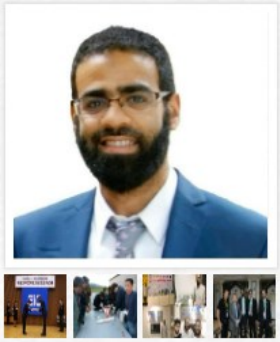
CSx25: Digital Signal Processing
NCS224: Signals and Systems

Dr. Ahmed Shalaby

http://bu.edu.eg/staff/ahmedshalaby14#

Dr. Ahmed Shalaby



Academic Position: Asst. Professor

Current Administrative Position:

Ex-Administrative Position:

Faculty: Computers and Artificial Intelligence

Department: Computer Science

Edu-Mail: ahmed.shalaby@fci.bu.edu.eg

Alternative Email: ahmed.shalaby@ejust.edu.eg

Mobile:

Scientific Name: Ahmed Shalaby

Publications [Titles(11) :: Papers(3) :: Abstracts(11) **]**

Courses Files(93**)**

Inlinks: (0**)**

External links: (41**)**

News

Great Teams: Embedded System Course: CanSat Project. [2022-07-04]
https://www.youtube.com/watch?v=w7v8W1ENgqMmore

Research Interests

Hardware Security, System on Chip, Network on Chip, VLSI, Embedded System, High Efficiency Video Coding (HEVC)

Selected Publications

- Efficient autoencoder-based human body communication transceiver for WBAN
- Sentry-NoC: a statically-scheduled NoC for secure SoCs
- Automatic arrival time detection for earthquakes based on Modified Laplacian of Gaussian filter

Benha University

Staff Search: Go

Welcome:Ahmed Shalaby (Log out)

- Benha University
- Home
- النسخة العربية
- My C.V.
- About
- Courses
- Publications
- Inlinks(Competition)
- Theses
- Reports
- Published books
- Workshops / Conferences
- Supervised PhD
- Supervised MSc
- Supervised Projects
- Education
- Language skills
- Academic Positions
- Administrative Positions
- Memberships and awards
- Committees
- Scientific Activities
- Experience

You are in:Home/Courses

add mode | view mode

Dr. Ahmed Shalaby :: Courses Details:

Number of courses : 13

Number of uploaded files for these courses from students : 0

NCS463: Internet of Things - 2022/2023

Files(-) URL(-) Assignments(-) Exam(-)

CSx25: Digital Signal Processing / NCS224: Signals and Systems - 2022/2023

Files(-) URL(-) Assignments(-) Exam(-)

CS 221: logic Design - 2022/2023

Files(-) URL(-) Assignments(-) Exam(-)

CS 324: Embedded Systems - 2022

Files(21) URL(-) Assignments(-) Exam(-)

CS 222: Computer Architecture - 2022

Files(30) URL(14) Assignments(-) Exam(-)

CSW 353: Assembly Language

Files(-) URL(3) Assignments(-) Exam(-)

CHW 261: Logic Design

Files(13) URL(6) Assignments(-) Exam(-)

