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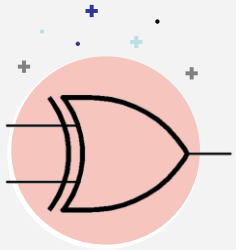


# Digital Circuits

## Lecture 0:

## Introduction

By: M.Razeghizadeh

Start now!

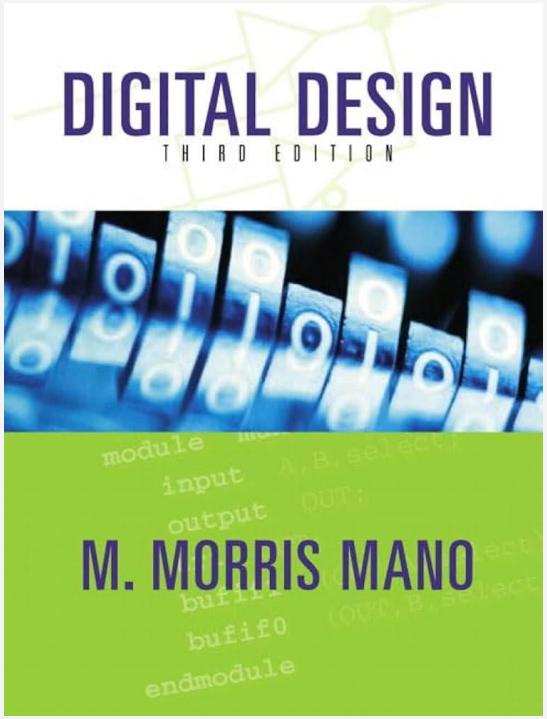
# Course Webpage:

http://www.Razeghizade.pudica.ir/digitalLogicDesign-2-140304.php

This Webpage Include:

Lecture Slides, Assignments, Lecture Information and references

# Which Book will be Used?





Digital Design

By M. Morris Mano

# What will I Learn in this Course?

- Towards the end of this course, you should be able to:
  - Represent numbers and perform arithmetic in various number systems.
  - Understand the basic identities of Boolean algebra and perform algebraic manipulations of Boolean expressions.
  - Simplify functions using the K-map method.
  - Design efficient combinational circuits utilizing basic functional blocks such as multiplexors, encoders, decoders, adders, and comparators.
  - Analyze and design efficient Mealy and Moore sequential circuits.
  - Design registers and counters and understand their applications.

# Contents of This Course

## Base on Reference Book

- CH1: Digital Systems and Binary Numbers
- CH2: Boolean Algebra and Logic Gates
- CH3: Gate-Level Minimization
- CH4: Combinational Logic
- CH5: Synchronous Sequential Logic
- CH6: Registers and Counters

## Grading Policy

| | |
|---|---|
| Assignment | 10% (2/20) |
| Participation | 5% (1/20) |
| Exam 1 | 25% (5/20) |
| Exam 2 | 30% (6/20) |
| Final Exam | 30% (6/20) |

## Analog versus Digital Circuits

- Analog means continuous
- Analog parameters have continuous range of values
  - Example: temperature is an analog parameter
  - Temperature increases/decreases continuously
  - Other analog parameters?
  - Sound, speed, voltage, current, time
- Digital means discrete using numerical digits
- Digital parameters have fixed set of discrete values
  - Example: month number $\in$ {1, 2, 3, …, 12}, month cannot be 1.5!
  - Other digital parameters?
  - Alphabet letters, ten decimal digits, twenty-four hours, sixty minutes

## Analog versus Digital Circuits

- Are computers analog or digital systems?

