Lecture 1
Digital Electronics

Introduction

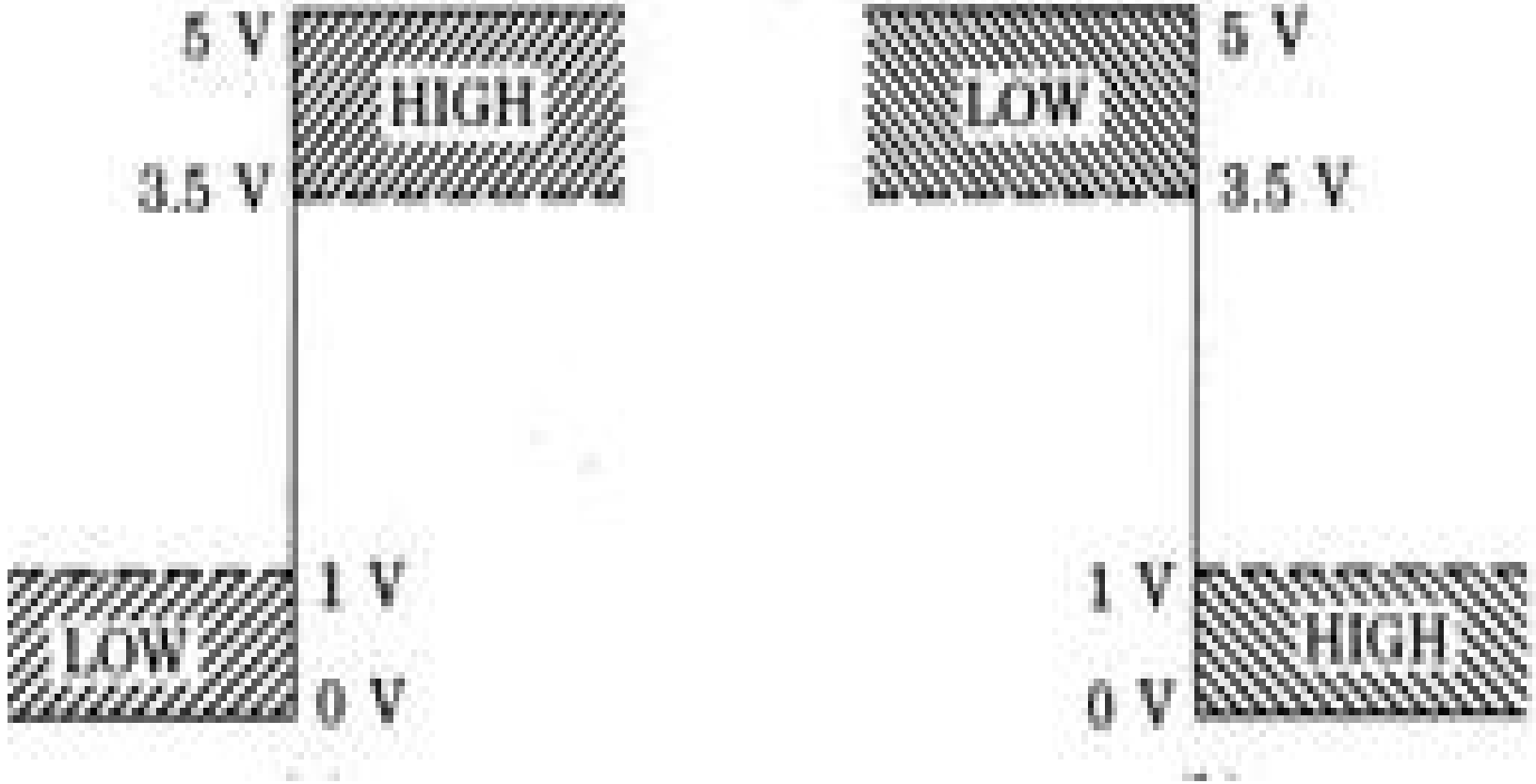
- Digital electronics is the branch of electronics that deals with digital data and digital circuit .

