

Introduction

Mohammad Hadi

mohammad.hadi@sharif.edu

@MohammadHadiDastgerdi

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Overview

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Course Position

Communication vs Computation

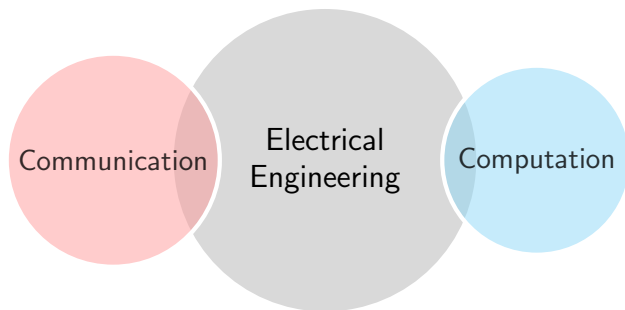


Figure: Pillars of the electrical engineering.

- ✓ **Computation** mainly deals with **signal formats** and addresses **time dimension**.
- ✓ **Communication** mainly deals with **signal locations** and addresses **space dimension**.

Analysis vs Design

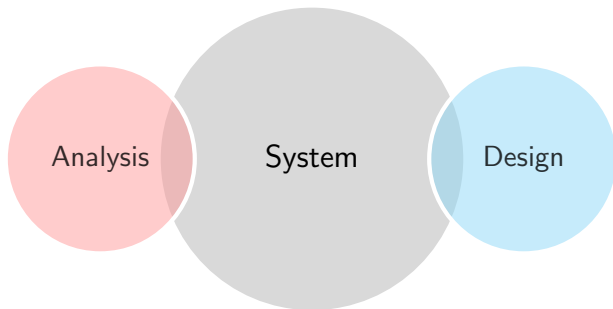


Figure: system analysis and system design.

- ✓ **Analysis** begins with **system settings** and ends with **system metrics**.
- ✓ **Design** begins with **system metrics** and ends with **system settings**.

Analog vs Digital

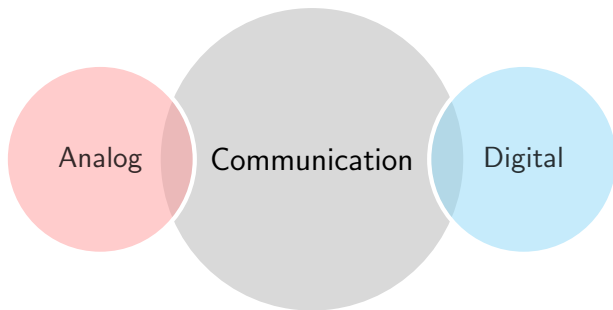


Figure: Communication types based on the signal specification.

- ✓ In **analog communication**, the **input** signal to transmitter (**modulator**) and the **output** signal from receiver (**demodulator**) is **analog**.
- ✓ In **digital communication**, the **input** signal to transmitter (**modulator**) and the **output** signal from receiver (**demodulator**) is **digital**.

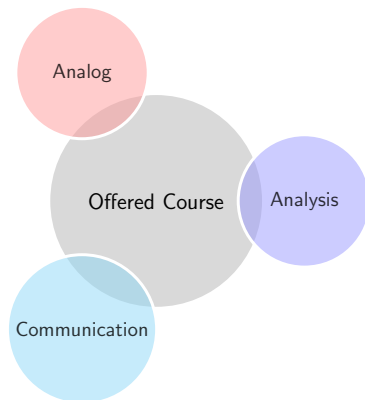


Figure: Position of the offered course.

- ✓ The exact course title is **Analog Communication Analysis**.

Educationally,

- ① Analog Communications
- ② Digital Communications

Practically,

- ① Analog Communications
- ② Digital Communications

Analog Communication



Figure: The Wireless Set 19 Mk II.

