Microcontroller reference guide

Timer/Counter

Multiple Circuits. Most commonly programmable interval timer (PIT)

Memory RAM/ ROM/ FLASH

- Basic Instructions: ROM
- Program Memory: Flash
- Data Memory: RAM

Interrupt Controller

Handles interrupt requests (IRQ) coming from multiple different sources (like external I/O devices) which may occur simultaneously

Clock Generator

- **Crystal Oscillator or**
- **Semiconductor Oscillator**

CPU XBIT

Ranging from small & simple 4-bit processors to complex 32-bit or 64-bit processors

Internal Bus (YBIT wide)

In-circuit programming & debugging

On-chip debug circuitry that when accessed by an in-circuit emulator (ICE) via JTAG, allow debugging of the firmware with a debugger

Serial ports & UARTs

Universal asynchronous receiver/ transmitter (UART) block makes it possible to receive and transmit data over a serial line with very little load on the CPU

I/O (GPIO)

General purpose input/output pins are software configurable to either an input or an output state. When GPIO pins are configured to an **input state**, they are often used to read sensors or external signals. Configured to the **output state**, GPIO pins can drive external devices such as LEDs or- motors, often indirectly, through external power electronics

A/D Converter

Convert incoming sensor data into a form that the processor can recognize

PWMs

Pulse-width modulation (PWM) block makes it possible for the CPU to control power converters, resistive loads, motors, etc., without using many CPU resources in tight timer loop

Examples: Y = 4, 8, 16, 32 Bit (Bus width)

X	Example CPU Core	Example MCU
4 Bit	Samsung SAM47	Samsung S3C7(KS57)
8 Bit	Microchip Atmel AVR	Microchip AVR DB
16 Bit	TI MSP430	TI MSP430
32 Bit	Infineon TriCore	Infineon Aurix
ARM Cortex	M4	STM32WLE5/E4xx