SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

19ECT221 – MICROPROCESSOR AND MICROCONTROLLERS

III YEAR - V SEM

UNIT 3 – MICROCONTROLLERS

8051 Microcontroller

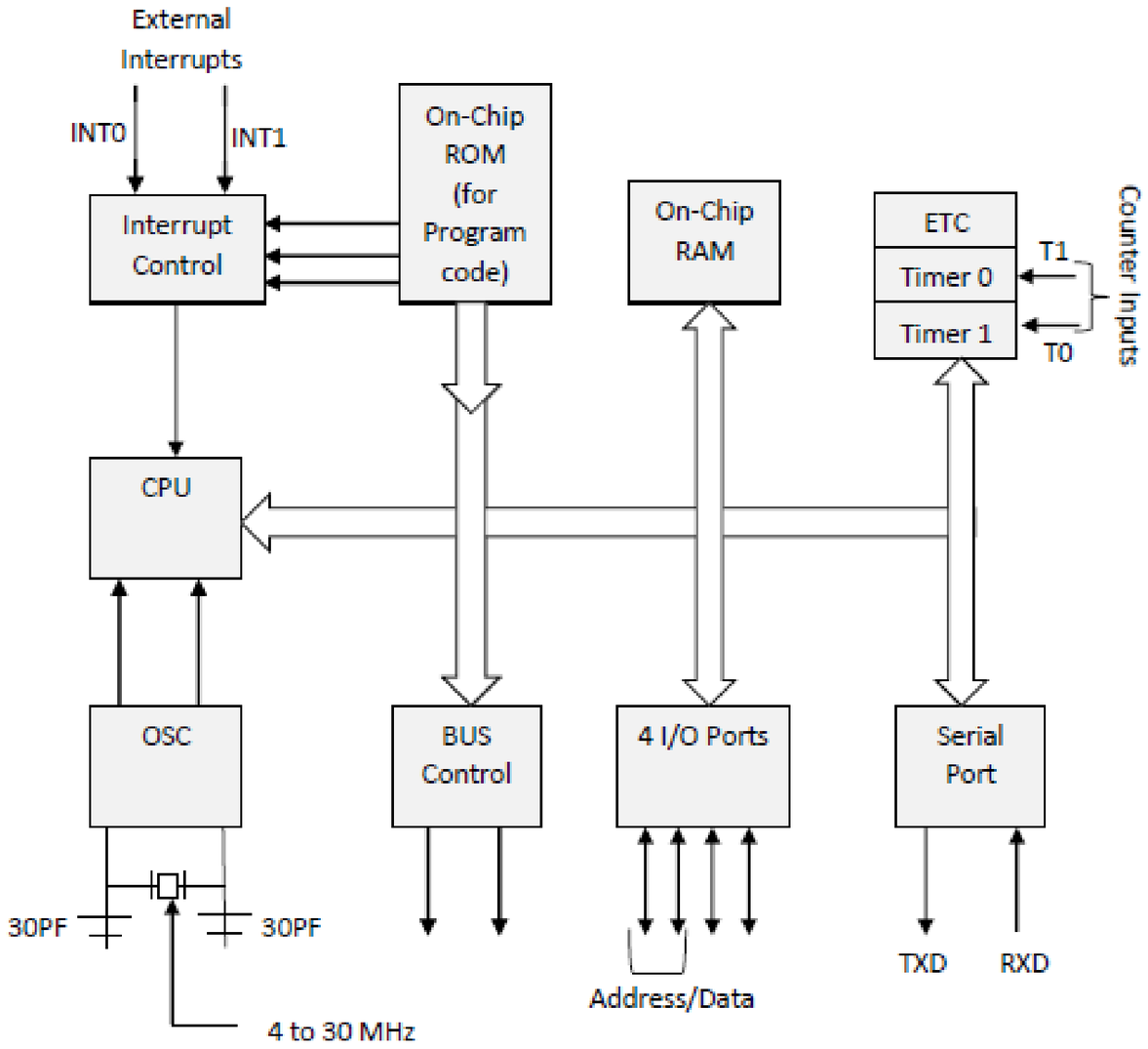
Embedded Processors

- An embedded processor is a microprocessor that is designed especially for handling the needs of an embedded system.
- It is a class of computer or computer chip that is embedded in various machines.
- Embedded processors are typically found in devices that require real-time processing capabilities, such as industrial control systems, automotive systems, and consumer electronics.
- They are also designed to be reliable and to operate for long periods of time without failure.

8051 MICROCONTROLLER

- 8051 microcontroller is designed by Intel in 1981.
- It is an 8-bit microcontroller. It is built with 40 pins DIP (dual inline package), 4kb of ROM storage and 128 bytes of RAM storage, 2 16-bit timers.
- It consists of are four parallel 8-bit ports, which are programmable as well as addressable as per the requirement.
- An on-chip crystal oscillator is integrated in the microcontroller having crystal frequency of 12 MHz

8051 Architecture



Architecture of 8051

- 8-bit CPU through two Registers A & B.
- 8K Bytes – Internal ROM and it is a flash memory that supports while programming the system.
- 256 Bytes – Internal RAM where the first RAM with 128 Bytes from 00H to 7FH is once more separated into four banks through 8 registers in every bank, addressable registers -16 bit & general-purpose registers – 80.
- The remaining 128 bytes of the RAM from 80H to FFH include Special Function Registers (SFRs).
- These registers control various peripherals such as Serial Port, Timers, all I/O Ports, etc.

Architecture of 8051

- These registers control various peripherals such as Serial Port, Timers, all I/O Ports, etc.
- Interrupts like External-2 & Internal-3
- Oscillator & CLK Circuit.
- Control Registers like PCON, SCON, TMOD, TCON, IE, and IP.
- 16-bit Timers or Counters -2 like T0 & T1.
- Program Counter – 16 bit & DPRT (Data Pointer).
- I/O Pins – 32 which are arranged like four ports such as P0, P1, P2 & P3.
- Stack Pointer (SP) – 8bit & PSW (Processor Status Word).
- Serial Data Tx & Rx for Full-Duplex Operation

Types of Interrupts

The interrupts of the 8051 microcontrollers have the following sources

- TF0 (Timer 0 Overflow Interrupt)
- TF1 (Timer 1 Overflow Interrupt)
- INT0 (External Hardware Interrupt)
- INT1 (External Hardware Interrupt)
- RI/TI (Serial Communication Interrupt)

Applications of 8051

Automation: The 8051 microcontroller is widely used in automotive applications.

They are widely used in hybrid vehicles to control engine options.

Medical Devices: Convenient medical devices such as blood glucose and blood pressure monitors contain microcontrollers that display measurements.

Energy management: Competent measurement systems support energy consumption calculations in home and industrial environments.

Touch Screen: Many microcontroller vendors incorporate touch functionality into their designs. Portable devices such as media players, and gaming devices.

References

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