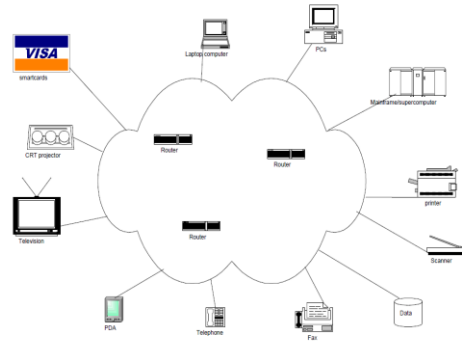## Digital Logic Design

Lecture :02

The Digital World

The Digital World

- Digital Systems, especially computers, are driving the world economy.
  - The Internet is changing the way we communicate, shop, learn, invest, and entertain ourselves.
- This is an amazingly fast moving business!!
  - Processors double in speed every 18 months
  - The Internet doubles in size every year
- Computers are the most amazing and complex things ever built by mankind
  - The Intel Pentium 4 has 55 million transistors
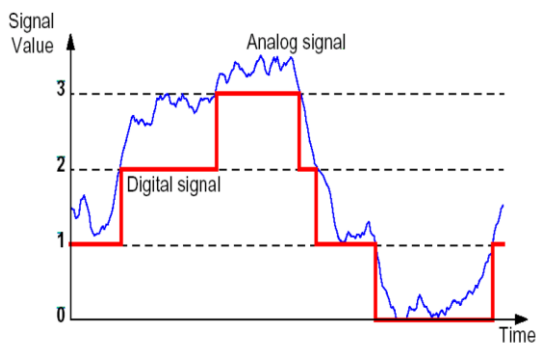 - It runs at 3 billion cycles per second

Analog vs. Digital
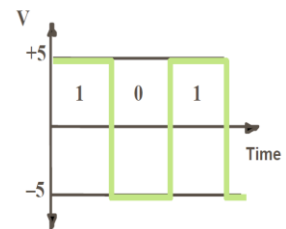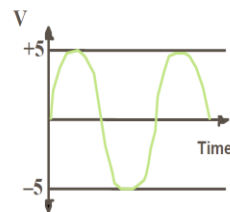
Analog: values vary over a broad range continuously

Digital: only discrete values

Analog Signal vs. Digital

Analog vs. Digital

- Analog devices process signal that can assume any value across a continuous range and produce results that are also in continuous form.
- Digital devices process signals that take on only two discrete values such as 0 and 1 and produce output that can be represented by 0 and 1.
- Examples
  - Analog Devices: solid-state devices TV (except for digital TV), Audio amplifier etc.
  - Digital Devices: Computer, CD player, digital TV, digital cellular phone, electronic calculator, and digital camera.
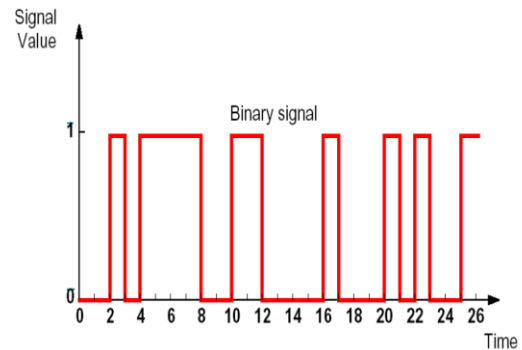
Analog vs. Digital Systems

Analog systems:

- Limited precision, errors accumulate, drift
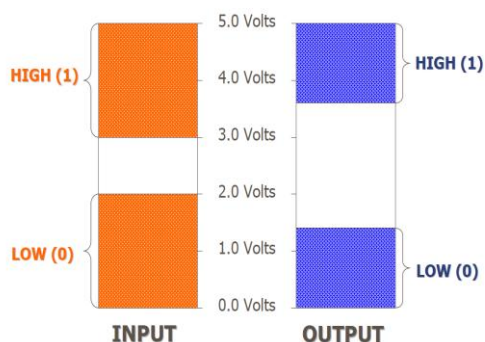- Interface circuits (i.e., sensors & actuators) often analog

Digital systems:

- More accurate and reliable
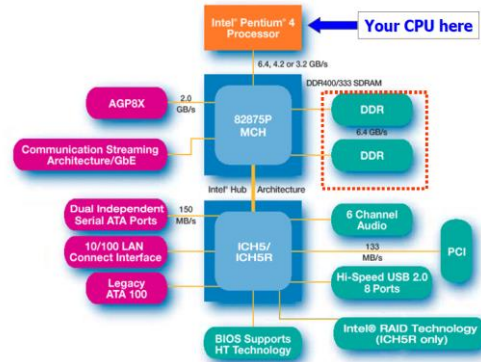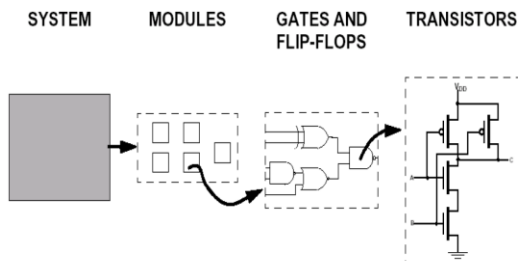- Readily available as self-contained, easy to cascade building blocks

Binary Signals
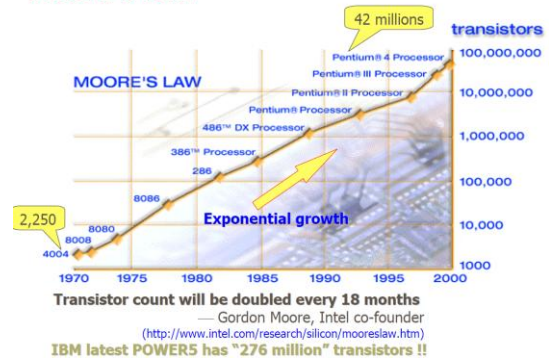

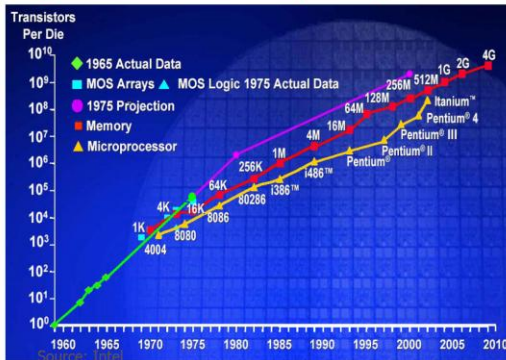## Voltage Range of Binary Signals

A Generic Intel-based PC System
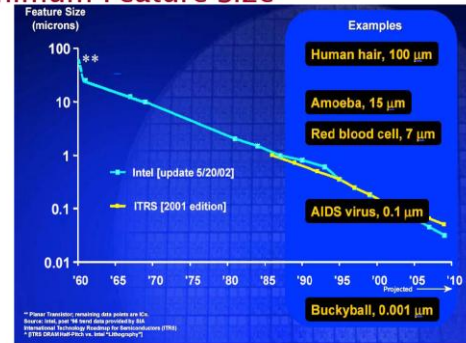

Zoom-in a System Component

Moore's Law

Integrated Circuit Complexity

Minimum Feature Size

We are currently at 0.09µm and moving towards 0.065µm

Average Transistor Price per year