



Value Added Course on Advanced Antenna Design

June 24 to June 29, 2024

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Although the microstrip antenna has been extensively studied in the past few decades as one of the standard planar antennas, it still has a huge potential for further developments. Microstrip antennas are considered as the most common types of antennas due to their obvious advantages of light weight, low cost, low profile, planar configuration, easy of conformal, superior portability, suitable for arrays, easy for fabrication, and easy integration with microwave monolithic integrate circuits (MMICs). They have been widely employed for the civilian and military applications in the form of broadcast radio, mobile systems, global positioning system (GPS), radio-frequency identification (RFID), multiple- input multiple-output (MIMO) systems, vehicle collision avoidance system, satellite communications, surveillance systems, direction finding, radar systems, remote sensing, biological imaging, missile guidance, body wearable antennas, and so on. Since there are several challenges in the design of antennas, a training program on this topic would be very beneficial to enrich their knowledge and to carry out advanced research in antenna domain. The objective of this Value added course is to train the participants in both fundamental and research levels.

About Instructors:

This course will be taught by a team of

Mr. Ojas Savardekar, Embedded IoT Developer, Mumbai.

Prof. Vandana Sawant, SIES GST, Nerul

Prof. Sonal Hutke, SIES GST, Nerul

Prof. Hema Raut, SIES GST, Nerul.

Mr. Kunal Khandelwal, Application Engineer – MathWorks Design Tech Systems Pvt. Ltd.

Course Objectives:

Students should be able to
Design, analyze and test microstrip line.
Design of line feed and probe feed rectangular patch antenna and develop its applications.
Design and analysis of wearable antennas for ISM band.
Design and analysis of wide band antennas.
Design of array antennas and antenna optimization.
Design and analysis of antenna using MATLAB.

Course outcomes:

- Design and analysis of microstrip line.
- Design of the Patch Antenna.
- Simulation of the Patch Antenna using simulation software HFSS.

- To evolve, develop and improvise different types of patch antennas suitable for numerous applications like microwave communication, radar, mobile communication, military communications, IOT applications and so on.

Course Content:

Module	Contents	Hours
1	MICROSTRIP LINE: Design of microstrip line, S parameter analysis, characterization of microstrip line based on length of line, design and simulate impedance matching using quarter wave transformer using HFSS.using HFSS. RECTANGULAR PATCH ANTENNA AND ITS APPLICATIONS : Introduction to microstrip structure, calculate dimensions of rectangular patch antenna at 2.4GHz, design and simulate edge feed rectangular patch antenna for various applications using HFSS.	6 hrs
2	Design and analysis of wearable antennas for ISM band using HFSS.	6 hrs
3	Expert session on Antenna fabrication for industry applications using HFSS.	3 hrs
4	Design and analysis of RMSA using probe feed, current. Distribution using HFSS.	6 hrs
5	WIDE BAND ANTENNA Introduction to wideband antennas, Design of wideband antennas. using HFSS.	6 hrs
6	Design of antenna arrays using HFSS.	6 hrs
7	Design of advanced antenna using MATLAB.	6 hrs
7	Mini Project on Design and Simulation of Antenna	40 hrs

Assessment:

- Students will be assessed based on module wise assignments and quizzes.
- Fifteen days internship will be provided, in which students must develop Mini projects based on the above concepts.

Course Co-Ordinator: Prof. Vandana Sawant

E mail ID: vandan@sies.edu.in

Contact no.: 9820755314 /9969004169/9970286104

SIES GRADUATE SCHOOL OF TECHNOLOGY, NERUL
DEPARTMENT OF ELECTRONICS AND ELECOMMUNICATION ENGINEERING
and
DEPARTMENT OF ELECTRONICS AND COMPUTER SCIENCE
Two-week Value-Added Course
on

Advanced Antenna Design

(24/06/2024 to 29/06/2024)

