



भारतीय अंतरिक्ष विज्ञान एवं प्रौद्योगिकी संस्थान Indian Institute of Space Science and Technology

Convocation Address

Dr. K. Radhakrishnan

Member, Space Commission

Address by President, GB, IIST

Shri. S. Somanath

Chancellor's Address

Dr. B. N. Suresh

Director's Report

Dr. S. Unnikrishnan Nair



ग्यारहवां दीक्षांत समारोह Eleventh Convocation

18 अगस्त / August, 2023



Dr. K. Radhakrishnan

Member, Space Commission
Former Secretary, Department of Space

Hon'ble Chancellor and the founder-Director Dr. B.N. Suresh, Admirable Indian Space Chief & President GB of IIST Shri S. Somanath, Eminent Director of VSSC and IIST Dr. Unnikrishnan Nair, Illustrious Guest of Honour, and Director of LPSC Dr. V. Narayanan, Esteemed Members of Governing Body and Board of Management, Erudite Deans, Heads, and Academics of IIST, Resourceful Registrar and Non-academic Staff members, My dear graduating students and their Proud Parents, Distinguished Guests, Friends from the Media, Ladies and Gentlemen,

A very warm good morning to you all!

I am profoundly privileged to stand before this promising audience today on the momentous occasion of the 11th Convocation of the Indian Institute of Space Science and Technology. I am happy to witness 275 students receiving their degree today. Let me greet them, congratulate them for the coveted academic distinction of degrees and medals, and wish everyone of them a very bright and prosperous tomorrow.

My dear young friends, your hard work and intrinsic learning skills have paid off. Importantly, it is also a culmination of the sacrifices made by your parents, family, and spouses as well as the guidance and support of your teachers. Please bow in reverence to all of them, remember it all through your life, and bring laurels to your alma mater through your deeds. You will now join a select club of 3000 plus accomplished alumni, both within and outside ISRO, who are evolving a 'Brand IIST'.



On IIST- Some Musings and Prospects

The very idea of this institute was shaped by dawn of the mid-2000's, from a dire necessity of ISRO, a grand vision, an inventive architecture, and the generous Governmental support. That journey started with undergraduate programme in aerospace, avionics, and physical sciences. Those formative years were quite challenging and eventful, and several of your teachers shared the load with the beloved founder-Director Dr. Suresh. Delightfully now, IIST has positioned as a world-class institution in space education. Let me salute everyone who made this possible.

I cherish my little association with IIST right from the start of 2006. In fact, my reunion with parent centre VSSC was prompted with Dr. Suresh volunteering to shoulder this onerous task. That gave me opportunity to witness its transition to the permanent campus, and later, the responsibility to participate in the first two Convocations, held in 2012 and 2013.

Significantly, way back in April 2014, there was a moment of pride for some of us touring USA, when an alumnus of IIST was introduced before us as a highly rated graduate student the venerable California Institute of Technology (CALTECH). Establishing Satish Dhawan endowed fellowship at his alma mater CALTECH was, indeed, a unique opportunity then, to respect that the transformational leader of Indian Space programme Prof. Satish Dhawan, the decorated 'Legend of CALTECH'.



I continue to admire IIST's focus on the master's programmes in niche areas of space science and technology as well as the rapid rise in its doctoral programmes. The sounding rocket VYOM launched in 2012, the Retarding Potential Analyser lofted in 2019, and the INSPIRESat-1 orbited in 2022 stand testimony to the brilliance of your students, tenacity of faculty, and connect with ISRO. The Space Technology Innovation and Incubation Cell is a laudable initiative at IIST.

I complement the current leadership for the renewed strive to transform IIST in pursuit of academic excellence and aside a cultural transformation aside for a strong connect with ISRO as well as the emerging wings of space sector.

I wish that, in the near-future, IIST evolve as the beacon of futuristic knowledge, culture and ethics of the national space sector in its strive: (a) to gain prominence in 'New Space Age' accentuated by a new breed of space protagonists and commercial space enterprises, (b) to meet imminent imperatives of sustainable development, climate change and disaster risk reduction, (c) to stay abreast for leaping with aspirational initiatives in space exploration, space habitat, and exploitation of celestial resources, in the new world order. Humankind on Earth might transform themselves to an Interplanetary Society by 2050 with space habitats possibly in Moon and probably in Mars.



India's Higher Education System in Transition

In the recent years, I have had a rather intense engagement with our Higher Education System, especially in governance of Higher Educational Institutions (HEIs). The Indian higher educational system is in transition, with a huge emphasis on research, innovation, and entrepreneurship.

Delightfully, India has an amazing National Educational Policy (NEP 2020) in place. Posterity will be grateful to the thoughtful architects and visionary leadership for gearing up the nation into global prominence in a rapidly changing world.

- Firstly, NEP 2020 aims to transform India into a vibrant knowledge society and mould global citizens with critical thinking, conceptual understanding, and human values.
- Next, NEP2020 is a great enabler for multi-disciplinary education and research universities. The recently enacted National Research Foundation would foster a concomitant research ecosystem in the country.

An institutionalised arrangement has also been made for mobility of academics to research institutions and industry in executive roles, and for the reverse flow of mid-career functionaries to academia as Associate/Full Professor-of-Practice. Internationalisation of Higher Education is another highlight, with Indian high performing Indian HEIs opening



offshore campuses abroad, as well as reputed foreign universities coming to India.

Transformative reforms for strengthening the periodic assessment, accreditation and ranking of all HEIs are underway in a mission-mode, with a strategic intent i.e.: "Consistent with the Vision of NEP 2020, adopt, right away, a simple, trust-based, credible, objective and rationalised system for approval, accreditation and ranking of HEIs, with (a) a verifiable and secured centralised database, (b) technology-driven modern systems that could replace/minimise manual involvements and (c) mentoring and incentivising schemes for raising their participation as well as accreditation levels, towards eminence, significance and global acclaim." Such a transition is expected by the end of 2023.

Technology and Healthcare

Humanity scraped through the historic mutation of the pandemic that came with a bang and disrupted everyone's way of life, study, work, and interactions. In this new state of equilibrium, enhanced research at the interface of technology and medicine is paramount, aside emphasis of medical technology and higher education.

Let me elaborate on this point, citing an example that I am familiar with. Amidst the first wave of Covid-19 pandemic, IIT Kanpur resolutely responded to the clarion call of our Hon'ble Prime Minister and came up with a high-end yet affordable,



mechanical invasive ICU ventilator in a short span of 90 days. Behind this mammoth task, there was a team of technical faculty and researchers, experienced doctors, senior corporate leaders and alumni, technical and business leaders of medical devices industry, experts of supply chain and manufacturing as well as several young members of the Technology Business Incubator of this IIT. More than 5000 ventilators could be pressed into operation in several hospitals across the country. This is a pathfinder for the healthcare sector where nearly 80% of medical equipment is imported.

Prospects for IIST in Bioastronautics and Space Robotics

India is in the threshold of human spaceflight, and its logical extensions to higher levels of space habitat.

Space environment provides many challenges to astronauts, and space scientists, which are constantly subjected to unique conditions, including microgravity, radiations, hypoxic condition, and absence of the day and night cycle. These stressful stimuli have the potential to affect many human systems, triggering physical and biological adaptive changes called space motion sickness, or referred to in a more general was as space adaptation syndrome.

World is rapidly moving towards brain-inspired intelligent robots with visual cognition, computing, and motion control. A hybrid of Space Robotics and Human-based Space Exploration would be paramount in future. It is heartening that several



academic institutions and R&D Agencies in India have made commendable foray into these frontline technologies.

The academicians at IIST may wish to ponder over this as a fertile field for intense education and research since you are uniquely placed to take lead, with your symbiotic connect with ISRO.

Sharing a few life-lessons

More than five decades ago, Thumba was an emerging yet another wonderland of modern technology and a sought-after destination for hundreds of youngsters from all over the country. It was awe-inspiring. Dr Suresh and I belong to that genre, and incidentally both of us worked from the same laboratory under the tutelage of an inimitable space technologist Dr. S.C. Gupta and both of us fanned out, though differently.

Stalwarts of that genre were in their early 30's, yet they laid the bedrock of rocketry for India, and many of them sustained their self-less contribution to space science, technology, and societal applications far beyond their formal superannuation. The prime determinant of their professional longevity was a relentless pursuit of knowledge for adaptation in a transformative world, and the courage to step outside comfort zones. They could live with a satisfying feeling that there was a purpose in their life.



Our generation stood on the shoulders of these stalwarts and drew inspiration to venture into new turfs. Aside, we learnt the power of team excellence, self-belief, learning from failures (and successes) and resilience to leapfrog in adversities, and importantly the need to set goals rightly at the personal level and institutional level. Fortunately, there is a wealth of knowledge, well-documented and preserved for the posterity. Today, I am delighted to rub shoulders with the captains of the New-Gen Space in India who are making every Indian proud.

My dear friends, these stories must kindle you all as well. You are now stepping into a world that is waiting with many more challenges and immense opportunities. I shall conclude by restating my learning of life, some of which are documented in my biography:

1. 'Knowing' and 'Doing' are important for professional success; but 'Being' what you are, your character and conscience will elevate you as emulable ones.
2. Success is a tricky thing. It may or may not reflect the effort that you had put into it. The best thing is to concentrate on the tasks at hand. The results are not under your control; so why lose sleep over it!
3. Recall what Bhagavad Gita says: 'Handle the situation with equanimity, renounce all egocentric attachments, don't worry about the success or failure and act with equipoise in all situations.' But you need to prepare and prepare harder. Try to excel in whatever role that you take.
4. Every one of us will go through eclipses in our professional



life, and personal life too. Learn to balance work and life. Good health and happy family make you fit to take deep plunges.

5. We must not fear failure. Embrace adversities with steely nerves, take them as opportunities for you to evolve with it. It is difficult while you go through it; but at the end, you will thank those who placed the hurdles in front of you. This is how you evolve into higher planes of enlightenment and achievement. Be aware that you will have to walk, mostly alone, facing the odds that would come all at once.
6. While you are flying high, many would flock around with their own agendas. Beware of them, at the same time ensure that you identify and invest in your well-wishers.

You must choose wisely and create your own future. Exactly what you want to do and where you want to see yourself is up to you and your passion in life. While you walk on the way to personal growth and material wealth, you may like to be sensitive to the quality of life of the humankind and world around you. Particularly, it is well-said that we make a living by what we earn; we make a life by what we contribute.

Each one of us could live to leave behind a legacy and make a difference to the society we are a part of our nation and the humanity at large.

Wish you the very best in life.





