RESEARCH AND TRAINING UNIT FOR NAVIGATIONAL ELECTRONICS
OSMANIA UNIVERSITY - HYDERABAD

5-Day Short Course on **GNSS TECHNOLOGIES: FUNDAMENTALS & APPLICATIONS**	**Course Code: NERTU/SC/82** **11-15, OCTOBE.R 2022**
2-Day Symposium on **CURRENT RESEARCH TRENDS IN NAVIGATION SYSTEMS**	**Course Code: NERTU/SC/83** **14-15, OCTOBER 2022**
5-Day School on **GNSS SIGNAL PROCESSING: ADVANCES IN SIGNAL STRUCTURE AND RECEIVERS**	**Course Code: NERTU/SC/84** **17-21, OCTOBER 2022**

Venue NERTU Auditorium, OU, Online & Offline

Time : 09.30AM – 05.30PM

Faculty of the Course

1. Prof.P.Laxminarayana, NERTU, OU
2. Dr.Arjun Singh, Sakthi Aviation
3. Dr.Dinesh Manandhar, University of Tokyo
4. Dr.Chilaka Mahesh, AAI
5. Shri K.V.Ramana Murthy, IISM-SoI
6. Dr.Anindya Bose, Burudwan University
7. Dr. Nirvikar Dashora, NARL-ISRO
8. Shri Abhineet Shyam, SAC-ISRO
9. Dr.Ashish Agarwal, NPL
10. Dr.Rammurthy, TSFD

Keynote Speakers of the Symposium

1. Dr.Manish Saxena, Satnav-PO, ISRO-HQ
2. Dr.D.Sam Dayala Dev, IISU-ISRO
3. Prof.P.Vijaykumar, IISc
4. Dr.Dileep Dharmappa, ISTRAC-ISRO
5. Ms.Sugandh Mishra, SAC-ISRO
6. Prof.Hari Hablani, IIT, Indore
7. Dr.Ashish Agarwal, NPL
8. Smt.Padmavathi R, Jasmin Infotech
9. Dr.Dinesh Manandhar, University of Tokyo
10. Dr.Susmita Bhattacharyya, IIT-KGP
11. Dr.Narayan Panigrahi, CAIR-DRDO
12. Dr.Parimal Majitia, SAC-ISRO
13. Prof.Dennis M Akos, University of Colorado
14. Dr.Ashish K Shukla, SAC-ISRO
15. Prof. Raj Kumar Pant, IIT, Bombay

Faculty of the School

1. Prof.P.Laxminarayana, NERTU, OU
2. Dr.Ratheesh, CMET, Hyderabad
3. Dr.K.S.Parikh, SAC-ISRO
4. Dr.Ashish K Shukla, SAC-ISRO
5. Prof.Sasibhushana Rao, ECE-AU
6. Dr.Susmita Bhattacharyya, IIT-KGP
7. Shri.Abdul Shukkoor, IISU (Rtd)
8. Dr.Shweta Shah, NIT, Surat
9. Dr.Lalitha Vadlamani, IIIT, Hyderabad
10. Dr.Dinesh Manandhar, University of Tokyo
11. Dr.Saumi De, SAC-ISRO
12. Shri Ankesh Garg, SAC-ISRO

COORDINATOR, GNSS-22

Prof.P.Laxminarayana, Director, NERTU, OU
Ph: 9490805486, laxminarayana@osmania.ac.in

Introduction: GNSS has become a ubiquitous technology, including the sectors related to surveying, defence, unmanned vehicles, agriculture, timing & synchronization, aviation, road, rail and sea transport. GPS chips are also proposed to use in the Applications of Power Engineering, Internet of Things in the Industry and other organizations to know the location and time of events, sensors and devices. The global navigation satellite system market is projected to grow from $175.19 billion in 2021 to $320.73 billion in 2028 at a CAGR of 9.02% in forecast period. The business can be divided into development of GNSS chipsets and the integration of GNSS chipsets with different applications. This is the high time in India to develop GNSS chipsets and also applications with GNSS chipsets including NavIC/IRNSS.

5-Day Short Course on GNSS Technologies: Fundamentals & Applications:
The main objective of this course is to introduce the basic concepts and its applications and limitations. This course will cover the topics: Principle of operation, architecture and signal structure of GPS, GLONASS, Galileo, Compass and NavIC; Errors in GPS or GNSS; DGPS, Augmentation systems, Applications of GNSS. Specifications of a GNSS receiver, and integration of GNSS receiver or a GNSS chip with other applications. **This course is open for all candidates, who are interested to develop new GNSS applications.**

2-Day Symposium on Trends in GNSS Research: It is an era of everybody speaking about Artificial Intelligence, Machine Learning and Autonomous Vehicles/Robots. The main aim of the symposium is to know the latest trends in the GNSS research and autonomous vehicles, covering the challenges and advantages of GNSS for different applications. This Symposium will cover mainly the keynote talks by the senior scientists/academicians/engineers working in this field, and few presentations by the PhD research scholars. The expected participants of this symposium are academicians, scientists, engineers, research scholars and managers at all levels interested to pursue research or technology development in the area of GNSS and autonomous vehicles.

5-Day School on GNSS Signal Processing: Advances in Signal Structure and Receivers: Though many people are using GPS or GNSS for navigation and other applications, very few people are working to develop the GNSS receivers and simulators in India. Development of GNSS receiver requires the expertise in Signal Processing, Communication and navigation algorithms. **The main objective of the school is to give the basic concepts and advances in the signal structure and development of GNSS Software Receivers with emphasis on IRNSS**. The school is designed for **the engineers, scientists, academicians and research scholars, already working or decided to work in the development of GNSS receivers or its applications.** Participants are expected to have the UG level knowledge in signal processing and communication engineering.

Last Date for Registration: 09th October 2022

See the Details of Registration Fee in the next page. Interested Participants can fill the registration form at **https://forms.gle/pLkqPDuTne3MVSwQ8**

Please see more details at www.osmania.ac.in like Speakers with Title of talks and final schedule.

