





Annual Giving Report 2018–2019

















Annual Giving Report 2018–2019







To be an academic institution in dynamic equilibrium with its social, ecological and economic environment, striving continuously for excellence in education, research and technological service to the nation.

To pursue excellence in:

- Teaching developing human resources in the service of the nation
- Research
- Consultancy
- Helping to improve technical education in the country

I&AR Mission & Vision

Serve as outward-facing window from the Institute to the Alumni:

- act as primary interface to alumni-at-large
- authorize alumni access to campus facilities
- administer Distinguished Alumnus Award program
- administer Travel Grant program, etc.

Drive Institute-related fund-raising activities among alumni:

- devise fund-raising strategy
- coordinate fund-raising activities
- ensure timely deployment of funds
- report to Institute and back to donor regarding status of funded projects

Register graduating students into the alumni database:

- enroll students into the database
- provide permanent alumni e-mail ID
- maintain and grow database
- provide database access on as-needed basis

Serve the student community:

- administer scholarships and awards
- solicit alumni funds towards student travel, facilities, projects, etc.
- facilitate student mentoring by alumni

Serve the faculty community:

- **promote interactions between visiting faculty and local alumni**
- promote campus and department visits by alumni
- promote research *L* consultancy relationships between faculty *L* alumni

Serve the alumni community:

- support networking activities and events, such as reunions
- support alumni communications, such as monthly newsletter
- support alumni registration in database
- work closely with IIT Madras Alumni Associations (IITMAA, IITMAANA, etc.) on alumni related matters
- support Pan IIT activities (e.g., Club) and events (e.g. Annual Meets)



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Message from DIRECTOR, IITM



Dear Alumnus/Alumna,

Indian Institute of Technology Madras celebrated its Diamond Jubilee of its founding on 31st July 2019. The journey so far has been glorious and exciting, amplified by the fact that IIT Madras has been ranked as the "Best Educational Institution" in India, in the latest edition of National Institutional Rankings Framework (NIRF) 2019 of MHRD, Govt. of India. The institute continues to be the "Best Engineering Institute" in the country, for the fourth consecutive year in a row. To top it off, IIT Madras has emerged as the No. 1 institution in the maiden edition of the Atal Ranking of Institutions on Innovation Achievements 2019, MHRD, Govt. of India.

We are delighted that our efforts to constantly improve our course programmes, research, and industry collaboration, as well the creation of a world-class innovation ecosystem in India's first-of-its-kind Research Park at IIT Madras are being recognized.

This wouldn't have been possible without the support and wishes of our alumni as well as several industry captains. Our alumni fraternity has yet again set a new watermark in giving back to IIT Madras. The grants from MHRD is used to run the institute, while alumni and donor contributions help us to aspire for excellence in research, develop cutting edge technologies and promote entrepreneurship. Your contributions empower us to invest in new initiatives and forward-looking programs and provides the necessary impetus to take our Institute towards global pre-eminence. I solicit your continued support for the continued growth of IITM to touch new horizons.

I take this opportunity to thank each and every one of our alumni and well-wishers for your contributions, be it in the form of money, interacting with students to share experiences or even a simple visit to the campus to take a trip down memory lane. Every little act of yours towards IITM, every time you think of your alma matter, and every act of generosity, makes a difference.

-Prof. Bhaskar Ramamurthi

Message from DEAN, I & AR



Dear Alumnus/Alumna,

It gives me great pleasure to write a preamble for our Annual Giving Report for the Financial Year 2018-19. IIT Madras has always seen an extreme outpouring of love and affection from its alumni in many different forms. This year is no exception.

IIT Madras was rewarded with the prestigious Institute of Eminence (IoE) title on 5th Sep 2019. This status was accorded by the Union Ministry of Human Resource Development, coincidently on Teachers' Day, and during its glorious Diamond Jubilee year. With this recognition, IIT Madras is further motivated to intensify its research focus in various fields, as part of an effort to develop solutions to the country's problems and to foster world class research labs and centres of excellence in emerging areas.

As we celebrated our Diamond Jubilee of foundation this year, we are extremely grateful to the thousands of alumni who have contributed their time, talent, and treasure to help the Institute grow in various directions. A clear testament of this growth has been reflected in the fact that IIT Madras is ranked No.1 as The Best Engineering College in the country for the 4th year in a row. We are humbled to receive these laurels that have been bestowed upon this young Institute. Such achievements are only possible through the extreme hard work of generations of faculty members, staff and students combined with the passion and affection of its alumni.

During last year we received over INR 73 crores of donations. In addition, it is heartening to know that half of our donations received this year, have been from the first-time donors. New donors who have contributed first time to IIT Madras, are harbingers of a wave of support from our newer generations of alumni. The exponential growth—of both money raised and number of donors, have helped us to set foot in many new and emerging areas. The IITs have reinvented themselves from time to time to be relevant and to be able to serve the demands of a growing country from being a UG teaching Institute to an Institute that helps Indian industries to solve its problems and now, to become an Institution that has grown to be a global hub of exciting startups. IIT Madras has continuously reinvented and refocused its efforts to produce and nurture a talent pool that the country can absorb and be proud of.

