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

छठा दीक्षांत समारोह
Sixth Convocation

18 जुलाई / July, 2018

Convocation Address
Prof. K. VijayRaghavan

President, GB, IIST Address
Dr. K. Sivan

Chancellor's Address
Dr. B. N. Suresh

Director's Report
Dr. V. K. Dadhwal

Prof. K. VijayRaghavan

Principal Scientific Advisor to the
Government of India

Chief Guest, Sixth Convocation, IIST

Dr. B.N Suresh (Chancellor IIST), Dr. K. Sivan, (Chairman ISRO, President Governing Body and Chairman Governing Council, IIST) Dr. V. K. Dadhwal (Director, IIST) Distinguished guests on the dias, members of the faculty, members of ISRO, Ladies and Gentle men and dear young degree recipients:

I am indeed delighted to be here with you on this joyous occasion of 6th convocation of Indian Institute of Space Science and Technology. I am thankful to the management for inviting me to this august function of this prestigious institute.

At the outset, let me congratulate all the graduating students. This proud moment is the zenith of years of study, sincere hard work and diligent effort which all of you are going to cherish and be proud of in the rest of your life. It is indeed a glorious moment for your parents, teachers and all those who played one or the other role in leading you to success. I am sure, all of you would recognise and honour your competencies acquired during your stay in IIST and hope that the knowledge and skills acquired would be utilised for the development of the nation and the humanity. Your capabilities would surely go a long way in the development of our nation in various aspects.

DOS/ISRO is significantly contributing to realise the scientific vision of modern India by promoting development and applications of Space Science and Technology to the advancement of the nation in several areas such as telecommunications, navigation, metrology, remote sensing, agriculture, disaster management, health

management and education. Dear young graduates, you can be proud to be a part of the great legacy carried forward by the Department of Space.

IIST is the youngest member of the DOS family with great potential to aid the mission of DOS with brilliant enthusiastic students supported by the capable and dedicated faculty members.

This institute is following a unique education model where all the deserving undergraduate students are provided financial assistance by the Department of Space. Those successfully complete their undergraduate programme are given a chance to serve various DoS/ISRO centres. During their study in IIST itself they are given ample exposure to the field of Space Science and Technology so that they will be ready to serve and contribute to the space programmes of the country. Department of Space supports IIST not only by providing the financial support but also by taking active role in the academic programmes. I am sure that this unique model would have attracted many committed young talents who aspire to serve the country through R&D programmes, Space Science and Technology in particular. Thus brilliant and enthusiastic students from across the country have converged here for learning and thereby have been equipped to transform India using Space Science and Technology as a medium. I am told that more than 900 alumni of IIST have already been absorbed in various Dos centres and have started contributing directly to space programmes of the country. I am happy to see the enthusiastic minds forge ahead, building a great career in space science and technology. I am sure, these young

talents would bring pride not just to IIST and ISRO but for the entire country.

In addition to the undergraduate programmes, IIST also offers post graduate programmes and Ph.D programmes in various areas relevant to Space Science and Technology. IIST also gives an opportunity to the scientists and engineers from Dos/ISRO to update their professional knowledge by joining post graduate and Ph.D programmes offered by the institute. Today in addition to the 111 B. Tech students, 63 post graduate students and 16 Ph.D scholars are receiving their degrees. I understand that the Ph.D scholars have worked in areas relevant to space sciences, space technology and in basic sciences as well. Hope, Dos/ISRO and eventually, the country will be benefitted hugely by the quality human resources nurtured by the institute.

IIST is also in the process of developing as an excellent and vibrant research centre where the young scholars work for their doctoral degree as well as contribute to the research and development of the nation in areas related to Space Science and Technology. I understand that the research projects initiated by the faculty members in areas relevant to space science and technology are well supported by the institute and various ISRO centres. IIST and ISRO may work in synergy for maximum utilization of the intellectual resources of both institutions to bring out technical, engineering and scientific solutions.

IIST is also actively involved in organizing outreach programmes to instil scientific temper in young students

and skill enhancement programmes for those who are already in the scientific and technical field. Thus, activities and academic programmes well supported by the competent intellectual resources, this institute is moving ahead for realising the goals entrusted upon it by the nation.

My dear graduating students, this moment is a moment of victory, but as advised by Dr. APJ Abdul Kalam, former President of India and the first chancellor of this institute "Don't take rest after your first victory because if you fail in the second, more lips are waiting to say that your first victory was just luck". Yes, the country has assigned you a challenging task, the task of building an economically strong, scientifically progressive and technologically advanced nation. Take up the task and responsibility in its true sense and work hard towards achieving that.

I wish all of you a great future and may you be blessed with enthusiasm, courage, integrity, diligence, perseverance and wisdom to work towards the betterment of the people of our country and the whole world as well.

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Professor K. VijayRaghavan

Principal Scientific Adviser to the Government of India

Professor K. VijayRaghavan is the Principal Scientific Adviser to the Government of India, succeeding Dr. R. Chidambaram on April 3, 2018. He was Secretary, Department of Biotechnology (DBT), Government of India from January 28, 2013 to February 2, 2018.

The Principal Scientific Adviser will work with all arms of the Government, with our States, our citizens, national and international agencies. The goal is that the benefits of science, technology and innovation solutions reach the most needy, for the sustainable development of India and for the well being of our planet.

VijayRaghavan is also a Distinguished Professor at the National Centre of Biological Sciences (NCBS), Tata Institute of Fundamental Research Bangalore (TIFR) and was the NCBS Director till 2013. He studied Chemical Engineering at the Indian Institute of Technology, Kanpur, holds a Ph.D. in Molecular Biology from the Tata Institute of Fundamental Research was a Senior Research Fellow at the California Institute of Technology. His research is on nerves and muscles and how complex behaviour emerges during animal development.

VijayRaghavan is a Fellow of the Indian Science Academies, the Royal Society, the Academy of Medical Sciences (UK) and a Foreign Associate of the US National Academy of Sciences. He was awarded the Padma Shri by the Government of India in 2013.

Dr. K. Sivan

President, Governing Body, IIST
Secretary, DoS

Honourable Prof. K. VijayRaghavan, Principal Scientific Advisor to Govt., of India, Dr. B. N. Suresh, Chancellor, IIST, Dr. V. K. Dadhwal, Director, IIST, Mr. S. Somanath, Director, VSSC, Deans, Professors and other members of teaching and non-teaching community, distinguished invitees, dear students and their proud parents, friends from the media, ladies and gentleman, a very good afternoon to you all.