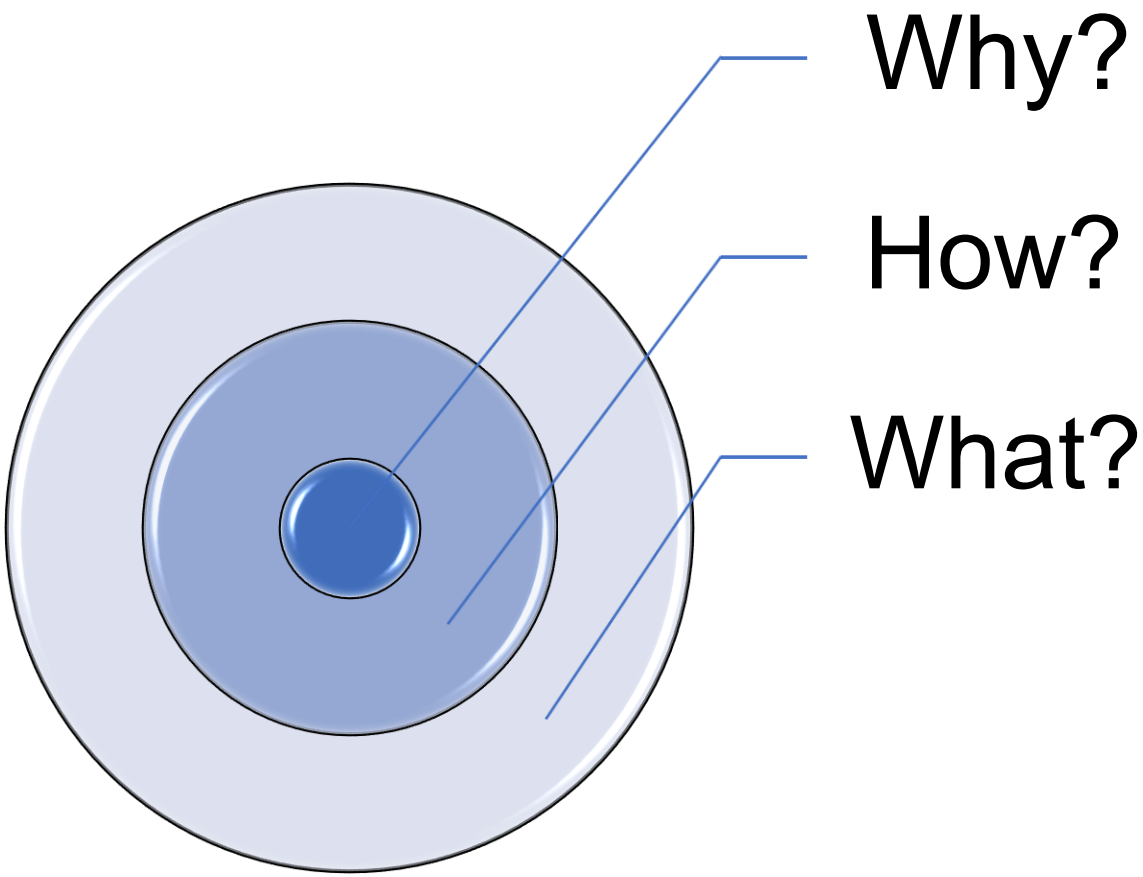
CHW 362 : Computer Architecture and Organization

Files(4) URL(9) Assignments(-) Exam(-)

(edit)

URL
Learn any language!
Past, Present, and Future of Computer Architecture
History of computers | تاريخ الكمبيوتر
History of Operating Systems | تاريخ أنظمة التشغيل
Try to understand and Improve your English: Surah al-Kahf (in-depth) Tafsir
WHY IS JESUS WHITE BY MUHAMMAD ALI
Improve you English ... audio books
Motivation: جيل الألفية - سيمون سينك
What If Money Was No Object? - Alan Watts
awesome Tech : Michi Yamamoto Channel
BBC Learning English
Longman 3000 Words List Pronunciation
Longman Communication 3000 Words
Speak English: English Coach Chad
IEEE Spectrum Magazine
MIT Technology Review
zAmericanEnglish - Channel
50 years of Computer Architecture- by David Patterson
ملخص كتاب : 12 قاعده للحياه - جوردن بيترسون
Silicon Run : manufacture microchips
يابانية اعتنقت الإسلام وتطرح أسئلة جميلة
أول منصة عربية متخصصة في التحديات البرمجية
Calculus - anaHr
The Now Habit - عاده الإنجاز
The astounding athletic power of quadcopters
PROJECTION MAPPING

Digital Signal Processing

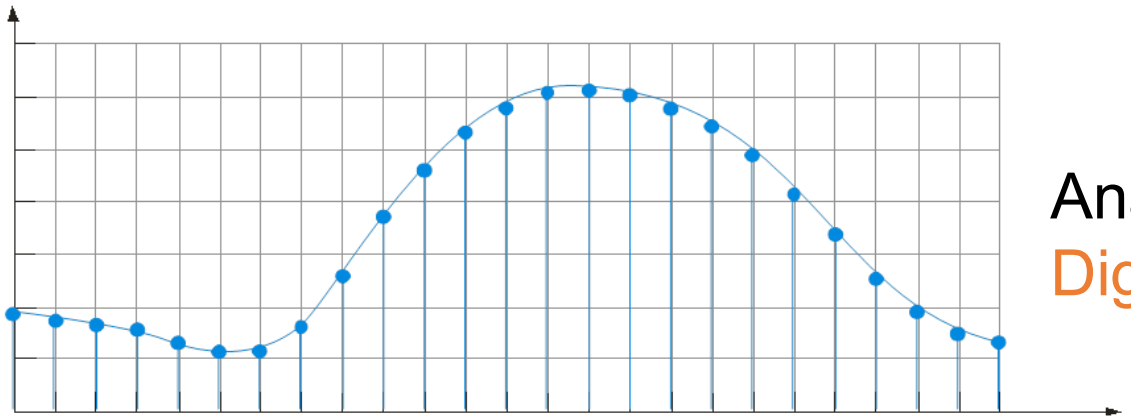


Digital Signal Processing – What?

