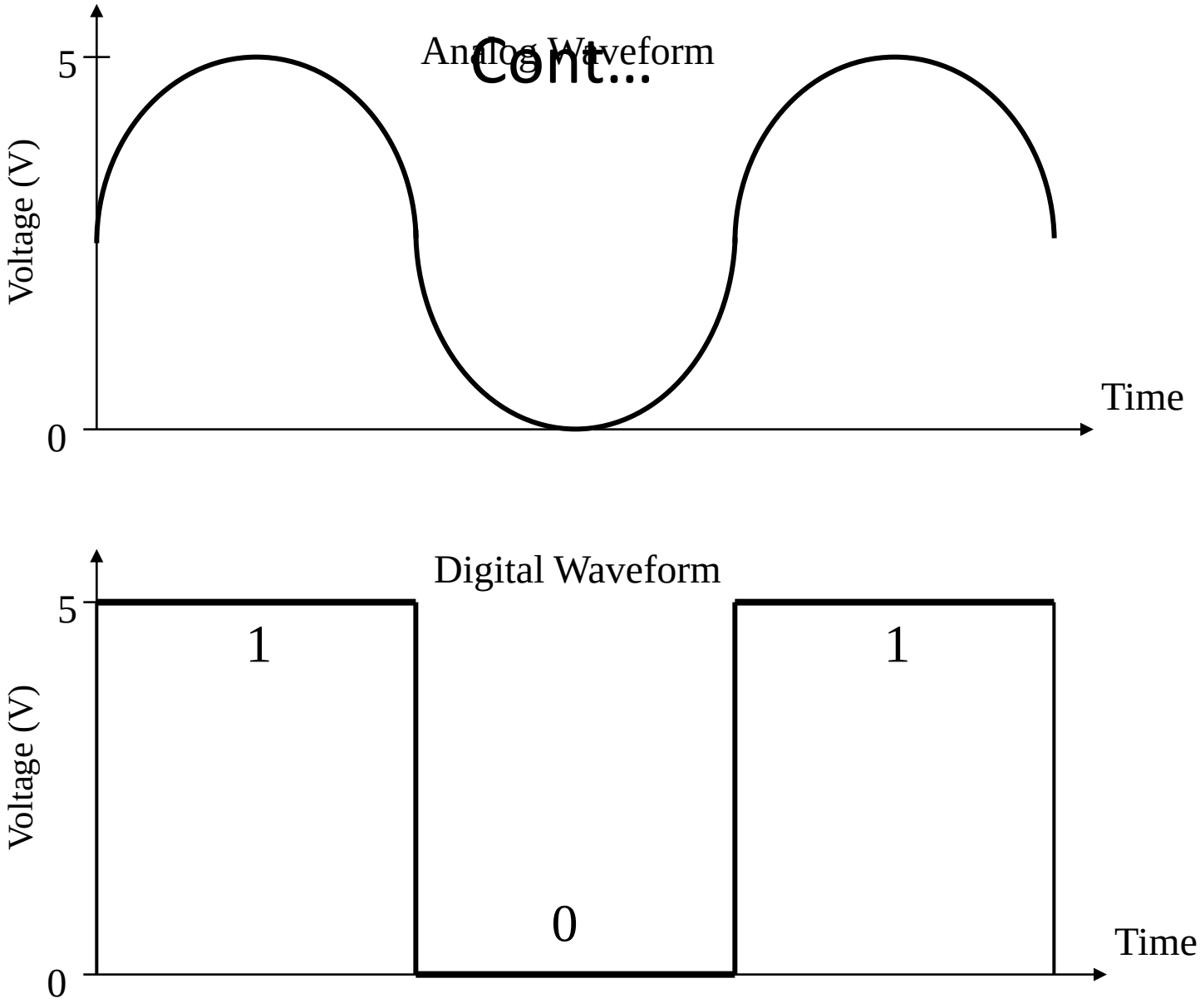
Analog versus Digital

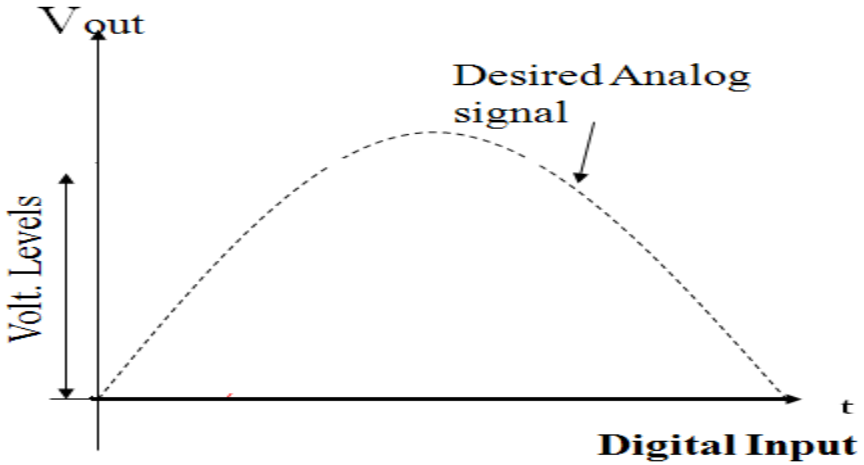
- Analog systems process time-varying signals that can take on any value across a continuous range of voltages (in electrical/electronics systems).

