Heaven's Light is Our Guide

Department of Computer Science & Engineering
Rajshahi University of Engineering & Technology, Bangladesh

Course Code: CSE 2203
Course Title: Digital Techniques

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Why needs Digital Techniques Course?

Background:

- Real World is analog
- All real world signal is analog

Reasons for studying this course:

- Digital machine (i.e. Computer, Calculator, Cell Phone etc. works with digital data / signal.
- To interact with analog signal or real world this course is very much helpful.

Digital Techniques

Technique

• technique of coming up with a solution to a problem

Digital Systems

• transform signals that can be abstracted as discrete in range and domain

Analog Vs Digital

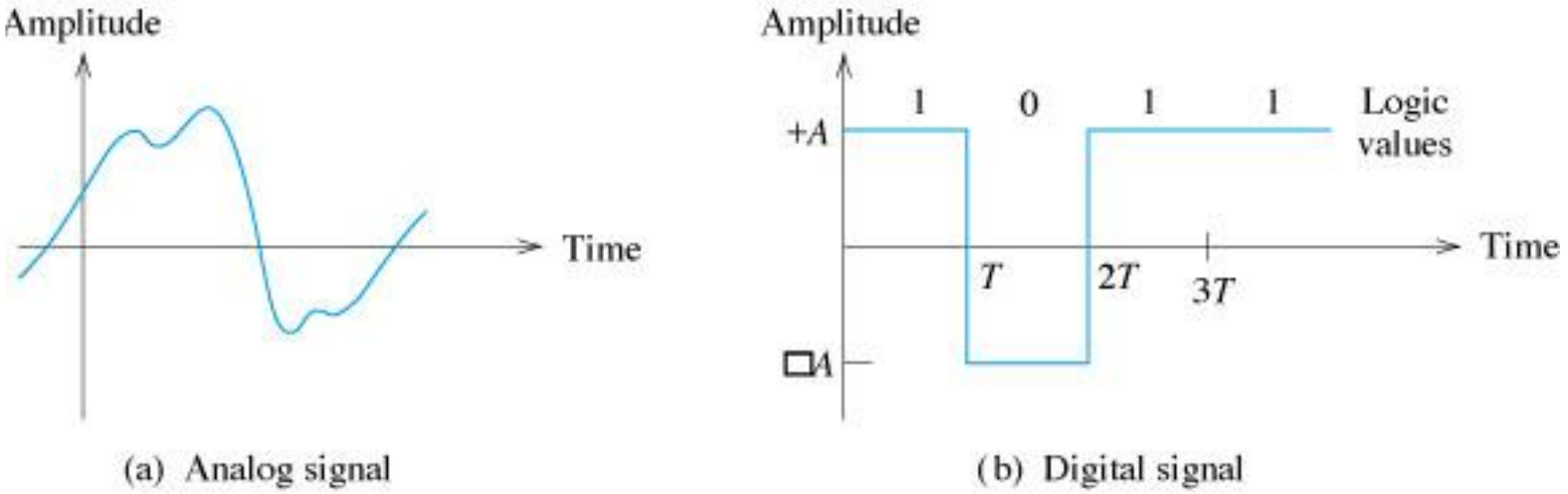


Figure 1. Analog signals take a continuum of amplitude values. Digital signals take a few discrete amplitudes.

Analog Vs Digital

Digital circuits advantages

- Easy to design
- Operation can be programmed
- Easy to store the information
- Less affected by noise
- Easier to fabricate on ICs
- Better economic

Analog Circuits advantages

- Require less devices
- Better to deal with low signal amplitudes
- Better to deal with high frequencies

Analog Vs Digital

Digital circuits disadvantages

- Real world is analog
- Processing digitized signals takes time

Analog to Digital Communication

- Convert the physical quantity to an electrical signal
- Convert the electrical signal into digital form
- Process the digital information
- Convert the digital outputs back to real world analog form

