



IEEE Antennas and Propagation Society (AP-S) Madras Chapter

announce seminar on

Antennas for Advanced Communication Applications

Event co-organized by

Indian Institute of Information Technology Design and Manufacturing, Kancheepuram

Monday, 27 March 2017

Venue

IIIT-DM, Melakottaiyur Village, Vandalur-Kelambakkam Road, Kancheepuram District.

Schedule

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| 08.45 am | Registration |
| 09.15 am | Inauguration |
| 09.30 am | “Antenna measurement considerations” by Dr. K.T. Selvan, Dept. of Electronics and Communication Engineering, SSN College of Engineering, Kalavakkam |
| 10.30 am | Tea Break |
| 10.45 am | “Investigations on Some Novel Phased Arrays, MIMO and Massive MIMO Arrays” by Dr. Satish Sharma, Dept. of Electrical and Computer Engineering, San Diego State University, USA |
| 12.15 pm | Lunch |
| 01.30 pm | “Multi beam Phased Array Antenna for communication satellites” by Mr. V. Senthil Kumar, ISRO Bangalore |
| 03.00 pm | Feedback and concluding comments by Dr. S. Joseph Gladwin, Chair IEEE AP-S Madras Chapter and S.S. Karthikeyan, IIIT-DM |
| 03.30 pm | Tea and exit |



Registration information

The number of participants is limited to 75.

The registration fee is Rs. 600/- for non IEEE members, Rs. 400 for IEEE members & student participants and Rs. 300 for IEEE AP-S members.

The fee should be paid by online fund transfer.

Click url: <https://www.onlinesbi.com/prelogin/icollecthome.htm?corpID=634626>

Please complete the Registration form online

Url: <https://goo.gl/forms/VRxDw4nPSaxrrHnJ2>

For any clarifications, please email any of the workshop coordinators:

Dr. S. Joseph Gladwin, josephgladwin@ieee.org

Dr. S.S. Karthikeyan, ssk@iiitdm.ac.in

Cancellation Policy:

Requests for cancellation of registration should be received by email on or before 22 March 2017. No refunds will be possible beyond this date.

Please send the registration form, along with DD to:

Dr. S.S. Karthikeyan
Assistant Professor, ECE Department
Indian Institute of Information Technology Design and Manufacturing
Melakottaiyur Village
Vandalur-Kelambakkam Road
Chennai - 600127

Please super scribe the envelope with **'IEEE AP-S Seminar'**

Abstracts of talk

Antenna measurement considerations

This talk will focus on the fundamentals and challenges of antenna gain and pattern measurements. Outlining the need for reporting a statement of uncertainty in any gain measurement, the talk will look at the different factors that contribute to uncertainty in pattern and gain measurements in free-space range. Some recent research efforts on these aspects will be reported.

Investigations on Some Novel Phased Arrays, MIMO and Massive MIMO Arrays

Beam steering antennas are widely used both in radar and communications applications for their ability to form arbitrary beam patterns in real time with superior speed compared to their mechanically gimbaled counterparts. In this talk, some novel phased arrays and massive MIMO array antennas will be discussed which are designed and developed at the Antenna and Microwave Lab (AML), San Diego State University. The different radiating elements used for the phased array antenna research are multiple modes based radiating elements, frequency agile and polarization reconfigurable radiating element, and millimeter wave (W-band) series fed linear array. Similarly, the emerging massive MIMO array antenna development effort for 5G communications will be presented employing a subarray approach, both at 5-6 GHz range and Ka-band. An example of multiple beams generation will also be shown. Additionally, an offset reflector antenna with a compact feedhorn polarizer at W-band will be shown which is under fabrication. The talk will conclude with design, analysis, fabrication and experimental verification challenges and future studies.

Multi beam Phased Array Antenna for Communication Satellites

Presently, Satellite Industries are developing Ka-Band transponders with multi-beam antenna systems to meet the user requirements of Multimedia communications (Gbps data). Initially all the spacecraft based Multi beam antennas were designed using large reflectors and cluster of feeds. Few Reflector based Multibeam antennas were developed at Ka-Band and put in operation. Reflector based multi beam antennas are conventional and has lot of disadvantages like volume, weight, and alignment problems and also have the limitation of maximum number of beams (less than 32). Direct radiating arrays with RF beam forming networks can be configured to generate medium number beams which are simpler than reflector based multi beam antenna.

Many Researchers are presently working on Phased Array Antennas for Multi beam applications. Multi beam satellite antenna requirements emphasize high gain with low side lobes. In addition, it is often important that the system have a high beam crossover level so that nearly full system gain is available within any point in the antenna field of view. To utilize the advantages of digital beam forming techniques, direct radiating arrays have to be employed for producing very large number of beams which is not possible in reflector based system. Multi beam generation using Digital Signal Processing (DSP) algorithms in a super computer platform is being taken up for implementation. Large number of beams, example 256 beams can be generated for larger coverage area (global / regional coverage) using DSP techniques on larger direct radiating antenna array. DSP based direct radiating antenna arrays are enjoying all advantages of DSP and best suited for large number of beams but it is very complex and expensive. Technical challenges in realising phased array antenna for multi beam generation will be presented.