CO-COORDINATORS, GNSS-22

Ch.SRINU, NERTU, OU, Ph: 903 293 0657, sreenu471.ece@gmail.com

S.SARASWATHI, NERTU, Ph: 994 899 1235, sirikondasaraswathi@gmail.com

ABOUT NERTU: The Research and Training Unit for Navigational Electronics (NERTU) is established in 1982. It is the focal point for research and training in the areas of Electronic Navigation in India. It is the first University centre to work in the area of Global Positioning System (GPS) and GPS Aided Geo Augmented Navigation (GAGAN) System. Since its inception, NERTU has successfully **executed 65 sponsored and consultancy projects and also 81 short term courses, conferences and workshops in the areas of** signal processing, communications and navigation. All the participants of the courses or sponsored projects are from various organizations like DRDO labs, ISRO labs, DST, MIT, ECIL, HAL, BEL, AICTE, ASL, other R &D and academic institutions.

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REGISTRATION FORM

Interested candidates can **fill registration** form at **https://forms.gle/pLkqPDuTne3MVSwQ8** before **09th October 2022.**

DD/Cheque should be drawn in favor of "The Director, NERTU, OU" (See the Details of Registration Fee below)

Or online payment through NEFT to "The Director, Eqpt. Maint., NERTU, OU",

Within India: A/C No. : 52198270713, IFSC: SBIN0020071 , Osmania University Branch, State Bank of India

Outside India: A/C No. : 52198270713, Swift Code: SBININBBH09, Osmania University Branch, State Bank of India

1. Name	
2. Designation	
3. Educational Qualifications	
4. Email	
5. Phone	
6. Organization with Address	
7. Professional Experience in Years a. Teaching b. Research/Industry	
8. Interested Areas of Research	
9. Interested To Register for (Tick the corresponding)	1. 5-day Short Course 2. 2-day Symposium 3. 5-Day School
10. Presentation of your work in 15 minutes in the Symposium	**YES** **NO**
11. Amount Paid Tick and write Transaction No. with Date	Rs. DD/Cheque/Online Payment
12. Signature of the Candidate/Sponsor	

For any details contact **CO-COORDINATORS, GNSS-22:**

Ch.Srinu, Research Scholar, NERTU, OU, Ph: 903 293 0657, sreenu471.ece@gmail.com

S.Saraswathi, Research Scholar, NERTU, OU, Ph: 994 899 1235, sirikondasaraswathi@gmail.com

COORDINATOR, GNSS-22, Prof.P.Laxminarayana, Director, NERTU, OU, Ph: 949 080 5486, laxminarayana@osmania.ac.in

Postal Address for sending DDs/Cheques: "**The Coordinator, GNSS-22, Research and Training Unit for Navigational Electronics (NERTU), Osmania University, Hyderabad 500007".** **Limited Accommodation is available on payment basis in the University Guest Houses based on First-Come-First Served.**

Registration Fee (Indian Rupees)

Registration Fee (including GST 18%)	5-Day Course (Offline/Online)	2-Day Symposium (Offline/Online)	5-Day School (Offline/Online)	Symposium & School (Offline/Online)	Course, Symposium & School (Offline/Online)
Students (Full Time)	3000 (3540)/2000(2360)	2000 (2360)/1500(1770)	5000 (5900) /3500(4130)	6000 (7080)/4000(4720)	8000 (9440)/5500(6490)
Faculty	5000 (5900) /3500(4130)	3000 (3540)/2000(2360)	10000(11800)/7000(8260)	12000 (14160)/8000(9440)	15000 (17700)/ 10000(11800)
Scientists & Engineers from R&D, Industrty	8000 (9440)/ 5500(6490)	5000 (5900)/ 3500(4130)	20000 (23600)/ 14000(16520)	22000 (25960)/ 15000(17700)	28000 (33040)/ 19000(22420)

GNSS-22: TENTATIVE SCHEDULE & SPEAKERS

5-Day Short Course and 2-Day Symposium				
	09.30-11.00	**11.30-13.00**	**14.00-15.30**	**16.00-17.30**
Day-01 **11 Oct 2022**	Principles & Architecture of GNSS Systems **Prof.P.Laxminarayana**	GPS Signal Structure **Prof.Sasibhushana Rao**	IRNSS Architecture & Signal Structure Comparison of All GNSS Systems **Prof.P.Laxminarayana**	GNSS Errors, Sources & DGPS Systems **Dr.Arjun singh**
Day-02 **12 Oct 2022**	Low cost GNSS receiver systems and guidelines to select GNSS receivers **Dr.Dinesh Manandhar**	WAAS-Civil Aviation **Dr.Chilaka Mahesh**	Geodesy, Coordinate Systems and Surveying **Shri K.V.Ramana Murthy**	GNSS compact modules and Application Developments **Dr.Anindya Bose**
Day-03 **13 Oct 2022**	GNSS: Science Applications in atmosphere and ionosphere **Dr.Nirvikar Dashora**	Harnessing GNSS signals for Atmosphere, Weather and Ocean Remote Sensing **Dr. Abhineet Shyam**	Time Scales **Dr Ashish Agarwal**	GNSS for Forest applications **Dr.A.R.Ramamurthy**
Day-04 **14 Oct 2022**	**Keynote Talk on NavIC and emerging navigation applications** **Dr.M.Saxena** **Keynote Talk on The Novel IZ4 Spreading Code Design for NavIC's L1 Signal** **Prof.P.Vijaykumar, Dr. Dileep and Ms.Sugandh Mishra**	**Keynote Talk on Kalman Filter-Based RAIM for Reliable Positioning with GNSS** **Dr.Susmita Bhattacharyya** **Keynote Talk on Navigation using Digital Map and GNSS System** **Dr.Narayana Panigrahi**	**Keynote Talk on GNSS Signal Security** **Dr.Dinesh Manandhar** **Keynote Talk on Functional Safety in Autonomous Vehicles - a GNSS perspective** **Smt. Padmavathi Ramanathan**	**Industry Talks**
Day-05 **15 Oct 2022**	**(9.00AM-11.15AM)** **Keynote Talk on High Integrity Position, Navigation, and Timing (PNT) within the Android Mobile Phone Platform** **Prof.Dennis M Akos** **Keynote Talk by** **Dr.D.Sam Dayala Dev** **Keynote Talk on High-Accuracy Flight Vehicles Position and Velocity Estimation Techniques using NavIC Aided Inertial Navigation** **Prof.Hari Hablani**	**(11.45AM-1.15PM)** **Keynote Talk on Atomic Clocks** **Dr.Ashish Agarwal** **Keynote Talk on Precision Navigation System using Pseudolites Mounted on Airships** **Prof. Raj Kumar Pant**	**Keynote Talk on GNSS Systems – Standalone & Augmented** **Dr.Parimal Majitia** Presentations by Young Researchers (3)	Presentations by Young Researchers (3) **Keynote Talk on Pseudolite Based Navigation System for aviation Application** **Dr. Ashish K Shukla**

