



Subject: Two-day course on “**Radar Principles and Modern Radar Technology**”

Regarding the above subject, we are proposing to conduct Two-day course on “Radar Principles and Modern Radar Technology” for Engineering students.

This course has been designed by our Radar experts.

The main objective is to provide thorough grounding in the Theory and Techniques of Radar Principles and Systems.

This course gives the participants, the complete exposure to Radar Theory and Design and covers wide spectrum of Radar aspects.

The job opportunities are very high in the field of Radar and RF& Microwave, as PSUs, DRDO, ISRO, NAL, HAL, L&T and many other big Industries involved in Design, Development and manufacturing of various types Radar systems for Defence and civilian purpose.

Hence this course immensely benefit Engineering students from the job opportunities point of view in the field of “Radar” and “RF & Microwave”.

The course details and the profile of the speakers is available in following pages

Please enroll for the course by sending an email to support@finetuningrf.com

Thanking you,

With best Regards

Team Finetuning Academy LLP

Our speakers are from industry with 30+ years of experience (in the field of RF & Microwave and Radar) with hands on skillsets.



P.M.Narayana received his BSc, (Physics & Mathematics) degree and BE (Electronics and Communication) from the University of Mysore, Karnataka. He has 32 years of Design & Engineering of Radar systems involving Design, Development and Commissioning of Surveillance (ship borne), Fire control, Tracking and Instrumentation Radar systems. He has retired as Additional General Manager and Technical Advisor, Bharat Electronics Ltd, Bangalore. He has held various positions as Design Engineer, System Engineer, Project and Divisional head in D&E-Radar department of BEL during the year 1976-2008.

He was instrumental in setting up a Central D&E-Radar Signal Processing core group in BEL. He is specialized in the field of Radar Digital signal Processing, Microwave Receivers and Digital Receivers. He is a Recipient of Annual BEL R&D award in the year 1992-93 and 1996-2000 for the outstanding contribution in Radar Signal Processing of BEL developed Radars. He has published & presented number of papers in various National and Inter National Radar conferences, International seminars. Associated with Kavveri Telecom Product Limited Bangalore as a GM (R&D) from April 2011 to Aril 2013. Involved in Embedded System Development related to Radar and Telecommunication, Radar up-gradation and Design Improvement. He is currently Director-Technical at Finetuning Academy.

Bhupinder Singh received his Master's Degree in Microwave System Design from IIT-Kanpur, India. He has extensive experience in product design and development both in India and abroad. In his 25 years of experience he has designed, developed and tested numerous RF system / subsystem used by Govt, Military, and Cellular, VSAT industry. He is currently Director-Technical at RF Specialities and Finetuning Academy. Previously he worked as a scientist at Aeronautical Development Establishment, Bangalore, from 1991-2001. Later, he was leading R&D team at HFCL, DMC-STRATEX in NZ, Blackbay in NZ, Technical Head-Telecom R&D at Astra MWP, Eminent Technology, Italy. He is an advanced user of Simulation tools like ADS, SystemVue, EM Pro, MWO, ALTIUM and ACAD. He is skilled at using Spectrum Analyzer, NW Analyzer, Vector Signal Analyzers, Signal generators.

Course Fee:

Rupees 1500 per student (including Service Tax)

Course Duration

2-Day event (9.30AM to 1PM, 2 PM to 4PM)

We are keen to meet you for a discussion with respect to the above subject. Request for the appointment at your convenient date and time.

FINETUNING ACADEMY

 A-407, Shriram Srishti, SSA Road, Anand Nagar, Bangalore – 560 032, India

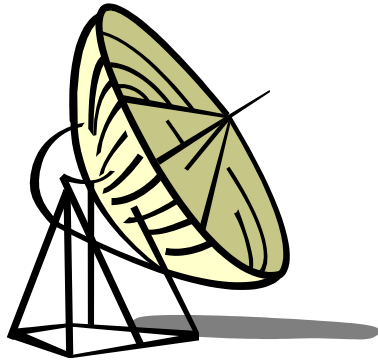
 +91 80 4219 7333 / 9343510805  +91 80 23432021

 support@finetuningrf.com

Annexure-1

Radar Principles and Modern Radar Technology

(Designed for Radar engineers and Engineering Students)



RAdio Detection And Ranging

Radar is an "active sensor". Active means it uses energy it radiates. Sensor means it collects information about the environment around the system. Information presented- to human operator via display and to a Computer.