IIST has been the dream Project for ISRO with the vision to create a unique learning environment enriched by the challenges of the Space Programme along with nurturing the spirit of innovation and creativity. It is heartening to note that in line with the vision, the IIST alumni are doing great work in tackling challenges of the Indian Space Program.

First of all, let me congratulate all the graduating students. I would also like to congratulate the teachers who in their own way have contributed in shaping the young minds. The bond between the teachers and the students brings in an emotional content to the Convocation day. Most importantly, I would like to congratulate the parents. Actually, Convocation day is remembered much more by the parents than by the students. This must be a day of pride for all the parents present who are seeing their children get degrees.

My dear young friends – I am taking the liberty of addressing graduating BTech as colleagues as most of you would appear for the placement process to ISRO tomorrow. All of you have gone through your respective

courses of studies and have been adjudged to be worthy of receiving the degrees. You are now ready to face the new and exciting world. You have to be an important part of the nation building process. Today there is ample scope for innovation and entrepreneurship. The way our country is evolving, the opportunities for the capable ones will continuously expand. I wish all of the degree recipients comprising 111 BTech, 63 MTech and 19 PhD, a very successful career ahead. May all your dreams be fully realised.

As I distinctly see the sparkling eyes in front of me eagerly waiting to be bestowed as Graduates of this excellent institution, and behind these sparkling eyes, I see the energy of hundreds of youth. This energy is capable of creating thousands of paths with millions of opportunities for national development. National development will not only require effort but also knowledge and wisdom which this institute has given you.

During your last four years in IIST, you must have definitely heard lot of success stories like that of GSLV operationalization, GSLV Mk-III first development mission, RLV-TD as well as Scramjet engine flight demonstration. When there are a series of success, especially of complex missions like the first development flight of GSLV Mk-III, RLV-TD or even Scramjet, you may form an impression that space technology is very simple and routine and success there is taken for granted. Now, the recent PSLV C39 failure would have baffled you. How a successful and stable rocket like PSLV which is ISRO's work horse has failed? Even though failure is very difficult to digest and painful, but in Space technology, all these

failures provide a unique opportunity to develop a better understanding on the working of the launch vehicle. I would say, you are going to enter into ISRO with this ample opportunity to learn and understand the working of space technology. If you look into the history of space development and progress, it is filled with many failures. In fact this technology has progressed through failures. But as you enter ISRO as a budding professional, you will have to learn to take these failures not only as a learning opportunity but do everything possible in personal capacity to prevent failures.

As you all know, the Indian Space Program was started by Dr. Sarabhai to use technology to solve the problems of common man. Launch vehicles, satellites and ground systems are the means and not the end goal of Indian Space Program. The goal of Indian Space Program is to provide space based services or technology spinoffs to the common people of this country. You are all aware that India is a global leader when it comes to space based services. Space based services like communication, navigation, disaster management, earth observation etc are bringing a paradigm shift in the service delivery of government schemes be it Make in India, Digital India, Swatch Bharat, MNREGA asset tagging, forest fire disaster alerts and so on and so forth. Just to give you an example, the Potential Fishing Zone advisory has increased the income of fishermen community by nearly 50 thousand Crores in the previous year.

However, this is not the end of the story. Even though the space based services have provided huge impact, we need to go a long way in meeting all the national requirements.

For example there is an urgent requirement to develop hand held devices utilizing the space based services like Navigation, two way satellite communication etc to complete the whole chain of development. Without the user devices, the benefits cannot reach the society. Similarly, there is urgent need to further enhance the scope and breadth of space based services in mobile communication, crop coverage, agility in disaster alerts as well as health and social services. All of this requires a good understating of user requirements to translate into payload and application development.

Similarly, in the area of space transportation system, the emphasis is on low cost reliable access to space. The existing launch vehicle systems are not easily amenable to value engineering exercise for cost reduction as this requires changes and validation of designs, which is costly and time consuming in an already proven launch vehicle. ISRO is working on a low cost small satellite launch vehicle which is slated for test flight in 2nd half of 2019. Lot of innovation has gone into its design. In fact there is lot of opportunity for youngsters like you to take up challenging technology developments in the areas of avionics, materials, propulsion, quality and reliability engineering in the emerging technologies of cryo, semi-cryo, reusable launch vehicle, scramjet, quick response launcher as well as heavy lift launch vehicle.

Today, there is a renewed interest in undertaking human space exploration not only by established space faring agencies but also by many private sector enterprises. The global approach is to extend human presence beyond LEO in a careful, stepwise manner. The establishment of a

human outpost beyond LEO is the next logical step, while shorter duration missions could explore specific areas of the Moon and evaluate the potential for local, habitable facilities. In addition, human missions to low gravity bodies such as asteroids and the Martian moons can provide practical destinations for gaining deep space operational experience prior to human landings on Mars. All of these efforts will be supported as much as possible by robotic means as both enablers and to provide complementary support for human missions.

It is important for India to be part of this global program for ensuring India's position as a serious space faring nation capable of executing complex missions for national development and societal gains. This will also ensure that India will play a fruitful role in future global space exploration endeavours as a contributing partner. It is right time to undertake the human spaceflight initiative as India has a viable launch vehicle capable of launching a manned crew module to low earth orbit. India has also demonstrated the critical orbital return technology and has undertaken a series of technology development initiatives relevant for undertaking human spaceflight. One critical system called Crew Escape System was tested on 5th July 2018 to demonstrate safe extraction of astronauts from the launch vehicle in the event of an exigency.

The human in space program will also ensure India's position as a serious space faring nation capable of executing complex missions for national development and societal gains. The benefits are going to be substantial as it is expected to provide a big fillip to advanced technology development within the country and improve the level of

Science and R&D to global standards. Even though, ISRO has all the basic ingredients for executing a human spaceflight demonstration, lot of technology development has to be done to accomplish this goal. This programme is a game changing and challenging one and being evolved as a national programme. The entire ISRO centres have to work in tandem with other research and development agencies, industries, academia as well as to work with global space agencies. I am looking for youngsters who can contribute to fast track the technology development through innovative methods. And I see in front of me the potential team who will execute this mammoth task.

So the question is, What is Innovation? Innovation is nothing but the application of ideas that are novel and useful for your organization as well as country. Creativity, which is the mother of innovation, is the ability to generate novel and useful ideas which works as the seed of innovation. But unless the idea is applied and scaled, it is just an idea. As Dr. Kalam said, your dream or your idea must not let you sleep. Innovation today has become a strategy to remain relevant and competitive. It is innovation which is driving the age of disruptive technology. Overnight a disruptive technology can replace century's old methods of doing things. I would like to emphasise that Innovation is necessary ingredients for leapfrogging the technology development curve. No space program can sustain if the present generation does not carry out need-based research that will metamorphose into flight worthy systems. I must also state that there is a multi-disciplinary method in solving technology development.

