**Block Explanation**

**Microcontroller**

The high-performance Atmel [8-bit](http://en.wikipedia.org/wiki/8-bit) [AVR](http://en.wikipedia.org/wiki/Atmel_AVR) [RISC](http://en.wikipedia.org/wiki/RISC)-based microcontroller combines 32 KB [ISP](http://en.wikipedia.org/wiki/In-system_programming) [flash](http://en.wikipedia.org/wiki/Flash_memory) memory with read-while-write capabilities, 1 KB [EEPROM](http://en.wikipedia.org/wiki/EEPROM), 2 KB [SRAM](http://en.wikipedia.org/wiki/Static_random-access_memory), 23 general purpose I/O lines, 32 general purpose working [registers](http://en.wikipedia.org/wiki/Processor_register), three flexible timer/[counters](http://en.wikipedia.org/wiki/Counters) with compare modes, internal and external [interrupts](http://en.wikipedia.org/wiki/Interrupts),serial programmable [USART](http://en.wikipedia.org/wiki/USART), a byte-oriented 2-wire serial interface, [SPI](http://en.wikipedia.org/wiki/Serial_Peripheral_Interface_Bus) serial port, 6-channel 10-bit [A/D converter](http://en.wikipedia.org/wiki/A/D_converter) (8-channels in [TQFP](http://en.wikipedia.org/wiki/TQFP) and [QFN](http://en.wikipedia.org/wiki/QFN)/[MLF](http://en.wikipedia.org/wiki/Quad-flat_no-leads_package#Variants) packages), programmable [watchdog timer](http://en.wikipedia.org/wiki/Watchdog_timer) with internal [oscillator](http://en.wikipedia.org/wiki/Electronic_oscillator), and five software selectable power saving modes. The device operates between 1.8-5.5 volts. By executing powerful instructions in a single clock cycle, the device achieves throughputs approaching 1 [MIPS](http://en.wikipedia.org/wiki/Million_instructions_per_second#Million_instructions_per_second) per MHz, balancing power consumption and processing speed.

Today the ATmega328 is commonly used in many projects and autonomous systems where a simple, low-powered, low-cost micro-controller is needed. Perhaps the most common implementation of this chip is on the ever popular [Arduino](http://en.wikipedia.org/wiki/Arduino) development platform, namely the [Arduino Uno](http://en.wikipedia.org/w/index.php?title=Arduino_Uno&action=edit&redlink=1) and [Arduino Nano](http://en.wikipedia.org/w/index.php?title=Arduino_Nano&action=edit&redlink=1) models.

**relay**

A relay is an [electrically](http://en.wikipedia.org/wiki/Electric) operated [switch](http://en.wikipedia.org/wiki/Switch). Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal. Relays with calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults;

**CT**

A current transformer (CT) is used for measurement of alternating electric currents.  A current transformer isolates the measuring instruments from what may be very high voltage in the monitored circuit. Current transformers are commonly used in metering and [protective relays](http://en.wikipedia.org/wiki/Protective_relay) in the [electrical power industry](http://en.wikipedia.org/wiki/Electrical_power_industry).

**LCD**

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over [seven segments](http://www.engineersgarage.com/content/seven-segment-display) and other multi segment [LED](http://www.engineersgarage.com/content/led)s. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even [custom characters](http://www.engineersgarage.com/microcontroller/8051projects/create-custom-characters-LCD-AT89C51) (unlike in seven segments), [animations](http://www.engineersgarage.com/microcontroller/8051projects/display-custom-animations-LCD-AT89C51) and so on.

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.

The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD.

**DS1307**

The DS1307 Serial Real-Time Clock is a low-power, full binary-coded decimal (BCD) clock/calendar plus 56 bytes of NV SRAM. Address and data are transferred serially via a 2-wire, bi-directional bus. The clock/calendar provides seconds, minutes, hours, day, date, month, and year information. The end of the month date is automatically adjusted for months with fewer than 31 days, including corrections for leap year. The clock operates in either the 24-hour or 12-hour format with AM/PM indicator. The DS1307 has a built-in power sense circuit that detects power failures and automatically switches to the battery supply.

ESP 8266

The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much WiFi-ability as a WiFi Shield offers (and that’s just out of the box)! The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community.

This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime. Its high degree of on-chip integration allows for minimal external circuitry, including the front-end module, is designed to occupy minimal PCB area. The ESP8266 supports APSD for VoIP applications and Bluetooth co-existance interfaces, it contains a self-calibrated RF allowing it to work under all operating conditions, and requires no external RF parts