- Digital systems process time-varying signals that can take on only one of two discrete values of voltages (in electrical/electronics systems).
  - Discrete values are called 1 and 0 (ON and OFF, HIGH and LOW, TRUE and FALSE, etc.)

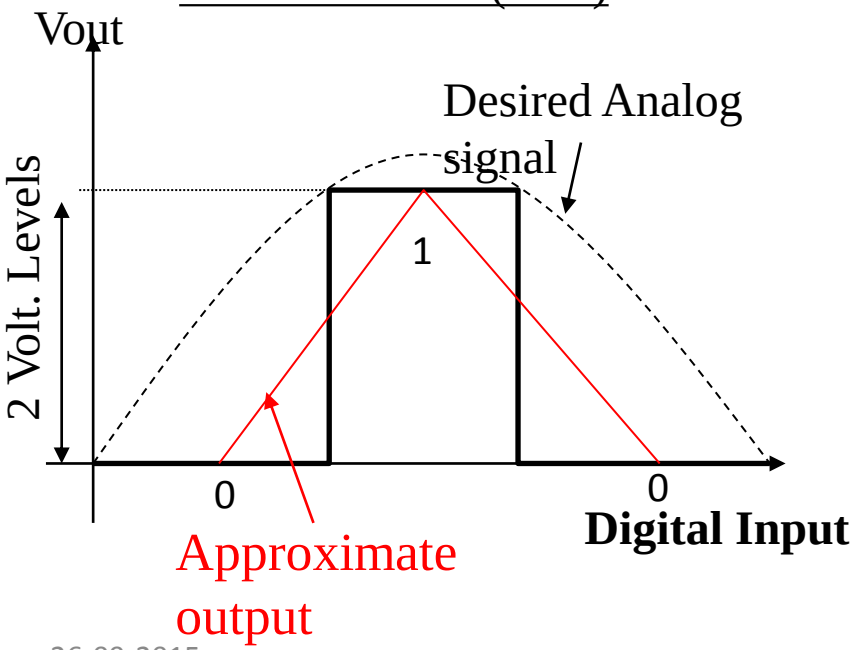
Cont...


Analog Waveform
5
0
Voltage (V)
Time
Digital Waveform
5
0
Voltage (V)
1
0
1
Time

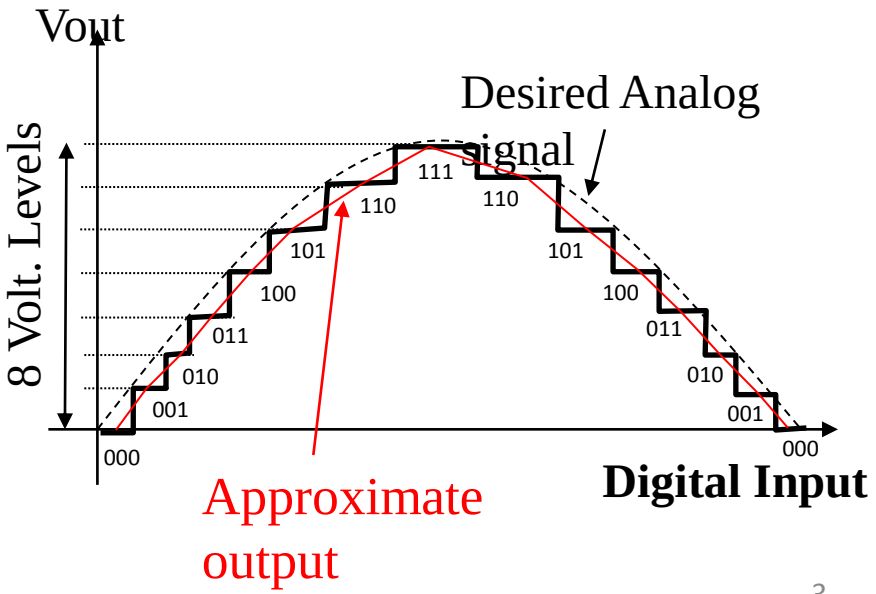
Analog to Digital Converters



Poor Resolution(1 bit)



Better Resolution(3 bit)



Benefits of Digital over Analog

- Reproducibility
- Not effected by noise means quality
- Ease of design
- Data protection
- Programmable
- Speed
- Economy

Disadvantages

- More expensive
- More energy consumption
- Quantization errors

Application

- Digital systems started back in 1940s.
- Digital systems cover all areas of life:
  - Digital audio & video
  - Telephone
  - Animation
  - Computers
  - Watches
  - Telephones
  - Cameras

- Traffic light system
- Car alarm system
- Microprocessor
- Digital cameras