5-Day School				
	09.30-11.00	**11.30-13.00**	**14.00-15.30**	**16.00-17.30**
Day-06 **17 Oct 2022**	Review of GNSS Signal Structure **Prof.P.Laxminarayana**	GNSS Receiver Overview **Prof.P.Laxminarayana**	Miniaturized antennas for GNSS receivers **Dr.Ratheesh**	RF-Front Ends for GNSS Receivers **Dr.K.S.Parikh**
Day-07 **18 Oct 2022**	Acquisition **Dr.Saumi De**	Tracking **Dr.Saumi De**	Navigation Data Decoding **Shri Ankesh Garg**	Code Phase & Carrier Phase Pseudorange Measurements **Shri Ankesh Garg**
Day-08 **19 Oct 2022**	PVT Computation including satellites **Dr. Ashish K Shukla**	RAIM and TRAIM **Ch.Srinu and Dr.P.Laxminarayana**	Kalman Filter for Computation of PVT **Prof.Sasibhushana Rao**	Advanced Tracking Algorithms: Vector Tracking Loops **Dr.Susmita Bhattacharyya**
Day-09 **20 Oct 2022**	Inertial Navigation Systems **Shri Abdul Shukkoor**	Integration of GNSS and INS **Shri Abdul Shukkoor**	Mitigation of Effects of Multipath and Interference **Dr Mrs Shweta Shah**	**Demos by NERTU Team**
Day-10 **21 Oct 2022**	Theory of BOC, MBOC, CBOC **Dr.Lalitha Vadlamani**	Modern Signal Structure of GNSS systems **Prof.P.Laxminarayana**	GNSS Security Issues: Spoofing and Anti-Spoofing **Dr.Dinesh Manandhar**	**Valedictory Session**

SPEAKERS

Dr. Arjun Singh, Sakthi Aviation Consulting Services P Ltd

At present, Dr. Arjun Singh is Managing Director of Sakthi Aviation Consulting Services P Ltd, New Delhi and working in aviation field. Prior to that, He was Program Director for US-India Aviation Cooperation Program (ACP) in Indo-American Chamber of Commerce (IACC). During this period, he published a first book on "Airport Ground Navigation Systems" in the year 2011, when India was celebrating centenary of Indian Civil Aviation. Second book on "Basic Airport Management" is also published. He has enriched experience in Project Monitoring & Implementation, Communication, Navigation and Surveillance/Air Traffic Management (CNS/ATM) Planning, Installation, Testing, Commissioning and Maintenance of CNS system for the last 25 years' service in Civil Aviation Department / National Airports Authority / Airports Authority of India in the Indian aviation sector. He was also Secretary to Ajay Prasad's Committee on "Futuristic Air Navigation System Master Plan" and completed the task in Feb-2008. This report was submitted to Ministry of Civil Aviation, Government of India, for acceptance and implementation. This report is called "Ajay Prasad Committee Report" which is available on Ministry of Civil Aviation and Airports Authority of India website. He did Bachelor of Engineering from M.M.M. Technical University, Gorakhpur (UP) in the year 1977 and Master of Business Administration - Finance in the year 1993. He also received M.E. degree in Microwave and Radar Engineering from Osmania University, Hyderabad (A.P.) in the year 1995 and received Ph.D. (Electronic and Communication Engineering) degree in the year 2005 from Osmania University, Hyderabad (AP).

Dr. Gottapu Sasibhushana Rao, Andhra University

Dr. Gottapu Sasibhushana Rao is a Senior Professor in the Department of ECE, Andhra University College of engineering, Visakhapatnam. He obtained Ph.D. from Osmania University, Hyderabad. 50 Ph.Ds. are awarded under his guidance. Authored 5 Text Books, published more than 200 SCI/Scopus journals. He has been granted 5 patents including IPR and Australian Government. He has 18 years of industrial experience (In Ministry of civil aviation, Govt. of India) and 15 years of teaching experience. Several research projects are completed successfully for Govt. of India.

Dr. Dinesh Manandhar, University of Tokyo

Dr. Manandhar is an Associate Professor (Project) at The University of Tokyo. He did his Ph. D. from the same university in 2001. He is currently working in the field of GNSS signal authentication and developing a new signal for Japanese navigation system "QZSS" for signal authentication services. He has been conducting several trainings, workshops, seminars and webinars around the world to promote GNSS technology. He is conducting several pilot projects and joint research in collaboration with universities basically in Asia. His research interests are GNSS signal analysis, anti-spoofing and signal authentication, low-cost high-accuracy receiver system development, indoor navigation using GNSS and other sensors such as UWB. He is one of the developers of IMES (Indoor Messaging System) for indoor navigation. He has also coordinated to develop several low-cost systems for RTK, MADOCA-PPP, Dynamic Air Quality Monitoring and GNSS based Road Pricing System (prototype). He is a member of ICAO/NSP working group that is related with SBAS DFMC signal authentication.

Dr. Chilaka Mahesh, Airport Authority of India

Dr.Chilaka Mahesh is Senior Manager (CNS) at Airport Authority of India. He received Ph.D. from JNTU, Hyderabad. He did advanced M.S (Air Navigation) From Ecole Nationale de l'Aviation Civile (ENAC), France, M.Tech from JNTU Hyderabad and B.E (ECE) from Sir CRR College of Engineering. He has contributed towards the Integrity & Continuity of ILS system: In the part of ICAO safety oversight audit in CNS HIAL, 2012.