- Digital electronics are a key element of many products, which we take for, granted such as personal computers, sophisticated sewing machines, microwave ovens, compact disc players, and video cassette players.

- The brains of all of these products and many more are composed of digital electronics.

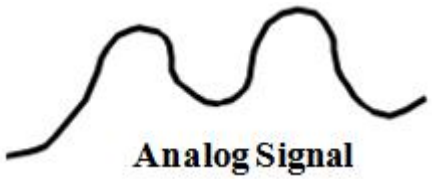
Digital Signal

- Digital system has only two discrete levels or values, low (0) or high (1). In case of positive logic, high is from 3.5-5v and low is 0-1v. In case of negative logic, high is 0-1v and low is 3.5-5v. As long as voltage remains in these levels, the state is considered low or high depending on logic used. High is also called as **on** and low as **off**.


5 V
HIGH
3.5 V
LOW
1 V
0 V
LOW
5 V
3.5 V
1 V
HIGH
0 V

Digital Systems

- Analog devices and systems process time-varying signals that can take on any value across a continuous range.
- Digital systems use digital circuits that process digital signals which can take on one of two values, we call: 0 and 1 (digits of the binary number system)



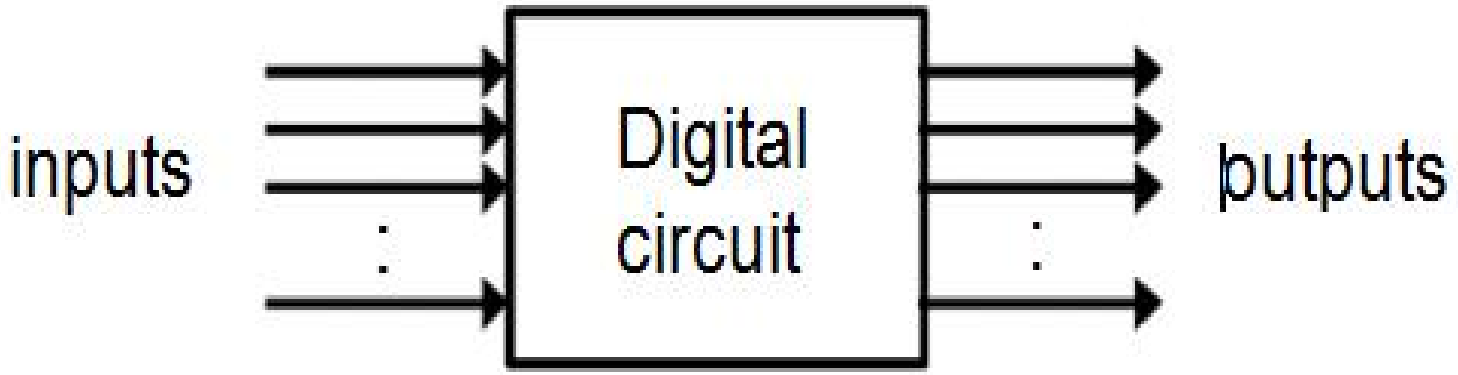
Analog Signal

Digital Signal

Applications

- Digital computers represent the most common digital systems.
- Analog Systems that use digital systems today are as follows :
- Audio recording (CDs, DAT, mp3)
- Phone system switching
- Automobile engine control
- Movie effects

Block Diagram



Advantages of Digital Systems Over Analog Systems

- Reproducibility of the results and accuracy.
- More reliable than analog systems due to better immunity to noise.
- Ease of design: No special math skills needed to visualize the behavior of small digital (logic) circuits.
- Flexibility and functionality.
- Programmability.
- Speed: A digital logic element can produce an output in less than 10 nanoseconds (10-8 seconds).
- Economy: Due to the integration of millions of digital logic elements on a single miniature chip forming low cost integrated circuit (ICs).