Aculmination of this decades long efforts, the reinvention and re-engineering of an already thriving Institution, is that IIT Madras being ranked as the No. 1 institution in the inaugural ATAL Ranking of Institutions on Innovation Achievements (ARIIA) as well.

Such tall laurels bestowed on a sixty-year young institution are indeed humbling. We are committed to build a globally renowned institute known for its innovation in every sphere of its activities. We have set high targets for the future. We have also charted a course to create disruptive technologies and train technology leaders of the future. We wish and seek your help and support in these future endeavors as we attempt to take IIT Madras to the global stage.

-Prof. Mahesh Panchagnula







Support their Alma Mater





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60 Years & Counting– The Rise of a Great Institution

Prof. R. Nagarajan



IIT Madras is a relatively young institution, compared to many others it is usually benchmarked against. Hence, our alumni are relatively young as well, spanning the age spectrum from late 70's to early '20s.

Alumni from the "pioneer" batches of '64-'69 are among the most devoted, never missing an opportunity to congregate on campus. As the classes were small back then, everyone knows everyone else. This makes for great bonhomie, and gives it that family feeling. They reminisce unabashedly, delighting in the incongruities of the early days. They are in thrall of the German faculty of those days who were instrumental in developing IITM's widely-acknowledged handson culture. Even now, our start-up's reflect this product focus.

The classes grew larger in the '70s, and group affinities started developing—hostel-wise, Department-wise, program-wise. Yet, alumni of the decade are still cohesive, preferring to meet as a whole rather than piecewise. The '70 batch is a classic example. They hold reunions several times a year, on-campus and off. Coincidentally (or not!), the Class of '70 also boasts the largest number of Distinguished Alumnus awardees. Many from this era are at a stage in their life where they are retired or semi-retired, and are able to devote time and energy to reconnecting with each other and with the alma mater. It is not too surprising that many of our largest donors graduated during this decade.

During the '80s, the profile of the graduating class started to change. While going abroad for higher studies was THE thing to do till the mid-80s, the trend started slowing as the end of the decade approached. With the emergence of the IT industry on a global scale, non-core pursuits began to exert a pull. A major paradigm shift was the compression of the B.Tech. program from 5 to 4 years in 1985. The shorter duration post-85 meant less residence time on campus, hence perhaps a reduced sense of belonging. The more intensive curriculum meant less time for extracurricular activities, and perhaps closer relations with fellow students in one's own discipline.

The '90s were--- even more so. Larger classes, more fragmented alliances, less "apping" to go abroad, more non-core options. Entrepreneurship reared its enterprising head early in this decade, as India itself opened up to business opportunities. While alumni of the '90s are less likely to build a long career with a single employer, they are also likely to feature more HNI's—millionaires and billionaires who would swear that they owed their success to the campus that shaped their character.

Post-2000, we see some significant changes in the alumni population—higher % of females, a majority of post-graduates, start-up's galore, a vast appetite for networking, an enhanced sense of social responsibility, activity-based groups, pride in IITM's achievements, extensive use of social media to spread the word, and a passion for the Institute that brings back memories of the '60s. We have gone full circle, shed much of the cynicism that invariably creeps in over decades, rediscovered the charms of alma materhood. As the alumni numbers approach 50K, and the matriarch herself turns 60, let us celebrate a glorious past, an incandescent present and the prospects of a fabulous future.

Young Alumni Support their Alma Mater

Tatavarthy Bala Vamsi [2005/BT/CSE]



1. What are your thoughts about giving back to the Institute that has created the foundation of your future?

I think there is no doubt that one's alma mater has enormous influence on one's future. It could be due to skills acquired, or relationships formed or just the brand IITM which might get you an extra glance of your profile. Thus giving back to the Institute which has enhanced one's life should hopefully come naturally to one and all.

2. What is the biggest value you have imbibed at IITM?

The biggest value I have taken away from IITM is something I have seen in my dear friends. I have had the privilege of studying with people who had been very passionate about what they wanted to do at very young age. They would have a burning desire to do something meaningful. They ended

up working in improvements that cater to autistic kids, sustainable agriculture etc. I wouldn't say I have imbibed it but its definitely something I aspire to and had left a mark on me.

3. What does the IITM alma brand mean to you?

When someone says IITM, to me it just doesn't represent the institute. It makes me nostalgic of best times of my life. It could be the late night lab works, or dreaming of the next big idea with friends, the cultural events, the high when you learn new things and the joy when you can replicate them successfully. It captures the essence of these experiences

4. How has the Institute shaped your thinking?

IIT, or at the very least Dept of Computer Science where I studied brings in a certain amount of rigour and method to one's analytical processes. It also gave me huge breadth that form the foundation of a wider range of activities - finance, machine learning, statistics etc. It helped me develop and crystallize a framework to look at new concepts.

