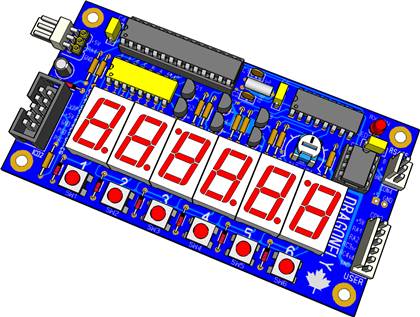
MICROCONTROLLAR BASED DIGITAL CLOCK WITH ALARM



A BRIEF INTRODUCTION TO 8051 MICROCONTROLLER-:

When we have to learn about a new computer we have to familiarize about the machine capability we are using, and we can do it by studying the internal hardware design (devices architecture), and also to know about the size, number and the size of the registers.

         A microcontroller is a single chip that contains the processor (the CPU), non-volatile memory for the program (ROM or flash), volatile memory for input and output (RAM), a clock and an I/O control unit. Also called a "computer on a chip," billions of microcontroller units (MCUs) are embedded each year in a myriad of products from toys to appliances to automobiles. For example, a single vehicle can use 70 or more microcontrollers. The following picture describes a general block diagram of microcontroller.

**AT89S52:** The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel’s high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 instruction set and pinout. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller, which provides a highly flexible and cost-effective solution to many, embedded control applications. The AT89S52 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry. In addition, the AT89S52 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning. The Power-down mode saves the RAM con-tents but freezes the oscillator, disabling all other chip functions until the next interrupt



The hardware is driven by a set of program instructions, or software. Once familiar with hardware and software, the user can then apply the microcontroller to the problems easily.

The pin diagram of the 8051 shows all of the input/output pins unique to microcontrollers:



The following are some of the capabilities of 8051 microcontroller.

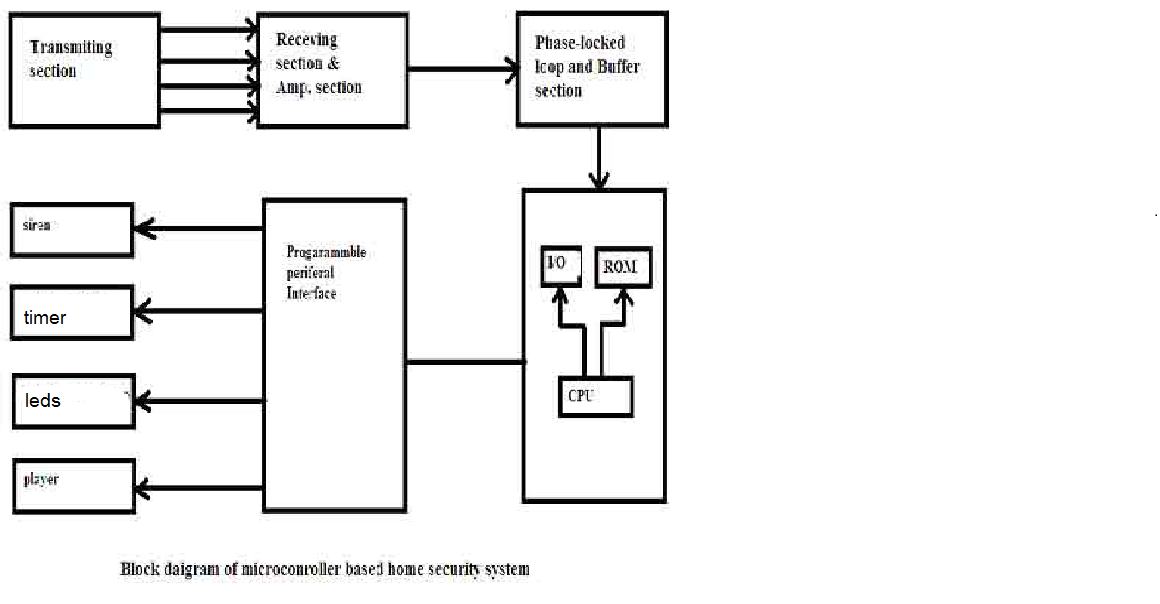
* Internal ROM and RAM
* I/O ports with programmable pins
* Timers and counters
* Serial data communication

The 8051 architecture consists of these specific features:

* + - 16 bit PC &data pointer (DPTR)
    - 8 bit program status word (PSW)
    - 8 bit stack pointer (SP)
    - Internal ROM 4k
    - Internal RAM of 128 bytes.
    - 4 register banks, each containing 8 registers
    - 80 bits of general purpose data memory
    - 32 input/output pins arranged as four 8 bit ports: P0-P3
    - Two 16 bit timer/counters: T0-T1Two external and three internal interrupt sources Oscillator and clock circuits.

THEORY-:

Electronic clocks have predominately replaced the mechanical clocks. They are much reliable, accurate, maintenance free and portable. In general, there are two kinds of electronic clocks. They are analog clock and digital clock. But digital clocks are more common and independent of external source. It would be needed the controlled devices and implementation of software for microcontroller control system because the hardware devices cannot do any desired task to execute. In this paper, the microcontroller-based digital clock is constructed with ATMEL 8051 and its software program is written with C program language. Various types of digital clocks and modules are available in the market nowadays but this clock is different at least in the accurate time. To be controlling in microcontroller is only the feature of the clock. The input frequency is taken from the 50 Hz clock frequency circuit. To show the time, seven-segment Light Emitting Diodes (LEDs) and four LEDs are used.



CONCLUSION-:

The microcontroller-based digital clock is mainly controlled by the clock pulse frequency. The clock pulse frequency can be generated by using the IC1 555. The clock pulse frequency can be obtained from other methods such as the power line frequency and the internal oscillator IC with RC circuit and so on. The power line frequency will not get more accuracy than the quartz crystal. The 555-timer astable mode can be used for this purpose. In the display, there are needed to give the outputs of seconds, minutes and hours and AM/PM. In this display system, the output of ATMEL 8051 is connected with the input of decoder (CD4028) to drive the seven-segment LEDs. The decoder (CD4028) has four inputs and ten outputs. But, in this circuit three inputs and six outputs are used. So, one input pin is grounded and four outputs pins are not used.

In the music section which generates the time, the output frequency is nearly 600 Hz. In the electronic circuits, the audiorange is between 20 Hz and 20 kHz. So, 600 Hz is the suitable output frequency.

***References-:***

The 8051 microcontroller and Embedded systems using assembly and C Muhammad Ali Mazidi, Janice Gillespie Mazidi

1. Keil Software, dScope Debugger, <http://www.keil.com/>
2. National Instruments Multisim 10.0 [www.ni.com/multisim](http://www.ni.com/multisim)
3. [www.8051projects.info](http://www.8051projects.info)
4. [www.8051projects.net](http://www.8051projects.net)
5. [www.dnatechindia.com](http://www.dnatechindia.com)
6. AT89c51 datasheet available at [www.alldatasheets.com](http://www.alldatasheets.com)