The fruits of technology development undertaken in the past are yielding fruit today. It is your paramount duty to undertake development initiatives so that the next generation is also enriched with the fruits of development. Only then the space program will sustain resulting in National development.

In the end, I would like to say, shoot for the moon. Even if you miss, you'll land among the stars. Spread joy. Chase your wildest dreams. The younger generation must rise to the occasion in realizing India's aspiration for science and technology leadership in the world. This can only be done if you think laterally and apply knowledge creatively. Thank You All.

--------Jai Hind-------

Dr. K. Sivan

Dr. K Sivan graduated from Madras Institute of Technology in Aeronautical engineering in 1980. He took his ME in Aerospace engineering from IISc, Bangalore in 1982. Subsequently, he completed his PhD in Aerospace engineering from IIT, Bombay in 2006.

He joined ISRO in 1982 in PSLV Project and has contributed immensely towards end to end mission planning, mission design, mission integration and analysis for all the launch vehicle programs.

During his career at ISRO, he has held many responsibilities like Group Director, Mission Simulations and Synthesis Group, Project Director, RLV-TD, Deputy Director, AERO and Structures and Chief Controller, VSSC. He was Director, LPSC from July 2014 till May 2015. He is Director, VSSC from June 2015 onwards and Member, Space Commission since August 2016.

He has contributed significantly in establishing a Parallel computing facility and Hypersonic wind tunnel facility. He evolved novel strategies for launching India's MARS mission endeavour through PSLV, ISRO's work horse. He also established a world class mission simulation facility which is being used for all the launch vehicle programs. He devised a novel day of launch wind biasing technique which has made rocket launch possible under any wind conditions.

He joined GSLV Project in April 2011 as Project Director after two consecutive failed launches with a mandate to

demonstrate the robustness and reliability of GSLV as well as flight demonstrate the Indigenous Cryo Stage. His leadership led to the historical achievement of most successful GSLV flight with indigenous cryogenic stage.

He has numerous publications in various Journals and is a Fellow of Indian National Academy of Engineering, Aeronautical society of India and Systems society of India.

He has authored a book "Integrated Design for Space Transportation System" published by Springer which highlights the end to end integrated design aspects, interactions between various systems and interdependencies of various launch vehicle systems. There is no other book published till date which presents the space transportation system design in an integrated manner.

He has received numerous awards throughout his career which includes Doctor of Science (Honoris Causa) from Dr MGR University, Chennai in March 2017, The Distinguished Alumnus Award 2017 from IIT Bombay in March 2017, Doctor of Science (Honoris Causa) from Sathyabama University, Chennai in April 2014, The Distinguished Alumnus Award 2013 from MIT Alumni Association, Chennai, Dr Biren Roy Space science award for the year 2011, ISRO merit award for the year 2007 and Shri Hari Om Ashram Prerit Dr. Vikram Sarabhai Research award for the year 1999.

Dr. B. N. Suresh

Honourable Chancellor, IIST

Chief guest of the programme, Dr. K. VijayRaghavn, Principal scientific advisor to Govt. of India, Dr. K. Sivan, President, IIST Governing Board and Chairman ISRO, Dr. V. K. Dadhwal, Director, IIST, Distinguished invitees, Deans, Faculty members, my dear young degree recipients, prize winners, proud parents, ladies and gentlemen:

I am extremely happy to be amongst you on this fine occasion to preside over the Convocation of this great Space Institute. Let me first of all convey my warm greetings and hearty congratulations to each and every recipient of the degree and award winners and wish each one of you a very bright future and a very successful career. No doubt today is indeed a very special day for all of you, who have acquired the degrees and received your honours by your sheer hard work for the past few years in this prestigious Institute. You have spent all your time till now as students in a safe environment and now moving into larger world seeking to shape your own career and future. Many of you will be getting into the excitement of getting into the development of cutting edge technologies needed for the advanced space projects at different ISRO Centres. Those who could not make it to ISRO, certainly you have very bright opportunity to choose a career of your interest and contribute in your own way for the betterment of the society and Country, since you are trained in one of the top Institutions of the Country. Today India is one of the fastest growing economies in the world and expected to attain the status of a developed Country very soon. Therefore India at this juncture provides immense opportunities in almost every domain and each such opportunity is very exciting and at the same time

very challenging.

This Institute has trained you commendably, imparted the needed knowledge and skills to each one of you and also has taught you how to face the challenges. With this background you have an excellent opportunity to utilize your skills intelligently and try to provide a great future for our great Nation. You may opt to choose an area which is close to your heart which you should and put your heart and soul in achieving the goal set by yourself. When I joined the space Department way back in the middle of 1969 as an young engineer, I did not even know about the space activities or its use for the Country. But thanks to the environment I had in the Organization, I started enjoying every minute of stay in ISRO and able to provide my squirrel service to the nation to my satisfaction. The message is that as long as you enjoy what you are doing, you will have the full satisfaction and certainly achieve the success. It is therefore important to start enjoying the task or career you are getting into.

All of you are now entering in to a new world, which no doubt is an unknown territory, different from the world you have spent so far. It certainly is more exciting, as well as more challenging. It is natural that as we move further in our life, take up a new career or a new activity we are bound to face number of challenges. Whenever we face such challenges there are two ways of treating them, either from a perspective of helplessness or from a stand point of one's own belief. But when we choose the latter, we are consciously optimistic and these challenges open up a vista of opportunities. Once we accept a challenge, no doubt we step into the world of the unknown and it has

a potential to change us forever. We need to seek the right solutions to the challenges we face. With the right mental attitude one can certainly reframe the way one treats the challenges.

At this point I would like to recall the very first challenge I faced, right at the beginning of my career when I joined Indian Space Research Organisation (ISRO) at Thiruvanathapuram in the middle of 1969 and how it taught me to transform the challenges into opportunities. Soon after I joined the Space Department, I was assigned the development of one of the control systems for our first launch vehicle SLV-3. But it was totally very different from the subjects I studied as a student of mechanical engineering all through my graduation and post-graduation courses. Thus the assigned task was totally new to me and I had no clue how to proceed. Therefore, I was in a dilemma whether to accept the assigned task with confidence or to try to seek a change in my assignment which matches with my acquired knowledge. Thus I bumped into the first great challenge of my career. I spent two days thinking over the problem again and again, discussing with my seniors, family members and spending a lot of time in library. At the end of two days, I still had a grip of fear of failing in my first assignment. I do not know the precise reason, but I decided to accept the challenge. The driving force for such a decision was my conviction that it would provide an opportunity to learn a new subject and new discipline right in the beginning of my new career.