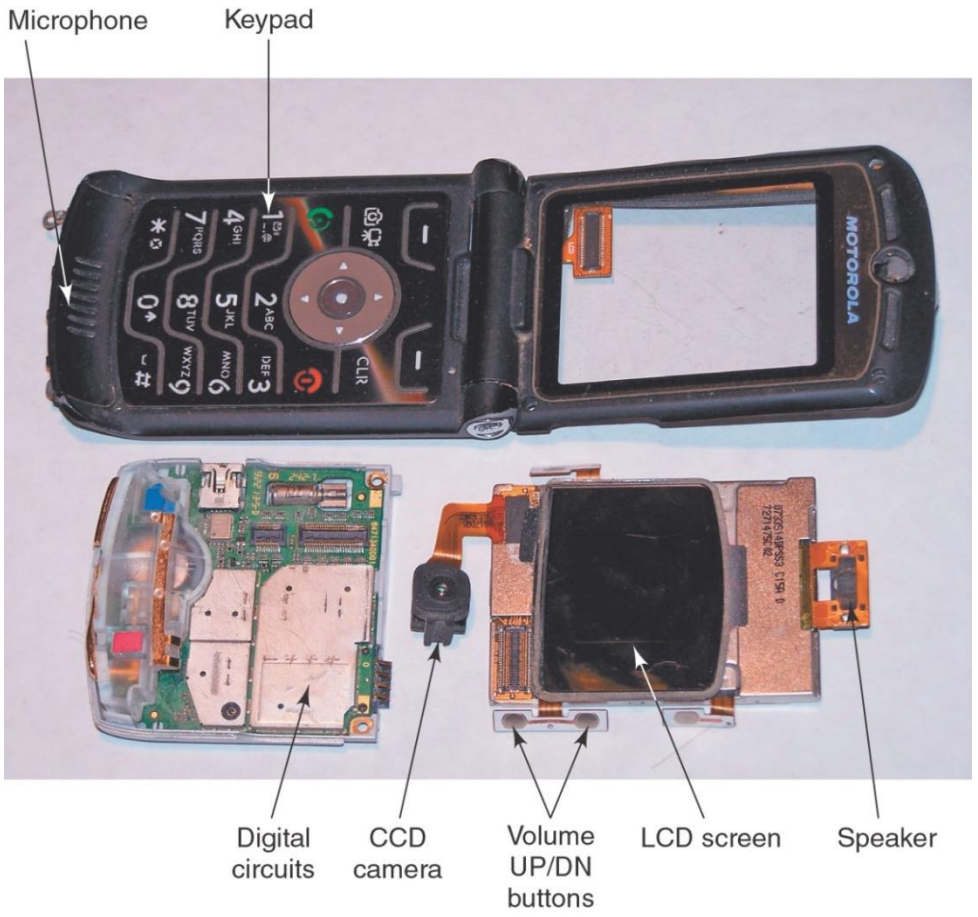
Analog Vs Digital System

- An analog system manipulates physical quantities represented in analog form.
- Quantities can vary over a continuous range of values.

- A digital system is a combination of devices designed to manipulate logical information or physical quantities represented in digital form.
- Quantities can take on only discrete values.

