

Chapter 1

Introduction

SKEE1223 Digital Electronics

Mun'im/Arif

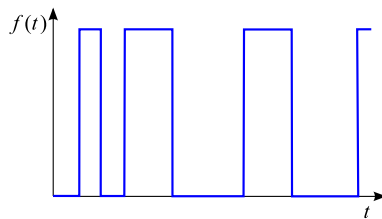
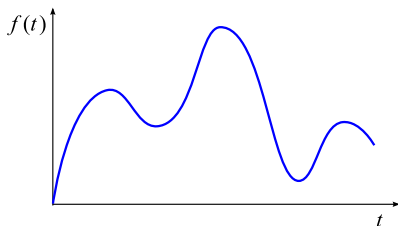
FKE, Universiti Teknologi Malaysia

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Analog vs Digital

- Analog systems can have any value
- Digital systems can have a limited set of values.
 - Decimal system: 0, 1, ..., 8, 9
 - Digital circuits: 0 or 1, TRUE/FALSE, ON/OFF
- To work with digital system, we must use binary number system

Digital vs Analog



Digital System Pro and Cons

■ Advantages

- Easier to design
- Repeatable results
- Less sensitive to noise
- Easier to store information
- Programmable
- Advanced processing is possible
- Selectable precision

■ Disadvantages

- The real world is mostly analog
- Sampling error
- System cost may be higher

Digital Processing of Analog Signals

Audio

Cassette tape



Audio CD, MP3

Digital Processing of Analog Signals

Photography

Film



SD/CF card

Digital Processing of Analog Signals

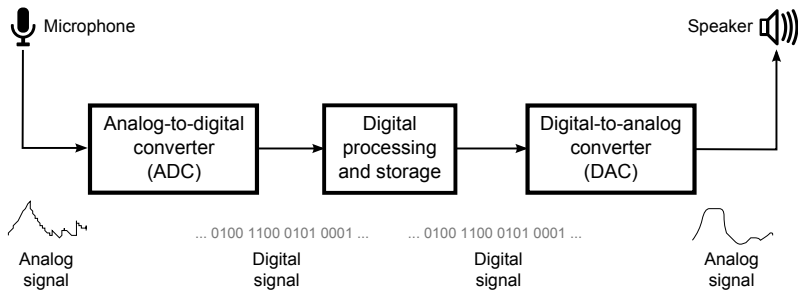
Video

35mm Film

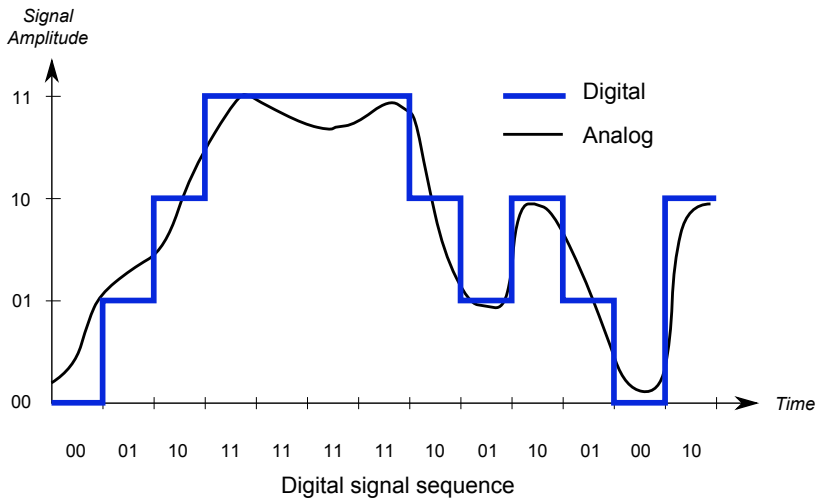


Digital storage & processing

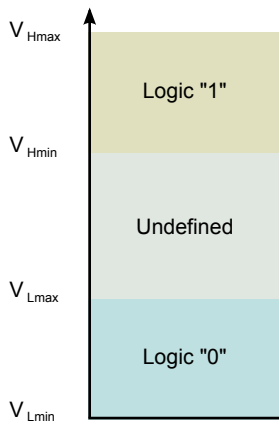
Digital Signal Processing



Sampling

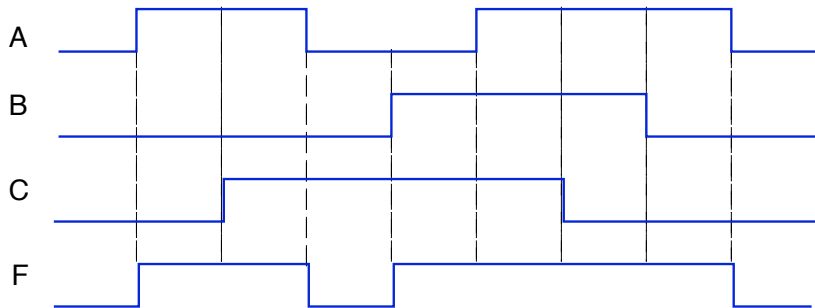


Digital Voltages



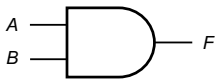
Notation	Definition
$V_{H(max)}$	Maximum voltage for logic HIGH
$V_{H(min)}$	Minimum voltage for logic HIGH
$V_{L(max)}$	Maximum voltage for logic LOW
$V_{L(min)}$	Minimum voltage for logic LOW

Timing Diagram



Logic Gates

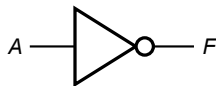
The most fundamental digital components



AND gate



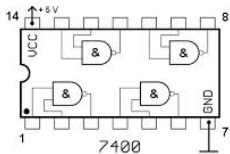
OR gate



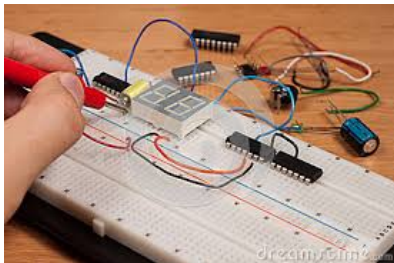
NOT gate

Chips

Gates in Action



7400 chip containing
4 gates



Breadboarding

Modern Chips

Smaller, Faster, Cheaper



Thousands of gates
inside a USB
connector



Billions of gates inside a microprocessor



<https://www.openlearning.com/courses/SKEE1223x>