5. What are your thoughts on the difference your contribution will make to future IITM students?

I believe IITs are still way behind in research productivity compared to the West. While my contribution is small and at the margin, I hope it rewards a professor who improves this aspect. . That in long run should benefit the students as nothing creates value for country as having an indigenous product and technology ecosystem.

Mahak Singhal [2013/DD/BT]



During my dual degree at IITM, it was not merely the scientific excellence that I imbibed but rather the cultural heritage of the institute that shaped my personality. I experienced how naïve students from various socioeconomic facets of Indian society were lodged, fed, trained, and groomed under the same roof to yield the leaders of the professional world. The part of the institute culture was to stay close to the ground, and the institute's faculty set up an excellent example of minimalistic living. This allowed developing a very focused career-oriented approach from very early in my career.

I was fortunate enough to benefit from the IITM alumni community quite early during my dual degree in the form of a travel grant to pursue a summer internship

abroad. This was, without a doubt, great help at that time to ease the financial burden while providing a career-shaping opportunity for me. This taught me how, over the past decades, IITM has not only been a collegial training platform but rather evolved into a family encompassing a global alumni network which is warm and willing to take care of the current generation in every possible way.

Lastly, in my opinion, it is to maintain this healthy continuum and to bolster the principles and endeavors of IITM that I have decided to connect to my roots and to support the needful. I, personally, think that, with the strong support of IITMAA and OAA, the growing international and national IITM alumni network should undertake more curiosity- and innovation-driven projects which will enhance the research environment on the campus.







Creating an Impact

Prof. Prathap Haridoss Department of Metallurgical and Materials Engineering

1. Elaborate the difference the donor contribution has made to your work and research.

The contributions made by donors have made a significant impact on various aspects of research work. It has made possible funding the line items which other agency funding will not cover. Also, it has provided the flexibility, liberty to work on topics that may not be commercially viable with immediate effect, but has social relevance.

2. What steps do you think should be taken to motivate more young graduates to give back to the Institute?

I feel the students should be imparted with the awareness of the impact, the previous contributions have made. They should learn to inculcate the habit of making a contribution. Successful examples from various institutions apart from IITM could be quoted to them to emphasise on the significance of contribution.

3. Do you think it will help to talk about the 'benefits' of the donation with the donors?

With existing donors, transparency through reports and regular conversation helps to strengthen the relationship. For the potential donors, we need to showcase existing projects, labs, research where the contributions have made a difference.



Prof. Sujatha Srinivasan Department of Mechanical Engineering

1. Elaborate the difference the donor contribution has made to your work and research

The TTK Center for Rehabilitation Research and Device Development (R2D2) is funded by Mr.T.T. Jagannathan of TTK Prestige group through CSR. This funding is indispensable since it provides freedom to try out new ventures and provides flexibility in spending the fund.

to the Institute?

Everybody wants to make an impact, so do the young grads. And these graduates have fresh and recent experience, so they should be provided a chance to select the area in which they would like to contribute. Donor suggestion on topic/area of donation is of utmost importance since they will feel connected to the area of work.

3. Do you think it will help to talk about the 'benefits' of the donation with the donors?

Certainly! There should also be a mechanism for donor engagement. They should be provided regular updates in the form of small videos, short write-ups, encouraged to visit, etc. It is important for people to see the change they have made. Donors will be more likely to be flexible how their funding is used when they see the impact.



2. What steps do you think should be taken to motivate more young graduates to give back



Visiting Chairs

Chair Launches during Alum Nite 2018

- 1. DR. S R RAJAGOPALAN CHAIR-Chemistry Department
- 2. PROF. T T NARENDRAN CHAIR—Management Studies
- 3. PROF. M A PARAMESWARAN CHAIR—Mechanical Engineering Department
- 4. PROF. V S RAJU INSTITUTE CHAIR-ICSR
- 5. ZOHO CHAIR-Electrical Engineering Department
- 6. ALUMNI COMMUNITY CHAIR



Dr. S R Rajagopalan Chair **Chemictry Engineering Department**

Dr. S R Rajagopalan, an alumnus and distinguished scientist in electro chemistry received his PhD from IIT Madras in 1970 from Chemistry Department. After completing his experimental work, he joined NAL in Nov. 1967. He continued his R&D at NAL till he retired in 1991 as a Scientist. His R&D activities spanning over 4 decades, lead to publication of 164 research papers, 76 reports, 11 patents and 18 know how. He had supervised for 9 PhD programmes.