Shri. S. Somanath

President, Governing Body, IIST
Secretary, DoS / Chairman, ISRO

Most respected Dr. K Radhakrishnan, Member Space commission and Chairman of the IIT council, who is the chief guest and delivering the convocation address.

Respected, Dr. BN Suresh, Honourable Chancellor, IIST and the founding Director and mentor of all of us.

Dr. S Unnikrishnan Nair, Director IIST, Director VSSC and Chairman, Board of Management of IIST.

Dr. V Narayanan, Director LPSC and the Guest of Honour.

Deans, Members of Faculty and Staff, Distinguished Guests, Degree recipients, Young and bright students, Parents, Ladies and Gentlemen;

Indian Institute of Space Science and Technology is a premier institute established in bringing out graduates of high standards in the field of science and engineering and also to serve and contribute to the nation building through the frontier of Space technology. Those who are graduating are the brand ambassadors of India's intellectual prowess like thousands of others who are serving in ISRO centres and other institutions.

The Indian Space endeavour, guided by the vision of our founder Dr. Vikram Sarabhai, focussed on use of space technology to find solutions to the problems of people and society and to empower the country to have a self-reliant space programme. This vision was shared and sustained as well as enriched by the successive leaders and members of the space



community. IIST is the product of such a vision as well, taken forward by many.

ISRO has developed expertise in solid, liquid and cryogenic propulsion technologies. Each of these systems is characterized by its complexity, efficiency and processing difficulties. The area of expertise available in ISRO is tremendous in the area of multidisciplinary systems engineering. Say it in, propulsion, control and guidance, aerodynamics, computational fluid dynamics, mission design, aero-thermal design, structural mechanics, mechanisms and pyros, mission simulation, avionics, checkout, testing and qualification philosophy, launch servicing, safety, quality.... So is the case with spacecraft technologies and space applications as well. There are people capable of understanding each of them separately and in aggregate in ISRO centres. I won't dwell on the accomplishments of ISRO at this moment, but would like to talk on the future.

Some of the immediate goals are to achieve substantial increase in throughput in the present generation of launch vehicles and spacecraft building with industry participation, while keeping the reliability and operability intact. We are also keen to induct new technologies keeping with the changing times. Bringing down cost of launch substantially through re-usable launch vehicle technology is very urgent. The SSLV should trigger rapid industrialisation of launch vehicle production in India for the emerging small satellite market. Vertical take-off and landing is one of the proven ways to recover expendable rockets



and we have to accomplish it with the development of semi cryogenic booster. Towards this a host of large scale system engineering activity are to be completed and many new technology elements to be developed and perfected. One such element is development of advanced miniaturised avionics and vehicle health management systems and AI driven tools, thus bringing more intelligence to rockets and spacecrafts in flight. New propulsion systems with LOX Methane engine is another. In the domain of spacecrafts and sensor technology also needs immediate attention. New sensors are to be developed which are compact, low cost, small foot print, intelligent for building spacecrafts for applications of earth observation, communication, surveillance, science and technology demonstrations. In the applications domain, quick turnaround, rapidly deployable systems are important as the technology residency period is small. With advent of convergence of communication, remote sensing and PNT services, spacecraft designs are changing rapidly.

With the announcement of space sector reforms, it is imperative that the space technology and systems development is accelerated in non-governmental entities with an aim to expand the space ecosystem and space economy. New roles played by Inspace and NSIL are important in these activities. ISRO role as a technology enabler has to be instilled in our community.

ISRO is one of the pioneering organization dedicated to the development of advance technologies and building of system that will benefit the society. It is one organization which has the



end-to-end capability to conceive applications, build the spacecrafts incorporating them and launch using its own space launch vehicles. Now the time has come to concentrate on more R&D projects that will give an edge compared to the competitors. The role of IIST in creating a research dominant culture within ISRO becomes all the more important. IIST should become integral part of the ISRO research canvas. Each of the ISRO centre should become a research lab of IIST. Students should be able to conduct research in those centres with the help of the expertise and mentorship there. Innovation, new ideas can germinate fast and prototyping should be done faster. These ideas should find place in new missions and possibilities that can be showcased to potential users.

ISRO has a very strong and matured partnership with Industry and Academia in realisation of the space systems. Strong institutional mechanisms and linkages with user community from the governmental sector, non-governmental sector and industry have also been in place. This is to be sustained by the new generation of scientists and engineers. IIST has to take roles, especially the faculty with the support of students and researchers in taking up projects for technology development, innovation and consultancy for the emerging space actors.

The rating of the institute has to be increased through carefully calibrated actions including and not limited to: increasing research students intake, enhance research outcome, publications, developing entrepreneurs, start-up companies, revenue generation programs, alumni support development etc.



I congratulate all graduating students once again and wish every one of you an exciting, challenging and a rewarding journey ahead in your life and career armed with the knowledge and skill gained from this institution.

Good luck. Thank you all.