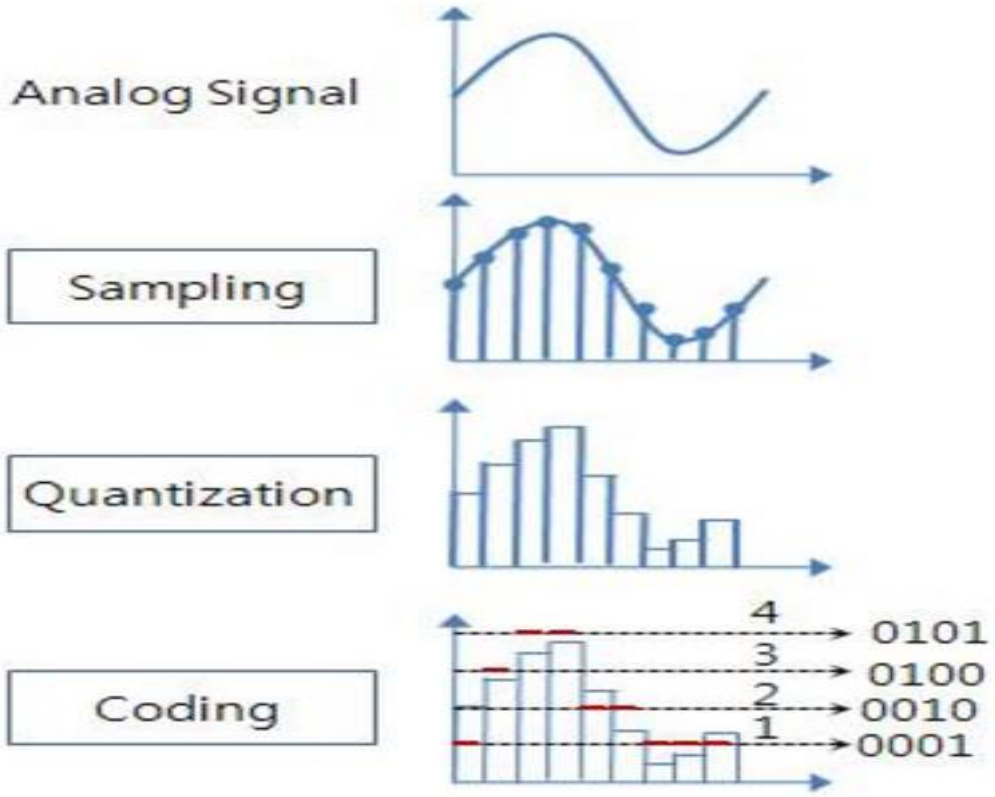
Analog Vs Digital System

The cell phone has digital & analog components, and uses *both* types of signals.



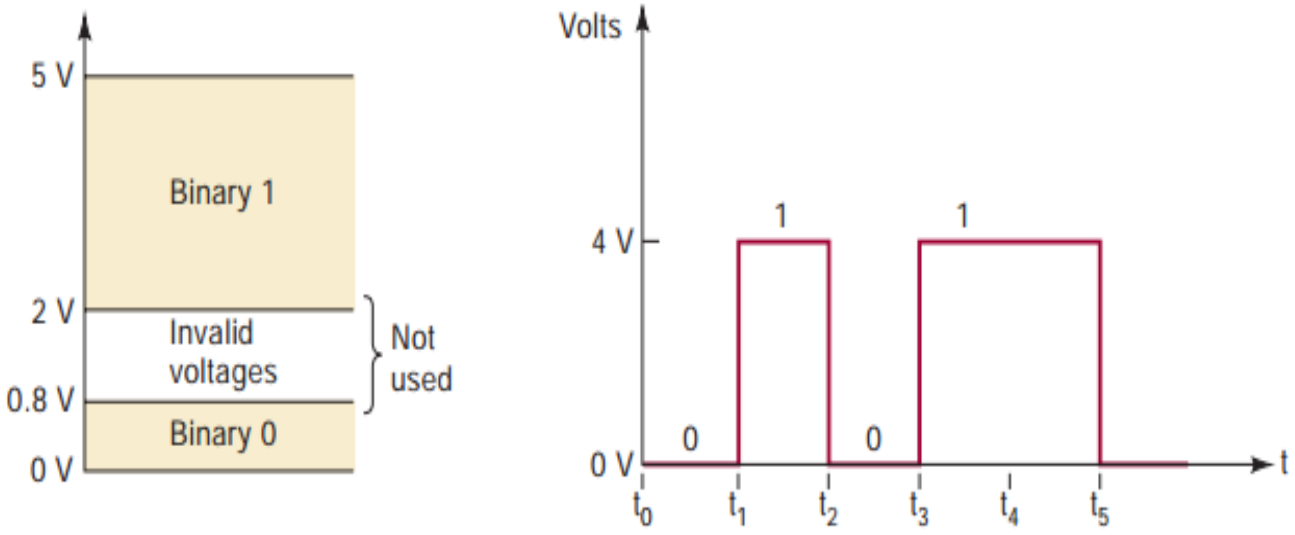
Converting Analog To Digital Signal

Three basic steps are needed to convert analog signal into a digital one.



