



## 2-Day Workshop – IoT – Training Workshop for Design, Testing of RF module and antenna

Date: To be decided  
Time Duration: 9:30am to 5:00pm  
Location: To Be decided as per customer request

### Course Description (Topics of interest customized as per IoT application requirement)

- RF design engineers currently working in Wireless product design using LoRa, GPS, Wi-Fi, ZigBee, Bluetooth Low Energy, LTE-NB and NB-IoT chipsets, modules for IoT applications, who requires hands on practical training for RF fundamentals, Modulation schemes and short range wireless technologies from 300MHz to 2.4GHz ISM bands, RF Transceiver, PCB antenna design and performance optimization, achieving range

### Pre-requisite

Engineers with Electronics Engineering background

### Learning Objectives

- The training program will cover RF fundamentals, ISM band RF transceiver module for short range wireless technologies – key parameters and how to choose a module for a specific application, propagation, and antenna fundamentals, testing – VSWR, radiation pattern, matching and tuning for performance optimization
- Test Setup with measurements for antenna performance tuning and optimization
- The scope does not cover automotive / Industry standards / baseband design / RF Protocols / algorithm development specific to your application
- We will provide a pdf soft copy of course material
- We will ensure that engineers understand basics and can practically use the concepts

### By taking this course, you will better understand

- Apply the application concepts for RF product design for Design, testing, validation and qualification

### Deliverables for the training:

- customized training materials covering topics mentioned above
- demonstration of Software design tools and RF test equipment currently used by RF system designers for RF module design and testing

### What we are not covering in this course

- Design for Digital baseband circuit and signal processing, software algorithms
- Protocols and stacks for any wireless standards



## Workshop Sessions & Schedule

### **DAY-1**

#### Session- 1

RF Fundamentals covering series and parallel resonant circuits, quality factor, conversion between series and parallel circuit, dB scale and conversion between dB, dBm, dBuV, etc. matching requirements, impedance transformation, rectangular and polar form and their conversions for electrical quantities.

#### Session- 2

TEM transmission lines, return loss, VSWR, S –Parameters and characterization of Linear RF systems using S Parameters, Smith Chart, lumped element matching on Smith Chart, conditions for maximum power match.

#### Session- 3

Introduction to transmission media such as Stripline, Micro-stripline and Coplanar waveguide etc., dependence of line impedance on geometric line parameters such as line width, dielectric constant and thickness, coupling effects of micro-stripline and stripline PCB traces.

#### Session- 4

Introduction to Antenna parameters such as gain, directivity and efficiency, various printed antenna types such as meander line, patch and Yagi antenna, radiation pattern and coverage areas of various antenna types.

### **DAY-2**

#### Session- 5

Line of Sight propagation, system gain, transmission loss and received signal strength, Gaussian channel, received Signal to Noise Ratio

#### Session- 6

Non-Line of Sight Propagation and multipath effect, receiver noise and sensitivity, Noise Figure and dynamic range of receiver

#### Session- 7

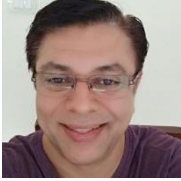
Test Setup to measure Antenna tuning, match and mismatch effects, matching techniques to improve antenna match and efficiency using lumped elements, techniques to match antenna to a specific chipset.

#### Session- 8

Questions and Discussion



## Speaker



**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 LLP.

Previously he worked as a scientist at DRDO-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-AWR, ALTIUM and ACAD. He is skilled at using Spectrum Analyzer, NW Analyzer, Vector Signal Analyzers, signal generators.

**Finetuning Academy LLP** is focused in RF circuit, system and MMIC design training services. Delivered advanced and basic trainings using RF design software tools, by Industry Experts with over 25+ years of Experience from ISRO, BEL, DRDO.

**RF Specialities (RFS)** is one of the leading companies in the design, development, servicing and maintenance of RF Equipment in India. RF Specialities is a leading supplier of customized RF Systems/ subsystems to Govt., military and commercial market. Boasting of a state-of-the-art RF laboratory at Bangalore and backed with experienced & well-trained manpower, it provides unique and cost-effective solutions in the shortest turn-around time for the satellite, broadcasting, telecom and military industry.



## How to Register?

Please fill out registration form and email the form to [support@finetuningrf.com](mailto:support@finetuningrf.com)

### Registration Form

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1. Name of the Participant:  
(In BLOCK Letters only)
2. Company Name:
3. Contact Phone number:
4. Email id:

Optional information

5. Years of work Experience:
6. Briefly describe your work experience:
7. Areas of interest:
8. Topics of interest:
9. Simulation Tools familiar with: