



Connecting Thinkers...

Thinklet's New Year Greetings

Message from the President



Dr. Chenraj Roychand

I am delighted to wish all the readers of THINKLET a bright, prosperous and fulfilling 2017. As researchers at Jain University, you are making an important contribution to enriching the ever expanding body of knowledge in different fields. Your contribution and efforts are central to building a vibrant knowledge society.

I take this opportunity to wish each and every one of you a successful year ahead. THINKLET provides a great platform for a dialogue among researchers. I would like to compliment all those who have strived to bring the issues out on the first of every month for the last two years and all the contributors and readers who have been instrumental in ensuring the success of this initiative.

Message from the Chancellor

I wish a glorious New Year - prosperous, joyful and peaceful for all readers of THINKLET and also to Prof. Sandeep Shastri and his great team who are doing an excellent job of regularly bringing out the issues of THINKLET and maintaining good standard. It is providing an excellent linkage between the research students and the faculty in various disciplines and enhancing multi-disciplinary knowledge.

My best wishes for the continued excellence.



Dr. C.G. Krishnadas Nair

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Message from the Vice-Chancellor

I am delighted to note that THINKLET the monthly newsletter highlighting the Research initiatives and achievements of Jain University has created a marked impact. It is a milestone achievement of Research wing of Jain University. THINKLET is a connecting link for the thinking minds. It has successfully completed two academic years and in the process rendered great service to the academic fraternity.

I deem it my pleasure to wish the editors, advisors, research guides, research scholars and all those connected with THINKLET a happy and prosperous 2017!!.



Dr. N. Sundararajan

Message from the Pro Vice-Chancellor

As we start a brand new year, THINKLET celebrates completing two years with 24 on-time issues. If one were to review the content of the issues, one notices a judicious mix of articles by doctoral supervisors and research students and the recent addition of interviews with eminent researchers. My sincere congratulations to TEAM THINKLET for doing a fabulous job with efficiency, enthusiasm and earnestness.

Jain University has always given primacy to research and THINKLET represents a University initiative to provide a dialogue space for researchers to share ideas and information. In the New Year one hopes for a more proactive involvement and participation of researchers in THINKLET.

My best wishes to all for a Memorable and Event Filled 2017.



Dr. Sandeep Shastri

Editors' Message

With great pride and happiness we wish to acknowledge the start of the Third Year of THINKLET. It has been our endeavour to not only bring out THINKLET on time, but also maintain the quality in the research articles published. At this juncture we would like to thank all those who have contributed to THINKLET and made it a success.

We are also grateful to all of you who write to us with ideas and suggestions for improvement. And above all, we are indebted to our mentor Dr. Sandeep Shastri who guides us every month, and our dedicated team members who make sure that we have a better issue with each passing month. We wish all our readers, contributors and colleagues, a very happy and prosperous 2017, and a fulfilling year for Research.



Dr. Mythili P. Rao and Dr. Reetika Syal

GUIDE'S COLUMN

Stem Cells: Applications in Regenerative Medicine and Cancer

Stem cells stand out as promising tools for regenerative medicine, providing alternative therapeutic solutions for a large number of degenerative diseases. The stem cells can be defined as “cells capable of proliferation, self-maintenance, and the production of differentiated, functional progeny that are characteristic of the organ from which they were derived”

A new branch of medicine, called regenerative medicine has emerged through our knowledge about stem cells. In this new branch, the therapeutic act involves the manipulation of stem cells in order to regenerate tissues and organs of an organism altered by destruction, disease, or congenital defects. The examples of stem cell therapies include, Parkinson's disease and liver regeneration with iPSCs (induced pluripotent stem cells), spinal cord injury and diabetes with human embryonic stem cells (hESCs), sickle cell anemia, thalassemia, hemophilia and other blood diseases with iPSCs. Bone marrow transplant (BMT) and hematopoietic stem cell therapy (HCT) have shown promise in treating Lymphomas and thymomas and Metastatic cancers of other origins.

In people who suffer from type 1 diabetes, the cells of the pancreas that normally produce insulin are destroyed by the patient's own immune system. Scientists have shown that it is possible to direct the differentiation of hESCs in cell culture to form insulin-producing cells that eventually could be used in transplantation therapy for persons with diabetes.

The generation of a functional human organ from pluripotent stem cells was reported for the first time in 2013. A three-dimensional vascularized and functional human liver was created by scientists using a co-culture of hepatic endoderm cells derived from human iPSCs, human umbilical vein endothelial cells, and human mesenchymal stem cells (MSCs). iPSC-derived liver buds transplanted into mice generated a vascularized and functional human liver. These findings offer a promising breakthrough in the field of regenerative medicine and organ transplantation.

Even in cancer, stem cells are becoming an increasingly greater focus of cancer research, as evidence suggests that they may be integral to tumor formation. Understanding the characteristics of these cells may lead to improvements in cancer diagnosis, therapy, and outcomes. Ultimately, patient survival depends on getting rid of these cancer stem cells.

Stem cell based therapies and regenerative medicine show promise for the future by providing healthy, functional tissues and organs to improve the quality of life for individuals. Research efforts in this domain offer hope that there will be no donor organ shortage, complete recovery and fewer side effects for many incurable diseases. As a highly promising area, Jain University encourages active research in this domain through projects and research programmes.

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The Importance of Visual Literacy

Visual literacy is the ability to interpret and make meaning from information presented in the form of an image. Making meaning out of symbols and images is not given academic precedence in comparison to interpreting written texts or words. Most individuals find it rather difficult or are incompetent to read an image as opposed to reading words. To read an image or reading images in itself sounds quite perplexing; only because we lack the training and the capacity to interpret an image the same way that we interpret words. Visual literacy in relation to moving images i.e., films, advertisements, videos or still images as in comics, graphic novels, hoardings etc. is disposed to an upsurge at the turn of the 21st century as dependability on digital media has seen an upward trend.

It is important to know how ideas are and can be expressed in a visual form

However, Visual literacy should reach younger people at an earlier age so that they can shape their minds to analyze images in the same way as the written word. It is important to know how ideas are and can be expressed in a visual form. Every image be it moving or still devises its own vocabulary that any spectator or audience or reader should be able to decode. Images become very powerful tools to depict or portray something that could have sociological, political, emotional and psychological indications and impacts. Consequently, individuals at a very young age should be able to decipher these complexities and also be adept at maneuvering language into an image seamlessly and grow sensitive to visual depictions.

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In the Shade of the Hand Post

While pursuing my PhD in English on the **Kannada poet K.S. Narasimhaswamy**, I was particularly impressed by his lesser known work '**KaimaradaNelalalli**' (*In the Shade of the Hand Post*). Here we meet men and women from the poet's familiar *Naviluru* and *Honnuru* villages, whose youth is behind them and they share their agony of losing their loved ones under the shade of the hand post at the crossroads. The village counselors remind the readers of a compassionate society which gradually made way for impatient modern life. Against the background of death there is an attempt to introspect life.

The village counselors remind the readers of a compassionate society which gradually made way for impatient modern life

In the scorching heat they burn the dead, they say hands burn on touching the lantern, the burnt body tells a different tale. In the twilight they got up as the story ended. Everyone agreed: Till we are alive we should not think of death. Everything is tolerated by our life. (K.S. Narasimhaswamy, KaimaradaNelalalli, MysuraMallige)

The hand-post doesn't really give shade to anyone, though (*in Kannada*) it is called a 'tree,' it doesn't bear either flowers or fruits; it is only an indicator of one's journey. Inherently the shared sorrow, symbolic title and flock of birds – symbolizes the journey from the unknown to the unknown. At the end of each day the perched parrots and counseled crowd disperse to meet again. The debate about life and death continues in small villages, big towns and large states. Yet, the shade of a tree with parrots perched on top, few compassionate listeners to empathize with life's experience, life would not be bad after all.

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From Research to a Startup...

Entrepreneurship is all about the quality of opportunity, and the team, important resources put together, and innovation. It is nothing but a game of playing strategies. Ideation is very early stage in the entrepreneurial journey. But the ideation without an execution is illusion. An idea is not necessarily an opportunity. The research is important to check if the idea is feasible. It is the first step carried by the researcher for validating an idea. Once the decision is taken to start a venture, one has to set an exit goal. Beginning with the end in mind will be helpful to map out the pathway to success.

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A startup is a new business in early stages of development and operation; wherein an entrepreneur comes up with a unique idea for a particular product or service and accordingly develops a business plan by applying various strategies, aiming for a rapid growth. Protecting an idea is an important stage of any startup. Protection includes trademarks, copyright and patents. Startups are divided into four categories: Sole trader, Partnership, Limited Company in which there is low risk of personal liability. Limited Liability Partnership wherein, personal liability of partners is limited to the business investment i.e. the investment for the machinery etc.

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Translating Responsible Government: D.V.GUNDAPPA'S Translations and Other Literary Works

“What role did the translations by D V Gundappa (DVG) play or not play in bringing the notion of “Responsible Government” into existence in Kannada/ Mysore region during the Colonial period till the transfer of power was imminent in 1946/7”.

During the colonial period the production of knowledge was not a simple process. It necessarily included a clash with a marginalization of the knowledge and the belief system of those who are conquered as also with some oppositional view at home. D V Gundappa seems to be a lone voice against the monarchy in Princely Mysore, which was a prominent region, marked as Karnataka. D V Gundappa consistently argued for a Democratic Rule, which he calls as Responsible Government, in Princely Mysore. He went to the extent of becoming a champion of democracy in all the princely states in India, and organizing a “South Indian States Peoples conference” at Trivandrum in 1929, which was attended by all the Representatives from Mysore, Hyderabad, Pudukotai, Cochin and Travancore.

He went to the extent of becoming a champion of democracy in all the princely states in India

Interestingly D V Gundappa is not known for his translations or his political writings he is remembered today only for his “Mankutimmana kagga”, which needs a proper investigation. He accepted and articulated self-consciously the western liberal framework in his political and social discourses. The paper focuses on the movement from monarchy to democracy in the princely state of Mysore. I shall be tracing these movements with reference to the early period of kannada literature, focusing mainly on the translations of Kanakaluka, Macbeth and Jack Cade and literary works of D V Gundappa. It is the study on the development of how the responsible government came into existence during the colonial period.

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How Can An Autobiography Help In ‘Catharsis’?

“The best way to overcome a fear is to face it.” -Unknown

The process of releasing and there by providing relief from strong or repressed emotions is termed as ‘Catharsis’. It is derived from the Greek word “*katharsis*” meaning "purification" or "cleansing". It is the purification and purgation of emotions that results in renewal and restoration of the mental and the emotional body.

It is like healing at the emotional level which no medical system or therapy has the capability to do

Most of the time, all deepest hurts and pains are hidden in a secluded corner of one’s heart, which no one is allowed to access. These memories never see the light of the day, some keep mounting and some are healed with time, with or without scars. Writing an autobiography gives an opportunity to relive the past. It could be a means to acknowledge, erase painful memories and forgive all the people who were directly or indirectly responsible for it. It is like healing at the emotional level which no medical system or therapy has the capability to do.

Women have always been and continue to remain on the receiving end, irrespective of caste, creed or economic status. In the recent past, women have started giving voice to their emotions. This works well for women writers who otherwise do not get a chance to vent out their feelings because of social or family pressure. Thus, writing an autobiography is about wearing one’s past as an armour and a crown, acknowledging its role in being instrumental in shaping one’s present self and also carrying it forward in the future as an eternal reminder of from where we belong.

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Special Reflections

On the occasion of the 6th Annual Convocation of Jain University, some of our Research Scholars and Guides share their thoughts.

ON RECEIVING THE ‘BEST STUDENT’ AWARD

I was deeply honoured to receive the award for the Best Ph.D. Student at the recent University Convocation. It was a truly overwhelming experience to receive the award in the presence of luminaries from the field of education and research and I count it as a special blessing. Getting this award has given a boost to my passion to continue research and I consider this as a stepping-stone to achieve greater heights in my career

I am extremely thankful to the management and authorities of Jain University for providing very good research facilities, and a platform to interact with eminent professors from IISc and IITs. I got an opportunity to work with Dr.G.R.Nagabhushana, ‘former’ Chairman, Department of High Voltage Engineering, IISc Bangalore. My experiences made me believe that doing ‘Ph.D’ at Jain University is as good as doing it at IISc. Inputs to write a good thesis were well explained in the Research methodology classes which paved the way to come up with a good thesis.

My Research topic was “Developmental (Simulation and Experimental) studies on Fast High Voltage Marx Generators”, which has applications in pulsed power applications. The work was carried out on a 700 kV Marx generator. Also work has been carried out to generate ultra-fast pulses. This technology can be used for pasteurization of food also and currently research is being undertaken on treatment of vegetable juices using Pulsed Electric fields. There is lot of scope to continue research in this field. I would also like to thank my parents, wife and my research supervisor for endlessly supporting and encouraging me in achieving my dreams and goals.

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ON RECEIVING A Ph.D. DEGREE

I received my Ph.D. Degree in Management at the Jain University Convocation held on 23 December 2016. I thought I would use this opportunity to express few of my feelings and learning's during this research journey. Coming from the corporate world and industry, when I recall the initial days of my research, peer opinion was generally “not once again” to tutorials and classes. However, the following were motivating factors and key drivers to pursue research.

1. Urge to pursue learning, progress and acquire more knowledge and education,
2. Disseminate learning acquired during my career,
3. Make contributions back to society and the business sector that has supported me till now.

After a lot of procrastination, I began research work in August 2012 from Jain University. The mission wasn't without rejections which I had to face at every stage

There is a well-known proverb:- “A journey of a thousand miles has got to start with a single step”. My research started out with a well-designed coursework that laid the foundation for attaining my research objectives in a well-timed manner. It is my sincere and strong feeling that, the dedication, hard work and place of work for intended study are primary explanations in accomplishing any research successfully. The primary two reasons: Dedication and Hard work are however, under the control of the student whereas the element of place, vary from university to university. Certainly it was God's reward that I got a chance to pursue Ph.D in Jain University and benefitted from its valuable research environment. I have coined a phrase CLIME (Synonym for place) which is an acronym for:

Content strategy: well-designed course content harmonized with the research requirements from methods to Award. Involves skill development programs, workshops, research retreat and so on.

Leadership: One must experience the Research Program leadership in Jain University. One could have the opportunity to experience Participative, Transactional and Transformational leadership here.

Infrastructure : Sufficient quality of expertise resources and learning assistances made on hand

Missionaries to deliver content

External Intellectuals made available during the course work

I consider these as some of the vital elements of a congenial research atmosphere that would facilitate world class research with the right specifications and standards.

Briefly, my work was titled “DEVELOPMENT OF A BUSINESS MODEL FOR SUCCESSFUL ENTRY OF INDIAN ICT INDUSTRIES INTO INTERNATIONAL BUSINESS: REFERENCE TO AFRICAN CONTINENT“. This innovation is intended to guide Indian ICT industry in business sustainability through potential business from emerging markets, particularly in current business uncertainties in developed markets.

Finally, I am very grateful to each person in my Jain University, who has directly or indirectly guided me throughout the study and transformed me to reach this stage of award of doctorate degree. Although, the intention has been executed but the transformation have an effect that is so powerful that it ensures that I remain as an independent scholar contributing to academia and industry.