- He received many awards in his distinguished career. •

Mr D Chandrasekhar, 1970/BT/MME contributed Rs. 65 Lakhs towards Dr. S R Rajagopalan Chair. He has also part contributed for two more chairs viz. MAP Chair and Alumni Community Chair, with a cumulative donations crossing well over INR 1 crore. The occupant of Dr. S R Rajagopalan Chair is Prof. M V Sangaranarayanan, Chemistry Department. He obtained his Ph.D from the IISc Bangalore. He Joined IIT Madras as Assistant Professor in 1993. He has made outstanding research contributions in theoretical as well as experimental electrochemistry. The only person from IIT Madras chosen (i) for Prof C N R Rao National Prize for research in Chemical Sciences and (ii) as the President for the Society of the Advancement of Electrochemical Science and Technology, India. He has given research guidance to 14 PhDs, and has 120 Journal papers.

Thanks to the generous contribution from Mr D. Chandrasekhar, this Chair is fully funded and launched during AlumNite, 19th July 2018.



He was elected as a Fellow of the Indian Academy of Sciences.

Prof. TT Narendran Chair Management Studies

Prof. T. T. N agreed to lend his name for the Institute Chair in Department of Management Studies. Prof. T.T .Narendran most popularly known as MAMA endeared well to student's community across generations. Our eminent Professor joined IIT Madras in 1971 and obtained his PhD in Industrial Engineering. He then joined the services of the Institute in 1976. During his career, he has guided many research scholars, published more than a hundred research articles in reputed Journals and prestigious conferences. Professor TTN also was instrumental in the conception, design, launch, of the MBA Programme.

Prof. TTN was closely associated with Music Club in IIT Madras for several decades and he is well known for his wry jokes.

Thanks to the generous contribution from various donors, this Chair is fully funded and launched during AlumNite, 19th July 2018.



Prof. M A Parameshwaran Chair Mechanical Engineering Department



Prof. M.A. Parameswaran, an extremely popular teacher in the Mechanical Engineering Department of IITM has graciously agreed to lend his name for the Institute Chair in the Department of Mechanical Engg. Prof. M.A. Parameswaran served as the Head of the Department of Mechanical Engineering during 1983-86. Professor Parameswaran was well- known for his dedication to teaching the mechanical design courses. He authored three books and his books on Mechanical Design are of extreme value to the students as well as practitioners of Mechanical Engineering. His books are a true reflection of his personality. Professor Parameswaran was President of IIT Madras Alumni Association in the 1990's and was instrumental in making Alumni silver unions, a regular reunion program. He was one of the first trustees for the IIT Madras Alumni Charitable Trust, formed in 1993.

The occupant of Prof. MAP Chair is Prof. A. Ramesh, Mechanical Department. Prof. A Ramesh received his M.Tech and Ph.D degrees from IIT Madras and he joined IIT Delhi as Assistant Professor and moved to IIT Madras in 1995. He was instrumental in developing three new state of the art laboratories for UG/PG teaching. Prof. Ramesh is a well-known face in the Auto industry, to whom he has been consulting for the past few years. Thanks to the generous contribution from various donors. This Chair is fully funded and launched during AlumNite, 19th July 2018.



Prof. V S Raju Institute Chair ICSR

Prof. V.S. Raju obtained his Masters in engineering from IISc and Doctorate from University of Karlsruhe, Germany. Prof . V.S. Raju was a Professor in IIT Madras and later became the Director of IIT Delhi. In a career spanning over 4 decades Prof. Raju had performed many roles, like teaching, research, administration, Industrial consultancy etc. He coordinated major R&D projects on Ocean Energy. He was a Lead Partner in Byrraju Foundation which adopted 155 villages in 5 districts of Andhra Pradesh. He was responsible for Safe Drinking Water and Livelihoods. Currently, he is active in enhancing the quality of Higher Education in the country, helping Institutions such as IIT's at Gandhi nagar, Mandi, Jodhpur, Madras; and others.

Prof. V.S.Raju and his family have generously donated Rs. 65 Lakhs towards setting this chair. Incidentally, all his children, viz. two daughters and son all graduated from IIT Madras.

The occupant of Prof. V.S Raju Chair is Prof Ravindra Gettu, Dean IC&SR.



