VOL. 10, NO. 5, MARCH 2015 ISSN 1819-6608
ARPN Journal of Engineering and Applied Sciences

www.arpnjournals.com

# ONTOGENY SMART BULLETIN BOARD

S. Karthikeyan
Department of Electronics and Communication Engineering, Sathyabama University, India
E-Mail: Karthijoy01@gmail.com

**ABSTRACT**

At present days every advertisement is going to be digital. Some large shopping malls and shopping centers are using the digital moving displays. In Railway station and bus Stations, ticket information, platform number etc are displaying in digital moving message display. But in these case if they wants to change the information they have to go there and connect the display to PC or laptop and then change it. Suppose the same information, if the person wants to display in main centers of the cities or longer distance places, he have to go there with laptop and change the information by connecting to the PC. In this application we are implementing wireless communication to change the information which is displayed on the VGA monitor. Here we are implementing this idea for college notice board with the help of VGA monitor. This paper is to display the color image and text by using ARM7 (LPC2148).

**Keywords:** bulletin board, resolution, speed, delay, distance.

## 1. INTRODUCTION

A smart device is an electronic device that is cordless (unless while being charged), mobile (easily transportable), always connected (via Wi-Fi, 3G, 4G etc.) and is capable of voice and video communication, internet browsing and that can operate to some extent autonomously. A notice board is a surface intended for the posting of public message, announcing events, or provide information etc. In our project we are developing a smart notice board used to display images and text on a standard VGA monitor (Marlet, 2008).

## 2. BLOCK DIAGRAM


**Figure-1.** Transmitter section.

The above Figure-1 explains the transmitter of the notice board. Which contains a PC, MAX232 voltage converter and a XBEE transmitter for sending the image?

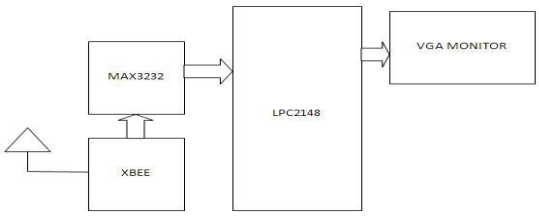


**Figure-2.** Receiver section.

The Figure-2 explains the receiver section of the notice board which contains a receiver XBEE max232 for voltage conversion and a ARM 7(ADVANCED RISC MACHINE) processor and VGA monitor to display the image and also the data.(Anderson, 2008).

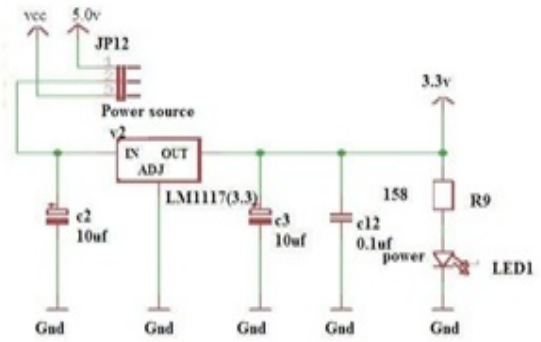


**Figure-3.** Power supply.

The Figure-3 explains power supply. The reference board from either USB (5V) or by using the DC Barrel (VCC), can choose between these two power supply. By connecting the common pin in the middle of the jumper (pin 2) to the LM1117's voltage ($V_{in}$) pin. We can easily switch to either USB or DC power simply by moving the jumper one position to the left or right [12].

The LM1117 is chosen because it is low cast and widely available, and both the USB and DC power supplies are high enough that the 1.4V forward-voltage drop on the LM1117 (3.3V) won't cause any problems. If we use a battery power supply that was only slightly above 3.3V -- a lithium polymer battery that generally runs between 3.7 and 4.2V, for example we need to choose a voltage regulator with a lower forward-voltage. Some possible alternatives in that case it would be the 150mA ADP121 from Analog Devices with a very low 90mA forward-voltage drop or the 300mA ADP1712 with 170mA forward voltage drop for more power. A simple power indicator LED is provided (LED1) to indicate power is currently available with in the circuit or not, along with a 150 ohm current limiting resistor (R9). (Bahadur, 1990)