Dr. B. N. Suresh
Honourable Chancellor, IIST

Chief guest of the programme, Dr. K Radhakrishnan, Member Space Commission, Former Secretary Department of Space, Sri S Somanath, President, IIST Governing Board and Chairman ISRO, Dr V Narayanan, Director LPSC and Guest of Honour, Dr. S Unnikrishnan Nair, Director VSSC and IIST, Dr. YVN Krishnamurthy, Registrar, IIST, Distinguished invitees, Deans, Faculty members, IIST Staff, my dear young degree recipients, medal and award winners, their proud parents, ladies and gentlemen;

I consider it a great privilege and honour to preside over the Convocation of this great Space Institute with which I am associated since the day ISRO/DOS conceived the idea of starting this Institute. The IIST is quite young, running sweet sixteen this year. The birth of the Institute, on 14th September 2007 is still green in my memory. I was very fortunate to get associated with this Institute in its formative years as founding Director. Listening to the detailed account of Institute activities and great strides accomplished by IIST by the Director, I am elated, with a sense of very satisfied and joyous feeling. It is indeed very heartening to know that the Institution has recorded phenomenal all round success in every sphere of activities be it in education, in research, in innovation, in satellite building, in facilities establishment and in many many other facets of the Institute. It is the hardwork, devotion and dedication of all students, faculty members staff and vision of the management, responsible for this notable achievement. All graduating students today are very lucky that you are graduating from such a prestigious Institution. Let me convey



my warm greetings and hearty congratulations to each and every recipient of the degree today and my special word of congratulations and appreciation to all medal and award winners. I also extend my warm congratulations to the proud parents who, certainly will remember this day with much greater fondness than the graduating students and rightly so. I also wish each one of the graduates a very bright and eventful future and also a very successful career.

My dear young friends, remember today is your day, a very special day for all of you. You will be receiving your degree certificates and honours which is a testimony to your sheer hard work during the past few years in this prestigious Institute.

An often asked question is which is the investment which pays the best interest. Benjamin Franklin who was a great statesman, author, scientist, inventor and also a diplomat gave the perfect answer. His answer was “An investment in knowledge is the only investment that pays the best interest.” How true it is. It is now for all of you, my young friends, to charter your future goals and aspirations to earn the best interest for the knowledge you have acquired in this Institute.

In my opinion, Convocation is an occasion to gaze both past and future. It is a day for you to look back with a sense of satisfaction, recalling your experiences, your trials and tribulations, and sometimes even some your funny franks you have played in this Institute. Today you are entering as a graduate into a world, which has changed, continues to change,



at an incredibly rapid pace. Today, can also be called as Commencement day because you are commencing your journey of translating your education to the benefit of the Country and the globe. The 21st century landscape is very much a global world, driven by advanced technologies. You can look forward to exciting days ahead with hopes, aspirations and expectations in the days and years to come. Truly in my opinion today is a right transition and a moment where transformation gets initiated.

Presently we are all in the third decade of 21st century. Our beloved Country, India, has been witnessing impressive growth trajectory for the past couple of decades and we have attained the status of fifth largest global economy and almost on the verge of becoming the third largest economy sooner than later.

The Celebrations of year long Azadi ka Amrut Mahotsav is almost getting over and this is the right opportune time to introspect the growth of the Nation and the kind of opportunities which have been thrown open to our youngsters who are moving out of this Institute. While we move towards 2047, the coming two decades are very vital. India has fared better, shown much resilience, despite the global uncertainties and economic crises. With a reasonable average growth rate over couple of decades, India is certainly identified as the fastest growing economy in the world. International Monetary Fund, IMF has pegged India as the 'bright spot' and a key contributor to the entire world. It is envisaged that India alone will contribute 15% of the global growth in the coming years.



Amidst this vibrant growth story, India has made great strides in almost every domain. The first green revolution resulted in high yielding varieties, of wheat, rice, maize, and many other agricultural products thus achieving total self-reliance in food grain production and supply in India in spite of a 1.4 billion population. In pharma sector, many public sector units and a few private industries have played a central role in developing indigenous capabilities in both R&D and manufacturing of drugs and vaccines. Today we are branded as “Pharmacy of the globe”. But remember, we need to retain this brand image, expand and maintain strict quality standards. In space sector, where I have spent my whole lifespan, India stands almost shoulder to shoulder with advanced Nations by accomplishing many complex missions in a very cost effective manner. Indian space programmes are also very unique in utilizing the advanced space technologies effectively for national development in every domain we can think of, like natural resources survey, education, health, agriculture, rural development disaster management and many more. The establishment of state-of-the-art nuclear power stations and development of advanced and sophisticated technologies for nuclear plants to meet the energy needs have opened a vista of opportunities. The advancements in Defense is indeed remarkable by demonstration of lethal firepower in a plethora of sophisticated missiles, ammunitions and elegant fighter aircraft and helicopters. Infrastructure development in the Country has been truly exceptional and exponential but a lot more has to be done. In education sector too, both public and private sectors have recorded impressive growth, both in quality and quantities. In research, India stands third globally



in peer reviewed science and technology publications. Well, one can go on and on. Undoubtedly these are all fabulous growth recorded by the Country which we as Indians should feel proud of. I am mentioning all this to inform you that you are all entering into new India which provides for utilizing all your skills and contribute to the accelerated growth of the Country.

While we appreciate all these phenomenal developments, my young friends, we cannot bask in glory of the past. We are now at a defining moment of our history. Times are critical, challenges are great and urgent. Stakes are high. Many parts of the world are in strife, conflict and turmoil. All these issues no doubt create an ocean of opportunities to all of you to find the right solutions. My dear young friends, you have to grab these opportunities and become the agents of change. I am confident that all of you, would squarely face challenges by imbibing the wholesome values and virtues derived from this great Institute guided by your own wisdom. You are moving out today with a robust education backed by one of the most valued degrees.

