



Ministry of Education,
Government of INDIA



Aerial Communications & Networks

3rd March to 13th March 2025

Department of ECE

National Institute of Technology Warangal, Telangana, INDIA

About GIAN Course: The Global Initiative of Academic Networks (GIAN) is a program the Ministry of Education, Government of India offers. It aims to tap the talent pool of scientists and entrepreneurs internationally to encourage their engagement with the institutes of higher education in India to augment the country's existing academic resources, accelerate the pace of quality reform, and elevate India's scientific and technological capacity to global excellence.

About NIT Warangal: National Institute of Technology Warangal (NITW), formerly RECW, is the first among seventeen RECs set up in 1959. Over the years, the institute has established itself as a premier institution in imparting technical education of a very high standard, leading to B.Tech, M.Tech, and Ph.D. programs in various specializations of Science and Engineering streams. 14 departments offer 8 U.G., 31 P.G. programs, and doctoral programs. It is a fully residential campus sprawling over 250 acres with excellent infrastructure. National Institute of Technology Warangal campus is 2 km from Kazipet railway station and 12 km from Warangal railway station.

About the Department: The Department of Electronics and Communication Engineering has been one of the key departments of the institute since its inception in 1971. The department has expanded steadily over the last few decades and is one of India's leading academic and research institutions. The department supports R&D organizations and is actively engaged in providing solutions to industry problems as consultants. The department at NITW has an international reputation for excellence in teaching, research, and service. The department of ECE offers a broad range of programs that include undergraduate (B.Tech) and postgraduate (M.Tech) in Embedded and Machine Learning Systems, VLSI System Design, and Advanced Communication Systems and Research (PhD) programs.

About Warangal: Warangal is known for its rich historical and cultural heritage. It is situated at 140 km from the state capital, Hyderabad (Nearest Airport). Warangal is well connected by rail and road. It was the seat of the erstwhile 5th Kakatiya dynasty. It is a tourist attraction with several historical monuments like Thousand Pillar Temple, Warangal Fort, Bhadrakali Temple, Ramappa Temple, and Laknavaram Lake.

Course Overview

Airborne networks are unique and significantly different from vehicular networks involving only ground vehicles in many perspectives. Classical mobility models and security strategies designed for MANETs, and ground vehicular networks are unsuitable for airborne networks. Mobility models that consider unique characteristics, such as smooth turns and high-level information assurance, authentication, and integrity verification strategies that can meet the minimum latency requirements, are needed for airborne networks.

An airborne network is a cyber-physical system (CPS); computation, communication, and networking elements form the cyber components of the system, flight paths, maneuver geometries, and multi-mode resources, including ground-based nodes and control stations, form the physical components of the CPS. The fundamental challenge for airborne networks is to bring the synergistic interactivity between their cyber and physical components. This synergy, if successfully explored and exploited, will immensely benefit the next generation of air transportation systems; for example, predicting the trajectories of airborne vehicles within the neighborhood (say, 1000 square mile region), forming a trusted network with friendly nodes, reconfiguring the network as its topology changes, and sharing audio and video streaming data securely over the air among the pilots, significantly improve the situational awareness of an airborne vehicle and enhance the safety capabilities of the air transportation system.

Fundamental design principles are needed to explore this synergy between the cyber and physical dimensions, and they have yet to be developed. There is an excellent need to generate experimental datasets, which has led to such design principles.

Objectives

The primary objectives of the course are as follows:

- i) Exposing participants to understanding aerial networks and their working principles
- ii) Understand Network Architecture and UAV Communication Protocols.
- iii) Understand mobility and communication trajectory aspects.
- iv) Provide exposure to air-to-ground and air-to-air channel modeling.
- v) Introduce spectrum management techniques.
- vi) Provide exposure to 5G NR and 6G way forward.

Modules	
	Day 1: Deployable aerial communication networks: challenges and practical aspects for futuristic applications
	Day 2: Networking architectures and communication protocols for aerial communications
	Day 3: Intelligent swarm and UAV communication systems
	Day 4: Joint trajectory design and resource allocation in aerial communications
	Day 5: UAV-assisted wireless communications, 3-D networking
	Day 6: Drone Communication requirements and its architecture – a case study
	Day 7: Channel modeling for air-ground and air-air links
	Day 8: Spectrum management and multiple access schemes for aerial communications
	Day 9: 5G NR Physical Layer & 6G Way forward
	Day 10: Connectivity for and among aerial platforms
	Number of participants for the course are limited to fifty.

You Should Attend If	<ul style="list-style-type: none"> You are an engineer, research scientist, or entrepreneur designing Aerial Communication systems and products for various applications. You are a UG/PG/PhD student interested in or working in Aerial Communication-related areas such as Drones, UAV, HAPS, Low-orbit Satellites, Hardware, Simulations, and Securities. You are a faculty from an academic institution interested in learning, designing, and offering Aerial Communication and Networks or subsystems courses.
Fees	<p>Registration fees for the course are as follows (inclusive of GST + Overheads):</p> <p>Participants from abroad: U.S. \$300 (Online – only few) & U.S. \$150 (On campus)</p> <p>Industry/ Research Organizations: INR 4500 (Online – only few) & INR 2500 (On campus)</p> <p>Academic Institutions (Research Scholars/Students): INR 4000 (Online – only few) & INR 2000 (On campus) & Faculty: INR 4500 (Online – only few) & INR 2500 (On campus)</p> <p>The above fee includes all instructional materials, computer usage for tutorials and assignments, laboratory equipment usage charges, and a 24-hour accessible internet facility.</p> <p>Add Rs. 1500 for award of Grade (on completion of 100% attendance, assignments, and exams)</p> <p>The accommodation to participants is provided on a payment basis (for more details, contact the Course Coordinator).</p>