K.V. Ramana Murty, Survey of India

K.V. Ramana Murty is Superintending Surveyor at Survey of India, Hyderabad. Presently working as Teaching Faculty of Geodesy in Indian Institute of Surveying & Mapping, Survey of India He is involved various types of Surveying Tasks across India and their monitoring like Topographical Surveys, Cadastral Surveys across India, Hydro-electric Projects in Himachal Pradesh state, Boundary surveys etc.He has around 25 years of field experience. Lifetime Achievement :Went to the icy continent Antarctica as a member of Indian Scientific Expedition to Antarctica and carried out Surveys for the 3rd Indian Antarctic station i.e. "Bharati" also carried out the Topographical surveys around 2nd Indian Antarctic station Maitri surroundings and interior areas.

Dr Anindya Bose, University of Burdwan

Dr Anindya Bose is working as Senior Scientific Officer in The University of Burdwan, India with teaching and R&D responsibilities. He is alumnus of CSIR-National Physical Laboratory, New Delhi and ISU, Strasbourg, France, recipient of URSI Young Scientist Award; Fellow, IETE, India, Member, IEEE, ISRS, ASI and IGNSS. His research interests include Global Navigation Satellite System (GNSS), Microwaves Antenna and RF Communications.

Dr. Nirvikar Dashora, NARL

Dr. Nirvikar Dashora completed M. Sc. in Physics in the year 2002, M. Tech. in Space and Atmospheric Science from Physical Research Laboratory, Ahmedabad in 2004. He completed PhD Physics in the year 2007 on "ionospheric TEC and Scintillation using GPS. He was the first from India to report effect of Ionospheric TEC depletions and scintillations on GPS signal in year 2005 and again the first to report the effect of geomagnetic storms on GPS-TEC in Indian sector. He joined as Scientist-Engineer-SD at NARL in 2007. He has been developing a ground network of GNSS receivers for high resolution imaging of ionosphere. He is presently working as Sci/Eng.-SF.

He has also worked for ISRO-GAGAN project in capacity of Ionosphere Working Group member and contributed significantly to the project in defining critical issues related with Storms, TEC depletions and scintillations. He has been a reviewer in several international and national journals like JGR, Radio Science, ASR etc. His contribution as a reviewer earned him award of "Editors' Citations for Excellence in Refereeing" by American Geophysical Union-2015 for his critical and in-depth scientific reviews of papers in AGU. He has published 22 papers in peer-reviewed national and international journals and presented more than 40 papers at various conferences. With the advent of IRNSS/NAVIC, he aims to develop scientific applications of this uniquely configured constellation along with GNSS using ground and Satellite based experiments. He has organized workshops on GNSS/IRNSS applications and has delivered lectures on this subject at various platforms.

Dr. Abhineet Shyam, SAC-ISRO

Dr. Abhineet Shyam is a post-graduate in Physics from Delhi University and received his doctoral degree in Physics from Gujarat University. He joined Space Applications Centre of ISRO at Ahmedabad in 2008 as Scientist. He started his scientific work with designing and implementation of operational retrieval algorithm for Megha-Tropiques ROSA instrument gives profiles of atmospheric temperature and water vapour partial pressure from GNSS radio occultation technique. He is also keenly involved in using radio occultation technique for planetary atmosphere of Venus and Mars. He is a member of the ISRO-JAXA joint science team for AKATSUKI radio science instrument dedicated to exploring Venusian atmosphere. He is also member of ISRO's future Mars mission MOM-2 which shall carry a radio occultation instrument. Recently, he is involved in using GNSS signals of opportunity for ocean wind remote sensing, a fast-emerging branch also known as GNSS- Reflectometry. He has several papers and scientific reports to his name. He has contributed to the chapter on GNSS remote sensing for the book "Fundamentals of Remote Sensing" 3rd edition, by Dr. George Joseph. He has delivered invited talks on GNSS based atmospheric and oceanic remote sensing at several institutes/universities.

Dr Ashish Agarwal, NPL

Dr Ashish Agarwal is Head of Indian Standard Time Division at CSIR-National Physical Laboratory and Professor of Academy of Scientific & Innovative Research. Dr Agarwal has M.Sc. Physics degree from Indian Institute of Technology (IIT) Kanpur and Ph.D degree from Jawaharlal Nehru University in Delhi. His postdoctoral research work was performed at AIST Japan and Northwestern University, USA. He has held various positions at CAT Indore, TIFR Mumbai, IIT Delhi, NPL United Kingdom, and ICTP Trieste Italy. His research areas are Time and Frequency Metrology, Quantum Optics, Nonlinear Optics, Laser Spectroscopy, and Atomic Physics. He has also worked on Squeezed states of light, Optical Kerr Effect and Coherent Optics. He was involved in the development of Rubidium Atomic Clocks for India's Navigational Satellite system, NavIC. Currently Dr Agarwal is responsible for National Atomic Time Scale with international traceability to Universal Coordinated Time (UTC), which generates UTC (NPLI) and Indian Standard Time (IST). His group performs the maintenance of Primary Time Scale, Backup Time Scale, Traceability Link to BIPM's UTC, Calibration Services, Traceability to ISRO time scales in Bangalore and Lucknow, and R&D on Cesium Fountain and Optical Frequency Standard. He is leading National Time Dissemination project creating Time scales in Faridabad, Bhubaneswar, Ahmedabad, Guwahati and Bangalore. Dr Agarwal also serves as an associate editor of MAPAN, an international journal from Elsevier. He is a Conformity Assessment Body, NABL's assessor and trained in maintenance of quality infrastructure as per ISO 17025 guidelines. His contributions have been recognized by the Honorable Prime Minister, Shri Narendra Modiji, who dedicated National Atomic Time Scale generating Indian Standard Time to the nation on 4th January 2021 and declared CSIR-NPL as the Time Keeper of India. Dr Agarwal's work led to the major reduction in the uncertainty of Primary Time Scale from 20 ns to 7.2 ns and finally to 2.8 ns. Honorable PM emphasized that "Achieving the accuracy level of 2.8 nanosecond is a huge capability in itself. This will be a big help for organization like ISRO who are working with cutting edge technology. Modern technology related to banking, railways, defense, health, telecom, weather forecast, disaster management and many similar sectors will be benefited greatly from this achievement".