- Signal
  - A signal is formally defined as “a function of one or more variables that conveys information on the nature of a physical phenomenon.”
  - A signal, as the term implies, is a set of information or data.
- Signal Processing deals with the representation, transformation, and manipulation of signals and the information they contain.
- System
  - A signal is *applied to* a system as *input*, and the system *responds* to the signal by producing another signal called the *output*.

Digital Signal Processing – What?

Most natural quantities (such as temperature, pressure, light intensity, …) are **analog quantities** that vary continuously.



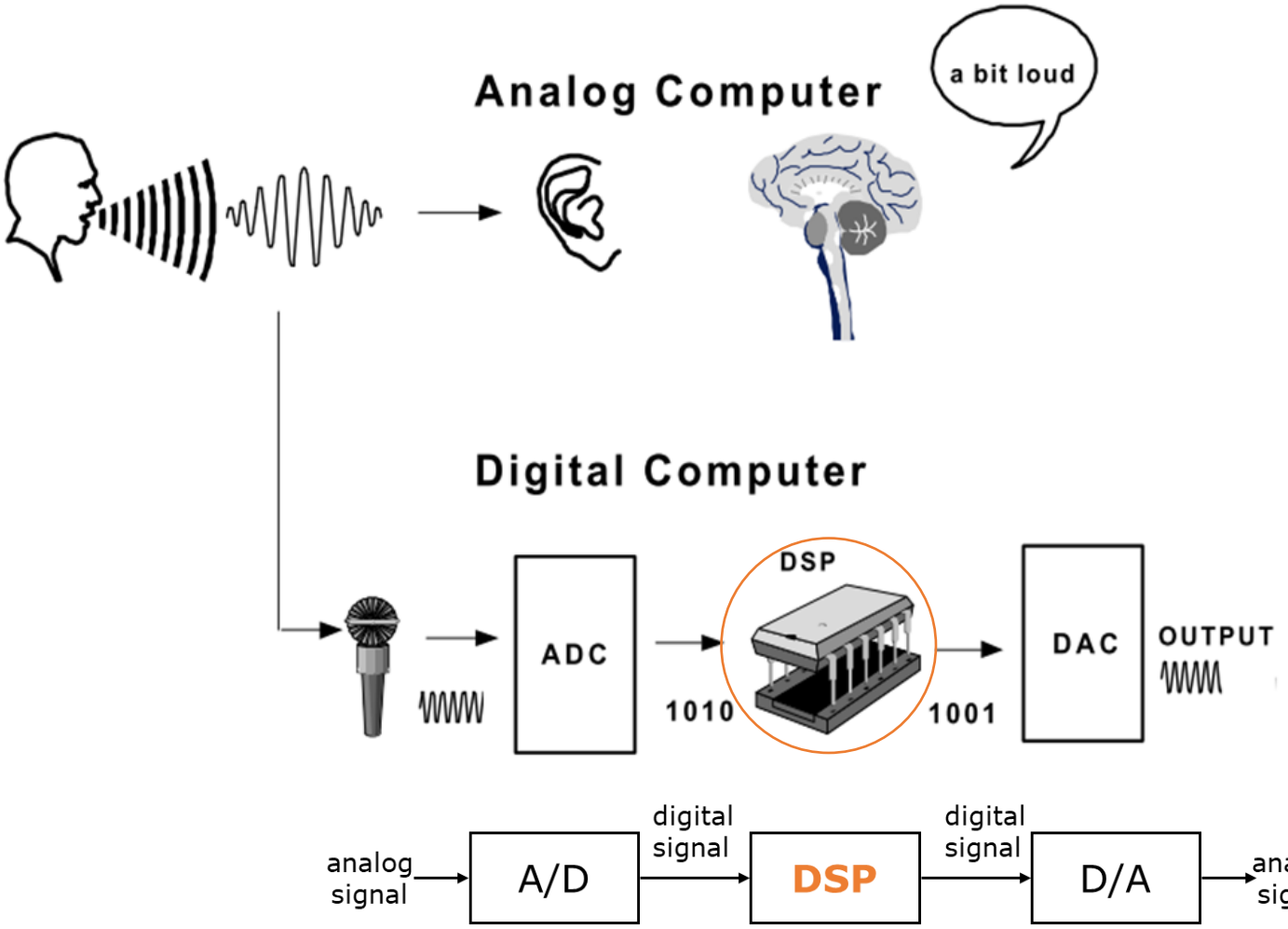
Analog = continuous
Digital = discrete

Digital systems can process, store, and transmit data more efficiently but can only assign **discrete values** to each point.