The difference between the probability of success and failure, when we face such a challenge is only in our

perception. How we represent things to ourselves determines our response to that situation. Our positive response surely gives us the right solution. I spent considerable time in the next couple of months, studying the new subject intensely in library and discussing with the control experts in the department. Deep and deep I started exploring the new subject, it became more and more interesting and fascinating. This intense involvement and urge to learn something new led me to build a proto unit of the system assigned to me successfully within a span of one year. I am happy that it has become a fore runner for today's advanced control systems used in all our launch vehicles.

Further to this experience of learning the new area of aerospace control systems for five years facilitated my selection for the commonwealth scholarship for doctoral studies at United Kingdom, as they were looking for scientists working in the newer and cutting edge technology areas in India. Thus, the decision I made to accept the challenge in the very beginning of my career provided an excellent opportunity to me to do doctorate in a very specialized field in one of the premier Institutions at United Kingdom.

In all our careers and life, challenges are the real stuff of life. They certainly create an opportunity, make us stronger, smarter and provide us the way forward. Important lesson is that until we jump into challenges we won't have any opportunities. It is one of the most empowering things we can do for ourselves. We have to chalk out our direction meticulously. We have to control our steps from the very beginning, systematically and cautiously, so that we are in

the right direction. This kind of planning and execution make it much easier for us to maintain the right direction and reach the set goals. It also helps to learn newer and newer things.

When we talk about the new learning I am reminded of one of the sloka's of wisdom from 'Subhashitham' and I quote the gist of the sloka, "A student learns one quarter from his master, second quarter from his own intelligence, third from fellow-students and the last quarter form time and experience". Swami Vivekananda, one of the great sons of India, too stresses the same in his teachings, which are numerous and immortal. One of his teachings which I love most is that: Experience is the greatest teacher in this world. The learning should continue till our last breath. Gaining knowledge should be our prime aim as we move on, in our lives. The education which does not enable a person to stand on his own feet, does not teach him/her self-confidence and self-respect, is useless. Positive education is the catalyst to learn newer and newer things and in turn helps us to gain self-confidence and self-respect.

All of you are proceeding to work in the very exciting area of space or in any other chosen careers. If we look at the world we live in today it is imperative that we learn to integrate seamlessly the learning, research and innovation. We all know that the learning is acquiring the known knowledge, research is creating a new knowledge and innovation is converting the knowledge into wealth and social good. All of you will be transiting from the college to your own chosen careers, to higher studies, may be start-ups, corporate world or any other area you may choose. In

a way you will be moving from the domain of predictability to unpredictability. We all need to shoulder bigger and bigger responsibilities as we move up in our career and in our future.

So far you have been excelling as an individual. Once we move to the outside world, we face complex challenges in a multidisciplinary environment. To face such challenges with success, we need to learn to work in teams and with confidence. If we look at the tremendous progress made by ISRO in both multidisciplinary rocket systems and spacecraft in this Country, it has been made possible mostly due to sound teamwork. In spite of the denial of technologies from the advanced countries during the development phase of our systems in 70's and 80's, our young engineers who joined ISRO then marshalled their own innovation skills to design and develop world class systems. Reaching Mars, a journey of 300 days through interplanetary space, exemplifies our competence to undertake the most demanding and challenging S&T endeavor. Travelling more than 600 million km, demanding high levels of precision and accuracy, introducing the high levels of onboard autonomy and achieving the highest levels of quality and reliability are indeed some of the daunting challenges.

Working in the cutting edge technologies in Space Department for the past four plus decades one thing I experienced is that we have great talent in India. With 100 percent of our own indigenous talent we succeeded in many of our complex projects, be it launch vehicle, satellite, applications or Mars orbiter mission. In India we have many more such achievements including the longest and

highest bridge in the Himalayas, which is one of the engineering marvels. We are the world leaders in information technology. This only proves that the Indian Talent in every field is second to none. I am very proud to see such an abundant talent in front of me here today.

But India is fast changing and the entire world is in awe with our growth rate. Along with this growth India provides a lot of opportunities. Therefore, the days of going abroad to seek opportunity and making it to top is no more required nor necessary. Now is the time for the reverse flow and utilize the abundantly available opportunities in India. Each one of you is very fortunate to be part of such a vibrant Nation and all of you have much bigger responsibility to transform the dreams of our beloved Dr. APJ Abdul Kalam who was our first Chancellor. His dream was to transform this Country as a developed nation in another 5 years and also a world leader in the coming years. As many of you may know, he was the first Project Director for India's first launch vehicle SLV-3 which successfully launched our satellite successfully from the Indian soil in July 1980 thus enabling India to join the elite club of five other developed nations. No doubt he was a visionary who went on to become the missile man of India, chief of defense research organization and then ultimately President of India known popularly as people's President.

We were fortunate enough to have many such visionaries in India who have impacted the Country's growth in a big way. While it was Dr. HomiBabha who seeded the development of complex technologies needed for the nuclear energy, it was Dr. Vikram A Sarabhai, known as the father of the Indian space programme who visualized

the importance of space for the Country's faster development. Dr. Swaminathan was responsible for the green revolution which has helped the Country to have self-sufficiency in food in spite of the large population of 1.3 billion. Dr. Verghese Kurian brought in white revolution by activating the co-operative sector in Gujarat to ensure sufficient milk for all. The list can go on and on. I am mentioning only a few such names of visionaries, anticipating that we have here with us a few such future visionaries amongst you, who would be making a big difference for the accelerated growth of the Country.

My young friends, one question which bothers all of us is how to achieve the success as we proceed. In India we keep on complaining on many of the problems we face and also on scarcity of certain things. Instead of complaining, why not we consider them as plenty of opportunities and attempt to find the right solutions. This certainly helps us in setting a goal. To achieve the goal we need to have aspirations, but our aspirations should always be high. Aspirations has to be coupled with the hard work. Let us all make sincere attempts to achieve the goal silently and the success as and when happens creates noise.

