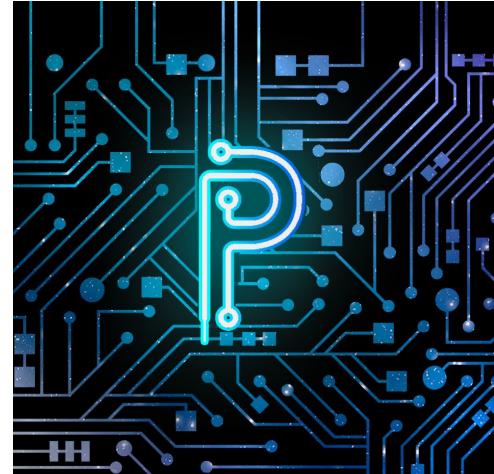


# Visits to ECE and the world of Microwaves, NIT Trichy



ECE-Association, NIT Trichy





**JC BOSE** is the **FATHER OF RADIO** of the world. Marconi himself had lots of regard for JC BOSE. He played with 65 GHz so many years before, he has done work on METAMATERIAL as well as FSS. This is the pen sketch drawn in an hour by **Ms. Karri Sri Siddhi, III year ECE, NIT T.**



Siddhi and her team decorated the Smith Chart Rangoli for the first time in the 50 year history of REC/NIT Trichy



## Chief Guest

**Dr. Surendra Pal**, Deputy Director, Digital & Communications Area, **ISRO** Satellite Center

Dr Pal, a space communication technologist, accomplished researcher, academician, administrator and visionary of great repute is former: Prof Satish Dhawan Professor & Senior Advisor Satellite Navigation Programme (ISRO), Distinguished Scientist, Associate Director and also Programme Director Satellite Navigation Programme at ISRO Satellite Centre Bangalore, is President of Institution of Electronics and Telecommunication Engineers –India

He joined Indian Space Research Organisation in 1971 after a brief tenure at Tata Institute of Fundamental Research. Dr Pal pioneered the Space borne communication activities at the ISRO Satellite Centre at its inception. He is responsible for development of all Indian Satellite based on-board Telecommunication Systems, starting from Aryabhata to IRS, INSAT, GSAT, Low Earth Orbit series of space crafts and Chandrayaan. The team created by him has worked for MARS-Orbiter Mission. He is also responsible for pioneering satellite based navigation activities in India. He spear-headed the Indian Satellite Based Wide Area Augmentation System - GAGAN (GPS Aided Geo Augmented Navigation System) from infancy to blossom and Indian Regional Navigation Satellite System (IRNSS) for aviation activities for civilian & restricted users. (*GAGAN SYSTEM is certified for RNP-1 & IRNSS first satellite was launched in July 2013*). He is the originator of Satellite Navigation Programme in India. During his ~ 43 years career at ISRO he developed many innovative technologies

Dr Pal is widely respected for his knowledge and the same in his various areas of expertise, has been utilized as a consultant, by a number of national and international organizations, viz; (i) INMARSAT/ICO(UK) (ii) International Telecommunication Union (ITU) (iii) Nan yang Technology University & many more. Dr Pal was on the United Nations panel of experts on Global Navigation Satellite Systems (GNSS) and Chaired/participated in various UN meetings. Dr Pal has received more than one and a half dozen national and international awards. Besides these he holds patents for his various inventions. He is also recipient of IEEE-2010 Judith A. Resnik Award. He has been awarded the coveted: *BITS Pilani Distinguished Alumni Award in the Category of Professional Management of Business, in recognition of his outstanding contribution to society*.

Dr Pal has published/presented more than 220 papers in international, national journals and conferences of repute, one book on communications & guided number of PhD students. He is a Distinguished Visiting Professor of Indian National Academy of Engineering. Presently he is on the Distinguished Lecturer Programme of AEES-IEEE- Under the DLT Scheme, he has delivered invited talks, lectures and tutorials on antennas, GNSS, Space and RF communications at NTU Singapore, NASA & IEEE-Houston(USA), Bradford University UK, Many Universities at Republic of South Africa . He is also a Senior Adviser on ICT curriculum and other academic matters to newly formed Institute of ICT-Ahmadabad University Gujarat and BITS Pilani. Dr Pal is Honorary Professor of number of Indian Universities.