Program Schedule

S.N.	Session 1 (10:00 – 1:00)	Session 2 (01:30 – 04:30)
MONDAY (24/06/2024)	Design of antenna and parametric analysis. <i>(Prof. Sonal Hutke)</i>	Antenna optimization and analysis <i>(Prof. Sonal Hutke)</i>
TUESDAY (25/06/2024)	Design of array antenna and its analysis for gain and radiation pattern. <i>(Prof. Sonal Hutke)</i>	Expert session on Antenna fabrication for industry applications. <i>(Mr. Ojas Savardekar/ Industry Expert)</i>
WEDNESDAY (26/06/2024)	Microstrip line: Design of microstrip line, S parameter analysis, characterization of microstrip line based on length of line, design and simulate impedance matching using quarter wave transformer using HFSS. <i>(Prof.. Vandana Sawant)</i>	Rectangular patch antenna design Introduction to microstrip structure, calculate dimensions of rectangular patch antenna, design and simulate edge feed rectangular patch antenna for various applications using HFSS. <i>(Prof.. Vandana Sawant)</i>
THURSDAY (27/06/2024)	Design and analysis of wearable antennas for ISM band. Design of Human phantom and SAR calculation. <i>(Prof.. Vandana Sawant)</i>	Introduction to probe feed antenna design Design of RMSA and determination of various antenna parameters <i>(Prof. Hema Gavali).</i>
FRIDAY (28/06/2024)	Introduction to the Design of Antenna Elements and Arrays using MATLAB and Antenna Toolbox, Antenna Designer App. <i>(Mr. Kunal Khandelwal)</i>	Antenna Array Designer App. PCB Antenna Designer, <i>(Mr. Kunal Khandelwal)</i>
SATURDAY (29/06/2024)	Parametric analysis of the design and current distribution over the surface. <i>(Prof. Hema Gavali)</i>	Wide band antenna Introduction to wideband antennas, Design and analysis of wideband antenna. <i>(Prof. Hema Gavali)</i>

LUNCH BREAK



SIES Graduate School of Technology
Sri Chandrasekarendra Saraswati Vidyapuram
Sector 5, Nerul, Navimumbai-400706

Department of EXTC & ECS

Event Report

Advanced Antenna Design

June 24 to June 29, 2024

Event Information

Event Type: Value added course

Event title: Value added course on **Advanced Antenna Design**

Resource Person:

1. Mr. Ojas Savardekar, Embedded IoT Developer, Mumbai.
2. Prof. Vandana Sawant, SIES GST, Nerul
3. Prof. Sonal Hutke, SIES GST, Nerul
4. Prof. Hema Raut, SIES GST, Nerul.
5. Mr. Kunal Khandelwal, Application Engineer – MathWorks Design Tech Systems Pvt. Ltd.

Event date: June 24th - June 29th 2024

Organized for: SE, TE -EXTC Students

Organized by: Department of EXTC & ECS

Target audience (branch & nos.): EXTC – 23

Attachments: **1. Photographs (in JPEG/PNG)**
2. Attendance report
3. Feedback
4. Certificate

Event Description

1. The Electronics and Telecommunication Department of SIES GST had organized a hands-on value added course for students of SE & TE EXTC on topic “Advanced Antenna Design” from June 24th - June 29th 2024. It was a one-week hands-on training followed by one week miniproject, conducted by Mr. Ojas Savardekar, Embedded IoT Developer, Mumbai, Prof. Vandana Sawant, SIES GST, Nerul, Prof. Sonal Hutke, SIES GST, Nerul, Prof. Hema Raut, SIES GST, Nerul, Mr. Kunal Khandelwal, Application Engineer – MathWorks Design Tech Systems Pvt. Ltd. The aim of this value-added course was to Introduction to basic understanding and designing of the Patch Antenna. Simulation of the Patch Antenna using simulation software HFSS and MATLAB. To evolve, develop and improvise

different types of patch antennas and wire antennas suitable for numerous applications like microwave communication, wireless communication, radar, mobile communication, RFID, IOT applications and so on. This value added course is attended by students of SE&TE EXTC.

Prof. Sonal Hutke started the course, with an explanation of Optimetrics in HFSS. Students designed probe feed antenna and used parametric analysis and optimization. Further she gave hands on sessions on array design using duplication along line method and Master slave method.

Prof. Vandana Sawant started with the introduction to Microstrip lines then students were given hands on training on Design of microstrip line, quarter wave transformer. Design, Simulation and Optimization of an Edge fed and wearable Inset fed Microstrip Patch Antenna using Jeans material, Design of human phantom and parameter analysis.