The failures should not deter us. Use the failures to learn great lessons which you would not be able to learn otherwise. Again working in the space department we learnt everything only through failures. I recall the frustration we went through when we failed successively in two of our ASLV launches in the initial stages of the development. We were able to learn most of the lessons through these two failures and I am happy to mention that these failures laid a firm foundation for all the successes we

are witnessing today.

Many of you might have heard the common usage of rocket science. The very word rocket science signifies that it is highly complex to achieve success. Whenever we launch a satellite from Satish Dhawan Space Centre, Shriharikota, it takes about 18 to 20min for the vehicle to travel approximately about 6000 to 7000 km across the globe carrying out thousands of operations autonomously before injecting the satellite in the precise orbit specified. To achieve that success it is important to master the art of visualizing the invisible. In other words imagine all possibilities of failures and provide the right solutions in both design and implementation. One can make even seemingly impossible, possible. But it involves very systematic planning, addressing all eventualities and also demands very creative thinking.

One important lesson which I can share with you all is, to treat the challenge as a game and enjoy it as a fun. If we fear in taking a tough decision it prevents us from facing the challenge and seeing it as an opportunity. It is always necessary to step out of our comfort zone and all actions we undertake need much more attention than any one normally thinks. Debate and discussions amongst our colleagues to arrive at possible solutions are highly beneficial. At this juncture, I am reminded of the two important quotes on this topic, one by Albert Einstein; "In the middle of difficulty lies opportunities" and another by Winston Churchill; "The pessimist sees difficulty in every opportunity, the optimist sees opportunity in every difficulty". How true they are!

I do not want to frighten the graduating students but it is truth to say that the future is not so predictable. The real truth is the change is certain. We have to prepare ourselves to face such turbulent conditions with grit, determination and our own imagination. We should never stop the learning process. So my young friends choose to uphold the legacy of this Institute which has moulded you all these years. Choose a destiny close to your heart which will aid to change India. Also you have to aim to reach where no one has before, but you also have to do it which no one has attempted to do before. This may demand taking calculated risks but it is worth it.

Albert Einstein, greatest scientist of the globe once told to a group of young students " Bear in mind that the wonderful things you learn in your schools are the work of many generations, produced by enthusiastic effort and infinite labour in every part of the world. All this is put into your hands as your inheritance in order that you receive it, honour it, add to it and one day faithfully hand it on to your children. Thus, do we mortals achieve immortality in the permanent things which we create in common. If you always keep that in mind you will find a meaning in life to work and acquire the right attitude toward progress."

My young friends, you can not have a better message than this to exemplify the spirit of this august occasion. Finally I conclude by conveying my very best wishes to each one of you and I earnestly hope that all of you will have a very bright career in ISRO or anywhere in India so that you become instrumental in transforming the Country as a developed nation very soon.

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Dr. B. N. Suresh

Dr. B. N. Suresh, the founding Director of IIST, is now serving as the Honourable Chancellor of the Institute. He is presently, President, Indian National Academy of Engineering (INAE), Delhi, a premier Engineering Academy of the Country and Honorary Distinguished Professor at ISRO HQ, Bangalore. He is also member of Board of Governors, IIT Madras, Chairman, Governing Council, MVJ College of Engineering, Bangalore. He was Chairman, Research Board for Aeronautical Development Establishment, DRDO for two years.

After his degree in Science and Engineering from Mysore University he took his Post Graduate degree from IIT Madras. He got his Doctorate under Commonwealth Scholarship in Control Systems from Salford University, UK. He joined Vikram Sarabhai Space Centre, Trivandrum in 1969 and discharged several responsibilities before taking over as Director, Vikram Sarabhai Space Centre in 2003 and served four and half years till end November 2007. He took over as Founder Director for the newly established Indian Institute of Space Science and Technology (IIST) at Trivandrum in 2007 and served for three and half years till Nov 2010. He was instrumental in establishing this world class Institution. He was Member, Space Commission for four years. He served as Vikram Sarabhai Distinguished Professor for 5 years from 2011. He was also distinguished Professor at IIT, Bombay and MIT Manipal.

He is a fellow of several professional bodies like Indian National Academy of Engineering (INAE), Astronautical Society of India(ASI), Aeronautical Society Of India (AeSI) Indian Society of systems for Science and Engineering(ISSE) and International Academy of Astronautics (IAA) at Paris. He is also Fellow and past President for System Society of India (SSI).

He was well recognized in the internationally too. He was Head of Indian delegation for the United Nations Committee for space on Peaceful Uses of Outer Space at Vienna, Austria during 2004-07. He was elected as Chairman of the prestigious United Nations Scientific and Technical Committee for the year 2006 from the Asia Pacific Countries. This was a unique distinction, since from the inception of UN Committee a technical expert from a developing Country was selected for this coveted post. He was Vice-President for S&T Committee for International Academy of Astronautics (IAA), Paris and Chairman for the selection of members in S&T area for IAA for five years. He was selected by the International Astronautical Federation to Chair for Programme Committee for finalizing the technical programme for the International Astronautical Congress in 2007.

He has delivered several prestigious guest lectures like, Ramanujam memorial, Vikram Sarabhai memorial, Dr. Srinivasan memorial, Satish Dhawanmemorial and many more in prominent Institutions and national conferences. He has given invited lectures at several International Institutions like, European Space Policy Institute, Paris, Space Institute at Strasbourg, United Nations conferences at Vienna, NASA conference on Project Management at Houston, USA and many more.

He has won several awards & honours and prominent among them are “Dr. Biren Roy Space Science design Award” from Aeronautical Society of India, “Agni Award” from DRDO for achieving the self reliance, “ASI Award” for contribution to space technologies, by Astronautical Society of India. “Distinguished Alumni Award” from IIT Madras, “Ramanujam Award” by PSG Institute of Technology for System Engineering, “Technical Excellence Award” by Lions International , “Outstanding Achievement Award” by Department of Space, Govt of India, “Lifetime Contribution Award” in engineering by Indian National Academy of Engineering (INAE) for his significant contributions for space technologies , “National Systems Gold Medal” for lifetime contributions to large systems from System Society of India, “Aryabhata Award”the highest award by Astronautical Society for his invaluable contributions for aerospace developments, “Big Kannadiga Award” by FM 93.7 Radio for Science in 2014, “Karnataka State Rajyotsava Award” for 2014 for Science & Technology, the top award from Government of Karnataka, “MR Kurup Endowment Award” by Centre for Indian Consumers Research, Trivandrum, for outstanding contributions in space education and research in 2015 and “Life time Achievement Award” from Karnataka State Science and Technology Academy in 2015,"Sir M Visweswariah Science Award”,by the Karnataka Branch of "Vijnana Bharathi" for his outstanding contributions to Space research and education, in 2016 and “Lifetime Achievement Award” by ISRO, Government of India, in 2016, in recognition of lifetime contributions to the Indian Space Programme. Recently he was honoured with the award by INCOSE at Washington for System Engineering.

