IEEE

RAS

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Task 7

Component of Computing system:

1. Processor.
2. Memory.
3. I/O.

Type of computing system:

1. General purpose.
2. Specific purpose.

Embedded system challenges:

1. Power.
2. Cost.
3. Speed/time.
4. Size.
5. Performance.

Type of embedded system:

1. SB (system bord).
2. SOC (system on chip).

Examples for IC:

555 timer - op_Amp.

VLSI:

[Include more than million transistors]

1. Lower size.
2. High functionality.

MPU [microprocessor unit]:

1. Processor.
2. MP.
3. CPU.

Bus set:

1. Data bus.
2. Address bus.
3. Control bus.

Processor:

1. ALU
2. Control unit [ID]
3. Register files [IR]

   Decode:

   - Instruction set.
   - Instruction format.

PC [Program counter]:

Connect between CPU and ROM.

Type of instruction:

- HW
- SW

Type of ISA:

- RISC
- CISC

Specific register:

1. PC
2. Stack pointer.
3. ACC
4. IR
5. PSW

Basic memory element:

Flip flop [D]

Types of memory:

- Volatile [RAM]
- Non-volatile [ROM]
- Hybrid [MIX]

RAM:

- SRAM
- DRAM

SRAM [Based on transistor]:

- Faster than DRAM.
- High cost [6-transistor]

DRAM [Based on capacitor]:

- Simple HW.
- Low cost per bit.
- High density.
- Low power consumption.

ROM [based on FGM]

Charge (FG):

1. Negative
    - 0
    - Programing state
2. Positive
    - 1
    - Erasing state

Types of ROM according to (MP):

1. Mask programmable ROM.
    - One time program (OTP)
    - EX: toys

2. PROM.
    - OTP
3. EPROM.
    - Erasable.
    - Non-volatile (save data).
    - Effected by noise and radiation.

Hybrid:

1. EEPROM.
    - Byte access.
    - High cost per bit.
2. Flash.
    - Block access.
    - Endurance.
    - Low cost per bit.
3. NVRAM.
    - SRAM + Battery.
    - EEPROM + SRAM + Battery.