The economic development of any Country is intrinsically linked to its education and skilling. It was Nelson Mandela who said that “Education is the most powerful weapon we can use to change the world”. It is only an educated country which can aspire to become a developed country. We need to ensure that the knowledge we gained has to permeate into all the strata of society to provide a better quality of life for its citizens. It



becomes your bounden duty to spread the knowledge you have gained to wider spectrum of society.

In your new chosen professional life, you need to learn newer and newer things. Your learning process truly starts now. There will be tougher situations where you feel that you cannot do this or do that. Never, get disheartened or deterred by it. A famous Dutch painter "Vincent Van Gogh" gives an elegant solution. He states that, "If you hear a voice within you that "you cannot paint," then by all means go ahead and start painting and then your inner voice of "you cannot paint" will be silenced.

These days, most aspirational tasks are huge and need team work. Don't forget to radiate positivity in interacting with your team. During the student days it is all "I", and rightly so as you have to excel as an individual. But as you move into career the emphasis should shift to 'We' rather than, 'I' because, remember you are going to work in a team. It is imperative that we learn to take calculated risks to achieve the success and sometimes we may end up with a failure. But learn to face failure as much as you enjoy the success. In fact, there is no such thing as a failure, it is only learning and learning. Failure helps us to learn many intricacies of life and brings success.

My young friends, the very fact that all of us being together here, today exemplifies the spirit of this august occasion. Remember to recall your collective experiences and memories



at IIST and each one of you would take away different stories, experiences and also fond remembrances. This institution has given so much to you to have better future and prosperity and it was your teachers here who have honed your talents to shine much brighter from what you were. Therefore, stay in touch with IIST, no matter where you shape your future and continue to build on your collective memory with your alma mater.

Finally, I convey my very best wishes to each one of you to transform yourself into highly intellectual leader either at ISRO or in any other profession you choose elsewhere in this Country . I earnestly hope that each one of you would become instrumental by your positive contributions for transforming this Country into a super power sooner than later.

Thank you, Jai Hind





Dr. S. Unnikrishnan Nair

Director and Chairman, BoM, IIST

Most Respected Dr. B. N. Suresh, Chancellor, IIST; Shri. S Somanath, President Governing Body of IIST and Secretary, Department of Space; the Chief Guest of the 11th Convocation of IIST -Padma Bhushan Dr K Radhakrishnan, Member, Space Commission & former Secretary, Department of Space; Dr. V Narayanan, Distinguished Scientist and Director, Liquid Propulsion Systems Centre (LPSC); members of IIST Board of Management; distinguished guests, faculty members, officers, staff of IIST, invitees from the media, and most importantly, our graduating students, their proud parents and family members.

I have great pleasure in welcoming you all to the 11th Convocation of the Indian Institute of Space Science and Technology. On behalf of the entire IIST fraternity and all those gathered here, let me take this opportunity to congratulate all the degree recipients for your hard-earned degrees, and I wish you all the best in your life and career.

We deem it our privilege to have with us today, Dr K Radhakrishnan, Member, Space Commission and former Secretary, Department of Space as the chief guest of the day. His exemplary tenure as the Chairman of the Indian Space Research Organisation (ISRO), has left an indelible mark on the Indian space program with 37 space missions which includes the India's first Mars Orbiter Mission. Currently, Dr. Radhakrishnan is member of Space Commission, member of National Security Advisory Board, Chairperson of the Board of Governors of IIT Kanpur and IIT Ropar, Chairman of Standing Committee of the IIT Council, and Chairman of the expert



committee on DST- SATHI scheme. His role as the Chairperson of the overarching committee of the Union Ministry of Education to strengthen the assessment, accreditation and ranking of higher educational institutions demonstrate his profound understanding and support for higher education institutions, making his presence at our convocation more appropriate. Let me take this opportunity to extend a very warm welcome to you sir and I am sure that your life's journey and professional achievements will serve as a beacon of motivation, instilling a sense of purpose and dedication in the young minds who will soon embark on their own paths of exploration and innovation.

As IIST completes its fifteenth year, I would like to express my gratitude to the Department of Space for their unwavering support in advancing the various programs and infrastructure of IIST since its establishment in 2007. I would also like to express my gratitude for the valuable support extended by Dr. V Narayanan, Distinguished scientist along with his team in LPSC.

It is with great privilege that I present, before this august gathering, a concise report of the achievements and progress of IIST since the previous convocation. Throughout this reporting period, we have remained committed to surpassing our own achievements and establishing higher benchmarks for excellence. Due to time constraints, I will present only a gist of activities which IIST has undertaken during the reporting period.



Academic Report - 2023

The progress of IIST on all fronts has been commendable in 2023 and I would like to acknowledge the devoted efforts of the faculty members, staff and administration of the institute. We are in the final stages of discussion of the New Education Policy which we plan to implement in phases starting with the next academic year. The task team constituted for learning NEP 2020 and implementing the same in IIST had several rounds of discussion and has framed a draft proposal. IIST is currently gearing up for NAAC re-accreditation and has been ranked in the 48th position in the engineering category in the NIRF rankings.

In order to continue imparting high-quality and holistic education to the much larger student populace, the Institute continues to modify and evolve processes which can effectively address the changing situations. IIST facilitates a model of learning that emphasises a thorough engagement with the concepts and theoretical fundamentals, hands-on practical work, and provides to its students opportunities to engage in cutting-edge research in the chosen field of learning.