Dr. Rama Murthy Anumula, TSFD

Dr. Rama Murthy Anumula, Assistant Conservator at State forest Service, Telangana. He is completed Ph.D. from JNTUH, on Geospatial technologies for conservation of soil, water and forest resources for sustainable livelihoods. M.Sc and B.Sc from Osmania University. He held various posts in TSFD, like Forest Divisional Officer, Forest Range Officer/Project Manager (GIS).

Dr. Manish Saxena, ISRO

Dr. Manish Saxena is the Director of Satellite Navigation Programme Office at ISRO Headquarters, Bengaluru. He leads the initiatives for adoption of indigenous NavIC system in the civilian sector and in important national projects. He is working closely with the various government departments and industry experts in this regard. He has also contributed for the inclusion of NavIC into national and international industry standards.

Dr. D Sam Dayala Dev, IISU-ISRO

Dr. D Sam Dayala Dev is a Distinguished Scientist and is the Director of IISU since July 1, 2017. He has also taken charge as Director of Indian Institute of Space Science and Technology on January 20, 2022. Prior to taking over as Director, IISU, he was the Associate Director of IISU and Deputy Director of Advanced Inertial Systems Area which is responsible for the design, development and production of advanced inertial sensors such as ISRO ring Laser Gyro (ILG), Ceramic Servo accelerometer (CSA), Advanced Inertial Navigation Systems (AINS) for LV MK3 and Precision Scan mechanisms for Spacecraft payloads. He has more than 30 years of experience in the design, analysis and simulation of inertial sensors, actuators, systems and mechanisms. He has specialized in Rotor dynamics of turbo rotors and momentum wheels, passive vibration control of precision rotors, harnessing micro-vibrations for inertial sensors and actuators. Under his leadership IISU has developed and successfully operating in space Magnetic levitated Reaction wheels and high dynamic capable Control Moment Gyroscopes for agile Spacecrafts such as Cartosat 3. Currently leading teams in developing autonomous Navigating systems with ultra-stable inertial sensors such as Hemispherical Resonator Gyro (HRG) for long duration missions of ISRO and vision based navigation system. Synergising the multi domain expertise and knowledge base of IISU teams, he has initiated AI and ML enhanced Space Robotics activity. The Smart Space Robot (SSR), a technology demonstrator for space debris management and Half-humanoid for first unmanned Gaganyaan mission as an astronaut assistant are being developed under his active involvement and leadership.

Dr. D Sam Dayala Dev had graduated in Mechanical Engineering from College of Engineering Guindy, Chennai, did his masters from IIT, MADRAS and doctorate from IIT, Guwahati in the area of non-contract nanofinishing with plasma. He has been deputed as mechanical expert for design review in other Space organisations like CNES. Dr. Sam Dayala Dev is recipient of ISRO Performance Excellence award, ISRO Merit award and few ISRO Team leader and team excellent awards, ISRO-ASI award for performance excellence in Rocket and related Technologies (Rocketry). He is a Fellow of Aeronautical Society of India. He has to his credit various publications in National and International journals and book chapters on advanced manufacturing methods and precision engineering and holds many patents as first inventor.

He is a strong proponent of industrialisation of inertial sensors production in India and has adopted aggressive initiatives to indigenous electronic components involving Indian Academia and Industries. He is a nature lover and his hobbies are trekking and nature camping.

Prof. P.Vijay Kumar, IISc

P. Vijay Kumar received his B.Tech. and M.Tech. from IIT Kharagpur and Kanpur, and his Ph.D. degree from USC in 1983, all in Electrical Engineering. From 1983 to 2003 he was on the faculty of the EE-Systems Department at USC. From 2003-2021, he was a Professor at IISc, Bengaluru, where he is currently an Honorary Professor. His current research interests include codes for low-latency communication, codes for distributed storage, and low-correlation sequences. He is a recipient of the 1995 IEEE Information Theory Society Prize Paper award and the IEEE Data Storage Best Paper Award of 2011/2012. A pseudorandom sequence family designed in a 1996 paper co-authored by him formed the short scrambling code of the 3G WCDMA cellular standard. The IZ4 family of spreading codes co-designed by him will be incorporated by ISRO into the new civilian L1 signal of the NavIC satellite navigation system. He received the Rustum Choksi Award for Excellence in Research in Engineering in 2013 at IISc and a 2018-2023 J. C. Bose National Fellowship. He was on the Board of Governors of the IEEE Information Theory Society from 2013-15 and was a plenary speaker at ISIT 2014. He is a Fellow of the INAE, IAS and INSA Indian academies and a Fellow of IEEE.

Dr. Dileep Dharmappa, NSA, ISTRAC, ISRO

He is Engineer/Scientist at ISTRAC-ISRO. The IZ4 family of spreading codes co-designed by him will be incorporated by ISRO into the new civilian L1 signal of the NavIC satellite navigation system.

Ms. Sugandh Mishra, SAC-ISRO

Ms. Sugandh Mishra has obtained Bachelor's degree in Electronics and Communication Engineering from the Utter Pradesh Technical University in 2008. She is working as scientist/engineer in Space Applications Centre, ISRO since 2009 in the field of satellite navigation. She is the key designer of NavIC and Pseudolite signal simulator developed at SAC and currently working as Project Manager for CDMA PRN code design for upcoming satellites for NavIC/IRNSS Project. She is part of IISc-ISRO team that developed the indigenous and Novel Interleaved Z4 PRN codes for NavIC L1 satellite signal. Her research interest are in the field of PRN code design, satellite navigation, FPGA based design and simulation of GNSS signals.