His field of interest are: RF Space Communications, Space Technology, Microwaves, Electromagnetics, Antennas, Radars, Digital Communication and Satellite Navigation -(GNSS). He is recognized as an expert in these areas at international level.

## Visit to ECE Association, NIT Trichy



**Dr. Mini Shaji Thomas**, Director, greeting the Chief Guest of the occasion **Dr. Surendra Pal**

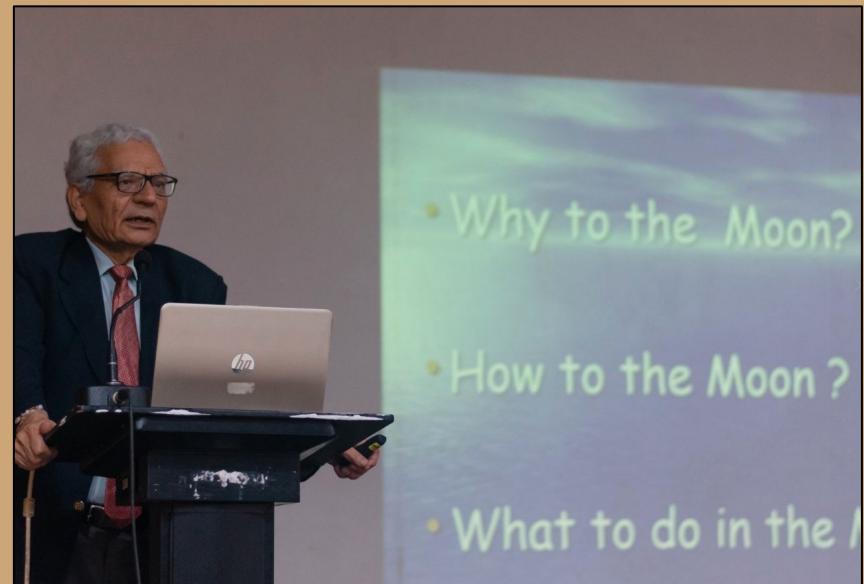
The Chief Guest **Dr. Surendra Pal** interacting with the Senior Professors of the Department **Dr. S. Raghavan** and **Dr. B. Venkataramani**





The Chief Guest Dr. Surendra Pal lighting the lamp

The Chief Guest Dr. Surendra Pal delivering his guest lecture



## ECEA Inauguration 2018-2019



### Chief Guest

**Dr. A.S.Kiran Kumar**, Distinguished Scientist (Apex) and Director, Space Applications Centre, Ahmedabad, assumed the office of the Secretary, Department of Space, Chairman, Space Commission and Chairman, **Indian Space Research Organisation (ISRO)**

Mr Kiran Kumar is a highly accomplished space scientist and engineer with a distinguished career spanning over four decades in ISRO in the satellite payload and applications domains.

He has made immense contributions to the design and development of Electro-Optical Imaging Sensors for Airborne, Low Earth Orbit and Geostationary Orbit satellites starting from Bhaskara TV payload to the Mars Orbiter Mission payloads.

Mr Kiran Kumar was instrumental in evolving the successful strategy for steering the Mars Orbiter Spacecraft towards planet Mars as well as its Mars Orbit Insertion. He has also made significant contributions for evolving the observation strategy encompassing land, ocean, atmospheric and planetary studies.

Mr Kiran Kumar is an alumnus of National College, the esteemed educational institution of Bangalore. He obtained his Physics (Honours) Degree from Bangalore University in 1971 and later obtained his Master's degree in Electronics from the same university in 1973, and thereafter his M.Tech Degree in Physical Engineering from the Indian Institute of Science, Bangalore in 1975.

Mr Kiran Kumar began his career in ISRO by joining Space Applications Centre (SAC) in 1975. Later, he became its Associate Director and in March 2012 took over as the Director of SAC.

At SAC, Mr Kiran Kumar has been steering the design, development & realisation of payloads and application activities of earth observation, communication, navigation, space science and planetary exploration.

Mr Kiran Kumar is a recipient of many national and international laurels/awards including the Padma Shri Award conferred by the President of India in 2014, International Academy of Astronautics' Laurels for Team Achievement Award for Cartosat in 2008 and for Chandrayaan-1 in 2013, Indian Society of Remote Sensing (ISRS) Award for the year 1994, VASVIK award (Electronic sciences and technology) for the year 1998, Astronautical Society of India Award (Space Sciences and Applications) for the year 2001, ISRO Individual Service Award 2006, Bhaskara Award of ISRS in 2007 and ISRO Performance Excellence Award 2008.