IIST currently offers B.Tech in Aerospace Engineering and B.Tech. in Electronics and Communication Engineering (Avionics), with 75 seats each, and a dual degree program with B.Tech in Engineering Physics with 24 seats. 168 students have been enrolled for B.Tech and Dual degree programs in the current academic year.



IIST offers 14 Master of Technology and 1 Master of Science programs. Admission for the new M.Tech batch was completed in July 2023, and a total of 138 students have joined IIST, with 8 sponsored candidates (6 from ISRO and 2 from DRDO). The PhD student strength has been steadily increasing. Currently, 298 students are pursuing their Ph.D. degrees in IIST.

A total of 275 students are graduating today on this august occasion. B.Tech degrees will be conferred on 135 students, 71 graduating in Aerospace Engineering, 64 in Electronics and Communication Engineering and 18 students from the fifth batch of the Dual degree program. 97 students are receiving their M.Tech degree and Ph.D. degrees will be awarded to 25 students across all seven departments.

Mr Hritham Nath of B.Tech, Aerospace Engineering is honoured with the prestigious Gold Medal for being the best academic performer across all undergraduate programs and Mr Arun S of Master of Science in Solid State Physics through the Dual Degree program, is awarded the Gold Medal for attaining the highest rank among all postgraduate programs. The excellence certificate and cash award for the student who has secured Best academic score in Electronics and Communication Engineering (Avionics) goes to Mr Nirbhay Tyagi, and Mr Ayush Sharma of B.Tech, Aerospace Engineering is selected as the all-rounder of the UG Programs. The toppers of Aerospace Engineering and Electronics and Communication Engineering branches will undertake a sponsored Masters Program at California Institute of Technology (Caltech), USA, before joining ISRO. The 9-



month program is financially supported under the DoS-Caltech Professor Satish Dhawan Endowment Fellowship.

With this, the total degrees awarded by the institute are 1626 B.Tech, 104 dual degree, 784 M.Tech and 162 PhD degrees. These students are a great resource to their communities, nation and the world as a whole for the way they imbibe the best spirit of scientific temper and ethical values. A large number of them directly serve the country as engineers/scientists in ISRO. A total of 1316 graduates from the institute have joined ISRO so far. The impact and the appreciation for this legacy is reflected in the recognition IIST continue to receive.

The Institute has 99 faculty members on rolls, among the finest in the country, and recognized nationally and internationally for their research, teaching, and learning quality. Our student-to-faculty ratio remains at 1:10 in comparison to the AICTE norm of 1: 20. The institute is keen on recruiting talented faculty in cutting-edge research areas of science and technology, and new faculty recruitment in niche areas were announced.

Progress in Research and Space Technology Research

Small-spacecraft Systems and PAYload CENTre (SSPACE) was established in 2018 with an objective of conceptualising, evolving design and development of small spacecraft systems & payloads and also for establishing required equipment and facilities. A number of small satellite projects have been initiated at SSPACE, with the core objective of design and



realisation of a space-borne hardware.

IIST successfully launched PILOT and ARIS-2 payloads on the POEM2 platform of PSLV C55 on April 22, 2023. Both payloads are healthy and transmitting the necessary scientific data to the IIST ground station. I sincerely acknowledge the work of our faculty members and students, the support provided by the M/s L&T for the metallic 3D printing of PILOT body that too at no cost to IIST, the SR team at VSSC who played a crucial role in getting both the payloads qualified in time and the grit and determination of few of our alumni members who made sure that our payloads comply to the stringent flight qualification requirements.

As a part of the Small-spacecraft Systems and PAYload CENTre (SSPACE) of IIST, a fully operational satellite ground station facility has been established. The ground station carries out tracking, telemetry and commanding (TT&C) operations of various satellite missions. The ground station facilitates learning and hands-on experience for students in the field of radio communication, satellite tracking, antenna positioning/control systems along with telemetry data visualisation/processing, real-time commanding and mission operations.

IIST is advancing in the areas of quantum technologies. The physics department of IIST has developed India's first bright quantum entangled twin light beam source and measured a 60% noise reduction from the standard quantum limit. They have shown the applicability of bright entangled twin light beams for secure quantum cryptography and published a paper in the



prestigious journal, Science Advances. The department had started a new M Tech Programme on Quantum Technology in the academic year 2022-23.

The faculty members of IIST are actively engaged in numerous research projects pertaining to space science and technology, which are in various stages of development and implementation.

Hybrid rocket experimentations are proposed as part of the student's hands-on experiments in reusable launch vehicle technologies. IIST Hybrid Rocket Experiments (IHRX) is a student-driven program which will be mentored by faculty members from the institute and various scientist from ISRO.

Advanced Space Research Group (ASRG)

Recognizing the imperative of strengthening and streamlining IIST's research environment and to facilitate the seamless integration of ideas, expertise and know-how between IIST and ISRO/DoS centers, an Advanced Space Research Group (ASRG) was constituted in IIST. As of June 2023, a total of 27 projects are approved and MoUs signed with ISRO/DoS centres. In 2023 as part of the ASRG projects, MoUs were signed with the VSSC for four research projects and with ISTRAC for 1 project.

Centres of excellence

3 Centres of excellence which are multidisciplinary, are



recommended by IIST. They are Advanced Combustion Research Lab, ASIC Design and Characterization Lab, and Advanced Space Robotics & Control Lab. They will be an integration of several labs of IIST and has been welcomed by several ISRO centers.