### 3. MAX 3232 (VOLTAGE CONVERTER)

The MAX232 is IC that can converts signals from an RS-232 serial port to signals suitable for use in TTL compatible digital circuits. The MAX232 is a dual driver/receiver which converts the RX, TX, CTS and RTS signals. The dual driver provide RS-232 voltage level outputs (approx. ± 7.5 V) from a single + 5 V supply via on-chip charge pumps and externally connected capacitors. This makes useful for implementing RS-232 in devices that otherwise do not need any voltages outside the 0 V to + 5 V range, as power supply design does not need to be made more complicated just for driving the RS-232 in this case. The receivers reduce RS-232 inputs (which may be as high as ± 25 V), to standard 5 V TTL levels. These receivers have a typical threshold voltage of 1.3 V, and a typical hysteresis of 0.5 V. It is helpful to understand the changes occur to the voltage levels. When a MAX232 IC receives a Transistor-transistor logic level to convert, it changes a TTL logic 0 to between +3 and +15 V, and changes TTL logic 1 to between -3 to -15 V, and vice versa for converting from RS232 to Transistor-Transistor logic (TTL). This can be confusing when you realize that the RS232 data transmission voltages at a certain logic state are opposite from the RS232 control line voltages at the same logic state. To clarify the result, see the table below and RS-232 voltage levels. The later MAX232A is backwards compatible with the original MAX232 but may operate at higher baud rates and can use smaller external capacitors— 0.1 μF in place of the 1.0 μF capacitors used with the original device.(Sparksfun.com).

### 4. ARM 7 BOARD INTRODUCTIONS

ARM7 is a generation of ARM processor designs.ARM7 processor introduced the Thumb 16-bit instruction set which provide the improved code density compared to previous designs. The most oftenly used ARM7 designs implement the ARMv4T architecture, but some of the design which also implement ARMv3 or ARMv5TEJ. All these designs using a Von Neumann architecture, so the few versions comprising a cache do not separate data and instruction caches. Some ARM7 cores are obsolete.

#### Features of ARM7

16/32-bit ARM7TDMI-S microcontroller, 8 **t**o 40 kB of on-chip static RAM and 32 to 512 kB of on-chip flash program memory is in a tiny LQFP64 package. In-System/In-Application Programming (ISP/IAP) via on-chip boot-loader software enables high speed 60 MHz operation using 128 bit wide interface/accelerator .full chip or Single flash sector erase with in 400 ms and in 1ms programming of 256 bytes can done. Embedded ICE-RT and Embedded Trace interfaces (ETI) offer real-time debugging with the on-chip Real Monitor software and high speed tracing of instruction. USB 2.0 Full Speed compliant Device Controller with 2 kB of endpoint RAM and the LPC2146/8 provides 8 kB of on-chip RAM accessible to USB by DMA. One or two (LPC2141/2 vs. LPC2144/6/8) 10-bit A/D converters provide a total of 6/14 analog inputs, with conversion time as low as 2.44 μs per channel. Single 10-bit D/A converter provide variable output (analog). Two 32-bit timer/external event counters (with four capture and four compare channels each), PWM unit (six outputs) and watchdog. Which also have Low power real-time clock with independent power and dedicated 32kHz clock input. Multiple serial interfaces including two UARTs (16C550), two Fast I2C-bus , SPI and Detect (BOD) or Real-Time Clock (RTC).(Perez,1998)

### 5. XBEE FIRMWARE

The XBee family of embedded RF modules provides OEMs with a common footprint shared by multiple platforms, which includes multipoint and Zigbee/Mesh topologies, and both the topologies use 2.4 GHz and 900 MHz solutions. OEMs deploying the XBee which can substitute one XBee for another, depending upon the dynamic application needs, with the minimal development, reduced risk and shorter time-to market. XBee multipoint RF modules are ideal for applications requiring low latency and predictable communication time. It providing quick robust communication in point-to-point, peer-to-peer, and multipoint or star configuration, XBee multipoint product enables robust end-point connectivity with ease. Whether it deployed as a pure cable replacement for simple serial communication and as part of a more complex hub-and-spoke network of sensors, XBee multipoint radio frequency modules maximize wireless performance and ease of development. XBee multipoint RF modules maximize wireless performance and ease of development.