ECE Association, powered by ISRO and Qualcomm

Memento to the Chief Guest of the occasion  
Dr. A S Kiran Kumar





The Chief Guest Dr. Kiran Kumar lighting the lamp

The Chief Guest **Dr. Kiran Kumar** awarding a Senior Professor of the ECE Department **Dr. S. Raghavan**



## Shri. Shyam Chetty



He has more than 30 years of experience in the field of Aircraft Flight Mechanics & Control.

His research fields include Flight Control System Design & Development, Aircraft Simulation & Modelling, Handling Qualities & Aircraft Pilot Coupling, Computer Aided Flight Control Design & Rapid Prototyping Techniques.

### Major Awards

- JawaharLal Nehru Memorial Award in 1976
- Sir C.V. Raman Distinguished Young Scientist Award in 1998
- AeSI National Aeronautical Prize in 2001,
- DRDO Award for Path Breaking Research in 2002
- CSIR Technology Award in 2002 & 2003



**Memento to the Chief Guest of the occasion Shri Shyam Chetty**

**Shri Shyam Chetty addressing the audience**



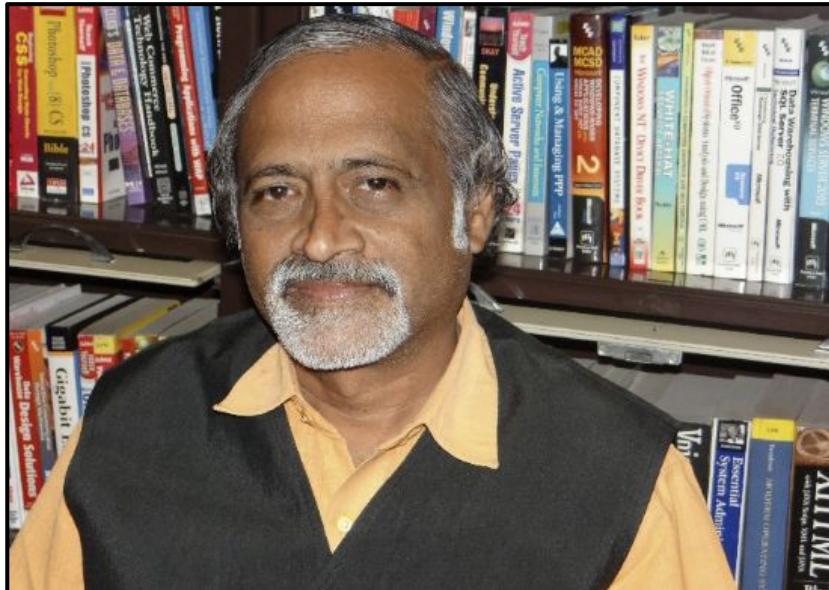


The well renowned Dr. Kiran Bedi, interacting with Dr. S. Raghavan



Some glorious moments and wonderful experiences in NIT Trichy, in the world of microwaves

Dr. S. Raghavan of NITT has been a contributor to Microwaves101, with regard to [finline](#). He also holds the distinctions of being the final Ph.D. scholar of Prof. B. Bhat and being a Senior Professor at NITT. His interests include microwave integrated circuits, [biological effects](#) of microwaves, [computer aided design](#), and [meta materials](#). He is a Fellow or Senior Member of 18 technical societies.

