded or external RAM for execution. The flexible erase architecture of the device, with its page erase granularity it is ideal for data storage as well, eliminating the need for additional data storage devices. The data stored in the registers of the flash memory are transferred to the data ports through the microcontroller. The port definition is shown below. The data ports are connected to the LED panels using the FRC cable connectors.
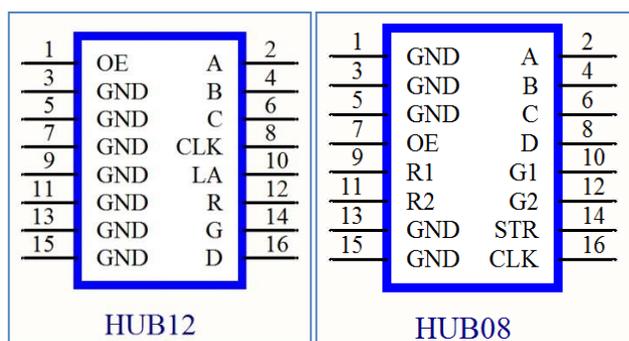

Figure.8 data ports

In addition to all these specified embedded devices on the controller card, it is provided with additional space to accommodate the various sensors such as the temperature/humidity sensor, the brightness sensor, the IR sensor by which the controller card can be accessed using remote control. A point switch can also be placed on the controller card which is interfaced with the flash memory and the microcontroller. This point switch is used to control program such as switching to the previous program or to the next program, timer start, pause or reset and counter reset. It is also provided with a USB port through which the external commands from the pen drives or the memory cards can be accessed and displayed. The controller card also consists of a test button using which we can test the display status of the LED panel.

B. P10 LED DISPLAY:

The display consists of a dot matrix of lights or mechanical indicators arranged in a rectangular configuration such that by switching on or off selected lights, texts or graphics can be displayed. It has an on board matrix controller which converts the instructions from a processor or controller into signals which turns on or off indicator elements in the matrix so that the required display is produced. The panel is arrayed with a total of 512 LED's in 16 rows and 32 columns. The distance between two LED's is measured to be 10mm; therefore the name P10. The display consists of shift register IC's and the data transfer occurs through serial in parallel out.
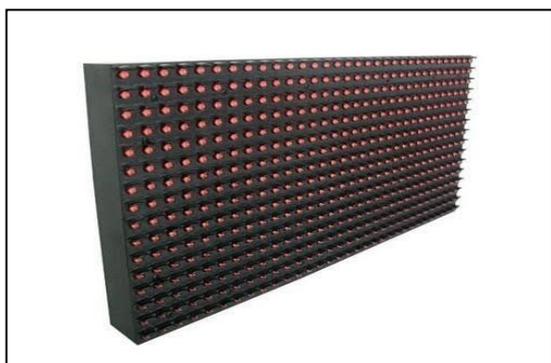
Figure.9 P10 LED Display

C. SMPS:

A Switched Mode Power Supply is an electronic power supply that incorporates a switching regulator to convert AC power supply to desired DC voltage, such that it can power a DC loads. It consists a circuit of transformer, bridge rectifier, capacitors and resistors, bulk capacitors, filters, thermistors and current mode controller for converting the voltage and current characteristics.

D. FLAT RIBBON CABLES:

A cable with many conducting wires running parallel to each other on the same flat plane is referred to as the flat ribbon cable. Its name comes from the resemblance to a piece of ribbon. Generally used for internal peripherals in computers, CD drives and floppy drives; it also serves as an interfacing or connecting device for the purpose of transfer of data.

III. WORKING MODEL

LEDART app which is available on the Google play store is used for the programming of the LED display. It is simply downloaded and installed on the android phone. After connecting the devices as shown in the block diagram, the LEDART android apk is run. Using the cell phones' Wi-Fi connection, the controller device is to be searched over the network. Once connected, the required information is programmed in the program section including the sensor information and they are sent over to the controller card through the Wi-Fi connection. The transceiver on the controller card detects the incoming

information and stores the information in the flash register after receiving the information from the android device. If the information to be displayed has to be changed, the text is re-written and then sent to the controller card again for the display. The controller card overwrites the previous program with the latest program and the information is displayed on the LED panel. The Wi-Fi is password protected and only an authentic and authoritative person can operate, avoiding its misuse. Additional display includes date and time that is accessed from the cell phone. The controller card can also be controlled externally by using the Universal Serial Bus port provided on the controller card without the use of connecting through Wi-Fi. PC software HD2020 has to be installed and the text information or the graphic information can be programmed in the software.


Figure.10 Model Diagram

IV. RESULTS & CONCLUSION
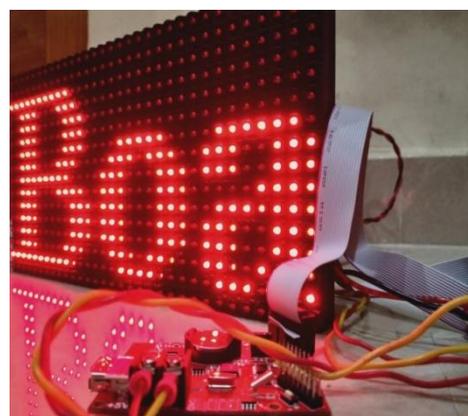
Figure.11 Hardware model

By using the concept of this technology in the field of wireless communication we can make our communication more efficient, faster and we can display the messages with less error. The controller card used in this project completely relies on the function of Wi-Fi module. In the near future it is even possible to access the messages and information from the internet. Sensor information stored on the cloud can also be accessed through further developments. These display boards are very useful in busy places such as educational institutions, airports, railway stations, high-tech restaurants and so on. The display boards can also be used as bill boards, showing directions, at stores etc;. Apart from monochromatic LED boards, dual and multicolour (RGB) LED boards can also be used.

II. ACKNOWLEDGMENT

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