Digital Signal Processing – What?

- Represent signals by a sequence of numbers
  - Sampling or analog-to-digital conversions
- Perform processing on these numbers
  - Digital signal processing
- Reconstruct analog signal from processed numbers
  - Reconstruction or digital-to-analog conversion

Digital Signal Processing – What?



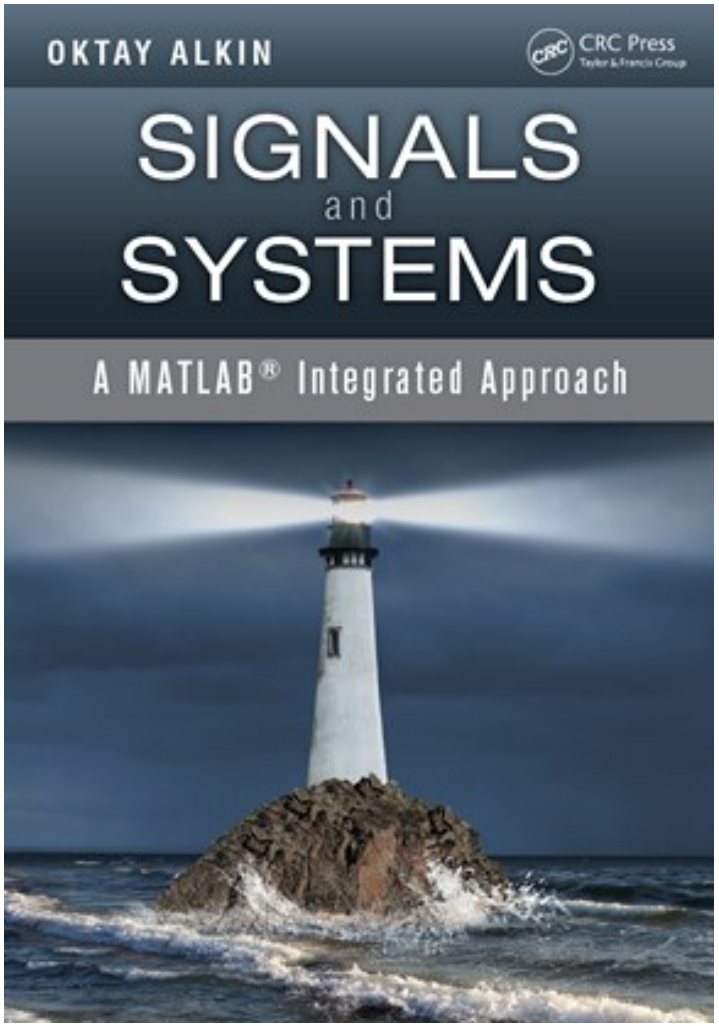
Digital Signal Processing – What?

- Analog System - Ear
  - The sound waves create changes in the air pressure around the membranes in the ears.
  - Detect the changes in the air pressure, and we perceive them as sound.
- Digital System – Microphone
  - the sound waves create changes in the air pressure around the microphone.
  - Pressure changes also cause vibrations on the membrane within the microphone.
  - the microphone produces a time-varying electrical voltage in such a way that the variations of the electrical voltage.
  - the microphone acts as a transducer which converts an acoustic signal to an electrical signal.

Digital Signal Processing – How?

Chapter 1 - Signal Representation and Modeling
Chapter 2 - Analyzing Continuous-Time Systems in the Time Domain
Chapter 3 - Analyzing Discrete-Time Systems in the Time Domain
Chapter 4 - Fourier Analysis for Continuous-Time Signals and Systems
Chapter 5 - Fourier Analysis for Discrete-Time Signals and Systems
Chapter 6 - Sampling and Reconstruction
Chapter 7 - Laplace Transform for Continuous-Time Signals and Systems
Chapter 8 - z-Transform for Discrete-Time Signals and Systems
Chapter 9 - State-Space Analysis of Systems
Chapter 10 - Analysis and Design of Filters
Chapter 11 - Amplitude Modulation