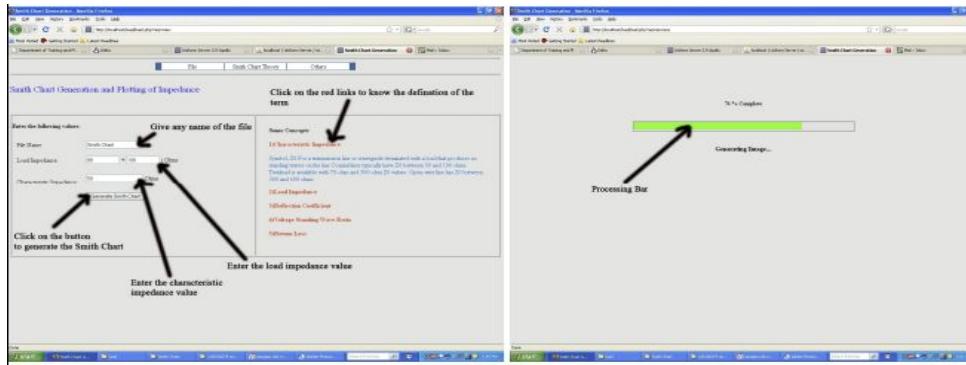




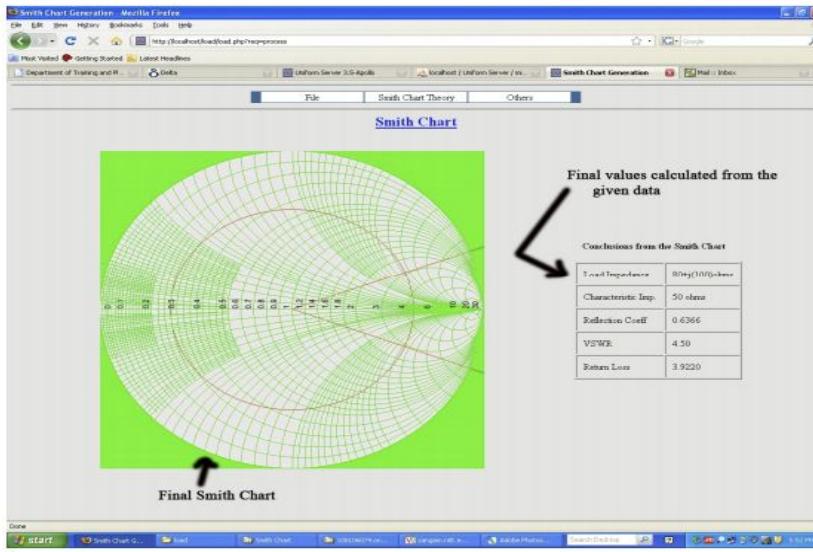
Overcoming financial hardship, a research scholar of National Institute of Technology Trichy (NIT-T) from the Electronics and Communication Engineering Department **K. Krushnakanth** who excelled in making gadgets usable in RADAR (Radio Detection and Ranging) has won the first prize in the 'Dare to Dream' contest conducted by DRDO (Defence Research and Development Organisation).

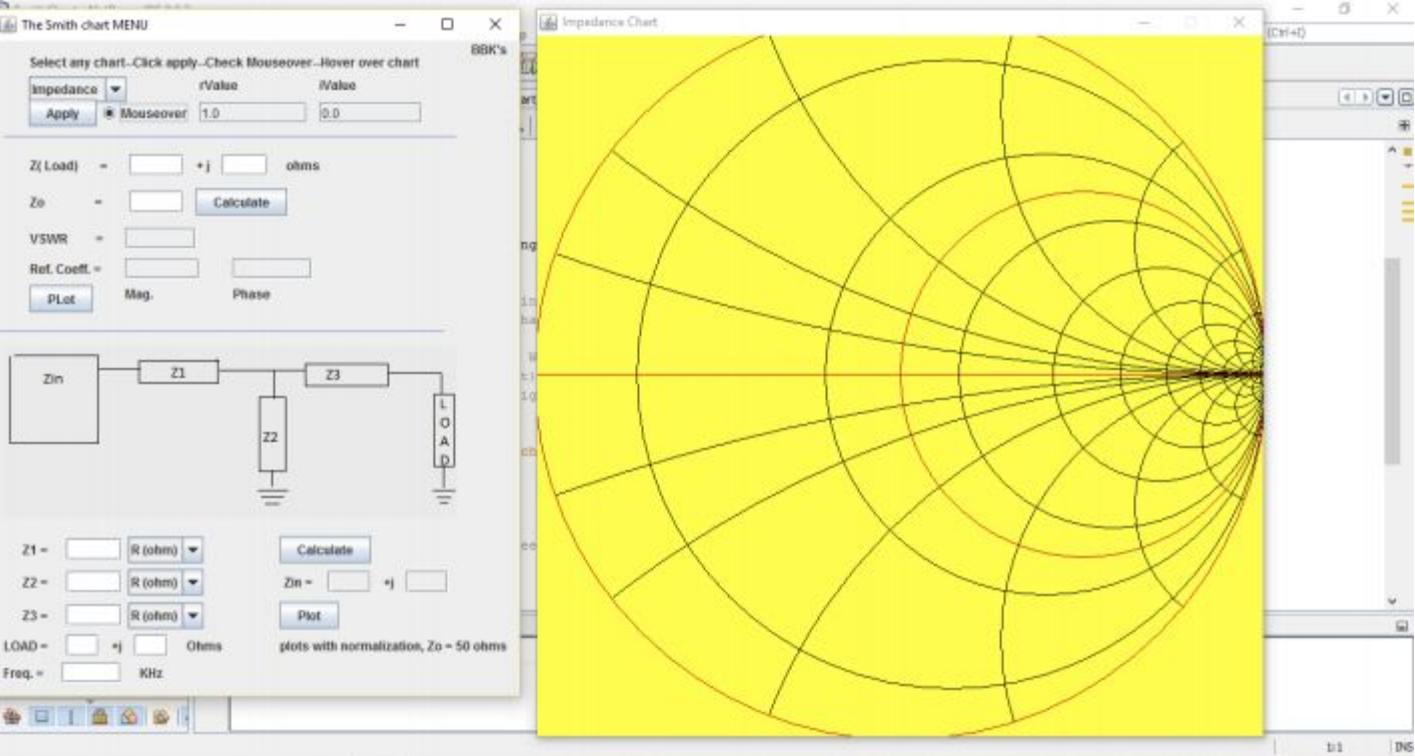
Krushnakanth received the prize money of **₹5 lakh** from Prime Minister Narendra Modi, for his research work on Frequency Selective Surfaces. Working under the guide-ship of **S. Raghavan**, Professor in the department, Krushnakanth had, over the last four years, come out with 13 gadgets that could be directly used in RADAR. Son of a carpenter, Krushnakanth has proved that hard work will take one to great heights.