- 1 Second World War mobile radio transceiver!!!
- 2 Dimension: 68.6x25.4x33.7 cm
- 3 Weight: 40.03 kg

Analog Communication

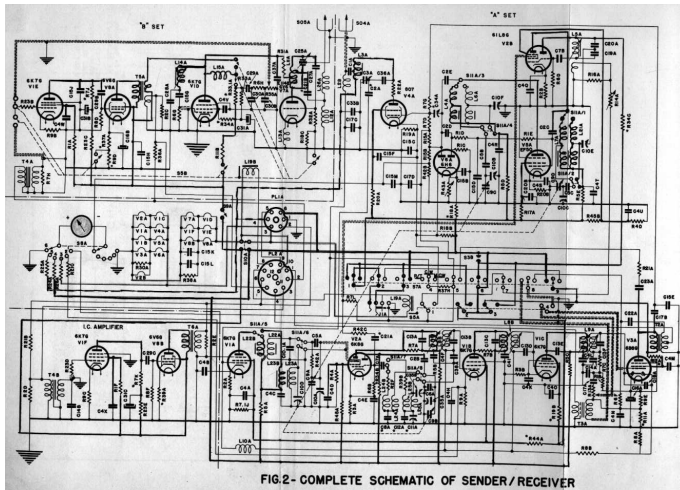


Figure: Schematic of the transceiver.

Analog Communication

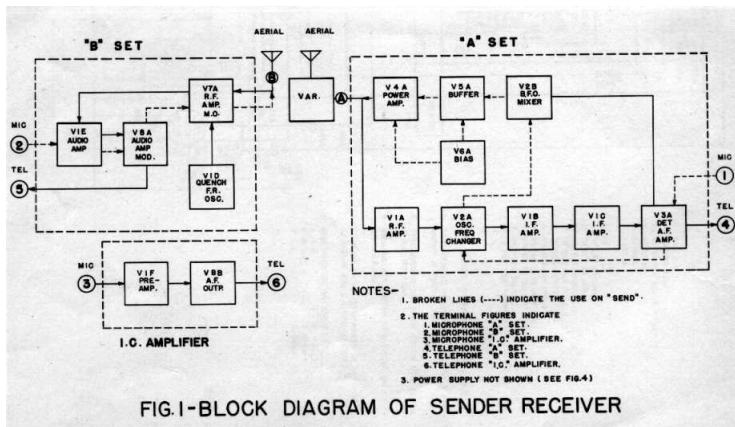


FIG.1-BLOCK DIAGRAM OF SENDER RECEIVER

Figure: Block diagram of the transceiver.

Analog communication is still important due to

- 1 Fixed fundamentals
- 2 Digital approximation
- 3 Analog media
- 4 Legacy systems
- 5 Simple description

Course Coverage

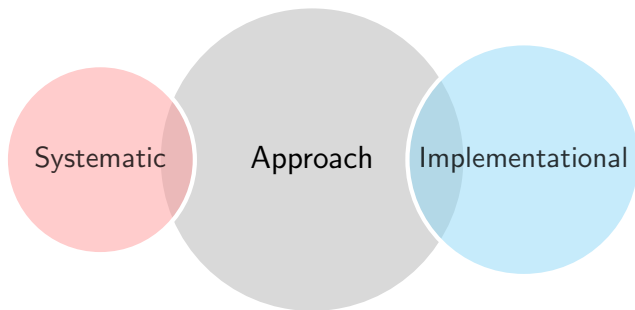


Figure: Systematic and implementational approaches.

- 1 What is system **block diagram**?
- 2 What are system **metrics** and **settings**?
- 3 What are system **limitations** and **specifications**?

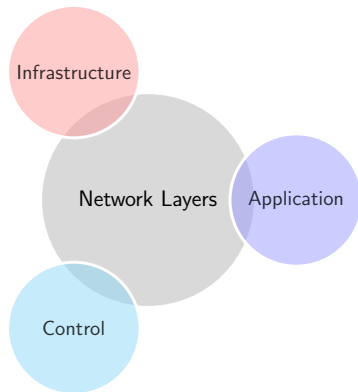


Figure: Network layers.

- 1 What are **physical resources**?
- 2 What are **physical constraint**?
- 3 What are **operational objectives**?

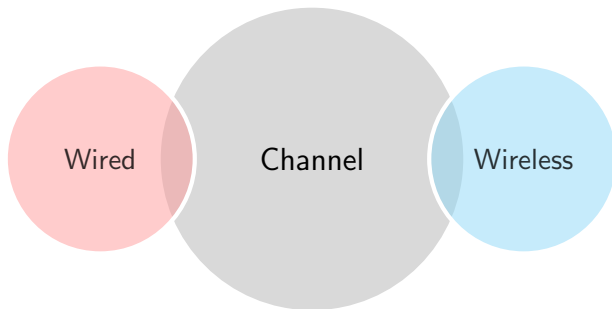


Figure: Communication channels.

