

Digital Communication Laboratory

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Course Details

Description

This laboratory course provides hands-on exploration of physical layer communication. Through a sequence of guided explorations, students design and implement a digital communication system with modulation to an acoustic carrier frequency. The acoustic operation allows students to hear, see, and wirelessly transmit signals using readily available, low-cost hardware, such as a PC with sound card or a smartphone. Acoustic wireless transmission, while readily accessible, nonetheless presents a student with the channel impairments and synchronization issues encountered in radio frequency systems. An accompanying smartphone app provides an acoustic transmitter for receiver testing and is available for free download. Matlab files provide code for creating examples and figures found in the text.

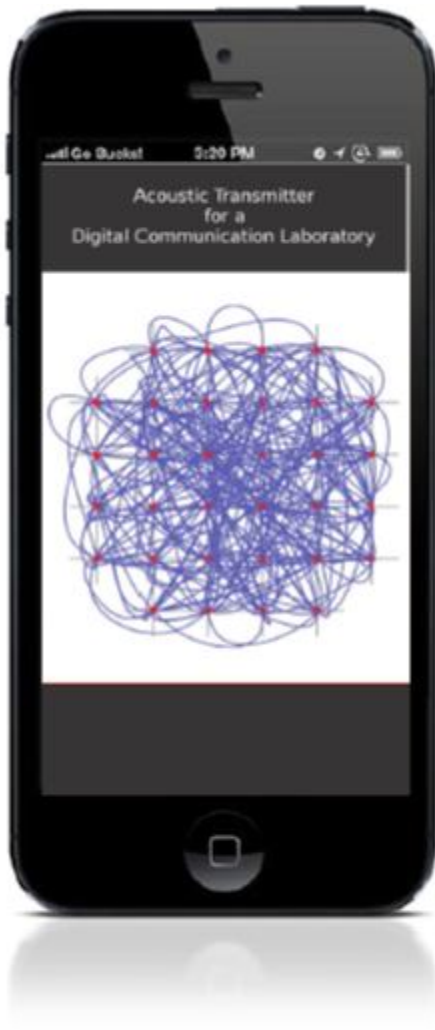


Figure 1. Acoustic Transmitter App

Prerequisites

- Introduction to Analog and Digital Communications

Original Course Documents

[Source file URL](#)

Course Contents

Lesson 1

- Introduction

Reading

- Chapter 1

Lesson 2

- Quadrature Modulation

Reading

- Chapter 2

Lesson 3

- Digital Modulation

Reading

- Chapter 3

Lesson 4

- Pulse Shaping and Intersymbol Interference

Reading

- Chapter 4

Lesson 5

- Synchronization

Reading

- Chapter 5

Lesson 6

- Frequency Recovery

Reading

- Chapter 6

Lesson 7

- Acoustic Modem Demonstration

Reading

- Chapter 7

Project

Project Details

The explorations in Chapters 1 through 7 culminate in students implementing a half-duplex modem operating at an acoustic carrier frequency.

Textbooks

A Digital Communication Laboratory: Implementing a Software-Defined Acoustic Modem

By Lee Potter and Yang Yang

[Free pdf version](#)

[At cost paperback version](#)

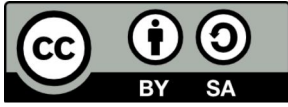
Resources

Acoustic Transmitter App

- [iTunes](#)
- [GooglePlay](#)

Links

[MATLAB Code Files](#)



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