Graphical User Interface for Smith Charts - on Microwave 101, by Mr. Arpit Raj, who was in his final year Electronics and Communication Engineering in 2010.



Use of PHP helped in generating the smith chart and when combined with Javascript was used for problem solving. The various parameters were calculated such as reflection coefficient, VSWR and return loss. The snapshots are as follows:





Bharath Krishna shows how to create a Smith Chart in Java. He is a student of ECE, NIT Trichy. This is published on Microwaves101

## Events in NITT, in the microwave world

**May 2019:** The Department of Electronics and Communication Engineering of National Institute of Technology Tiruchirappalli, one of the prominent Engineering Institutions in India, takes immense pleasure in organizing an International Conference on Microwave Integrated Circuits, Photonics and Wireless Networks (IMICPW-2019). This conference will provide a forum to academic researchers, practicing engineers, and industry experts to present and discuss their recent work, technical advancements, and new products. Main objective of IEEE IMICPW-2019 is to provide a platform for the community of researchers and practising engineers to meet and present their latest technical achievements in microwave and RF components, circuits & systems, photonics and wireless networks. For more info, see the [IMICPW website](#).

**July 2018:** Dr S. Raghavan writes to tell us about one of the attendees of his recent workshop. "ONE LADY MICROWAVE PROFESSOR, MUTHU RAMYA has a wonderful unbelievable CRAFTS @ ARTS hobby. Will you be interested to post the same in NITT WEBSITE of MICROWAVE 101. She attended the 'MICROWAVE WORKSHOP' conducted by me in NITT . She teaches MICROWAVES in a near by Engineering college." We're happy to help, sir! The website is [www.craftoframya.blogspot.com](http://www.craftoframya.blogspot.com)

**June 2018:** ITT Workshop on CAD of Microwave Integrated Circuits, 9 - 10 June 2018, Tiruchirappalli, India  
The objective of the course is to impart in-depth knowledge in the Computer-aided design of Microwave components including antennae through the conventional coding (MATLAB). The highlight of the workshop is to compare the joy and originality of getting the solution through conventional coding with that of commercial software tools (ADS, HFSS, CST MWS, COMSOL, etc.). Each has got its own exclusive merits and demerits. The demonstrations will speak of the above claim. Eligibility: The programme is open to the Research Scholars, UG, PG, faculty members, and Industry persons, to get exposed to the state-of-art design of MICs.