### 6. VGA LCD MONITOR

In the early 1970's, digital watches started showing up in the marketplace with a new and different type of display-the liquid crystal display or LCD. The LCD displays used in these early digital watches were very different from the LEDs they replaced. While even a tiny LED display consumes a few mill watts of power, the LCD consumes just microwatts of power. Hence, the LCDs are over 1000 times more efficient at their job than the LEDs. Since their commercialization in the '70s, LCDs are the most popular electronic display device, except one-the CRT. LCD flat full color panels are now challenging the CRT as displays for television and desktop computer. There are many hybrid systems that use LCD display technology (www.ti.com).

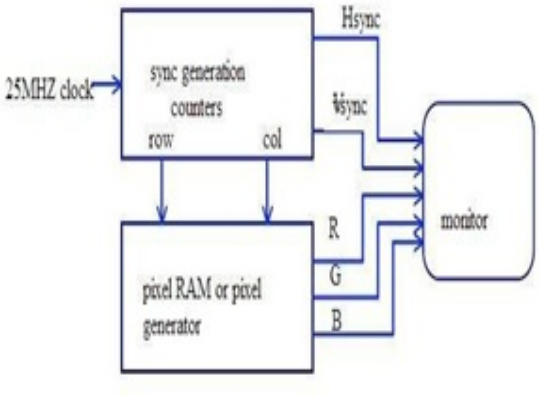


**Figure-4.** VGA LCD monitor.

Figure-5 explains the block diagram of a sample VGA monitor. One use of the term “display resolution” applies to fixed-pixel-array displays such as PDPS, LCD, digital light processing (DLP) projectors, or similar technologies, and it is simply the physical number of columns and rows of pixels creating the display (e.g., 1920 × 1080).(Karthikeyan, 2012).

A consequence of having a fixed-grid display is for multi-format video inputs, all displays need a "scaling engine" (a digital video processor that includes a memory array) to match the incoming picture format to the display. Note that for broadcast television standards the use of the word resolution here is a misnomer, though common. The main interest in these types of compound is that the nematic phase compounds with rod-like molecules can be aligned by varying an external electric field. Most of the liquid crystal displays (LCDs) produced today use either the twisted nematic (TN) or super twisted nematic (STN) electro-optical effects. In 1888, an intermediate phase is discovered and is known as the crystalline liquid or liquid crystal. This phase is called the nematic phase. An example for nematic phase is 4-n-pentyl-4'-cyano-biphenyl (PCB). Since then, over 20,000 known compounds have been found to have the nematic phase.