- 1 What are **channel specifications**?
- 2 What are **channel impairments**?
- 3 What is **channel model**?

Communication Transceivers

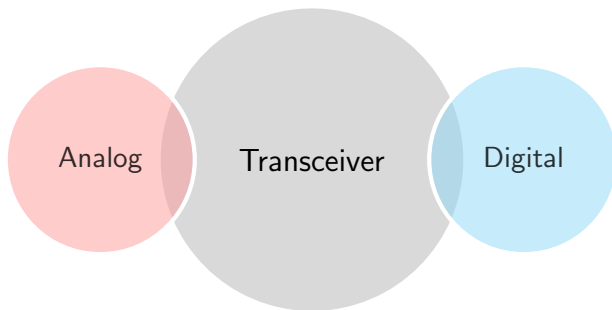


Figure: Communication transceivers.

- 1 What is **modulation**?
- 2 What is **demodulation**?
- 3 What are **transceiving performance metrics**?

Course Content

- 1 Online teaching on Sundays and Tuesdays, 7:30-9:00 at <https://vc.sharif.edu/ch/mohammad.hadi>
- 2 Course website at <http://cw.sharif.edu>
- 3 Telegram channel at <https://t.me/joinchat/TLuKHToPB0ffI7bW>
- 4 Telegram group at https://t.me/joinchat/U_QoyhWP8c1jQZMn
- 5 Personal email to mohammad.hadi@sharif.edu
- 6 Telegram message to [@MohammadHadiDastgerdi](#)

Session	Frequency	Attendance
Review	7	V
Lesson	20	F
Practice	5	V/F
Exam	6	F
Lecture	3	V

Table: Course sessions. F and V stand for forced and voluntary, respectively.

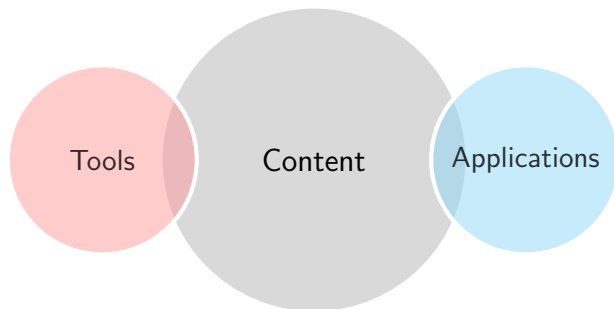


Figure: Course content.

- 1 The **tools** include **signals & systems** and **probability & random processes**.
- 2 The **applications** include **transceiver analysis** and **channel modeling**.

- ① Signals & Systems
 - ① Signals
 - ② LTI Systems
 - ③ Fourier Transform
 - ④ Hilbert Transform
 - ⑤ Power & Energy
 - ⑥ Lowpass & Bandpass Representation
- ② Probability & Random Processes
 - ① Probability
 - ② Random Process
 - ③ Wide-Sense Stationary Process
 - ④ Gaussian Process
 - ⑤ White Process
 - ⑥ Additive White Gaussian Noise

① Transceivers

- ① Analog
- ② Digital

② Channel

- ① Noise
- ② Attenuation
- ③ Delay
- ④ Distortion



Figure: Scrambled egg.



Figure: Scrambled data.

- 1 Systematic design
- 2 Deep space communication
- 3 Optical communication
- 4 Military communication
- 5 Catalog and datasheet reading
- 6 Anonymous communication blocks
- 7 Your suggestion!!!

Course Assessment

Item	Frequency	Contribution	Bonus	Oral Test
Work Assignments	5	30%	✓	✓
Short Quizzes	5	35%	✗	✓
Final Exam	1	20%	✗	✓
Software Project	1	10%	✓	✓
Class Attendance	20	5%	✓	✓

Table: Items involved in the course assessment. The specified contribution weights are tentative.

Course References

References

-  Bhagwandas P. Lathi and Zhi Ding (2010)
Modern Digital and Analog Communication Systems
Oxford University Press
-  A. Bruce Carlson, Paul B. Crilly (2009)
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McGraw-Hill
-  Simon Haykin (2009)
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John Wiley & Sons
-  John G. Proakis, Masoud Salehi (2007)
Fundamentals of Communication Systems
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The End