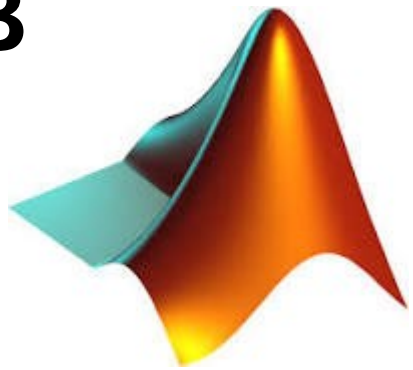
Signals and Systems - Oktay Alkin



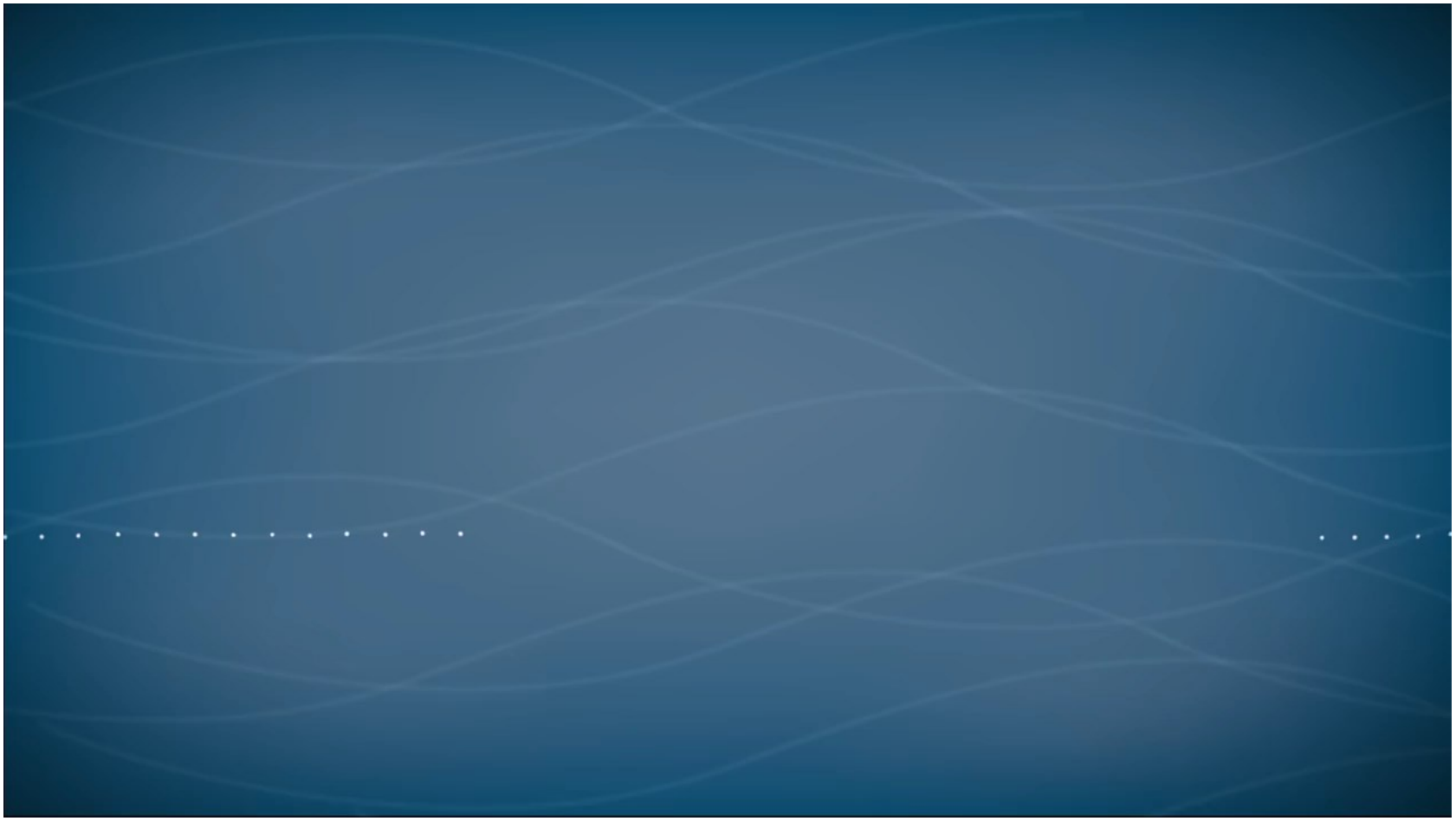
Assessment

Final-Term Exam	50
Mid-Term Exam	15