Zoho Chair Electrical Engineering Department

Mr Shridhar Vembu, CEO of Zoho Corp., generously contributed towards Zoho Chair, the company behind the Zoho suite of online applications. He co-founded AdventNet in 1996, and has been CEO since 2000. Prior to Advent Net, Sridhar worked as a wireless systems engineer at Qualcomm, Inc. He obtained his Bachelor & degree in Electrical Engineering from IIT Madras in 1989 and Ph.D from Princeton University. Prof. Bhaskar Ramamurti, Director of IIT Madras, is the occupant of ZOHO chair. He is from Electrical Department and is a great teacher, researcher and academic administrator. He has made IITM, the No 1 engineering institution in the country with his visionary leadership. Prof. Bhaskar Ramamurthi got his B.Tech in Electronics from IIT Madras in 1980, and his M.S. and Ph.D is Electrical Engineering from the University of California at Santa Barbara, in 1982 and 1985 respectively. After working at AT&T Bell Laboratories for a couple of years, he joined the faculty of IIT Madras in 1986. He took over as Director, IIT Madras in September 2011. His areas of specialisation are Communications and Signal Processing. His research work is in Wireless Networks, Modulation, Wireless Data, and Audio and Video Compression. He is currently also honorary Director of the Centre of Excellence in Wireless Technology, IIT-M Research Park. He is a Fellow of the Indian National Academy of Engineering and International Medical Sciences Academy. He was awarded the Vasvik Award for Electronic Sciences and Technology for the year 2000, the Tamil Nadu Scientist Award for Engineering and Technology for the year 2003 and the India Semiconductor Association Techno Visionary Award for the year 2011 and the Doyens of Madras Award for the year 2014.



Alumni Community Chair

Occupant of Alumni community chair is Prof. R. Nagarajan. He is currently Professor in the Department of Chemical Engineering at IIT Madras. He has been a visible face of IITM, with the alumni and corporate community for about a decade and elevated the institution's presence in the minds of alumni to great heights. He obtained his B.Tech. in Chemical Engineering in 1981 from IIT Madras, and a Ph.D. in the same field from Yale University. He worked with IBM Storage Systems Development Laboratory in San Jose, and he joined IITM in 2004. His association with Office of alumni affairs started from 2009 and he served as Dean from 2012 to 2018. He has transformed alumni engagement with the Institute. He has personally sponsored 10 student Awards. His passion for writing pop fiction is well known, and his extempore speeches have been well appreciated.

Many generous donors contributed for the Alumni Community chair.

Inauguration of Rooftop Solar Power Plant

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Rooftop Solar Power Plant 184.14 KW Capacity funded by 1995 and 1975 batch was inaugurated on 19th Jul, 2018. The 1995 and 1975 batches have contributed Rs.98 Lakhs to install Rooftop Solar Power Plant in Hostels viz. Tunga, Badra and Sabarmati and Central Library. The project was inaugurated by Prof. R. Nagarajan, Dean I & AR and a few Alumni from the 1995 and 75' Batch attended the event.



#**2**

Two MW rooftop solar power plants were inaugurated on Jul 11, 2018. It was funded by CSR initiative of Rural Electrification Corporation Limited.









CSR

S.No	Corporate house through CSR	Projects Funded
1	HT Parekh Foundation	International Centre for Clean Water re- search
2	SUPER AUTO FORGE PVT LTD	Breast Cancer Detection Using Thermal Imaging
3	Verizon Data Services India Pvt Ltd	1Lab-1School
4	Sundaram BNP Paribas Home Finance Limited	Prof T.T.Narendran Institute Chair
5	Natesan Synchrocones Pvt Ltd	Natesans Summer Scholar program
6	Shakthi Sustainable Energy Foundation	Implementation roadmap for sustainable urban freight mobility in Chennai
7	Huawei Technologies India Pvt Ltd	Huawei Scholarship for Excellence
8	Western Digital	RISE Lab for open source hardware devel- opment
9	E-Care India Pvt Ltd	Adopt Your Hostel Room
10	Chennai Petroleum Corporation Limited	Nagapattinam Village adoption
н	RmKV Silks Private Limited	Business Development and Livelihood Enhancement of Pathmadai Weavers Com- munity
12	Kwality Milk Foods Ltd	Promoting education
13	Hermes I Tickets Private Limited	qPCR based method for the detection of coliforms and E Coli in drinking water
14	Computer Age Management Services	Training Small Scale Entrepreneurs
15	Bill Desk	Novel Technology for Training in Reduction of Infant Mortality Rate in Rural IND
16	AMM Murugappa Chettiar Research Centre	Grant for Technology Transfer Facilitation Project
17	Portescap India Pvt. Ltd	Arm Rehabilitation Robot for Shoulder and Elbow Training
		Design and development of sit-to-stand mobility aid
18	BNY Mellon Technology Private Limited	Cancer Detection Using Thermal Imaging
19	HDFC Bank Limited	NeoBolt Project
		HT Madras Incubation Cell
20	Ansys Software Pvt. Ltd.	ANSYS Fellowship Award
21	L&T Technology Services Limited	Enhanced Traffic Mobility Using Signal Improvements