**August 2015:** an update from Dr. Raghavan on his microwave students and sad news from India.

*Below, the MICROWAVE Group of National Institute of Technology Trichy, India has paid respects to the Space scientist Dr.A.P.J.Abdul Kalam in an unique way. To make his coat appear as natural as it was during his last speech in Indian Institute Of Management (IIM), Shillong, the students used tea powder in the floral decoration. He was the Project Director of SLV\_3 in 1980 and had a keen interest in MICROWAVE Engineering.*



**September 2014:** A lecture was given by Ms. Seema R. Tirky (first year post graduate) to bring awareness of Microwaves101 web site to other students.



The Electronics and communication engineering association office bearers of 2014 are shown.



Words from NITT regarding the historic Indian Orbiter Mars mission:  
**Mangalyaan**

It entered orbit on 24 September 2014

### ***Microwave Group of NITT celebrated the proud victory of Mars Orbiter Mission***

*All health parameters of the Mars Orbiter Mission (MOM) are normal and its performance will be as per the computed time" said the proud scientist and the project Director of MOM S. Arunan few days before in NITT during his talk to the Electronics and Communication Engineering association students. His words came true when the whole world witnessed Indian Space Scientists' latest space marvel Mangalyan being put in orbit around Mars at the very first attempt. Along with the whole country, the Microwave group, are jubilant for many reasons. Starting from N. Valarmathi, the Project Director of Radar Image Satellite (RISAT), P.K. Anuradha, the Project Director of GSAT 12 and finally MOM Project Director Arunan had inspired every student of the department to aspire to become space scientists. The Microwave group headed by Dr. S. Raghavan, Professor, and the ECE department celebrated with great joy and satisfaction. The scholars and the students had designed the colorful model of the MOM in the form of rangoli. Microwave Engineering has played an active role in the mission. One of the present scholars of the Microwave group, Mr.S. Purusothaman is from the Compact Antenna Test Facility (CATF) of ISRO, Bangalore where High Gain Antenna of Mars mission was exclusively tested for the radiation pattern, gain polarization and isolation before integrating with MARS space craft. The communication systems for the Mars mission are responsible for the challenging task of communication management up to a distance of 400 million km. One student Nitesh Jha from Nepal has told that he feels proud to study in India where extraordinary achievement on space science had happened. Another scholar wished that ISRO should excel NASA in space research. Other proud comments include, "Super power" is exhibited, at the rate of 11 Rs/km the mission is the world's cheapest interplanetary mission, "the cost is lesser than the budget (100 million dollars) of the English movie 'Gravity' ", and "I will work hard to become a space scientist". For any space mission volume and weight are very critical and the biggest advantage of microwave is miniaturization. The group is doubly happy to see the practical usage of Microwave Engineering in the space mission which made India scale high!*

TEQIP Sponsored  
Three Days National Workshop/Conference/Symposium  
on

# TELEMEDICINE

(Merging of Engineering with Medicine)  
Unique opportunity where engineers and health care professionals  
share their expertise



*Co-ordinators*

Dr.S.Raghavan, Professor, Department of ECE  
Dr.N.Sivakumaran, Associate Professor, Department of ICE

Dates: 12 - 14, July 2013  
Venue: EEE Auditorium,  
National Institute of Technology, Tiruchirappalli

PATRONS

Padmashri Dr.P.Namperumalsamy  
Chairman, World Famous Aravind Eye Hospitals

Dr.S.Sundar Rajan  
Director, NITT

Dr.G.Ganapathy  
Former Lt.Director, TamilNadu Medical Services



**June 2013:** Dr. Raghavan organized a three-day conference on **Telemedicine** (merging medical and engineering practices) at NITT on July 12-14. Here you can learn about many topics including tele-cardiology, tele-ophthalmology, tele-anaesthesiology, tele-pathology, tele-diabetology, tele-radiology, stem cell engineering, bio implantable antennas and more. [Download the poster here.](#)

The photo of the first ever female project director of ISRO, Dr.P.K. Anuradha who was the head of GSAT-12, along with the student organizers of the Electronics and Communication Engineering department , N.I.T., Tiruchirappalli. You will notice that women are well represented in this group.