Prof. Hari B. Hablani, IIT Indore

Dr. Hablani is a former Boeing Technical Fellow. Presently, he is an INAE Professor and Technologist at Department of Astronomy, Astrophysics and Space Engineering, IIT Indore. During 2008-2018, he was a Visiting Faculty at IIT Kanpur, IIT Bombay, IIT Gandhinagar, and IIT Indore. In these positions, he taught courses on spacecraft attitude dynamics, estimation, and feedback control; aided inertial navigation; Kalman filtering; and space flight mechanics. He conducted research with Ph.D., M. Tech. and B. Tech. students in satellite-based navigation of satellites, missiles and aircraft using NavIC (Navigation with Indian Constellation); spacecraft and payload attitude determination, attitude maneuvers and precision pointing control; missile guidance with onboard radar and infrared sensors; and underwater vehicles navigation. Dr. Hablani was at the Boeing Company for twenty-six years. There, he was responsible for the design and analysis of precision pointing and control of surveillance and tracking and remote sensing spacecraft and payloads including rendezvous navigation, guidance, attitude determination and control; interplanetary spacecraft control; navigation and guidance of exo-atmospheric interceptors. He has numerous publications and awards, including The Aeronautical Society of India - Excellence in Aerospace Education award. He is an AIAA Associate Fellow. He was an Associate Editor (AE) of the AIAA Journal of Guidance, Control and Dynamics, and IEEE Transactions on Aerospace and Electronic Systems. He was an Engineer of the Year at Rockwell International. He is a Fellow of the Indian National Academy of Engineering. He earned his Ph.D. at the Department of Aerospace Engineering, Indian Institute of Science, Bangalore, India, of which he is a Distinguished Alumnus.

Smt. R Padmavathi, Jasmin Infotech Pvt Ltd.

Padmavathi R is the Business Line head for Automotive Network and R&D in Advanced Technologies at Jasmin Infotech Pvt Ltd. A Certified Project Management Professional (PMP), she builds the pipeline to grow organization capabilities geared towards Automotive Business Unit vision, develops IP, and collaborates in joint pilot programs with Customers for Proof-Of-Concept. Prior to Jasmin Infotech, Padmavathi worked at Analog Devices Inc (Project Lead, Audio group), Couth Infotech Pvt Ltd (Team Lead, DSP Software Engineer) and KLA-Tencor (SW engineer, E-beam metrology), San Jose. Padmavathi holds a bachelor's degree in Electronics and Communication Engineering from Osmania University, India and a Master of Science degree in Electrical Engineering from Villanova University, Pennsylvania, USA.

Prof. Rajkumar S. Pant, IIT, Bombay

Prof. Rajkumar S. Pant has Bachelors, Masters and Ph.D. degrees in Aerospace Engineering. His areas of specialization include Aircraft Conceptual Design, Air Transportation, and Optimization. He has been a member of faculty of Aerospace Engineering Department at the Indian Institute of Technology Bombay since December 1989. Prof. Pant is an alumnus of College of Aeronautics, Cranfield University, UK, where he earned his Ph.D. under Commonwealth Scholarship Scheme, and IIT Madras, where he did his Masters in Aeronautical Engineering. He has also worked for five years in Hindustan Aeronautics Limited in the Design & Engineering Department at Kanpur (3.5 years) and Nasik (1.5 years) Divisions. In 2002, he set up a Lighter-Than-Air (LTA) systems laboratory at IIT Bombay, which has undertaken several R&D and Consultancy projects related to design, development and demonstration of LTA systems. He has been an international member of AIAA's Lighter-Than-Air Technical Committee for over a decade starting 2007, and was the Chairperson for 2014-16. He has published and presented > 270 scientific papers, of which > 190 are in international journals and conferences. He has also visited several top-ranking institutes and universities all over the world. Prof. Pant was a visiting faculty at Department of Mechanical and Aerospace Engineering at Nanyang Technological University in 2016, and Department of Aerospace & Ocean Engineering at Virginia Polytechnic Institute and State University in 2010-11. He was a visiting researcher at Instituto Tecnológico de Aeronáutica, Brazil in 2012, Texas A&M University in 2011, Cambridge University in 2008, and Imperial College London in 2006. In 2102, he was appointed as a Special Visiting Researcher under the Science without Borders program of the Brazilian Government for a three-year project related to design and development of Hybrid Lighter-Than-Air systems. Prof. Pant was honoured with the D P Joshi Excellent Teacher Award in 2014, Hotchand and Jamunabai Lala Teaching Award in 2021, and Departmental Award for Excellence in Teaching in 2022. In 2019, he was felicitated by Institution of Engineers (India) as an Eminent Engineering personality in Aerospace Engineering. Recently, he received Special Recognition in Academic Excellence (Faculty-National category) award by Institution of Engineers (India), as part of 4th Biennial International Conference on Nascent Technologies in Engineering held in January 2021.

Dr. Susmita Bhattacharyya, IIT, Kharagpur

Dr. Susmita Bhattacharyya is an assistant professor in the Department of Aerospace Engineering at Indian Institute of Technology, Kharagpur. Prior to that, she was a project leader at Accord Software and Systems, Bangalore, India. She received her Ph.D. degree in aerospace engineering and mechanics from the University of Minnesota-Twin Cities, Minneapolis, USA. Her research interests include advanced GNSS receiver architectures, integrity monitoring and sensor fusion. She was the recipient of the Institute of Navigation's 2012 Bradford W. Parkinson Award for graduate student excellence in GNSS for her Ph.D. thesis titled Performance and Integrity Analysis of the Vector Tracking Architecture of GNSS Receivers.

Dr Narayan Panigrahi, CAIR-DRDO

Dr Narayan Panigrahi has received PhD from Indian Institute of Technology (IIT), Bombay, MTech (Computer Science and Data Processing) from IIT, Kharagpur, MSc (Computer Science) from J K Institute of Applied physics and Technology, University of Allahabad in the year 2012, 1999 and 1991 respectively. He is the recipient of Governor's gold medal and best graduate of Berhampur University, Odisha in the year 1987. He has authored Seventy (70) research papers in peer reviewed journals and conferences. He is the inventor of six (6) Indian patents and has authored nine books (9) and one book chapter in the field of Geographical Information Science and System (GI Science and GIS). The books entitled "Geographical Information Science", "Computations in GIS" and "Brain Computer Interface" are some of his noteworthy academic work used in the academic curriculum worldwide. Couple of his research publications is adjudged for best research award by INRIA, France and IEEE Computer Society. He is awarded with National Science day medallion in the year 2008. Received DRDO award for performance excellence in 2009. DRDO technology award in 2005, 2012 and 2019National Award for Geo-Spatial Excellence in Year 2019 by Indian Society of Remote Sensing.DRDO award for Excellence in Self Reliance in the year 2019.At present he is pursuing his research in the Center for Artificial Intelligence and Robotics (CAIR), a Defence Research and Development Organization (DRDO), laboratory in Bangalore, India. He led a team of scientists to design and develop Geographical Information System (GIS) indigenously which has resulted in transfer of technology to BEL, Bengaluru integrating the system with various indigenously developed technologies. His research interest includes GI Science and System, Digital Image Processing and design and development of robust computational methods in Spatio-Temporal data visualization and analysis. He is a key-note speaker in many national and international conferences. He is a fellow of IETE, and life member of Computer Society of India (CSI) and ISRS (Indian Society of Remote Sensing)