22	VirtusaPolaris
23	Fullerton India Credit Company Limited
24	Mahindra & Mahindra Limited
25	ABB India Limited
26	Nokia Solutions & Networks India Pvt. Ltd.
27	AMADA SOFT INDIA PVT LTD
28	Banca Sella S.p.A. Chennai Branch (IT Divisi
29	Tek Travels Pvt Ltd
30	Atos Global IT Solutions and Services Private Limited
31	Ramesh Santhanam
32	Cholamandalam Ms General Insurance Co. L
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33	Aricent Technologies (Holdings) Limited
34	Tata Technologies Limited
35	Capgemini Technology Services India Limite
36	Indian Additives Limited
37	TTK Prestige Limited
38	Rural Electrification Corporation Limited
39	Nile Ltd
40	TITAN COMPANY
41	The Wellcome Trust
<u>4</u> 2	City Union Bank Limited
43	Robert Bosch Engineering and Business Solu Private Limited
44	CGI Information Systems & Management Co tants Private Limited

	Centre for Rehabilitation Engineering and Assistive Technology (CBFATF)
	Carbon Zero Challenge
	Bridging the CAPS in supply chain & Mar-
	keting of Farmers Producer Organisation
	IT Madras Incubation Cell
	Promotion of social entrepreneurship
	among schools, higher institutions
	Bring proficiency in English to slum and
	rural School Children
	Center for Battery Engineering (CBE)
	Center for Battery Engineering (CBE)
	Design and Development of cost effective
	wireless broadband solutions for Rural
	HT Madras Incubation Cell
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	HT Madras Incubation Cell
1	Merit-cum-Means Scholarship
	Design & Development of Agricultural
	Transportation System
	National Program on Technology Enhanced Learning (NPTEL)
	National Program on Technology Enhanced
	Learning (NPTEL)
	National Program on Technology Enhanced Learning (NPTEL)
	Sustainable Waste Management and Re-
	source Recovery for the Healthy & Clean
	Villa
	TTK Centre for Rehabilitation Research
	and Device Development (K2D2)
	Koottop Solar Power Project In ITT Madras
	Merit-Cum-Means Scholarship Endowment
	Technology Incubators and Research
	Allordable Standing Wheelchair
	Development of open source platforms and capability creation initiative at RISE
ions	Robert Bosch Centre for Data Science and AI
sul-	Merit-cum-Means Scholarship
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MoU With Dr. Noshir S. Contractor

Our Distinguished Alumnus Dr. Noshir S. Contractor, (1983/BT/EE) signed an MoU on 6th August, 2018 to provide a travel grant to one student who will attend a conference outside India in the area of "Networks"



MoU With Mindtree Limited

Mindtree Limited signed a MoU on 17th August, 2018 to support teaching and research in Data Science and Artificial intelligence.





MoU With Shri V. Shankar

Our Distinguished Alumnus Shri V. Shankar, (1981/BT/ME) signed a MoU on September 25, 2018 to provide Scholarship for Students with Merit + Means + Extracurricular activities. He has contributed Rs. 3 Crores.





MoU With Mr. Sekar Vembu

Mr. Sekar Vembu [1993/BT/ME] signed a MoU on 20 December, 2018 to set up a Research Endowment in DoMS with a contribution of Rs. 50 Lakhs

Chennai Petroleum Corporation Limited signed MoU with HT Madras

Chennai Petroleum Corporation Limited signed an MoU on Jun 21, 2018 to provide solar power, safe drinking water and improved sanitation in three villages that are close to Cauvery Basin Refinery in Nagapattinam.





Merit-cum-Means Scholarship

A total number of 100+ students, around 69 from the 2016 batch, 39 from the 2017 batch and 44 from the 2018 batch benefitted from the MCM scholarship.





Message from Mohammed Sanjeed [ED17B047] I am honored to be a recipient of the MCM scholarship. I am the first in my family to attend college and this generous support means a lot to me. My educational pursuits would not be possible without generous support from scholarship sponsors like you. Thank you for this opportunity!



Dear Mr. Rajiv Khanna,

Message from Nazal Mohamed [AE16B034] Dear Mr. Vivek Rau Sir, as a recipient of the Merit-Cum-Means scholarship sponsored by you, I would like to express my sincere gratitude for the support that you have provided me through this scholarship. It was my dream since childhood to study Aerospace Engineering. Your aid has been extremely helpful in relieving the financial stress on me and my parents. I would like to continue and focus on my core branch even though it appears that job opportunities are comparatively less in this field. Aerospace engineering is becoming more and more interesting as we progress through our curriculum. I do realize that our Government and Alumni like you are spending a lot of money to ensure that we get the best education with the least financial burden and therefore it's our responsibility to make sure that the impact of your efforts doesn't stay within ourselves but get reflected in the lives of needy people in our country. I assure you that I will put in the best of my efforts to make meaningful contributions to our society with all the skills I possess. The time and money you spent will serve its purpose.

Message from Naveen Kumaar S [ME17B028] I am really grateful to Anil Goteti Sir. Also thanks to IIT Madras and I&AR Office who have started this scholarship program and have helped a lot of students in need like me. This scholarship helps the students who have big aspirations in life, but does not have means to achieve it. I have used the amount received from this scholarships to do some courses online and to attend some paid workshops. Overall it has helped me a lot. I would wish to further receive the scholarship so that I can save money to start up something on my own. It has always been my dream.