Speakers' biographies

Krishnasamy T. Selvan obtained his BE (Hons), MS and PhD degrees respectively from Madurai Kamaraj University (1987), Birla Institute of Technology and Science (1996) and Jadavpur University (2002). He also obtained a PGCHE in Higher Education from University of Nottingham in 2007.

Selvan has been a Professor in the Department of Electronics and Communication Engineering, SSN College of Engineering, India, since June 2012. From early 2005 to mid-2012, he was with the Department of Electrical and Electronic Engineering, University of Nottingham Malaysia Campus. He also held the positions of the Assistant Director of Teaching and Learning for the Faculty of Engineering and the Deputy Director of Studies of the Department of Electrical and Electronic Engineering.

From early 1988 to early 2005, Selvan was with SAMEER – Centre for Electromagnetics, Chennai, India. Here he was essentially involved in antenna analysis, design, and testing. During 1994–1997, he was the Principal Investigator of a collaborative research programme that SAMEER had with the National Institute of Standards and Technology, USA. Later he was the Project Manager/Leader of some successfully completed antenna development projects. In early 1994, he held a two-month UNDP Fellowship at the RFI Industries, Australia.

Selvan's professional interests include electromagnetics, antenna theory, design and measurements, and electromagnetic education. In these areas, he has authored or coauthored a number of journal and conference papers. He is currently an editor for the online journal Forum for Electromagnetic Research Methods and Application Technologies (FERMAT). He was on the editorial board of the International Journal of RF and Microwave Computer-Aided Engineering during 2006 to 2011. He was an academic editor for the International Journal on Antennas and Propagation from its inception in 2006 till 2014. He has been a reviewer for major journals including the IEEE Transactions on Antennas and Propagation. He was Technical Programme Committee co-chair for the IEEE Applied Electromagnetics Conference held in Kolkata in December 2011, and Student Paper Contest co-chair for IEEE AEMC 2013 held in Bhubaneswar. He was Publications Chair for the IEEE MTT-S International Microwave and RF Symposium (IMaRC) held in Bangalore in December 2014. He co-organized sessions on EM/microwave education during IMaRC 2014 and International Symposium on Antennas and Propagation, Kochi, 2014.

Selvan founded the Madras Chapter of the IEEE Antennas and Propagation Society (AP-S) in 2013, and was the Chapter Chair till 2015. Selvan is a member of the Education Committee of the IEEE Antennas and Propagation Society. He was an AP-S Region 10 Distinguished Speaker for 2015-16.

Selvan is a senior member of the IEEE, a Fellow of the Higher Education Academy (UK), and a Life Member of the Society of EMC Engineers (India).

Dr. Satish Kumar Sharma is a Professor and Director of Antenna and Microwave Lab (AML) in the Department of Electrical and Computer Engineering at San Diego State University (SDSU). He has received the National Science Foundation (NSF)'s prestigious faculty early career development (CAREER) award in 2009. He served as an Associate Editor of the IEEE Transactions on Antennas and Propagation journal since August 2010. He has published over 180 journal and conference papers and holds one US and one Canadian Patent on Multiple Phase Center Feedhorn. He has also co-edited three volumes of "Handbook of Reflector Antennas and Feed Systems", published by Artech House in May/June 2013. He has collaborated with industry on SBIR/STTR Phase I and II projects funded by DARPA, SPAWAR, Navy, Missile Defense Agency, in addition to the projects from the NSF, Office of Naval Research (ONR), and has completed almost \$2M of projects and contracts since August 2006. He also has served as Engineer/Consultant with industry such as Space Systems Loral (SS/L), Cubic Defense Applications, TaoGlas, DIRECTV, and AT&T on different antenna projects including 5G Communication antennas and feed systems for reflectors. His research interests include microwave and millimeter-wave frequencies beam steering antennas, reconfigurable and tunable antennas, multiple input multiple output (MIMO) antennas, massive MIMO antennas, antennas for Cube-Satellites, reflector antennas, and feed systems.



V. Senthil Kumar received his B.E degree in Electronics and Communication Engineering from Madurai Kamaraj University in 1992 and M.E degree in Communication Systems from (College of Engineering, Guindy) Anna University in 1994. He has been with Antenna division, Communication Systems Group of ISRO Satellite Centre, Bengaluru since March 1996. He has been involved in the design and development of Spacecraft and Ground Station antenna systems. He worked in Antenna Research Group, German Aerospace Centre (DLR) as Guest Scientist in the year 2002-2003. He worked as Project Manager (Antenna Systems) for Cartosat-2/2A/2B, SRE and W2M projects and contributed by developing many new Antenna systems. He served as Deputy Project Director (RF Systems) for Megha-Tropiques project and responsible for many RF systems development. Megha-Tropiques satellite was jointly developed by ISRO, India and CNES, France for Atmospheric studies. He received NRDC (National Research Development Corporation-Government of India Award in 1998 for the design of low cost monopulse tracking antenna system. His current research includes phased array antennas, microstrip patch arrays for spacecraft application. He published 50 technical papers in International /National journals /conferences. He is a recipient of Patent for his design on “Ultra Low Side lobe Antenna Arrays”. He also received “ISRO Team Achievement Award” for his contribution to Megha-Tropiques satellite in the year 2013. Presently he is leading antenna activities in ISAC as Division Head, Antenna & Passive Systems Division.