Shri. Parimal Majithiya, SAC-ISRO

PARIMAL MAJITHIYA did his M.Tech in Satellite Communication from Andhra University India. He extensively worked in INSAT-2, INSAT-3, GSAT series and METSAT. He contributed in the areas related to regional satellite mobile communication system, Satellite Aided Search and Rescue on-board processor and Optical Inter Satellite Link for data relay system. He has also given a novel onboard down link rain fade mitigation technique for multibeam Ka-band system. Presently he is working as Associate Project Director – IRNSS Payload Development. He contributed in defining IRNSS system configuration and signal structure. He designed IRNSS navigation and ranging payloads. He also defined navigation payload performance parameters specification. He has developed many navigation specific hardware for satellite, like; modulation scheme, signal switching, onboard clock setting and its synchronization etc. He also developed many measurement techniques for IRNSS navigation payload. He contributed in In-Orbit Test campaign of IRNSS satellites. Presently working for NavIC – 2 Series payloads development.

Prof. Dennis Akos, University of Colorado, Boulder

Dennis Akos completed the Ph.D. degree in Electrical Engineering at Ohio University within the Avionics Engineering Center. He has since served as a faculty member with Luleå Technical University, Sweden, and then as a researcher with the GPS Laboratory at Stanford University. Currently, he is a faculty member with the Aerospace Engineering Sciences Department at the University of Colorado, Boulder. His research interest include GPS/GNSS, Software Defined Radios, and RF Engineering. He was a co-founder of NordNav Technologies and is a fellow of the Institute of Navigation.

Dr Ashish Kumar Shukla, SAC-ISRO

Dr Ashish Kumar Shukla is working as a scientist in Space Applications Centre (SAC), ISRO, Ahmedabad, since May 2005. He received his Ph. D. Degree in Mathematics from Lucknow University, Lucknow in year 2003. He is working in the field of Satellite navigation for more than 17 years and has contributed significantly in Satellite navigation programs of ISRO. He had privilege to work in India's two most significant navigation programs: GAGAN and IRNSS since their inception. Currently, he is working in IRNSS User Receiver Development project and is a member of the team which has developed NavIC user receiver and NavIC Payload Test Receiver. Dr Shukla is also Deputy Project Director (DPD) of Reusable Launch Vehicle (RLV) project of ISRO for Pseudolite System and he is leading the team which has developed Pseudolite Based navigation System for precise landing of aerial vehicles such as RLV. His research interests include development of navigation algorithms and applications for NavIC, GAGAN, Pseudolite and LEO GNSS. He has more than 55 publications in peer reviewed journals and conferences. Dr Shukla is recipient of Team Excellence Award of ISRO and National Geomatics Award-Technology.

Dr. K S Parikh, SAC-ISRO

Dr. K S Parikh is working in Space Applications Centre, ISRO, Ahmedabad since 1986. He has worked for the design and development of payload system design, active and passive RF sub-systems of Communication and Navigation Payloads for satellites. He has worked for the design and development of navigation user receivers for IRNSS and GPS. He was also responsible for the design of Satcom ground terminals for mobile satellite service using GSAT-6 satellite. He is recipient of ISRO merit award 2016 and other team excellence awards. He is currently Associate Program Director for GEOSAT payloads and Deputy Director of Satcom and Navigation Payload Area at SAC.

Dr. R.Ratheesh, CMET, Hyderabad

Dr. R. Ratheesh completed Ph.D. in Physics from Kerala University in the year 1995. He worked as Scientist at Centre for Materials for Electronics Technology (C-MET), Thrissur from 1997 to 2016 and heading the microwave materials research activity. Currently he is the Director of C-MET, Hyderabad. He is recipient of many postdoctoral fellowships abroad which include Alexander von Humboldt fellowship at University of Osnabrueck, Germany, BOYCAST fellowship at State University of New Jersey, USA, Lady Davis fellowship at Solid State Institute, Technion, Israel, DIST bilateral fellowship at Department of Physics, University of Western Australia, Australia etc. His research group has successfully developed a patented process jointly with VSSC, ISRO for the fabrication of Super high Q Barium Magnesium Tantalate (BMT) dielectric resonators having more than 2,00000 quality factor for space communication applications under Indigenization of Space Materials Programme. BMT technology is transferred to two private industries viz. Shajanand Laser Technologies Ahmedabad and M/s. Ant Ceramics, Mumbai for commercial production. In addition, an indigenous process methodology coined as SMECH process has been developed by his research group for the fabrication of planar Cu-cladded microwave substrates, which is an embargo item for Indian strategic sectors. Two US patents and One Indian patent were awarded for this innovation to protect the intellectual property rights. This technology is transferred to M/s. Speedlam Electromaterials Private Limited, Hyderabad for commercial production Dr. Ratheesh published more than 100 research papers in International Peer review Journals, 8 patents, and two book chapters and delivered more than 150 invited lectures. Dr. Ratheesh bagged Young Scientist award from Government of Kerala in the year 2000, PSN National Technology Award in 2011 and ELCINA-EFY Award for excellence in outstanding R&D in 2016-17.

Shri. Abdul Shukkoor, IISU-ISRO (Rtd.)

Abdul Shukkoor A, an Outstanding Scientist, DyDirector (Rtd.) –Launch Vehicle Inertial Systems, ISRO Inertial Systems Unit /VSSC/ISRO, Trivandrum. Completed M.Sc, M.Phil from Kerala University. He has 36+ years industrial experience in ISRO, Guest faculty at IIST (Indian Institute of Space Science3 & Tech. –2018, 2019 (for Course- Navigation Systems & Sensors, Guest faculty: - 2015, 2017 for DIAT (Defense Institute of Advance Technology), Pune. Consultant: Skyroot Aerospace, Hyderabad/ Agnikul Aerospace, Chennai/ Space Lab, Thiruvananthapuram. Awards: ISRO Merit award/Team excellence awards, Vikram Award of System Society of India. Contributions: Analysis Design & development of Strapdown Inertial Navigation System, GNSS aided INS systems, Multi sensor integrated Navigation systems for multi-mode missions, Inertial Navigation Algorithm, Flight Software Engineering, Nav system modelling and simulation, Kalman Filter for integrated Navigation.