Message from Deepak Kumar Choubey (CH16B038)

You don't even know how much your contribution is helping the students like me whose father's annual income is between 1 to 4.5 lakhs. Being a son of an army man I would like to thank you from the bottom of my heart for helping my father. And I promise to help the students when I'll be an alumni.





Prof. EG Ramachandran Memorial Lecture, Remembrance Event & Chair Launch



An institute chair to honour Prof. E.G. Ramachandran (Late), the first head of the Department of Metallurgical and Materials Engineering, was launched on April 7th, 2018. It was launched during the Sixth Annual lecture of Prof E.G. Ramachandran Distinguished Lecture Series.











POTPOURRI







Leadership Lecture Series





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Distinguished Alumni Awards

The Distinguished Alumnus Award (DAA) is the highest award given to its alumni by displaying Madras, for IIT exceptional merit and excellence in a chosen field. The DAs are awarded in recognition of outstanding achievements in the areas of entrepreneurship, leadership and management, academia, social and technological innovation, and service to humanity at large.



The Missile Man of IIT-Madras Dr. Sudhir Kumar Mishra, DAA 2018



DAA 2018 Batch of 1996 - MTech -**Mechanical Engineering**

Dr. Sudhir Kumar Mishra graduated with a Master's degree in Mechanical Engineering from IIT Madras in 1995, after having obtained his Bachelor's from University of Jabalpur. Subsequently, he obtained his Ph.D. in Mechanical Engineering from NIT Warangal. Since August 2014, he has served as Distinguished Scientist & Director General (BrahMos), DRDO, Ministry of Defence, and CEO & MD, BrahMos Aerospace, leading an R&D team to design, develop, test, produce and maintain the world's fastest supersonic cruise missile BrahMos, encompassing its complete life cycle.

With more than 33 years of experience in industry, Dr. Mishra has made a monumental contribution in the areas of missile technology, defence technology management, business development, marketing and defence diplomacy. He started his career under the tutelage and guidance of Dr. APJ Abdul Kalam, former President of India, and has since contributed immensely to the design, development, flight tests and production of several missiles.

DR SKMISHRA

AND WHEN I MET DR ABDUL KALAM FOR THE FIRST TIME, HE ASKED ME, 'CAN YOU MAKE A MISSILE'."

As CEO & MD of BrahMos Aerospace, the renowned Joint Venture between Government of India (GoI) and Russia, Dr. Mishra is leading a highly-motivated and technically-competent team of more than 1,500 engineers, scientists and technicians located at New Delhi, Hyderabad, Nagpur and Thiruvananthapuram. He has successfully contributed to the 'Make in India' campaign of the GoI by creating a business of Rs.27,500 crores on an investment of Rs.1,300 crores and generating significant profits.

Dr. Mishra is the 2010 recipient of the 'Scientist of the Year' Award of DRDO, Govt. of India, and for his leadership and business acumen on display at BrahMos Aerospace, he was recognized as 'Super CEO of the Year' by Times of India Group in 2015. He was awarded the 'Gaurav Samman' Award by the Government of Madhya Pradesh in 2016. In 2017, he was selected as Academician by the Russian Academy of Cosmonautics. He has numerous publications in national and international journals and conferences. As a representative for DRDO in several foreign countries, he has demonstrated exemplary defence diplomatic skills which resulted in the culmination of many international R&D projects within the framework of foreign policy and defence cooperation agreements.

For his groundbreaking innovations in Defence Technology, Management and Diplomacy, IIT Madras and its alumni are proud to confer this award on Dr. Sudhir Kumar Mishra.

Congratulations on winning the DA award, Sir! Could you share your thoughts at this juncture? Today is not just any other day, it's a very special day. I have mixed feelings. I have a feeling of a sense of achievement and responsibility. I am feeling very humbled and happy that one of the best institutes in the country has recognized me. Thank you

Could you describe your time at IIT Madras? Your memories and takeaways.

I have both sweet and bitter memories on this campus. When I came here, I was full of anxiety and confidence. I shouldn't have had the confidence because when I started my classes, I realized that every other guy was better than me and the faculty was just too good. And soon I could understand that I was going to face the biggest challenge of my life. And in other ways, the campus provided the best facilities both academic and in the environment. It was a very green campus! Nothing can be better than this, nothing could have been better than this.