Dr. Shrishail K. Angadi

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Research is to see what everybody else has seen, and think what nobody has thought
- Albert Szent-Gyorgyi

ON HER FIRST STUDENT RECEIVING A Ph.D. DEGREE

Guiding my first PhD scholar's research was a very fulfilling journey, in fact every small milestone reached in the process was a big motivator. All the effort seemed worthwhile when the scholar successfully submitted her research thesis, confidently defended it in the viva and finally received approval for the PhD degree

It was learning at-every-step along with the scholar through extensive discussions on research methodology, critically thinking if the phases are planned thoroughly?, have we questioned the 'why' wherever possible?, does the study demand new tools in the given context?, how should we overcome the practical challenges posed in the data collection process?, have we considered all the experts and panel advice?, are we revising things with an open mind or have we got stuck with pre-set notions?, is the language clear and scientifically detailed?, which statistical methods would be more suitable?, can different perspectives be used in interpreting the results?, are we meticulous enough in considering every aspect?, what are the possible limitations that can be questioned and so on.

Suggestions and feedback received from colleagues during departmental presentations (such as synopsis, and pre-submission) greatly helped in improving the work. Prompt work, persistent optimism and a readiness to learn from the scholar's end surely had a huge role to play in this memorable experience.

Dr. Pooja Surana

Research Guide of Dr.Poorva Ranade, who received her PhD in Psychology at the Convocation

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Ms. Hemavathi B. receiving her M.Phil Degree and Award for Best Student



Dr. Madhu Palati receiving his Doctoral Degree and Award for Best Student



Dr. Shrishail Angadi receiving his Doctoral Degree



6th ANNUAL CONVOCATION REPORT

Jain University held its 6th Annual Convocation on 23rd December 2016 at its Global Campus. The Chief Guest on this occasion was Hon'ble Minister of State for Human Resource Development Dr. Mahendra Nath Pandey. All students entered the hall with a procession led by the Ph.D and M.Phil Scholars. This was followed by the Academic Committee and Faculty procession. The ceremony began with the Vice Chancellor Dr. N. Sundarajan, welcoming the gathering, and Chancellor Dr. C. G. Krishnadas Nair formally opening the convocation ceremony for and presentation of degrees and awards to students.

In the convocation address, Dr. Pandey said, "It's the moment to celebrate your academic achievements and I congratulate all of you for your efforts and success. But on that note I would also like to urge you to take the responsibility to share and spread the learning that you are taking away with you from here." He urged the students to contribute to the society through their individual abilities and initiatives and bring changes that can transform lives. Evoking the valuable teachings of *Mahavir Jain*, he advised the students on the importance of culture-rich society, and highlighted how science, technology and culture can go hand-in-hand to bring positive changes. Showing confidence in the talented citizens of the country and the resources possessed by India, he said that all of it could contribute to different sectors and boost the economic growth of the country.

There was obvious excitement in the hall when the students took their oath and subsequently received their degrees. Among the research scholars, 43 M.Phil and 47 Ph.D scholars received their degrees that day. Dr. Madhu Palati received the 'Best Student Award' for Ph.D and Ms. Hemavathi B. received the same award for the M.Phil degree. As it has been in the previous years, this was a day high emotions for the mentors, students and their families. It was a day to honour achievement, hardwork, and dedication and above all to celebrate the completion of the research journey

The research scholars who received their Degrees on 23rd December are as follows:

M.Phil Scholars: Shwetha V, Varsha Thapa, C Alekhya Iyengar, Surabhi Thapa, V G Bhargavi Rayavarapu, Sweta Rani, Hemavathi B, Naba Kumar Goswami, Pooja Manasi Srinivas, Umme Maria, Parvathy J, Varun M Tayur, Ankitha U, Ann Joma Job, Anu Sebastin, Dimpal Bhal, Dhriti Govindraj, Neethu Mol S, Nisha Osan, Vinaya Vincent, Astha Kumbhat, Gayathri Kuppaswamy, Gitamoni Nath. Sudharson T S S, Aparna R S, Shoba Ramesh, Anupama Jayasimha, Arun S, Madhulika Acharya, Padmini Seshadri, Ananya Bhagath, Swetha M, Karan Nahar. M, Saptarshi Sengupta, Chandan Kashyap S K, Kumudini Ravindra, Sindhu Joseph, Sudeshna Ghatak, N.S. Satish, Mathews P Raj, S. Sujayaraj, Anitha HC, and Shubha M D.

Ph.D Scholars: A. Ve. Sowrirraajan, Appaji Ashwini, Arun Bhardwaj, Ashwini K, Bibechanan Timsina, Budha Anuradha, Chandra shekhar A Badachi, Chandan H R, Chandrika N, Chitra Lakshman, Dikshit Abhishek Yogendrakumar, Geetha C.R., Jyothi M S, K Manjunath, K Rajasekar, K Prashanthi, Kamala H, Laveena Precilla D' Souza, Madhu Palati, Manjanaik N, Manohara M, Minchitha K U, Minnu Kejriwal, Mohammed Riyaz Ahmed, Nita Choudhary, Piyush Kumar Pareek, Poonam Sharma, Poorva Sunil Ranade, Preetha Nagalakshmi, Priyanka P V, Pushpavathi T P, Rajashekar J S, Rashmi Dikshit, Rashmi Niranjan Rashmi S Kulkarni, Rekha Datta, S Murali Krishna, S Prabhanjana, Shrishail Angadi, Shwetharani R, Sujatha Das, Sairam A, Sangita Gupta, Sirisha Namavarapu, Sowmya H B V, Supriya V G, and Vishwanath Y.

Team Thinklet wishes them All the Best for all their future endeavours!

In Conversation with the Experts

In this section we bring you an interview with an eminent researcher. This month's expert is Prof. C.G.K. Nair who is the Chancellor of Jain University. He is also Former Chairman of Hindustan Aeronautics Limited, and Fellow, National Academy of Engineering. Prof. Nair is a Padma Shri Awardee for outstanding contribution in Engineering Science and Technology. He led the Design and development of major projects such as Advanced Light Helicopter, Light Armed Helicopter, New Jet Trainer and led HAL as technology / industry partner with DRDO and ISRO for major projects such as LCA, Prithvi and Agni missiles, ASLV, PSLV, GSLV and various satellites. He founded the first joint venture defense sector BAe-HAL Software Ltd. And is the founder of Society of Indian Aerospace Technologies and Industries (SIATI)



You have been a student of Metallurgy and Mechanical Engineering. How did you get interested in Aerospace research?

With my background in Metallurgical and Mechanical Engineering, for my PhD research I chose a theme that required knowledge of metallurgy and mechanical engineering – “Effect of Micro Structure and Crystallographic Texture” (orientation atoms) in Aluminium alloy sheets on Fatigue crack propagation. Fatigue was in those days the dominant cause of structural failures in aircrafts, and aluminium alloy sheets contributed to the bulk of materials in aircraft structures. Research in this field led me to join Hindustan Aeronautics Limited.

Could you please share any one memorable experience of research during your time at the Hindustan Aeronautics Limited?

Research and development in industry vary considerably from what we do in academic institutions. The latter gives opportunity to continue research in specialised areas and contributing to scientific knowledge. Some academic institutions also provide an opportunity to work with industry on mission oriented research. Industrial research is mission oriented to develop materials, processes, technologies, design related projects and product design and development and the like. One must be prepared to work on a number of projects at the same time which requires a multi-disciplinary team-work and working with others. The job may not be in the field in which one has done research for Ph.D.