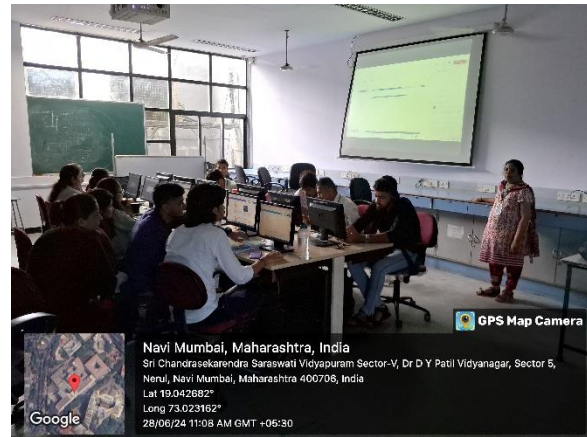
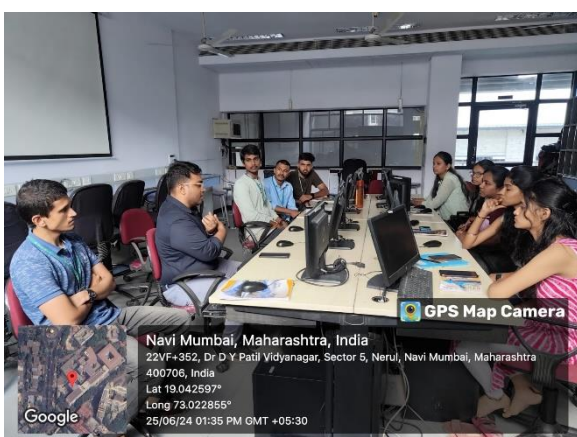
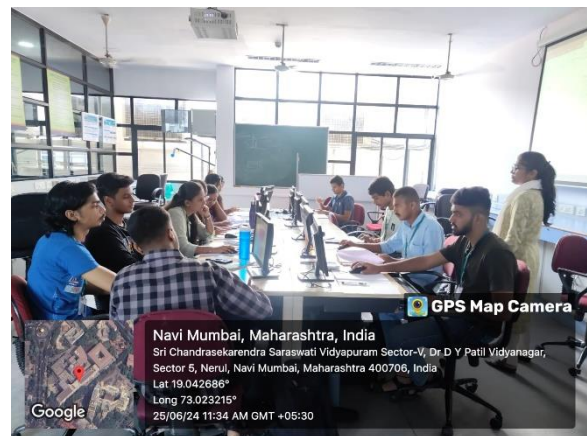
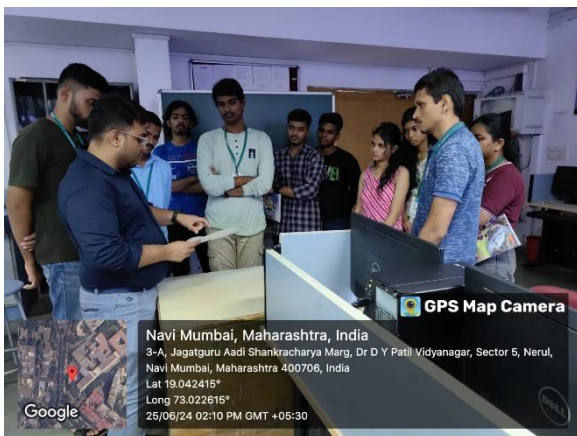
Prof. Hema Raut conducted a session on antenna design using the probe feed method. Also, simulation and parametric analysis was explained. Further, a session on WB antenna and UWB antenna design was conducted followed by HandsOn session on UWB antenna design and its analysis.

Mr. Ojas Sawardekar conducted a session on fabrication of antenna, antenna parameter measurement. He also discussed carrier opportunities in RF fields.

Mr. Kunal Khandelwal conducted a session on design and simulation of antenna using MATLAB.

Course completion certificates were provided to the 14 participants from second and third year of engineering.

1. Photographs (in JPEG/PNG)



3. Feedback (Analysis)

No. of students registered feedback: 15

Feedback is taken on course outcome. Average rating is out of 5

1. Design and analyze microstrip line..- 4.78
2. Design of probe feed rectangular patch antenna and develop its applications.- 4.67
3. Design of line feed rectangular patch antenna using quarter wave transformer.. - 4.28
4. Design and analysis of textile wearable antenna.. - 4.17
5. Design and analysis of wide band antennas.. – 4.44
6. Design of array antennas and antenna optimization. - 4.33
7. Fabrication of antenna- 4.33
8. Design of antenna using matlab. -3.33
9. Some specific comments given by students in feedback

Session was very informative and useful ,Thankyou
Nice sessions
Great work
Everything was good but please Conduct Matlab session offline so students understand quickly
Good experience for got know about antennas in detail

Impact Analysis:

- 12 students attended Quiz. 05 students scored 100% marks.
- 02 students scored 90% marks.
- 05 students scored 75% marks
- 14 students completed miniproject based on antenna design and submitted reports.
- 01 groups decided to do their final year project in antenna design for various applications.

4. Certificate