In recognition of his meritorious contributions for Science

and Technology, Govt. of India conferred on him "Padmasree" during the year 2002 and "Padma Bhushan" during the year 2013.

Dr. V. K. Dadhwal

Director and Chairman, BoM, IIST

Most Respected Chancellor, Dr. B. N. Suresh, Chief Guest of Sixth Convocation, Professor Krishnaswamy VijayRaghavan, Principal Scientific Advisor to the Government of India, Dr. K. Sivan, President of the Governing Body of IIST Society and Secretary Depart of Space and Chairman Space Commission, Guest of Honor Shri S Somanath, Director Vikram Sarabhai Space Centre (ISRO), Dr. V Narayanan, Director, Liquid Propulsion Systems Centre (ISRO), members of IIST Board of Management, Directors of ISRO Centers, Distinguished Guests, Degree Recipients and their proud family members, faculty of IIST, invitees including from media, Ladies and Gentlemen, a very good afternoon to all of you.

It is my privilege to welcome you all to the 6th Convocation of our Institute. As we march into the twelfth year, we take this occasion to recollect some of our notable achievements and progress over the last one year, and to share with you our goals. This year the investiture ceremony has been advanced by a month, in fact the admissions for 2018-19 academic year are still in progress, in order to confer on you the well earned diplomas at the earliest.

It is an honor to have amongst us Padmashri Krishnaswamy VijayaRaghavan, Principal Scientific Advisor to the Government of India to deliver the convocation address. Prof. K. VijayRaghavan is an alumnus of IIT Kanpur and TIFR Mumbai, senior research fellow of Caltech, an eminent scientist with significant and fundamental contributions in the field of developmental genetics. He is recipient of innumerable honors and I list Bhatnagar Prize, Infosys Prize, JC Bose Fellowship as well as Fellowships of Indian National Science Academy, Third

World Academy of Sciences (TWAS), Royal Society, London and Foreign Associate of US National Academy of Sciences. He was Director of National Centre for Biological Sciences (NCBS), Bangalore, and also served as the Secretary to the Government of India, in the Department of Biotechnology during 2013 to 2018. Since march of this year he has succeeded Prof R Chidambaran as the Principal Scientific Advisor to the Government of India. It is indeed a privilege to have you sir, with us on this august occasion, to guide and advise our students in their future professional careers.

Institute is delighted to welcome our Chancellor Padma Bhushan Dr. B. N. Suresh, who has assumed office in November 2017. As the first Director of the institute Dr. Suresh played a pivotal role in its inception and takeoff, and continues to inspire us.

I am privileged to submit, on this Sixth Convocation, a brief report on the activities of the institute since September last year.

Status and Ranking

It is with great satisfaction that I report that a UGC Review Team under Chairmanship of Prof Sheo Narayan Pandey, Vice Chancellor, Pandit Ravishankar Shukla University reviewed the functioning of the Institute during Januray 29 to 31 and based on its report the UGC in its 530th meeting held on 20 march 2018, extended the Deemed to be University status for next five years. UGC review team was impressed by the institute and it write in the recommendations "The committee feels that the institute

has the full potential to earn the status of the Institute of National Importance and hence the institute should take appropriate measures in this regard".

Institute submitted its technical education program to AICTE wwhich has now approved the undergraduate as well as postgraduate programs. The regulatory bodies as well as Governing Council and Board of Management have also renamed the BTech in Avionics as BTech in Electrical and Communication Engineering with specialization in Avionics. This meets the demand of all stakeholders, especially for equivalence when they choose and build careers outside ISRO.

I am happy to share with you that in the latest NIRF rankings, set up by the Ministry of Human Resource Development (MHRD), Government of India, we have advanced our position by five places to be ranked 23rd among all Engineering institutions in the country. Especially, we were ranked in the top 10 among these institutions for 'Teaching and Learning Resources'.

Academic Report

Admission to various UG programmes of IIST is on the basis of JEE Advanced score and courses offered are Aerospace Engineering, Electronics and Communications Engineering (Avionics) and a dual degree program in Engineering Physics. The institute has seven departments to cater to the curriculum – Aerospace, Avionics, Chemistry, Earth and Space Sciences, Humanities, Mathematics and Physics. IIST follows a unique model wherein the education (tuition, boarding, lodging, books) of B Tech students achieving specified GPA are provided Assistance ship by Department of Space. Based on number

of specified vacancies for that year and meeting CGPA qualifying criteria of 7.5 out of 10, the student have a placement opportunity in one of the centres of ISRO. This unique induction opportunity in to India's prestigious space programme and getting an opportunity to be involved in its many ambitious projects is an important attraction for the students and their parents, the main stakeholders of the institute.

B Tech degree will be conferred on 111 students, out of which 54 students will be graduating in Aerospace Engineering and 57 in Electronics and Communication Engineering (Avionics). This year the 2014 dual degree batch moves to Masters program. Of the 111 students receiving their BTech degree today, 61 are eligible for absorption in ISRO.

The Institute offers 15 MTech/Master of Science across departments. M Tech degree will be conferred on 63 students of which 9 students are from three M Tech programs of Aerospace department, 20 students from five M Tech programs of Avionics department, 6 students from one M Tech program of Dept of Chemistry, 8 from two M Tech programs of Earth and Space Science department, 5 students from one program of Mathematics department, 10 students from two M Tech programs of Physics department and 5 students from a Master of Science program from the Department of Earth and Space Science.

Our PhD programme currently has 117 regular students, and another 38 ISRO scientists pursuing their PhD along with their regular responsibilities at their respective centres. They form our primary bridge to pursue collaborative research with various ISRO centres on problems of current interest to ISRO. Ph D degree will be

conferred on 19 students from six departments. This is the largest number of PhD conferred in any convocation and indicates continued strengthening of PhD program.

In order to strengthen and enhance ISRO scientist's career with PhD, the Institute started a Dual Degree Masters/PhD programme, wherein ISRO sponsored candidates with GPA and qualifying test can initiate course work required for PhD. This year 3 ISRO candidates enrolled for this stream.