Representing Binary Quantities

In digital systems, information being processed is usually represented in binary form.

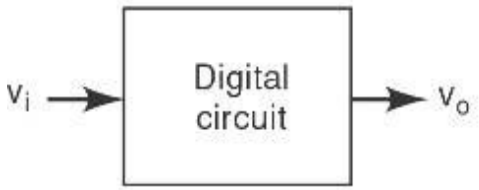


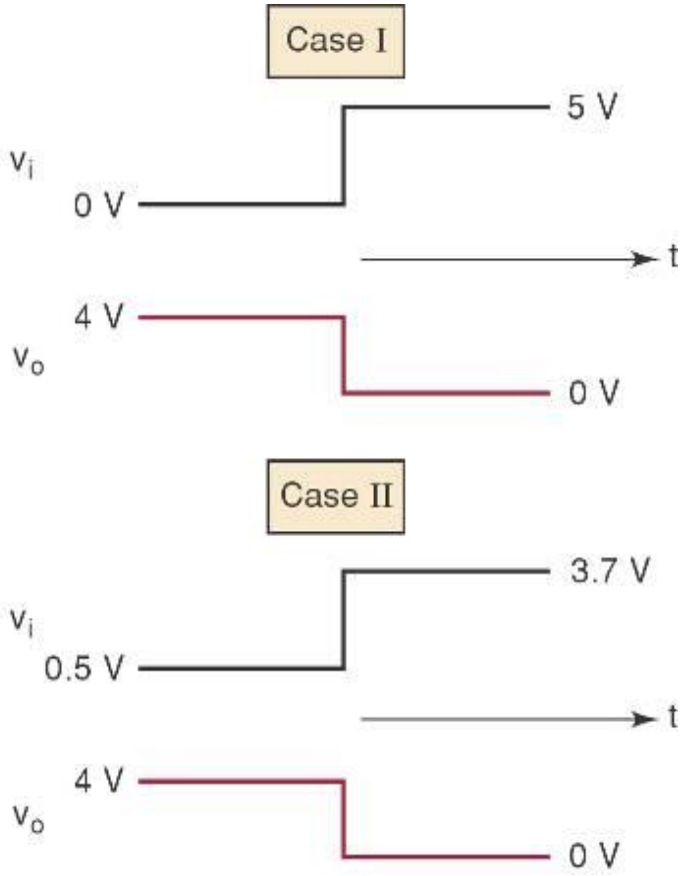
Digital Circuits/Logic Circuits

Digital circuits - produce & respond to predefined voltage ranges.

The term *logic circuits* is used interchangeably.

A digital circuit responds to an input's binary level of 0 or 1—not to its actual voltage.





Digital Computers

A computer is a system of hardware that performs arithmetic operations, manipulates data, and makes decisions.

Performs operations based on instructions in the form of a *program* at high speed, and with a high degree of accuracy.

Digital Computers

Major parts of a computer:

Input unit—Processes instructions and data into the memory.