lab Exam + Oral Exam +Projects	35

MATLAB

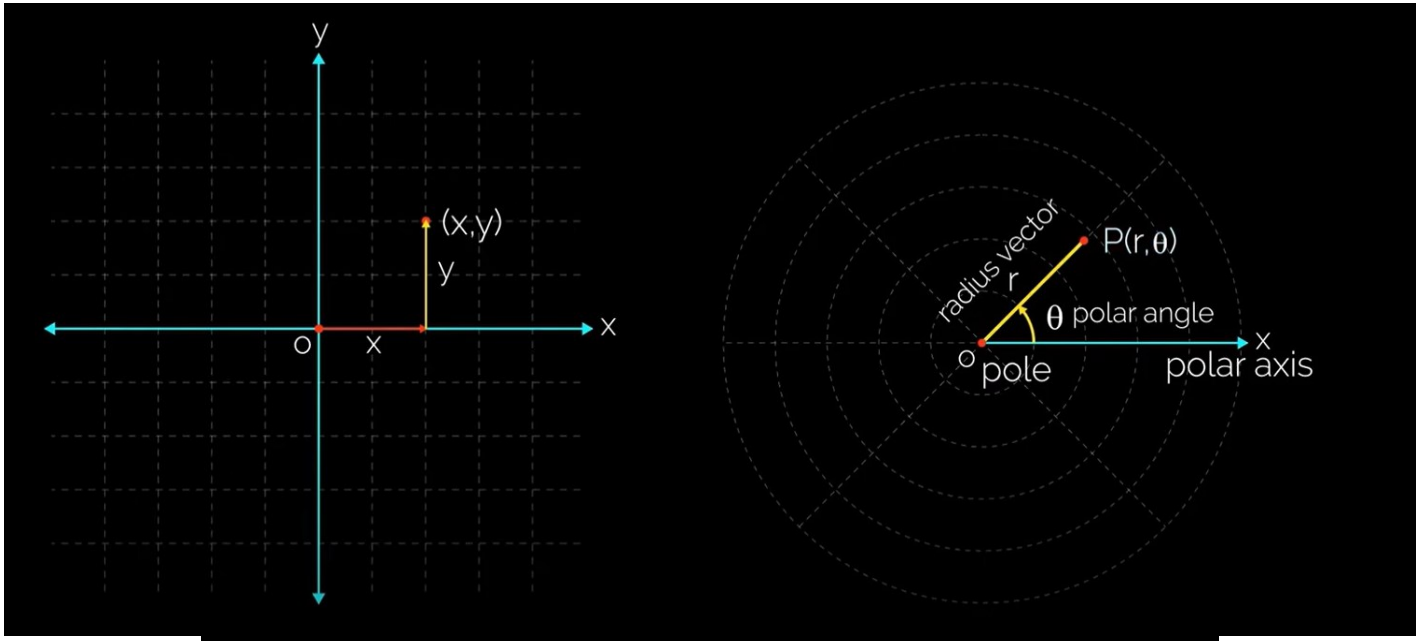


Digital Signal Processing – Why?



Signal Processing and Machine Learning

Cartesian and Polar Coordinates.