Institute encourages meritorious students, and recognizes their hard work. Two gold medals will be presented respectively to UG programmes topper Mr. Prashant G Iyer of B Tech in Electronics and Communication Engineering (Avionics) and the PG programmes topper Mr. Gokul S of M Tech in Thermal and Propulsion. In addition to this the student who has secured Best academic score in Aerospace Engineering named Padmanabha Prasanna Simha and the all-rounder of the UG Programmes named M R Srivatsa will be given excellence certificate and cash award. The BTech toppers of two streams will also be provided an opportunity to enroll and earn a MS at CalTech USA under Satish Dhawan Endowment. It is with great pride that I report Mr. Avinash Chandra who completes his MS under this programme this year has received 'The Abdul Kalam Award' awarded annually for exemplary academic performance in Aerospace Engineering Master's program at CALTECH. Mr. Avinash Chandra is the second student from IIST under this program to receive this distinction.

The cumulative enrollment of the institute as on September 1 2017 stands at Undergraduates 1582, post graduates 465 and doctoral enrollment 220. After degree to be conferred in this convocation, the total degrees awarded by the institute will be 1630, comprising of 1153 BTech, 419 MTech and 70 PhD. A total of 775 graduates from the institute have joined ISRO thus far and placement eligible students of this batch is scheduled for tomorrow, i.e., 19 of July.

Students Activities

A Student Activity Board (SAB) under the guidance of Dean (Student Activities) and with active participation of students through various committees and clubs provides a unique opportunity to the students to acquire soft skills and leadership qualities. The students organize and manage an inter-collegiate cultural festival named "Dhanak" as well as an inter-collegiate technological festival named "Conscientia" every year. These events provide a platform for the students to showcase their talents and creativity both in the cultural as well as in the technological domains. Conscientia 2018, the tenth Annual Technology and Astronomy fest of IIST was organised in march 2018 and was inaugurated by Shri P Kunhikrishnan, Director SHAR. Dhanak 2017 was organised during October 20 to 23 with 40 events and participation of more than 900 students from outside IIST, was inaugurated by the renowned dancer Dr Methil Devika. Seventh edition of IIST Model United Nations was held during 7-8 April 2018.

Progress in Space Technology Research and International Collaborations

A new center "Small-satellite Systems and PAyload CEntre" (SSPACE) is being established at IIST to encourage the students, faculty members and staff of IIST for taking up interdisciplinary activities related to spacecraft engineering and space science. Currently this group is developing a payload, an ionospheric plasma probe named ARIS, a "Retarding Potential Analyser" (RPA) for the upcoming Mars Orbitor Mission 2 of ISRO. The engineering model and high vacuum test has been successfully completed in last 8 months. The IIST has proposed a nanosatellite and an RPA payload for the under discussion Venus orbiter mission of ISRO.

At present, IIST has initiated three international collaborative student satellite projects, out of which two of them are under advanced stage of development and one under discussion. The "Autonomous Assembly of Reconfigurable Space Telescope" (AAReST) project is being developed in participation with Caltech University, USA, JPL, USA and University of Surrey, UK. IISTs responsibility is to develop one MirrorSat including the structures, propulsion system, ADCS and power system. As a first milestone, IIST has delivered the mass dummies for the IIST MirrorSat for vibration analysis to Caltech, USA.

IIST has entered into MoU with University of Colorado, Boulder, USA in 2017 to encourage student/faculty to carry our research and development in the area of space science and spacecraft engineering and develop a curicullum for spacecraft engineering. Laboratory of Atmospheric and Space Physics (LASP), University of Colorado, USA has invited IIST to participate in the "International Satellite

Program In Research and Education" (INSPIRE) program. The first satellite under this program is the InspireSat-1 carrying "compact ionospheric payload" (CIP). IIST has the responsibility to build the Command and Data Handling (C&DH) system and the flight software for this project. IIST has delivered the engineering model of the C&DH system and work on flight software is under progress at LASP where currently four IIST students are undergoing their internship.

Institute completed the Phase A of MOU with University of Cambridge, UK and jointly designed a future space telescope to study atmosphere of exoplanets. These developments have been submitted to various committees of ISRO and Advisory Committee of Space Research and have received very positive feedback. This year IIST has also signed two more MoUs, one with Nanyang Technological University (NTU), Singapore, and Technion Israel, to carry out research and development in the area of space science and spacecraft engineering through student/faculty exchanges.

Our participation in India's space programme increased further this year with the signing of four more MoUs with as many ISRO centers (NARL, IISU, LPSC & IPRC), including one with NARL under which PhD students working in NARL will be jointly supervised by IIST faculty, with participation in NARLs research endeavours. Besides these we also entered into an MoU with the Mangrove and Marine Biodiversity Conservation Foundation, a dedicated institution established by the Government of Maharashtra to focus on research and education, livelihood development, ecosystem conservation and policy development, enabling conservation of this unique ecosystem.

In an effort to further enhance IIST's direct participation in India's space programme, a one and a half day workshop 'Building Synergies for Next Decade' was held at IIST with the active participation of Directors from Several ISRO centres, inaugurated by the Chairman-ISRO, and the mentoring presence of our beloved Chancellor. The workshop envisaged a clear and accelerated road map for strengthening our participation, and as a first follow up action an APEX committee to oversee implementation of its proposals is now in place. We are positive that in the years to come these efforts will bear rich dividends for both IIST and the country's space programme.

IIST-ISRO Research Projects

In order to strengthen our focus on targeted research for the Indian space program, an Advanced Space Technology Development Cell (ASTDC) was established in the institute in October 2015. The ASTDC facilitates and monitors IIST-ISRO joint projects, and also helps in identifying active areas in various ISRO/DOS units wherein IIST faculty and researchers can contribute with their expertise. Currently thirty two projects are in various stages of execution in IIST, in collaboration with several ISRO centres - particularly, Semi Conductor Laboratory, Space Applications Centre, NRSC, ISAC, VSSC, IISU, LPSC and IPRC.

Of the 32 projects under execution, the following, especially, are at a fairly mature stage, and have started delivering significant results:

I. Design and development of a Ka band antenna system to be used for Cartosat 3 data reception. (with NRSC)

ii. Design and development of two ASICS. (with SCL)

iii. Intrinsically conducting polyimide composites with CNT or graphene with good optical properties. (with VSSC)

iv. Comprehensive stationary plasma thruster diagnostics instrumentation. (with LPSC)

The project titled "Design and Development of High Performance Hydrogen Sensor" in collaboration with IPRC has achieved its stated goals and has been taken up further with a Memorandum of Understanding with IPRC to develop operational sensors. This phase of the project is entirely funded by IPRC.