  Computer are digital systems

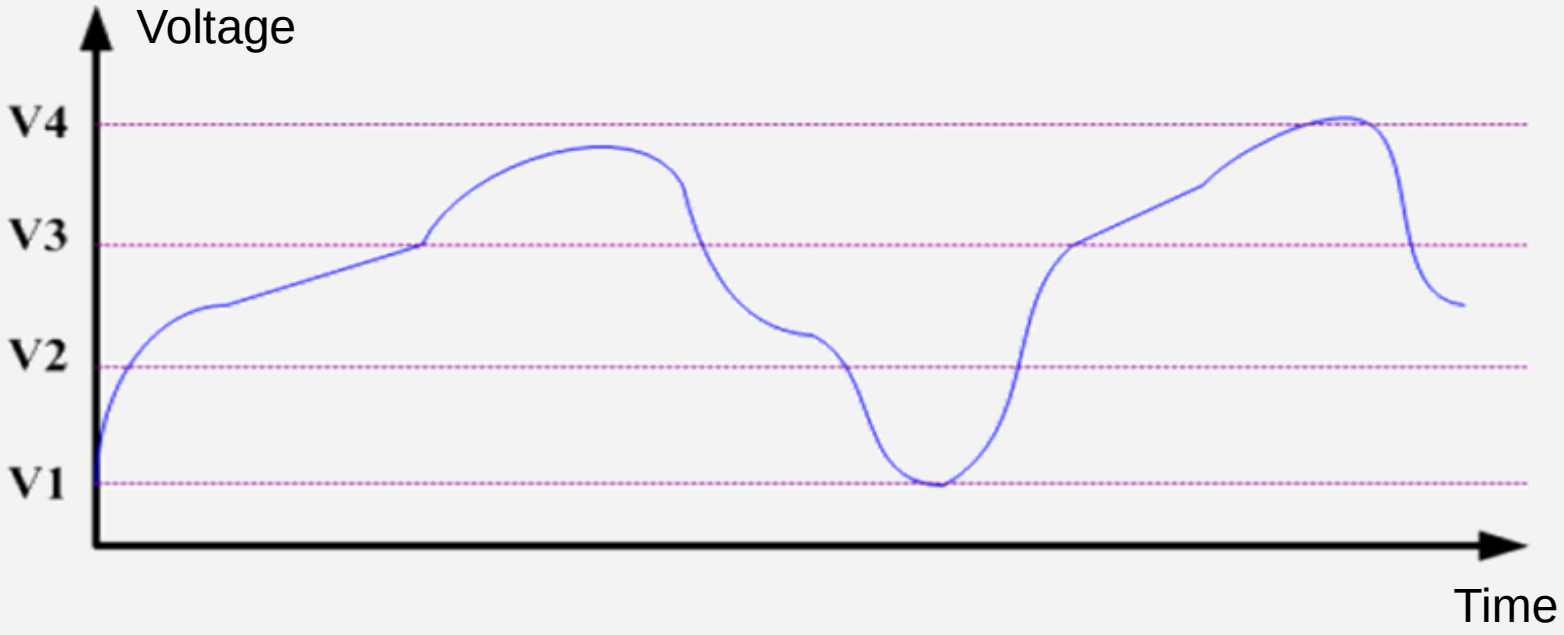
- Which is easier to design an analog or a digital system?

  Digital systems are easier to design, because they deal with a limited set of values rather than an infinitely large range of continuous values

