Arduino Timer Module

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What is a timer?

Similar to a clock; Counts the number of “ticks” that occur in some unit of time.

Counter/Timer modes

Resolution means the max value the timer counter can be, e.g., 8-bit is 255 and 16-bit is 65536

Runs separate from the CPU clock
Timers on Arduinos

Generates Interrupts (e.g. at the end of a countdown)

Types: 8-bit, 16-bit

Typical controllers have 3 or 6 timers, assigned different functions and clocks

Common functions

Time Functions: delay(), millis(), micros(), etc.

PWM Functions: analogWrite(), tone()
Programming with a Timer

Registers

TCNT - Timer Counter Register

TCCR1B - Timer “Clock” Register

TIMSK - Timer Interrupt Mask Register

ICR - Input Capture Register

OCR - Output Compare Register

#include "TimerOne.h"

void setup() {
    Serial.begin(9600); // Start the serial
    pinMode(10, OUTPUT); // Digital pin 10 is outputting
    Timer1.initialize(1000000); // initialize timer 1.0sec period
    Timer1.pwm(9, 512); // pwm on pin 9, 50% duty cycle
    Timer1.attachInterrupt(callback); // run callback func on overflow
}

void callback() {
    digitalWrite(10, digitalRead(10) ^ 1); // toggle pin 10
}

void loop() {
    Serial.println(TCNT1); // print out timer1 register value
}
References

https://arduino-info.wikispaces.com/Timers-Arduino

https://www.instructables.com/id/Arduino-Timer-Interrupts/

https://playground.arduino.cc/code/timer1


http://www.avrbeginners.net/architecture/timers/timers.html