Intellectual Property and Continuing Education

In 2017-18, the institute filed 2 more patent applications, in addition to the 10 already filed, while two more in the pipeline. It is the institute's policy to protect its intellectual property and license its technologies for wider industry's use.

As part of its outreach initiative, and dissemination of technical knowledge, the institute in the last one year has organized 11 workshops and short term courses with a cumulative participation of over 400 students and active researchers. In addition to this, as a continued effort to engage with the larger academic society, we hosted over 100 undergraduate and post-graduate students from across the country as winter and summer interns who spend six to eight weeks on a short research problem under

the supervision of our faculty. It would be appropriate to note here that IIST has been ranked highly under 'Outreach and Inclusivity', another important parameter in the performance metric under the NIRF protocol.

Acknowledgements

Institute would like to acknowledge and place on record the support received in abundant measure from the Department of Space, Government of India. I personally acknowledge the continued support and encouragement we have received from our beloved Chancellor, as well as President of Governing Body Dr. K. Sivan, Members of the Governing Council, Members of our Board of Management, our Academic Council, the Boards of Studies of each department, and from all my colleagues, and extend my appreciation to the students for their exemplary behavior and their contributions towards enriching the campus life.

Before I conclude, it is my duty to once again thank our esteemed Chief guest Prof. Vijayaraghavan, our Chancellor, Dr. B. N. Suresh, Chairman of Governing Council, Dr. K. Sivan, the degree recipients and our distinguished guests for their presence here today. The VSSC administration has just as always been extremely supportive in the organization of this ceremony. We are much obliged to Shri S Somnath, and the entire management of VSSC, for their unflinching support at every step.

To our passing out students, I would like to convey my heartiest congratulations and best wishes to each one of the 111 Btech graduates, 63 MTech and 19 PhD degree recipients, and the student toppers receiving the gold

medals for their special achievements. The world awaits you and we remain eager to learn and applaud you on your future successes and achievements.

Thank You.

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Dr. Vinay Kumar Dadhwal

Dr. Vinay Kumar Dadhwal is Director, Indian Institute of Space Science and Technology (IIST), Trivandrum and Chairman, Board of Management IIST since July 2016. Previously he worked in ISRO (1983-2016), including as Distinguished Scientist & Director, National Remote Sensing Centre (NRSC) during 2011-2016. Other positions held by him include Associate Director, NRSC (2010-11), Dean, Indian Institute of Remote Sensing (IIRS), Dehradun (2004-2010), concurrently he was Director-in-Charge at UN Centre for Space Science Technology and Education in Asia and the Pacific (UN CSSTE-AP) as Director in Charge (2005-06; 2009-10) and Head, Crop Inventory & Modelling Division, Space Applications Centre (SAC), Ahmedabad (1998-2004).

He was associated with major achievements at NRSC in the area of earth observation applications including National Geospatial Portal BHUVAN, National Database for Emergency Management (NDEM), National Information System for Climate and Environmental Studies (NICES), Space-based Inputs for Sustainable Development & Planning (SISDP), Water Resource Information System (WRIS), Disaster Management Support Program, etc and in satellite data, acquisition and processing including realization of IMGEOS and ground station at Antarctica. While at IIRS he was responsible for strengthening field based and quantitative application and EDUSAT based certificate program in field of remote sensing. His scientific contributions include as Project Director, National Carbon Project (NCP, 2007-2016) in biogeochemistry of Carbon and in as diverse EO applications areas as agriculture, crop simulation models, forestry, geo-hazards, geo-informatics, hydrology, land cover/ land use, land surface processes,

meteorology and oceanography and has co-authored more than 280 peer reviewed journal papers. His early studies on crop discrimination, crop mapping, crop yield modelling were critical to ISRO program on agriculture forecasting (1986-2004) and to final acceptance and establishment of a national centre by Ministry of Agriculture in 2012. He has co-guided 10 PhD students.

He has extensive international cooperation experience, as member/leader of Indian delegation to UN Committee of Peaceful Uses of Outer Space (UNCOPUOS), Vienna (2013, 2014, 2015), to Science & Technology sub-committee of UNCOPUOS, Vienna (2013-2015) and was Chair of UN COPUOS S&T subcommittee in 2016. He has been member/co-chair of Indian delegation in international cooperation meetings with US, Japan, ESA and China. Currently he is the Chair of Project Advisory Committee (PAMC) of DST-Network Project on Imaging Spectroscopy and Applications (NISA).

His scientific program management experience includes Co-Chair, National Spatial Data Infrastructure (NSDI) of DST (2011-2016), Governing Body/Council of Indian National Centre for Ocean Information Services (INCOIS, 2011-2016) and many State Remote Sensing Centre.. He was ISRO representative to the Board of Antrix Corporation (2013-16). Currently, he also serves in Board of Governors of APJ Abdul Kalam Technology University, Trivandrum, Member, Indian Institute of Management Society, Kozhikode, and Governing Body of Indian Institute of Tropical Meteorology (IITM) Pune.

He is Member, International Academy of Astronautics (IAA) (2015), Fellow of Indian Meteorology Society (2017), Fellow of Indian Society of Remote Sensing (2014), and

Fellow, National Academy of Agriculture Sciences (NAAS), New Delhi (2007). He is past president of Technical Commission VIII of International Society of Photogrammetry & Remote Sensing (ISPRS) (2012-2016), Indian Society of Remote Sensing (2012-14) and Indian National Cartography Association (2013). He is serving as Editor of Journal of Indian Society of Remote Sensing (Springer Publication) since 2010.

He is a recipient of many awards including ISRO Outstanding Achievement Award (2016), Bhaskara Award, ISRS (2013), Satish Dhawan Award, ISRS (2010), ISRO Merit Certificate for contributions to application of remote sensing to crop forecasting (2006), ISRO-ASI Award for Space Applications by Astronautical Society of India (2005), Hari Om Ashram Prerit Dr Vikram Sarabhai Award for Space Applications by Physical Research Laboratory, Ahmedabad (1999), Indian National Remote Sensing Award of ISRS, Dehradun (1999), Young Scientist Medal of Indian National Science Academy, N Delhi (1989) and ISCA Young Scientist Award, Indian Science Congress Association, Calcutta (1987).

भारतीय अंतरिक्ष विज्ञान एवं प्रौद्योगिकी संस्थान

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

वलियमला, तिरुवनंतपुरम

Indian Institute of Space Science and Technology

(Declared as Deemed to be University under Sec.3 of UGC Act, 1956)

Valiamala, Thiruvananthapuram