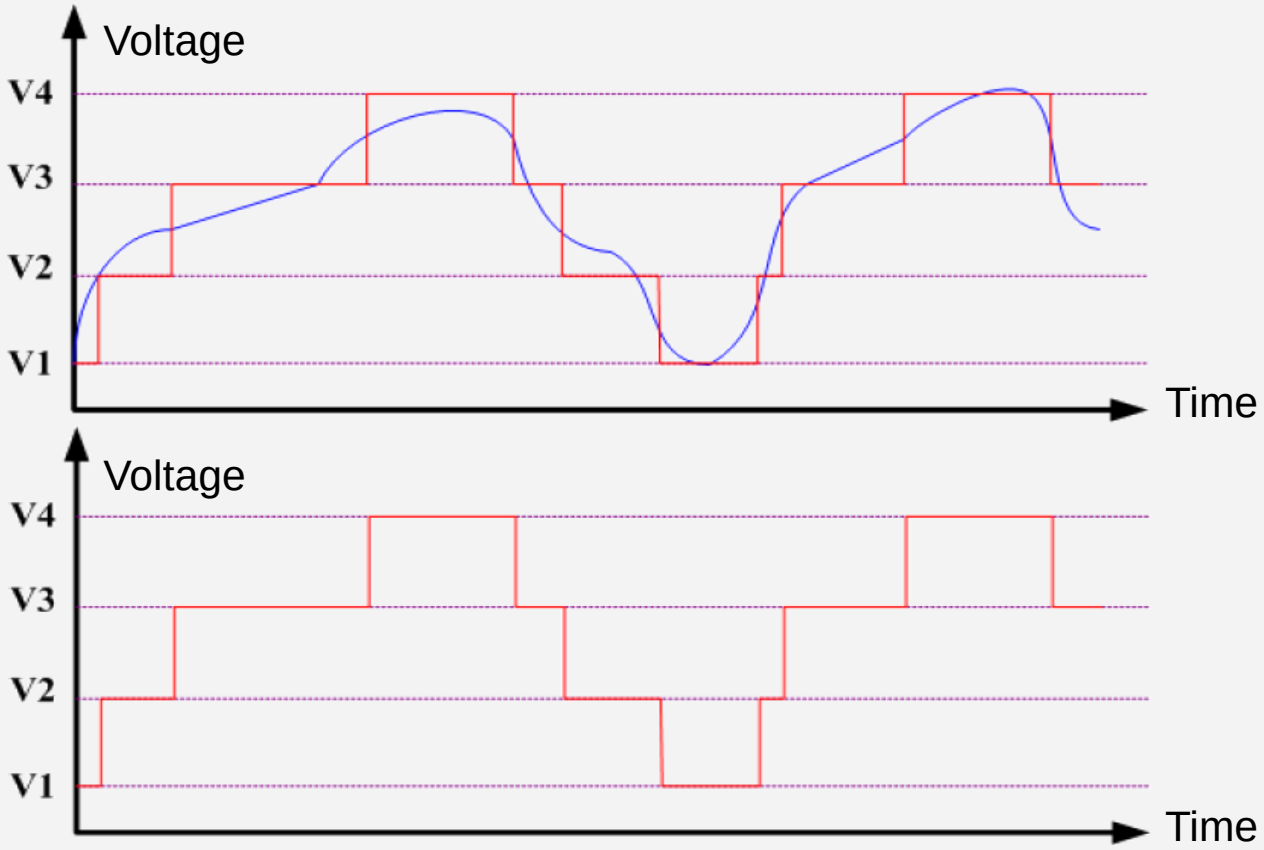
- The world around us is analog
- It is common to convert analog parameters into digital form
- This process is called **digitization**

## Analog versus Digital Circuits

- Digitization is converting an analog signal into digital form
- Example: consider digitizing an analog voltage signal
- Digitized output is limited to four values = {V1,V2,V3,V4}