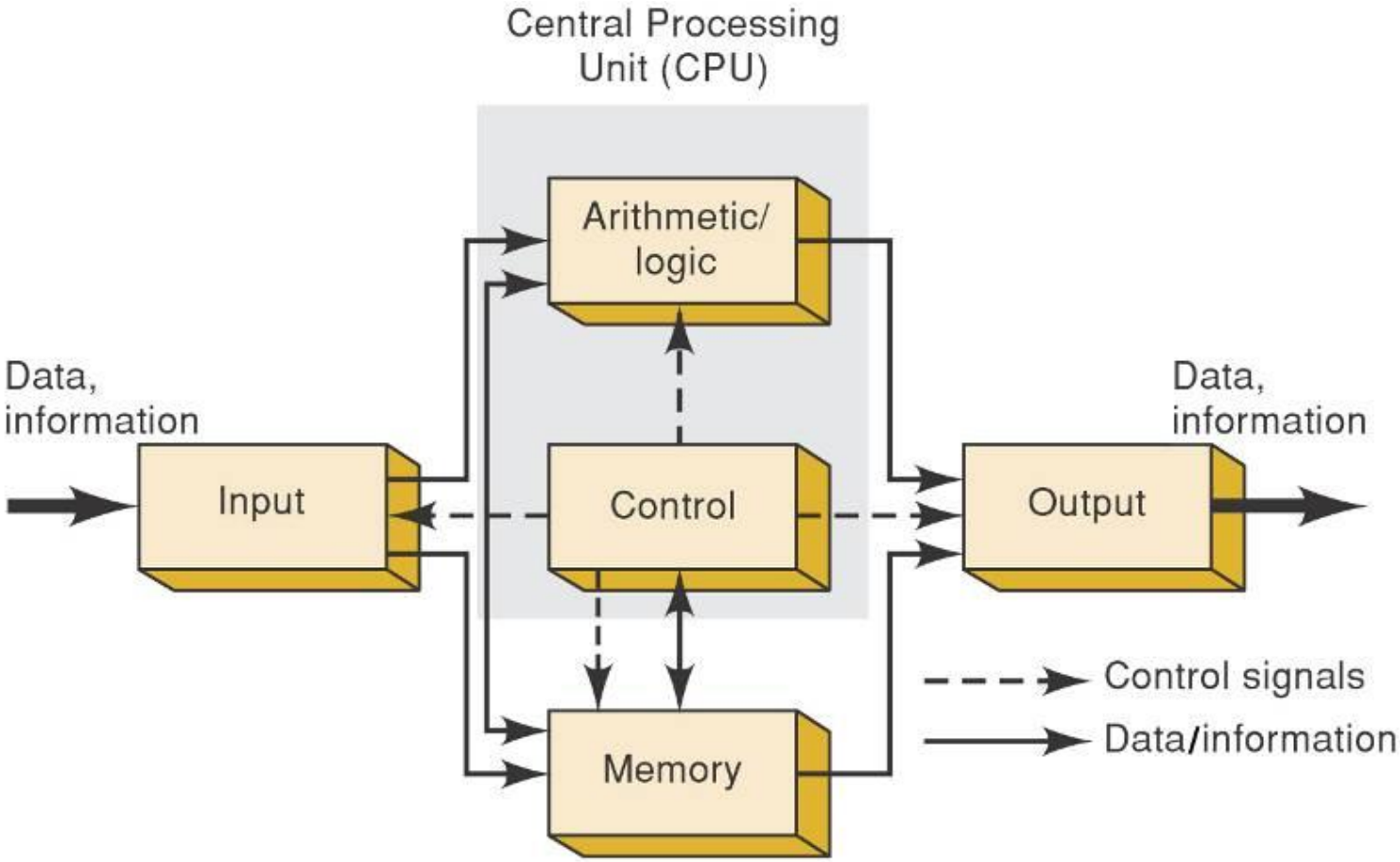
Memory unit—Stores data and instructions.

Control unit—Interprets instructions and sends appropriate signals to other units as instructed.

Arithmetic/logic unit—arithmetic calculations and logical decisions are performed.