The term RADAR is used to refer to Electronic equipment that detect the Presence, Direction, Height and Distance of objects by using reflected Electro-Magnetic Energy

Military Radars: Faced with the 'fog of war', commanders have always tried to find out what is on 'the other side of the hill'. The more information that one can discover about the enemy, the more likely one is to triumph over him.

In the modern information age, electronic sensors play a vital part in enabling military forces to find out this intelligence. Of all these sensors, none is more important than radar. Military forces have been using radar

since the start of the Second World War, since then the uses of radar have multiplied many folds. Nowadays it is used across the entire spectrum of conflict, from small, man portable ground surveillance radars, to massive phased array radars used to detect and track incoming ballistic missiles.

FINETUNING ACADEMY

 A-407, Shriram Srishti, SSA Road, Anand Nagar, Bangalore – 560 032, India

 +91 80 4219 7333 / 9343510805  +91 80 23432021

 support@finetuningrf.com

WWW.FINETUNINGRF.COM

Learning Objectives:

Learning Objectives is a preview of the information you are expected to learn in this course.

The main objective is to provide thorough grounding in the Theory and Techniques of Radar Principles and Systems.

The 'Radar Principles and Modern Radar Technology' course gives the participants, the complete exposure to radar theory and design. The course covers wide spectrum of Radar aspects. It includes topics of

Radar Fundamentals, Radar Range equation, Radar Transmitters, Radar Receivers, Tracking Radar, MTI and Pulse Doppler Radar, Radar Antenna and Radar Displays. Also, it includes Pulse compression techniques, Monopulse Angle error extraction, Design of MTI canceller.

The course includes a number of worked examples, designed to illustrate and develop important ideas and design techniques.

Contents:

1. Radar Fundamentals :

Introduction to a Radar System

Radar -History

Some of the major accomplishments of Radar

Radar Basic Concepts

Radar Reference coordinates

Components of a Radar System

Pulse Radar block diagram

Radar Bands, *Radar band functions*

2. Types of Radars:

Pulse Transmission –Pulse Radar, Pulse Doppler

Continuous wave Transmission – CW, FM-CW

3. Radar Pulse Relationships:

PW, PRF, Duty cycle, Peak Power, Average Power,

4. Radar Range equation:

RCS (Radar Cross Section), Noise and Detection, CFAR

5. Noise and Detection

Thermal Noise, Pre - detection Integration, Post- detection Integration

Probability of Detection (P_d), Probability of False Alarm (P_{fa}) CFAR

6. Range measurement:

Range, Minimum & Maximum range

Unambiguous Range

Ambiguous and unambiguous information

Dwell time & hits per scan

7. Range Resolution & Angular Resolution

The Resolution cell

8. Accuracy of Radar Measurements:

Range, Range Rate, Angular Position

9. Pulse Compression techniques:

10. Factors affecting Radar performance

11. Radar Transmitters:

Magnetron Based

MOPA chain (TWT, Klystron based)

12. Radar Receivers:

Superhetrodyne Receiver

Receiver Noise Figure, MDS, Phase Noise,
conversion loss, 1dB Compression, Intercept point, dynamic range

13. Digital Receivers:

Concept and Design

Digital modulation, DDS modulator,

Multirate DSP-Interpolation, Decimation

Polyphase FIR filter, CIC filter

Digital Down Conversion (DDC)

14. MTI and Pulse Doppler radar:

Doppler Principle, Delay -Line cancellers,

Digital MTI Processing, MTI Improvement Factor,

SCV, blind speed

Limitations to MTI performance, AMTI

Doppler filter banks, MTD

15. Tracking radar

Tracking in Range

Angle Tracking- Conical Scan and Sequential Lobing

Monopulse Tracking

Tracking Filters

16. Radar Antennas

Functions of the Radar Antenna, Antenna Parameters

Antenna Radiation pattern, Polarization

Reflector Antennas

Electronically steered Phased array Antennas

Phase shifters

Architectures for Phased arrays

Mechanically Steered Planar Array Antennas

Systems Aspects of Phased array Radars

17. Radar Displays:

Types of Display presentations- A-Scope, B-Scope, C-Scope,

E-Scope, F-Scope, PPI- display, RHI-display,

CRT Display, Stroke and Raster displays, Scan converter

Flat panel Displays (FPD)