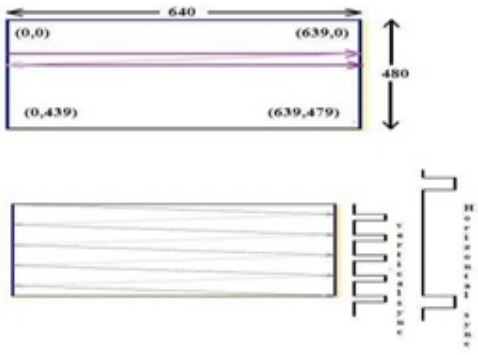


**Figure-5.** Frame and synchronization.

## 7. PROPOSED OPERATION OF THE NOTICE BOARD

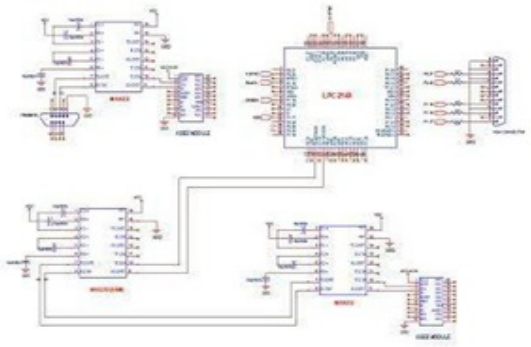

**Figure-6.** Schematic of transmitter section.

Figure-7 explains the transmitter section schematic of the notice board. Before transmitting the data to controller check the connections between the PC and the XBEE module so that proper communication channel will be available to transmit the data. Switch ON the power supply to the wireless module transmits the data to XBEE module through serial communication. We use USB-to-SERIAL converter to interface the MAX3232 with PC. MAX3232 is used to convert the RS-232 voltage levels to TTL voltage levels so that it is easy to interface XBEE module with the PC. Before sending the data to monitor we have to set the resolution of the image to be 240*480 then only the image will be displayed as fast as possible, otherwise the time taken for transmission is delayed more than usual. We can send all the 127 characters to display in the monitor. Each character occupies 28*20 pixels inthe LCD monitor. To transmit the data from the PC to serial port we use GCC compiler in LINUX operating system then only we can transmit a image of an array size of more than 65535 elements. A maximum of 13 lines each line of 15 characters is possible to display in the standard LCD monitor (WWW.Keil.com).

### 7.1 Receiver section

Connect the system as per the schematic diagram and proper connections are to given otherwise malfunction of the system may possible. Switch ON the power supply only after checking the circuit connections otherwise the controller may get damaged. Before receiving the data from a particular XBEE module we have to program both the XBEE modules and program the source and destination address to the receiver and transmitter respectively then only secured communication is possible between the two modules. After receiving the data from the wireless module those received data is in TTL voltage level and that need to be converted into RS-232 voltage levels in order to interface with the controller. All the received data is going to be stored in the memory blocks of the EEPROM. We use IAP (In Application Programming)

technique to store the frame data in the memory block time to time. Whenever the transmission is completed the processor will process the received data and that will be given to the VGA connector pins. We use 5 pins of the total 15 pins in the VGA connector. Out of five signals three are color signals and the other two are synchronization signals. Three color signals are Red, Green, and Blue to display the color images. We use threepins to send the data. So a maximum of eight colors are possible in the monitor. We use a standard 640*480 resolution VGA LCD monitor as a display screen. The image shown in the screen will be stretched four times than the original image. In order to display each pixel on the monitor the controller takes around 65ns but the actual required time is 40ns because of this every two pixels in the monitor having only one pixel information. Synchronization signals are HYSNC and VSYNC to synchronize the data signals of the LCD monitor. We use PWM technique in the controller to achieve the required synchronization for displaying the image. More number of systems displays images at a time if we use wireless protocols for secured transmission. We use the serial communication protocol for data transferring at 9600bps baud rate. Table 1 explains the cost of the notice boards of respected companies which were already designed and the ontogeny notice board which described in this paper is low cost and also low power consumption.

**Table-1.** Comparisons with other notice boards.

| S. No. | Notice board name | Cost in rupees |
|---|---|---|
| 1 | Electronic Automatic Moving Message Outdoor P10 Full Color LED Board P16 P20 | 69600 |
| 2 | cheap p12 uncolored electronic sign,ph12 video full color led panel boards | 55680 |
| 3 | With 3G Wireless system Electronic Outdoor LED Traditional Board | 133400 |
| 4 | Macao P12.5 roadside wireless/3G electronic LED visual display boards | 87000 |
| 5 | high resolution and high brightness 3G wireless led display board | 162400 |
| 6 | Waterproof PH16mm DIP Full Color Electronic!!!!!!!!!Outdoor Led Display Screen Boards | 52200 |
| 7 | P10 full color outdoor wireless marketing display boards | 174000 |
| 8 | Wireless Smart notice board | 1500 |

## 8. APPLICATIONS

As it is used to display images and text on LCD monitors through wireless protocols. The importance of this work we can easily display large number of images on multiple monitors through wireless communication. Used mainly for police, army, advertisements and college notice boards etc,. One advantage is without any human effort continuous display of images is possible. Cost of the system is low when compared to other conventional systems. More number of systems can be interfaced with a single host Wireless communication.

One disadvantage is only static images can be displayed. Quality of the picture is not as good as the original image in monitor. Speed of displaying the image is low when compared to other conventional systems.

## 9. CONCLUSIONS

The system design and presented the report on the “Ontogeny Smart Bulletin Board” which is used to display images and text on monitor. The physical circuit is verified for practical operations.

## FUTURE SCOPE

Advanced controllers is used to speed up the transmission and processing data by using RF modules and XBEE modules. The implementation for displaying the data on multiple monitors at a time which is used for secured transmission analysis of different protocols.

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