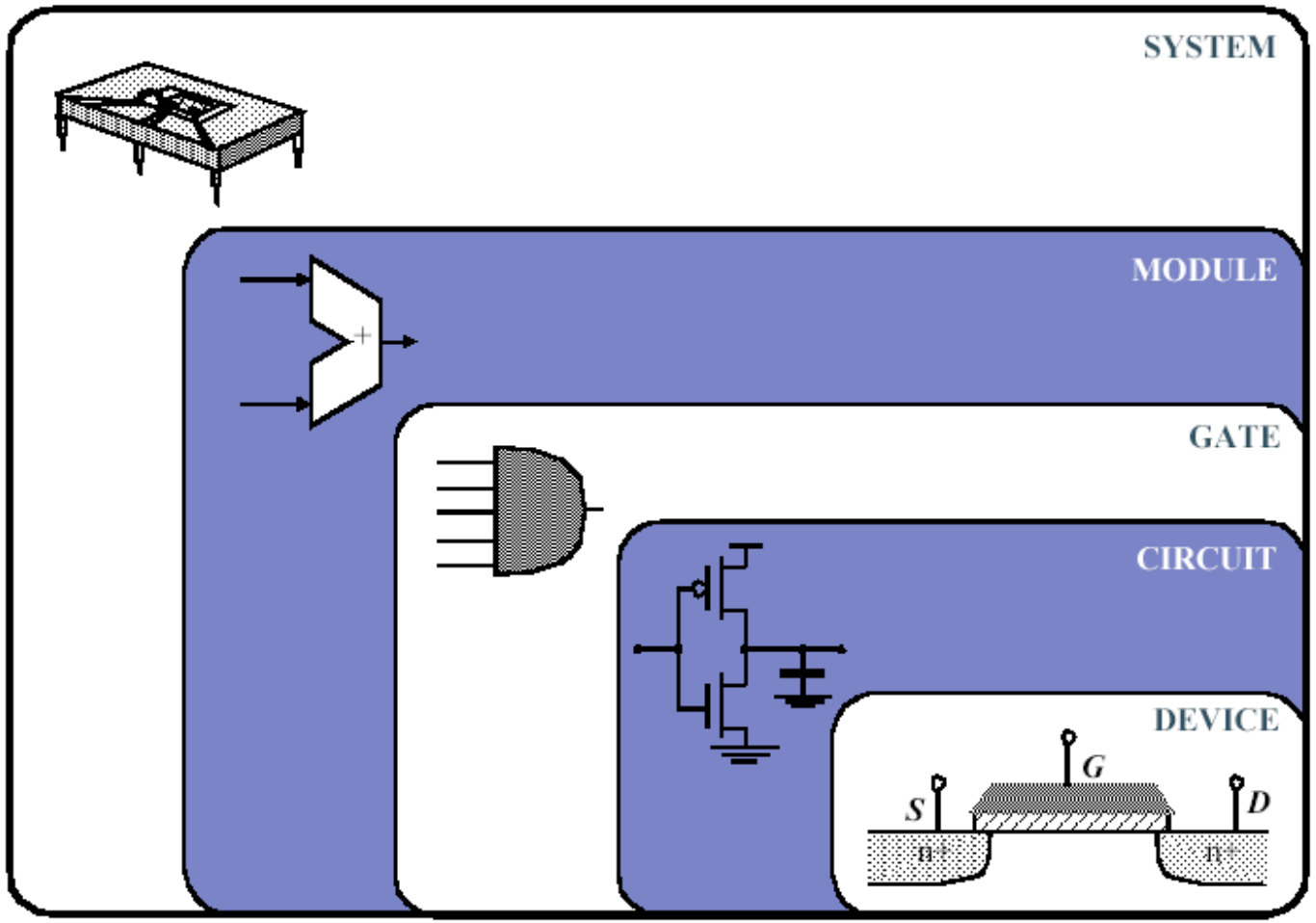
Output unit—presents information from the memory to the operator or process.

Digital Computers



The control and arithmetic/logic units are often treated as one and called the central processing unit (CPU).

Design Abstraction Levels



Digital Progress Today and Tomorrow

There are many needs in the world that digital technology can meet.

You will be able to become one of the pioneers on these new frontiers of technology.

Thank You

Next topic