Faculty



Prof. Kamesh Namuduri, is an Electrical Engineering Professor at University of North Texas, Denton, TX 76203, USA. Currently, he is Director, Autonomous Systems Laboratory and his research interests are Emergency Communications, Airborne Networks, and Image and Video Communications. He has authored two Books, Journal Papers (38), Book Chapters (9), Invited Talks (26), Tutorials (4), Refereed Conference Proceedings (118), Unpublished Presentations (5), and Industry Consulting Experience (7 years). He has 8 Active Research Grant totaling \$3 Million. Responsible for securing 43 federal grants worth \$10 Million federal research funding.



Dr. K L V Sai Prakash Sakuru is an Electronics & Communication Engineering, Associate Professor at the National Institute of Technology, Warangal, Telangana, India. His research interests include 5G and Beyond - Terrestrial and Non-Terrestrial Communications, Ad-hoc and Sensor Networks, Internet of Things & Cyber-Physical Systems, Machine Learning, and Smart Systems Design.

Payment Details via NEFT	
Account Name	Director Research Account
Account No.	62266262236
Bank	State Bank of India
Branch	NIT Branch, Warangal
Branch Code	20149
IFSC	SBIN0020149
MICR Code	506002030
SWIFT Code	SBININBBH14

How to Register?

Fill the google form using the following link to complete the registration process.

<https://forms.gle/3Sta681TWdiQmcuv8>

Candidates registering early will be given preference in short listing process.

Last Date of Registration: 20-12-2024

Course Co-Ordinator

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Brief Biodata of Foreign Expert: Kamesh Namuduri

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Education: Doctor of Philosophy – Computer Science and Engineering, University of South Florida, Tampa, December 1992. M.S. – Computer Science, Central University, Hyderabad, India, August 1986. B.S. – Electronics and Communications, Osmania University, Hyderabad, India, August 1984.

Research Interests: Advanced Air Mobility, Air Traffic Management, Airborne Networks, Wireless Sensor Networks, Image and Video Processing, and Information Security

Professional and Academic Appointments (32 years): September 2017 – Present Professor, Department of Electrical Engineering, UNT, August 2008 – August 2017 Associate Professor, Dept of Electrical Engineering, UNT, May 2008 – August 2008 Associate Professor, ECE Dept, Wichita State University, Summer 2008, 16, 21 and 22 Faculty Fellow, Air Force Research Laboratory, Rome, NY, August 2002 – May 2008 Assistant Professor, ECE Dept, Wichita State University, August 1999– August 2002 Assistant Professor, Computer & Information Sciences Department, Clark Atlanta University, Atlanta, GA 30314, May 1997 – August 1999 Assistant Professor, Computer Science Department, Research Scientist, Center for Theoretical Studies of Physical Systems, Clark Atlanta University, Atlanta, May 1993 – May 1997 Systems Engineer, GTE Communications Services, Atlanta, May 1986 – May 1988 R&D Engineer, C-DOT, Bangalore, India.

Professional Service: 2020 – present: 1) Member, IEEE Future Networks Initiative Public Safety Technology, 2) Task Force, Air Space Partner and Team Lead, Advanced Air Mobility – National Campaign, a nation-wide project led by NASA , 3) Vice-Chair, Emerging Technology Initiative on Aerial Connectivity, IEEE Communication Society 4) UAV Expert Adviser, COM/Access Core Standards Committee, IEEE Communications Society 5) Chair, IEEE P1920.2, Standards Working Group on Vehicle-to-Vehicle Communications for UAS, 6) Chair, Ad Hoc Committee on Drones, IEEE Vehicular Technology Society Member, IEEE Mobile Communication Networks Standards Committee 7) Chair, IEEE P1920.1, Standards Working Group on Airborne Networks and Communications 8) Member, Data Link Working Group, Airlines Electronic Engineering Committee.

Academic Recognitions and Awards (12), Special Issues and Guest Editorials (5), Blueprints (2), Journal Papers (38), Book Chapters (9), Invited Talks (26), Tutorials (4), Refereed Conference Proceedings (118), Unpublished Presentations (5), Ph.D. Dissertation Committees – Served as Chair or Co-Chair (9), M.S. Thesis Committees – Chaired (63), Professional Participation (50 – Chair, co-chair, TPC member, Co-organizer, Editorial Member, Reviewer), Industry Consulting Experience (7 years).

Google Scholar Citations: 2776, h-index: 26, i10-index: 50

Books (2 Published) : 1) Kamesh Namuduri “Unmanned Air Transportation: Bringing Principles to Practice”, Oxford University Press, in preparation, to be published in 2023. 2) Kamesh Namuduri, Serge Chaumette, Jae H. Kim, and (Late) James PG Sterbenz, eds., “UAV Networks and Communications”, Cambridge University Press, 2017.

Research Grants: 8 Active Grants totaling \$3 Million. Responsible for securing 43 federal grants worth \$10 Million federal research funding.