For example one of the several projects I handled in my early R&D career in HAL was development of light weight fibre reinforced composite materials and structures for helicopter. Composite materials were then just getting introduced, replacing many aluminium alloy structures. I had to develop processes technology for FRP structures using imported raw-materials (resins, fibre, rigid plastic foams and the like) and also then develop raw-materials as an import substitution. Many projects led to establishing manufacturing shops using technology developed, training and employing people, creating wealth and welfare through employment in addition to enhancing Science and Technology and self-reliance in the field. Such experiences prepared me to take up greater responsibility as I rose to the corporate level to lead major projects in design and development for helicopters, engines, aircraft, equipment and systems and also to associate with other organisations, such as DRDO, ISRO for missiles, satellites & launch vehicles.

The most memorable experience, I would like to share with you is the thrill of mission oriented research and the transformation from academic research to mission oriented research in the industry, developing materials, processes, and products and seeing these commercially exploited. I believe that academic research should be supported by industry to enhance our scientific knowledge and develop newer cutting edge technologies and develop new products. There are several other interesting memorable experiences which relate to bureaucratic delays, financial issues, dealing with people, encouraging and motivating colleagues, and overcoming resistance to accept indigenously developed products because of our mind set “imported things are always better”.

What led to the foundation of Society of Indian Aerospace Technologies and Industries (SIATI)?

SIATI was founded with the mission to involve private industries particularly SMEs in the development and manufacture of aerospace materials, components, structures, equipment and systems for the Indian aerospace programs. Since the requirements were small and quality standard was very high with low volume, low revenue and profit, it was necessary to build an organisation to stimulate private industries through hand holding, technology transfer, training and even financial support. Today when we look back over the last 25 years since its inception, it is very heartening to note that several industries have become R&D and Innovation partners with HAL, ISRO, DRDO and have also become cost effective supply chain partners for Indian aerospace and defence projects as well as for major foreign aerospace manufacturing industries.

With reference to technological advancement and government support in the sector, what opportunities and challenges do you foresee for Aerospace research in India?

There is considerable growth taking place in military and civil aviation as well as in space projects in India. We have a mission to enhance self-reliance through 'Make in India', meaning design and develop in India. The best of technologies cannot be bought. Government of India is supporting academic institutions and R&D institutions as well as industries, financially as well as through proactive policies, to enable growth through research & development. Challenges in aerospace research for future will be developing advanced design & manufacture enabling science and technology in aero-dynamics and configuration, materials and processes, structural design and analysis, MEMs based devices, equipment and systems, and IT based tools and technologies in design and manufacture as well as flight control laws. Factors such as stealth, noise and emission controls are becoming very important in future designs of aircraft and engines. Nano materials & technology, nano carbon fiber composites, intelligent materials and smart structures are significant emerging areas for intensive research.

Given your vast experience, what advice would you like to give young researchers of today?

My advice to young researchers be it in Science, Engineering, Arts, Commerce, Management or any field is the following:

- ◆ Apply your whole mind in the field of research you have chosen and add knowledge in that field through your research.
- ◆ Consider research not just as a means to obtain a Degree but as an experience in systematic investigations, collection of data and analysis, framing conclusions and giving some directions for the future work in the areas including applications of the knowledge gained. Use this unique management skill and experience in systematic analysis and problem solving in your life and career.
- ◆ Develop multi-disciplinary knowledge by interacting with your colleagues in various disciplines.
- ◆ After your PhD, look for opportunities to work in mission oriented research in your field or related fields. There is definitely a need for fundamental research to explore uncharted territories to gain and enhance scientific knowledge. Some of you may like to pursue research in specialised fields and if you have a passion in that area, you must pursue the passion.



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ARTICLES FOR NEXT ISSUE SHOULD BE SENT BY

January 20, 2017 WITH NOT MORE THAN 250 WORDS

PLEASE INCLUDE YOUR NAME, E-MAIL ADDRESS AND THE KNOWLEDGE DOMAIN OF YOUR INTEREST