NPTEL Video Course - Electrical Engineering - NOC:Digital Communication using GNU Radio

Subject Co-ordinator - Prof. Kumar Appaiah

Co-ordinating Institute - IIT - Bombay

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Digital Communication
Lecture 2 - Understanding GNU Radio features for Digital Communication: Basic blocks, input and output
Lecture 3 - Understanding GNU Radio features for Digital Communication: Advanced blocks, hardware interfacing
Lecture 4 - Fundamentals of Digital Communication: Signal Processing methods, vectors, and relevant GNU Radio
Lecture 5 - Fundamentals of Digital Communication: Signal Processing methods, vectors, and relevant GNU Radio
Lecture 6 - Complex Baseband Signal Representation
Lecture 7 - Real Passband Signal Representation, Up and Down Conversion of Complex Baseband Signals
Lecture 8 - Random Variables and Random Processes
Lecture 9 - Fundamentals of Digital Modulation
Lecture 10 - Linear Modulation Methods: Amplitude Shift Keying (ASK)
Lecture 11 - Linear Modulation Methods: Phase Shift Keying (PSK)
Lecture 12 - Linear Modulation Methods: Quadrature Amplitude Modulation (QAM) and Frequency Shift Keying (FSK)
Lecture 13 - Pulse Shaping for ISI Free Signaling
Lecture 14 - ASK using Raised Cosine (RC) and Root-Raised Cosine (RRC) Pulse Shaping
Lecture 15 - Basics of Detection: Properties of Gaussian Random Variables
Lecture 16 - Basics of Detection: Gaussian Random Vectors and Hypothesis Testing
Lecture 17 - Optimal Receivers for M-ary Signaling
Lecture 18 - Gram-Schmidt Orthogonalisation
Lecture 19 - Optimal Reception of M-ary Signals in AWGN
Lecture 20 - Detection and Optimal Decision for On-Off Signaling in AWGN Channel
Lecture 21 - Detection and Optimal Decision for M-ary Signaling
Lecture 22 - Python for GNU Radio
Lecture 23 - Extending GNU Radio Features using Python
Lecture 24 - Constructing and Visualising Constellations using GNU Radio
Lecture 25 - Understanding matched filtering using GNU Radio
Lecture 26 - Histograms in GNU Radio
Lecture 27 - Visualising Symbol Error Rate in GNU Radio
Lecture 28 - Signal-to-Noise Ratio and Symbol Error Probability - Part 1
Lecture 29 - Signal-to-Noise Ratio and Symbol Error Probability - Part 2

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Lecture 30 - Symbol error rate and Bit error rate
Lecture 31 - Computing bit error rates in GNU Radio
Lecture 32 - End-to-end Digital Communication System Simulation in GNU Radio
Lecture 33 - Parameter Estimation for Practical Receivers - Part 1
Lecture 34 - Parameter Estimation for Practical Receivers - Part 2
Lecture 35 - Phase Locked Loop and Differential Modulation
Lecture 36 - Maximum Likelihood delay estimate for a single symbol in GNU Radio
Lecture 37 - Maximum Likelihood delay estimate for multiple symbols in GNU Radio
Lecture 38 - Phase offse estimation in GNU Radio
Lecture 39 - Phase Locked Loop in GNU Radio
Lecture 40 - Costas Loop and Differential PSK in GNU Radio
Lecture 41 - Channel Equalisation
Lecture 42 - Detection Strategy for Dispersive Channels
Lecture 43 - Maximum Likelihood sequence estimation: Viterbi Algorithm
Lecture 44 - Suboptimal Channel Equalisation: Zero-forcing Receiver
Lecture 45 - Zero forcing Receiver in GNU Radio
Lecture 46 - Suboptimal Channel Equalisation: Linear Minimum mean-square error receiver
Lecture 47 - LMMSE Receiver in GNU Radio
Lecture 48 - Parallelising Frequency Selective Channels
Lecture 49 - Orthogonal Frequency Division Multiplexing (OFDM)
Lecture 50 - OFDM in the prescence of dispersive channels
Lecture 51 - Equalisation using OFDM in GNU Radio
Lecture 52 - Error Control Coding: Parity Check Codes
Lecture 53 - Error Control Coding: Repetition Codes
Lecture 54 - Error Control Coding: Linear Block Codes
Lecture 55 - Repetition Codes in GNU Radio
Lecture 56 - Error Control Coding: Perfect Codes
Lecture 57 - Error Control Coding: Hamming Codes
Lecture 58 - (7,4) Hamming Code in GNU Radio
Lecture 59 - Rate and error-free Communication
Lecture 60 - Quantisation
Lecture 61 - Visualising Quantisation in GNU Radio
Lecture 62 - Course Summary
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