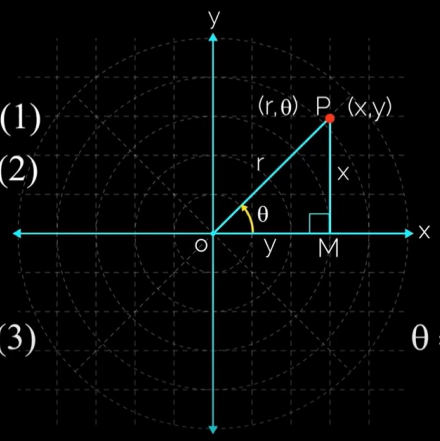


$x = r.\cos\theta \quad -(1)$

$y = r.\sin\theta \quad -(2)$

$x^2 + y^2 = r^2$

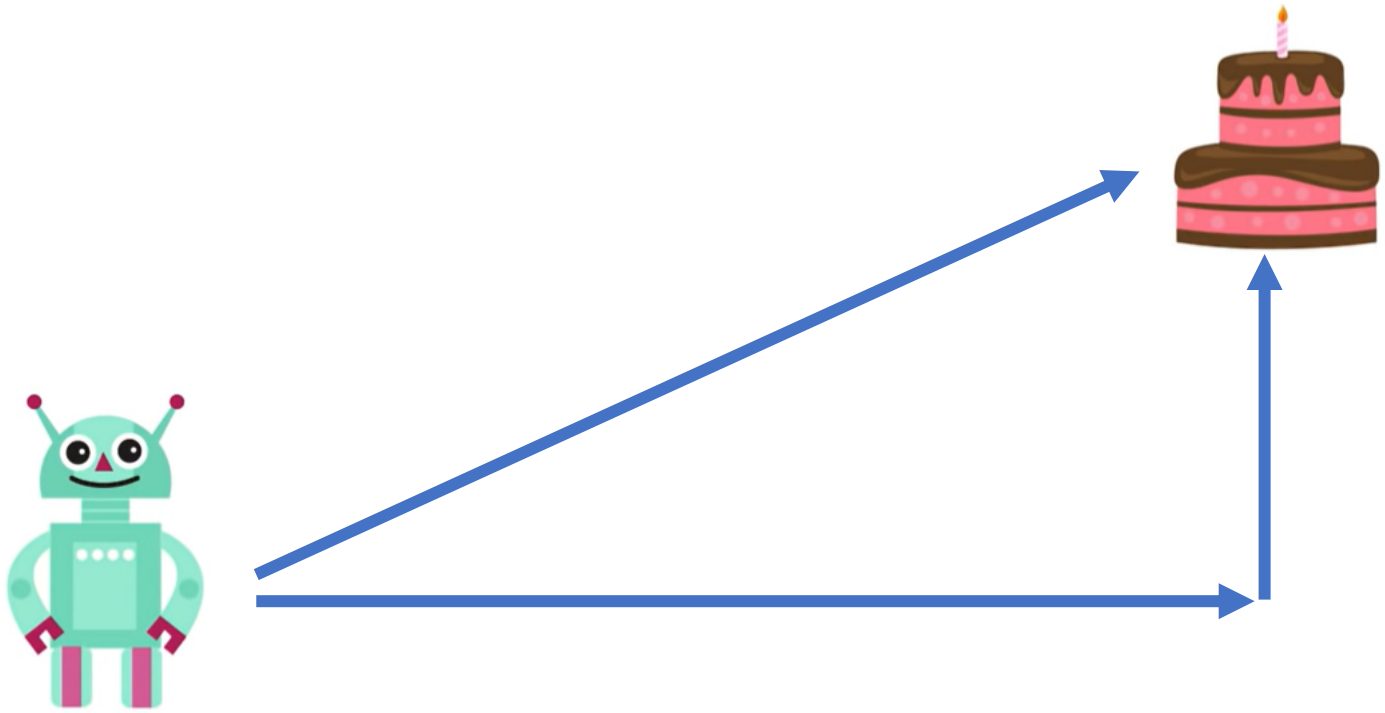
$r = \sqrt{x^2 + y^2} \quad -(3)$



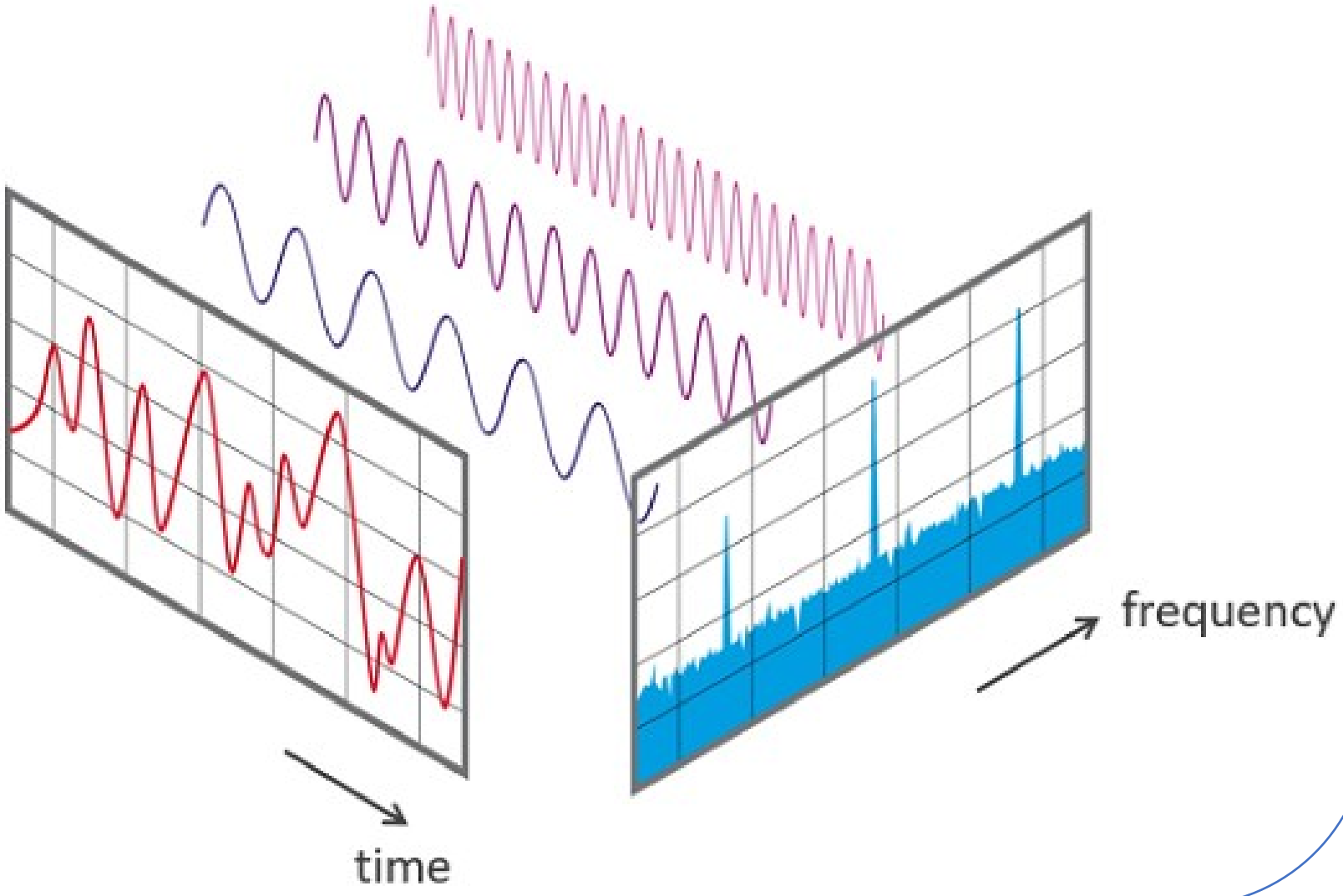
$\tan\theta = y/x$

$\theta = \tan^{-1}(y/x) \quad -(4)$

Cartesian and Polar Coordinates..



Time and Frequency Domains



Digital Signal Processing – Examples

- Audio Compare

  In this MATLAB script, we record two voice signals for different individuals and see their audio records in time and frequency domains.

- Audio Processing

  In this MATLAB script, we apply functions, like attenuation and amplification, on the recorded audio signal.

1.2 Mathematical Modeling of Signals

Mathematical modeling

Mathematical models for signals