External Projects

The Institute's research output has experienced notable advancement thanks to various external projects initiated by the faculty members of IIST. Presently, the faculty members are actively engaged in 40 externally funded research projects, out of which 10 were approved during the reporting period. These projects are mainly funded by Ministry of Earth Science under Monsoon Mission scheme, DST- SERB, Dept of Biotechnology, ICSSR, Max Planck Institute for Radio Astronomy, Department of Horticulture, Government of Karnataka, KSCSTE; Kerala State Young Scientist Award Grant and Ministry of Electronics and Information Technology.

National and International Collaborations

IIST has been working towards fostering active collaborations with other national and international universities and institutes, showcasing the institute's commitment to global research partnerships. A Memorandum of Understanding was signed with College of Engineering (CET), Trivandrum to facilitate academic and research cooperation in areas of mutual interest.



IIST has been selected as one of the collaborating institutes with Centre for Nanoscience and Engineering (CeNSE), IISc Bangalore through Ministry of Electronics and Information Technology's INUP idea 2 innovation program and for the Indo-French research collaboration sponsored by French Institutes in India and the embassy of France in India with Bordeaux Institute of Technology, France. In connection with the formal MoU between IIST and Niigata University, two faculty members from Department of ESS attended the "Kickoff symposium" held at Niigata University, Japan. As part of its Inter-University Exchange Program, three students from the Department of Earth System Sciences participated in the onsite lectures and global field training at Niigata, Japan during July 9-23, 2023. These are in addition to the already existing MoUs with other national, international institutes of repute and industries.

Space Technology Innovation and Incubation Cell (STIIC)

In line with the expanding entrepreneurial ecosystem within the country, IIST has established Space Technology Innovation and Incubation Centre (STIIC) in its campus. Through STIIC, IIST strives to achieve the mission to foster the spirit of innovation, act as a pedestal to assist knowledge driven enterprises to prosper under scientific guidance of IIST and ISRO and thereby mould successful entrepreneurs. 5 companies have been incubated and functioning actively under STIIC with many more in the pipeline. One of the start-up companies, Bhuh Pramaan under Department of ESS engaged



in developing innovative solutions in satellite image & Geo-spatial data processing have successfully completed projects funded by NABARD, IIST and Department of Horticulture, Government of Karnataka. M/s Vashishtha Research Pvt Ltd., the start-up company incubated under Department of Aerospace Engineering has successfully developed and delivered a 4 axis filament winding machine to IIT Jammu and successfully developed and delivered a halogen lamp based thermal excitation system to CMSE/ ISRO

New Facilities

Many new labs and facilities were established which included the expansion of shock tube and combustion experimental facilities, setting up of Manufacturing lab facilities, RF Anechoic Chamber (up to 40 GHz) Lab-scale Desktop testbed, Bio sensor and Gas sensor lab, NEMS & Microelectronics Characterization Laboratories and Intelligent Robotics and mobile robotics facilities to the Centre of Virtual Reality. Proposals have been submitted for setting up of human Physiology lab and for associated microgravity experiments

Other achievements

Many of the faculty members were elected as Fellows of several professional national and international bodies, thereby raising the glory of the Institute. Notable among them are the conferment of the Honorary Fellowships to the faculty members by the Indian Society of Analytical Scientists and



Astronomical Society of India, Space Universities Administrative Committee (SUAC) of International Astronautical Federation (IAF), IEEE life member and as Asia-Pacific coordinator of IEEE Microwave Theory and Technology Society. IIST faculty was also in the list of top 2 percent scientists by Stanford University, across the world in all subject fields for the year 2022 – 2023. Many faculty members, research scholars and students have received accolades for their outstanding achievements which included the Young Scientist Award Grant, Future Research Talent scholar as part of the 2023 FRT program at the Australian National University, Chief Minister's Nava Kerala Postdoctoral fellowship (CMNKPF), INAE awards, fellowships instituted by IEEE, International Union of Radio Science (URSI) young scientist award, best B.Tech Thesis award by CFD division of Aeronautical Society of India, financial support from international institutes for conferences and travel and many more

Publications and Patents

IIST has been consistently enhancing its research credentials, demonstrated through an increasing number of publications and patents. Since the last convocation in December 2022, one patent was granted and one is under process. Patent has been granted to the Avionics department for a work on “A System and Method for Acquisition of IRNSS Signal Having Efficient Architectures”. This is the 10th Patent granted in IIST. In the reporting period, IIST has 227 publications in International and national journals and 21 as book chapters in edited volumes.



Four books were published by IIST faculty members. Research of faculty members were also featured as Cover pages in reputed international journals

Student Activities and Outreach

The Annual Sports Meet for the academic year 2022-23 was inaugurated by Shri. U. Sharaf Ali, President of the Kerala State Sports Council and former Indian football on 13th April 2022. 'Dhanak, the three-day cultural fest, held from March 17-20, 2023, witnessed a massive turnout of 848 students from various Colleges and Universities. While Shri. Jayachandran, the renowned music director inaugurated the event with his divine music, Shri VJ James, a writer of unparalleled brilliance, adorned the event as the guest of honour, adding a touch of literary grandeur to the unfolding spectacle. The 10th edition of Annual Inter-College/University Model United Nations (MUN) organized from March 4-5, 2023 was inaugurated by Shri, TP Srinivasan, IFS (Rtd), former Indian Ambassador and permanent representative of UN. MUN is a simulation conference depicting the UN where students represent nations as diplomats. Conscientia, the four-day technical fest of IIST centred on the theme "Suit up Vyomnauts," was inaugurated by Dr. V.P. Joy, IAS, Chief Secretary to Government of Kerala. The fest was sponsored by Skyroot aerospace pvt. Ltd. and Aeronautical Society of India and had a footfall of over 1100 enthusiastic students. The other events organized under the Student Activity Board of IIST include the 5 days of induction programmes for the first year B.Tech., M.Tech students and



PhD students, SPICMACAY events and Konchords, the intracollegiate cultural fest.

