

Preface

In today's world of human-machine interaction, the necessity of custom communication is increasing day by day. The adjective 'custom' in communication or in true sense, telecommunication signifies a lot of things like secured communication, communication with hidden data through any type of multimedia covers like image, speech or video, communication in user suggested bandwidth, multi-channel communication without cross-talk, internetworking in LAN, MAN, WAN and integrated service digital network (ISDN) of image, video and data, data transmission in encrypted but non-perceptible mode and so on. The information exchange between the source and the destination is generally done through modulated signal both in analog and digital form. Digital design and processing can not only be easily realizable, but also digital signal processing can help one designer to meet the practical needs of this era as discussed before.

Therefore, the digital communication has become an important subject of study for students of electronics and communication, computer science and information technology both in undergraduate and post-graduate levels.

The aim of the book is to represent the theory and application of the design philosophy of the subject Digital Communication systems in a unique but lucid form. There are resource books that are supreme pedagogical documents of this subject. It is a bit difficult to consider them as the standard text for the entire student population, because the said books do not visualize the design problem clearly. An attempt has been made to bridge the gap between the design principle and system modelling. In this book, I have tried to introduce the subject through its obvious flow. Supporting MATLAB codes and outputs are also included for better understanding and visualization. Essentially it is designed for the large class of students in the standards of bachelors, masters or those who have started their research carrier in science, engineering or technology.

The title of the proposed book is 'Digital Communication- Principles and system modelling'. By selecting this name I essentially took the task to insert equal importance to the theory and application aspect of the subject. The subject is introduced considering absolutely zero prerequisite of the readers. The introductory chapter created a space for round table discussion between the author and the reader in the subject of signals, systems, types and choices of telecommunication methodology. Basic building blocks play their roles to design one complete digital communication

system according to necessity of successful interaction of information. In second chapter, the process of conversion of natural (analog) signal to digital signal is discussed for letting the input acceptable to digital communication system. In the subsequent chapters the processes of signal transmission with and without modulation are described. Process of security embedding in terms of spreading the bandwidth of a signal is represented. The issues of inter-symbol interference (ISI) are solved by using equalizer. Theory of information and channel capacity are also discussed in the light of probability theory. As the book claims zero prerequisite, one Appendix titled as *Elementary Probability Theory* is also appended to the main chapters. The error detection and correction in one digital communication system is understood physically and then suitable coding schemes are being employed to solve particular types of bit errors due to channel noise.

In the application part I have put my best effort to select a wide class of problems. Some of them are referral in nature and found in most of the books but the other group includes the applications, which I have collected from different resource books and different research papers (all the time submitting courtesy to the authors). Some applications are also represented as case studies on frequently used concepts convolution and correlation in Appendix B.

The style of writing is kept in the lucid level to attract the interest of a large class of readers. I always believe that, writing a text book is very much difficult in terms of presentation. Text book is not only for concept sharing, but also for preparing a slide show or movie which can just put the readers into a smooth and comfortable path of understanding the subject. Similarly, teaching is not a delivery of some raw data; conversely, it is a performance in front of the students/ audience. I think this book can be a good teaching aid, too.

Salient Features

1. The application area is rich and resemblance to the present trend of research.
2. An online content is included with the title, which includes *codes* and *MATLAB*, with illuminating uncommon and common applications along with some *flash movies* for better understanding of the subject.
3. Elegant worked out exercise section is designed in such a way that, the readers can get the flavour of the subject and get attracted towards the future scopes of the subject.
4. Unparallel tabular, flow chart based and pictorial methodology description is included for sustained impression of the proposed design/algorithms in mind.

The book is for everybody, the reader may be someone without the knowledge of basic engineering or someone like a researcher who wants to understand the subject in a different angle. Let me use the technical terminology to let you understand. Ultimately the received signal to you transmitted by this book must be converted

successfully to analog/ natural form; otherwise the knowledge cycle does not get completed.

Kolkata, India

Apurba Das

Digital Communication

Principles and System Modelling

Das, A.

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