The mathematical model for a signal is in the form of a formula, function, algorithm or a graph that approximately describes the time variations of the physical signal.

Goals:

1. Understand the characteristics of the signal in terms of its behavior in time and in terms of the frequencies it contains (signal analysis).
2. Develop methods of creating signals with desired characteristics (signal synthesis).
3. Understand how a system responds to a signal and why (system analysis).
4. Develop methods of constructing a system that responds to a signal in some prescribed way (system synthesis).

▸ MATLAB Exercise 1.1

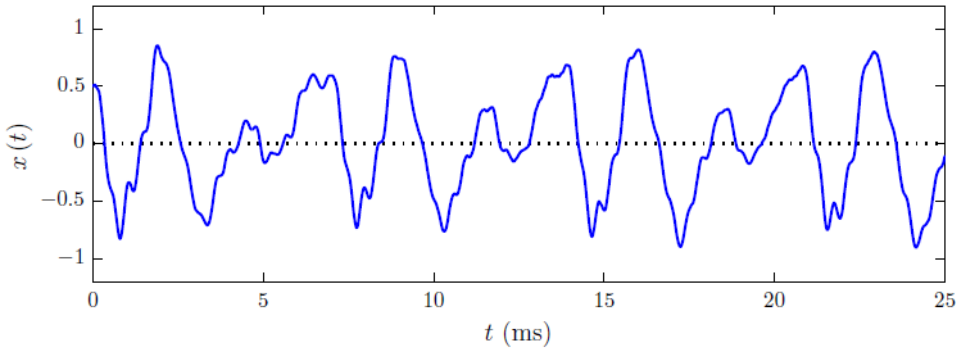
Digital Signal Processing – What?

Mathematics of Signal Processing - Gilbert Strang

1.3 Continuous-Time Signals

Continuous-time signals

A segment from the vowel "o" of the word "hello"



A segment from the sound of a violin