In an attempt to transform a routine curriculum subject of science into a lifelong passion among the less privileged students, the social outreach club of IIST- Nirmaan organized science camps for the students of the tribal settlement of Thenmala and Athrirapally forest divisions and for selected students of Government Upper Primary School, Ponmudi and Government High School, Njaruneeli. A smart class-room facility was established by the Avionics department in the Government UP School in Ponmudi, with the support from IEEE Antennas and Propagation Society and Nirmaan club of IIST. NuMaTS, the 5-day residential camp and the Young Talent Nurture Program were organized by Department of Maths in collaboration with SCERT, Kerala. Anvika, a six-day workshop on Advances in space sciences and technology was organised to improve the scientific exposure and awareness among young and potential school students

Dr Mackenzie Bristow from the University of Emory as part of the English Language Support Programme offered by the Regional English Language Office of the US Embassy offered six weeks' piloted teaching programme in Technical Writing for B. Tech First Semester students and Research Writing programme for M. Tech and PhD scholars.



Institute Events and Continuing Education

IIST hosted a Workshop on "National Education Policy and Implementation in IIST" with the aim of enlightening stakeholders about the comprehensive principles of the National Education Policy (NEP) as well as the challenges and opportunities associated with its implementation. Hon. Chancellor, Dr. B.N. Suresh, Prof. Indranil Manna, Vice-Chancellor of BIT Mesra and President of INAE, Prof. S. M. Sameer, Dean of Academics at NIT Calicut, shared their insights and experiences in implementing NEP.

The 8th edition of the National Conference on "Recent Trends in Materials Science and Technology (NCMST) and 23rd National Conference on Atomic and Molecular Physics by Department of Chemistry were organized by Department of Chemistry and Department of Physics respectively.

The International Women's Day celebrations 2023 was formally inaugurated on March 8th, 2023 by Mrs. Nishanthini R, IPS, DIG of Police, Thiruvananthapuram range. Dr. Jaya G Nair, former Scientist/engineer, VSSC was the guest of honour. The highlight of the day was a short video presentation titled 'Women Uninterrupted' about the women of IIST. A food fest, book festival and a cancer screening programme were also organized as part of this. A training programme on procurement was organised by IIST Purchase Section for the faculty, officers and staff on 8th March 2023. Dr. S. Suresh Babu, Scientist G, SPL, VSSC delivered a talk on "Aerosols and Climate" as part of National Science Day celebrations by, on 28th February 2023. As part of the World Hindi Day Celebrations – 2023



various Hindi competitions were conducted for the faculty, staff and students of IIST.

Several other seminars, Workshops, Executive programs, lecture series, talks on various topics of relevance were also organized. Swachhta Pakhwada -2023 and days of importance like Republic day, Ambedkar Jayanthi, Science day and International Yoga Day were celebrated.

Alumni

The Institute's alumni have brought honour to their alma mater through their remarkable accomplishments and significant contributions across various fields. Many innovative programs were organized by the IIST alumni association for the students of IIST. Shri. Nitish Shrimal, IIST alumnus (B. Tech 2016 batch) has been awarded "The Cable and Wireless Prize" from the University of Surrey. This prize is awarded for the best overall performance in M.Sc in Satellite Communications Engineering Programme. A memory book in the fond remembrance Shri. Niharranjan Pradhan, who passed away in an unfortunate incident was compiled by batch 2016 and handed over to IIST

Before I conclude, I thank the graduating students for making the institute proud of its profession, their parents for entrusting IIST throughout the enriching four-year journey of their wards, the former directors of IIST, the registrar, deans, faculty members, and the staff of IIST for standing with the vision of the institute. Our gratitude to the Chief guest of the day Dr. K



Radhakrishnan, for gracing this programme and for a profound convocation address, to our Chancellor Dr. BN Suresh, who carries IIST in his heart as a mission and a passion, to Shri S. Somanath, President, GB, for his unstinted support and his very involved leadership, and Dr. V Naraynan, who is a constant source of inspiration for the institute.

Let me conclude this convocation report with a resounding optimism, echoing the anticipation of our entire nation, as we eagerly await the historic touchdown of the Chandrayaan spacecraft upon the lunar surface. Together, we stand on the precipice of scientific achievement, united in the pursuit of knowledge and exploration. And in that, may our nation's development thrive.

Jai Hind





भारतीय अंतरिक्ष विज्ञान एवं प्रौद्योगिकी संस्थान

(वि. अ. आयोग अधिनियम 1956 की धारा 3 के अधीन मानित विश्वविद्यालय घोषित)

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Indian Institute of Space Science and Technology

(Declared as Deemed to be University under Section 3 of the UGC Act, 1956)

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