Dr. Shweta Shah, NIT, Surat

Dr. Shweta Shah is an Assistant professor in the Department of Electronics Engineering, SVNIT, Surat. She has 15 years of teaching and 8 years of research experience. She was published 30 journal papers, 21 conference papers and 6 book chapters. She guided to 5 Ph.D. students and now guiding 5 Ph.D. students. Industry/project collaboration with ISRO Ahmedabad, Unistring Tech Solutions Pvt. Ltd., Hyderabad, Elena Geosystem, Pune and SGCCI. Till now she has completed 2 projects for ISRO (approx.: 49 lacs) and 4 UG Projects

from TEQIP III (2.8 lacs). Present ongoing project is funded by DST (24.8 lacs). She is an advisory committee member for ASHINE NIDHI-TBI, SVNIT. She is a member of IETE, IEEE, ISTE and ION.

Dr. Lalitha Vadlamani, IIIT, Hyderabad

Dr.Lalitha Vadlamani is an Assistant Professor, IIIT Hyderabad. Completed Ph.D. and M.E from IISC, Bangalore and B.E from Osmania University. Previous work experience: Conexant Systems India Private Limited, Noida, Sept 2006-July2008, Project: Baseband System Design for MOCA (Multimedia Over Coaxial Alliance) chip; Qualcomm India Private Limited, Hyderabad, Jan 2006 - Aug 2006, Project: Development of Signal Processing Algorithms for Qualcomm's DSP platforms; Honeywell Technology Solutions Lab, Bangalore, Aug 2005 - Dec 2005,Project: Predictive Trend Monitoring and Diagnostics of Auxiliary Power Unit (APU) in aircrafts. Reviewer for IEEE Transactions on Information Theory, IEEE Transactions on Wireless Communications and various conferences including ISIT, SPCOM, ICC, WCC, NetCod and NCC.Volunteer for International Conference on Signal Processing and Communications (SPCOM) 2010 held in Bangalore, India. Her research areas are Coding Theory, Information Theory, Signal Processing and Distributed Storage Systems

Dr. Saumi De, SAC-ISRO

Dr.Saumi De is a Scientist/Engineer 'SG', Head, Navigation Receiver Division, SSAA, SAC, ISRO. ME in Electronics and Communication Engineering, from Jadavpur University, 2000 Joined SAC, ISRO in 2000. Working in Navigation Receiver domain from 2008 onwards. Worked in design, development, simulation and implementation of signal processing algorithms on FPGA target board for different variants of Navigation Receivers; namely NavIC+GPS hybrid receiver with GAGAN correction capability, NavIC payload test receiver, NavIC configurable short & long code RS receiver, Pseudolite receiver etc. Received Space Gold Medal from ASI (Astronautical Society of India) in the year 2009. Also received 2013 ISRO Team Excellence Awards, as team member of first Payload Test IRNSS Receiver team. Now her team has successfully developed 36 channel base-band ASIC chip, supporting both SPS and short RS NavIC signal. Currently she is working on new signal and data structure of NavIC L1 signal and direct acquisition of long code.

Shri Ankesh Garg, SAC-ISRO

Ankeah garg completed B.Tech and M.Tech in Electrical Engineering from IIT Kanpur with specialization in Antennas. Joined SAC/ISRO in 2011. Since then working for the design and development of Navigation Receivers for strategic users of IRNSS. As a part of team delivered navigation receivers for various applications such as payload test receivers, positioning mode receivers and receivers for launch vehicle such as PSLV and GSLVs. Awarded ISRO YOUNG SCIENTIST AWARD. Awarded ISRO Team Excellence award for the design and development of first IRNSS baseband ASIC manufactured in SCL, Chandigarh. The ASIC is successfully realized and flown as a piggyback receiver in launch vehicles.

Dr. Laxminarayana Parayitam, NERTU, Osmania

Dr. Laxminarayana Parayitam is Professor and Director of Research and Training Unit for Navigational Electronics, Osmania University, Osmania University, Hyderabad, Bharat (INDIA). At present, his areas of research interest are Signal Processing, Communication, and Navigation for Development of Real-Time GNSS software Receivers, Autonomous Navigation for Indoor and Outdoor Environments, Bio-Mimicking Navigation, Speech technologies, and Instruments for Biotech Industries. He is passionate about industry-institute interaction and start-ups. His GNSS team of Ph.D. and Masters Students have developed the Real-Time IRNSS/NavIC Software Receiver running on PC/Laptop with MATLAB and C/C++ platform. Another team is also working for Hybrid navigation by integration of GNSS with other navigation systems.
He has conducted almost 30 short term courses/workshops and schools in the area of GNSS for scientists, engineers, academicians, and students, as Coordinator cum Faculty Member.

Established and lead a 13-member team of "DSP and Audio Processing Technology" group at Hyderabad Development Centre (HDC) of Analog Devices Inc.(ADI) during 2003-2005. After returning from ADI to OU, ADI has funded to establish a Multimedia and ADSPs laboratory at Osmania University. Later, he was also Consultant to ADI and Lantiq Communications India Pvt. Ltd. Two groups of students/alumni members of OU are working in collaboration with him to develop new products with two start-ups in the areas in Speech Technologies and Instruments for Biotechnology industries.

He has Executed 14 sponsored and 06 Consultancy projects from public and private organizations as Principal Investigator and Co- Investigator. Recently he has completed two projects funded by ISRO under RESPOND scheme and MoU with IISU-ISRO for Speech-To-Speech interface for Humanoid in the Gaganyaan Mission. At present he executing another consultancy project on development of GNSS receiver algorithms for RAIM, TRAIM and mitigation of effects of multipath and interference, with an MoA between CRL-BEL and NERTU-OU.