Below are Dr. Praveen Wahid, USA, Dr. Salazar Palma of Spain, coordinators of WiE 2013 , along with Microwave Pioneers of TamilNadu, including Dr. Raghavan, of NIT Trichy



# A joint workshop on Transmission Lines and RF Systems, conducted in PSG Institute of Technology, Coimbatore. An insightful faculty development training program



## ONAM POOKALAM through MINIATURISED ANTENNAS instead of traditional FLOWERS



Microwave Group of NIT-T for a change formed ONAM POOKALAM using MICROWAVE INTEGRATED CIRCUIT antennas (ten types of antennas instead of ten rings found in the conventional pookalam viz. fractal antenna, patch antenna, implantable antenna, metamaterial antenna, RF ID, smart antenna, UWB antenna, spiral antenna, Yagi antenna, and sector antenna) chips designed and fabricated by the research scholars. Each small chip antenna has its own significant advantages. This Pookalam made up of small antennas propagate the joy of the integration festival ONAM.



Below is an image of the NITT ECE class taken when Scientist **N. Valarmathi** gave a technical talk about satellite communication.

Ms. Valarmathi is the **first woman** to head a remote sensing satellite project for India, the indigenously developed Radar Imaging Satellite RISAT-1. Valarmathi is the second woman to serve as satellite project director at the Indian Space Research Organisation (ISRO) after **T. K. Anuradha**, who headed the communication satellite GSAT-12 program.

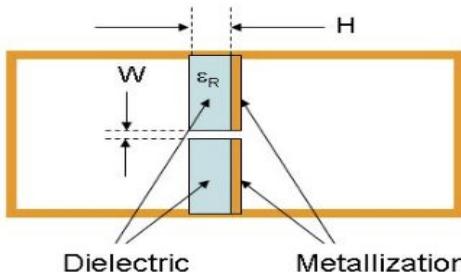


# Finline in a nutshell, the work of Prof. Bharathi Bhat and Dr. S Raghavan

**New for March 2010!** Professor Bharathi Bhat was one of the principal researchers in establishing the theory and application of finline. She literally [wrote the book](#) on finline!

This page was written with the help of Dr. S. Raghavan, the last Ph.D. scholar of Prof. B. Bhat and a Senior Professor, [National Institute of Technology](#), Trichirappalli, India. Thanks!

Finline is similar to [slotline](#), but the finline structure is bounded within a rectangular waveguide. It solves the problem of how to install components such as diodes into rectangular waveguide. It is a close relative of [double-ridged waveguide](#).



End view of unilateral finline

Finline was first proposed by Meier in 1972, and ideally suited for use in millimeter frequency applications. It can be used from 30 GHz to 110 GHz. Basically it consists of a partially metallized dielectric substrate shielded by a rectangular metal enclosure. The metallization can be in the form of fins and/or isolated strip conductors of arbitrary widths placed in symmetric or antisymmetric positions on the substrate. The types of finline include unilateral finline (fins on only one side of the substrate with slot in the centre or off-centered) symmetrical and asymmetrical, bilateral finline (fins located on both sides of substrate, broadside coupled double-dielectric finlines employing two symmetrically positioned substrates with an intervening air gap between them), asymmetric broad side coupled double dielectric finline, edge coupled finline, antipodal finline and insulated finline. Antipodal finline is useful to act as transitions between two kinds of planar transmission lines. The useful applications are filters, hybrid rings, power dividers, phase shifters, mixers and transitions.

Finline got its name because it resembles a fin of a fish. This is the only structure having planar transmission line in E-plane inserted in a waveguide. These kind of quasi-planar structures combine the advantageous features of planar technology in terms of amenability to circuit integration and mass production, and of waveguide technology in terms of low loss.

The characteristic impedance ( $Z_0$ ) range that can be realized in finline spans 10 to 400 ohms, which is much greater than what is practical in microstrip or stripline. The dominant mode of propagation is a hybrid mode. Commonly used substrates include RT-Duroid, Cuflon and Kapton. An exhaustive analysis of finline is reported in B. Bhat and S. K. Koul, *Analysis, Design and Application of Finlines*, Artech House, MA 1987.

Link -

<https://www.microwaves101.com/encyclopedia/finline>

Celebrating the success of NIT Trichy in the microwave world, with much more to come

The first year MTech ECE students under the guidance of Dr S Raghavan, Professor, ECE dept. came out for the first time with the novel idea of putting a Smith chart on a CAKE