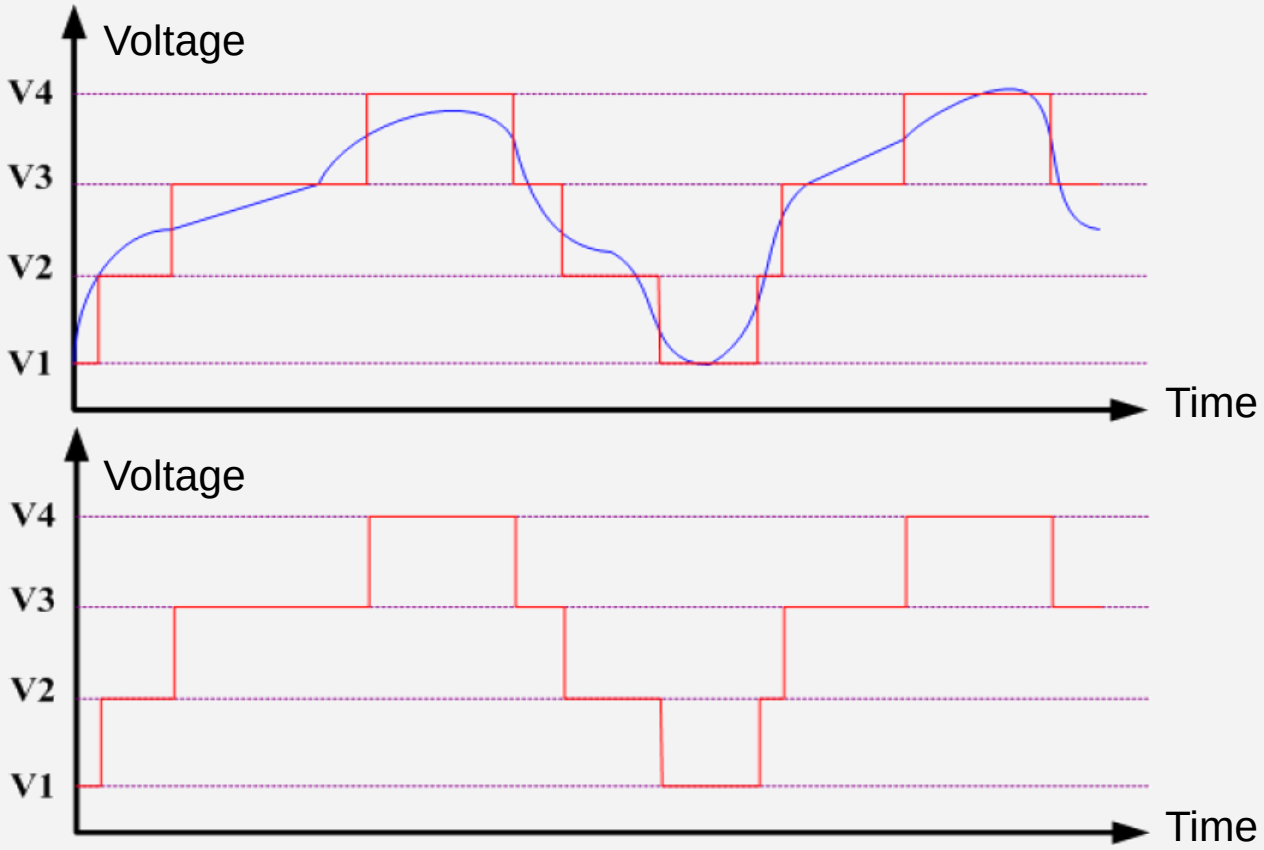


# Digitization of Analog Signals




- Some loss of accuracy, why?
- How to improve accuracy? Add more voltage values

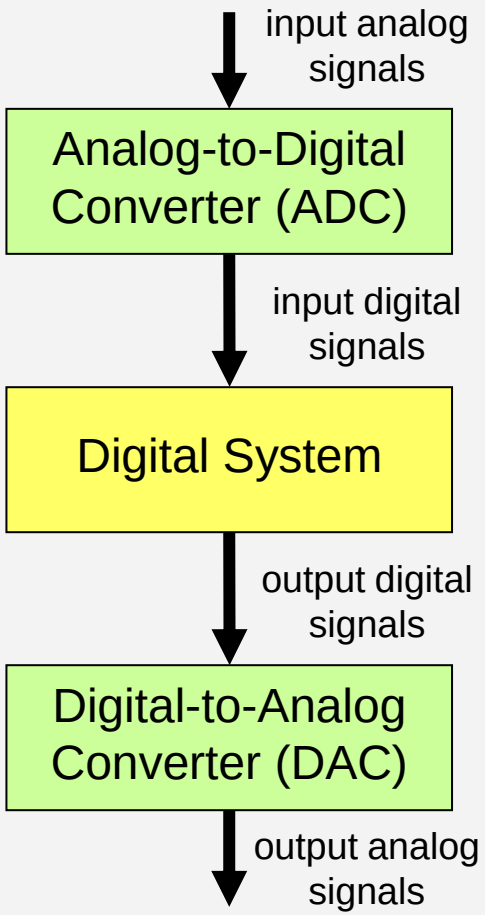
## Digitization of Analog Signals




- Some loss of accuracy, why?
- How to improve accuracy? Add more voltage values

# ADC and DAC Converters

- Analog-to-Digital Converter (ADC)
  - Produces digitized version of analog signals
  - Analog input => Digital output
- Digital-to-Analog Converter (DAC)
  - Regenerate analog signal from digital form
  - Digital input => Analog output
- Our focus is on digital systems only
  - Both input and output to a digital system are digital signals



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