You see what happens is that, when you graduate, you feel you know everything in the world. When you complete your post graduation, you then realize that you don't know many things in the world. And after completing your doctoral research, you realize that you don't really know anything in the world. So I was in the midway (when I was in my post graduation) that I realized that I don't know anything in this world. And IIT has equipped me with the knowledge and tools to understand engineering problems and situations. And best of all is that it has given me the confidence to take my real life engineering problems head-on. More than that it taught me the kind of integrity and morality to say what is correct and what is not. It might be somewhat arrogant, but in engineering, if something is correct, it is right, if something is not and it doesn't work, it means it is not correct. So, there is no grey area.

IIT has equipped me with all the tools to analyze and achieve something in my life. I really thank this institution for preparing me to face the life.

You went on to take Ph.D. in Mechanical Engineering from NIT Warangal. What was the focus of your research there?

I have done my Masters project in Job Shop Scheduling. This is a problem of production engineering and a lot of research has been taking place in the last forty years for optimizing the Job Shop Scheduling. I have extended this research to my Ph.D. also. So, it was a classical problem of Job Shop Scheduling, optimizing the size inventory and I came out with a new way of doing research using invasive re-optimization tactic and this technique has given very optimistic results. We have compared results with the stunted benchmark problems and found that all the solution that came out of my method were meeting the best possible results. This was my research. I am sure that this problem will continue to be there because this is a non-polynomial hardcore problem. So, we need to find out a way to find some near-optimal solutions.

What are the changes you see on this campus, now that you have come here after a long time? There are many changes. Most of the changes are positive. One positive I see now is a young, bright and colorful crowd. There are more girls on the campus. It is a very good thing as it brings in heterogenous thought processes.

Another positive thing is that new facilities, which were a luxury back then have come up. And if you decide to work on cutting-edge technology, then you have access to it in this campus. And I am happy to tell you that campus is still very green. Not many changes there and I am sure there are many deer too. I am really thankful to the authorities for maintaining the basic spirit of this campus. And the campus is full of positive energy and positivity. And I'm sure you all must still be having your dinner before 7, or does it go beyond that? It goes beyond 9.

We used to start our dinner at 6:45 and most of the things used to get over by 7. So, if that is not happening, then it is bad. You should have your food early and then study.

Converting the BrahMos dream into reality must not have been an easy feat. What were some challenges you faced and how were you able to face them?

As you all know BrahMos is a joint venture between India and Russia and the countries have different cultures, different mindsets and different ways of handling the problems. It has really been a challenge and we have competed for twenty years. These twenty years have been full of challenges, bridging the gaps. The best minds of India and Russia have collaborated and come up with the most powerful weapon system existing in the world of cruise missiles. I would like to tell that this missile has a great potential. It has several roles. It can engage various kinds of targets and can follow different kinds of trajectories. This missile has satisfied the requirements of our armed forces and there is a huge requirement from the other countries also. This culture of joint research in defense was non-existent. The reason is that defense is a very isolated field and no country is likely to share their apprehensions, their ideas, their strengths and capabilities with any other country. The scientists in India and Russia decided that we will devise a new way and these twenty years have been very fruitful. We have come up with different versions and we feel that the BrahMos can meet the requirements of armed forces for twenty more years. It has tremendous potential. We can change the software, we can change the way the missile behaves and hence it can meet our requirements. BrahMos is the result of the collaboration of the strengths of two countries. We decided in India that we can develop the software. So, we did the analysis and found that our strength lies in light control systems, fire control systems, and manufacturing airframes. The supersonic engine was already under development in Russia, so, we brought the strengths of the two countries together and came out with the world's best system. I am sure that when others catch up with this, we will be ahead of them.

You have made the country immensely proud and IITians even prouder by leading the research team on the BrahMos missile. What do you say is the secret behind the victory? The first thing about BrahMos is that it is the world's fastest supersonic cruise missile and has a lead

of almost 5 or 7 years more in this area. We want to leapfrog from supersonics to hypersonic and we are already doing research in this. And as an IITian I get a basic advantage of my thought process which was taught to me by IIT-M. And when somebody is thinking at a certain level, I think in the next level. This is an advantage, I feel IIT has taught me.

Second thing is, I have been working in the field of missile technology for the last 34 years and I joined this when India started missile research. We have come out with various kinds of missile programs, and today I am leading a cruise missile program. IIT taught me a very very basic thing, that whatever you make, it should work, it should satisfy the user. So you have to do the design, the development, and the realization. Then you must think of productionising it because ultimately the research should lead to some kind of sumptuous revenue and only then does it mean something. And about the missile program, this missile program is one of the most successful programs of our country and I feel that without the basic ingredients taught to me by IIT, this wouldn't have been possible.

We learnt that you have received the guidance of the distinguished Dr. APJ Abdul Kalam. How would you describe your experience and what were your key learnings in that collaboration? In fact, Dr. Kalam recruited me and I joined his laboratory. It was the Defence Research and Development laboratory located at Hyderabad. Truthfully speaking, I didn't know a single word about missile before that. From that day till today whatever I have learned, the basic foundation, the guidance and hand-holding were all done by Dr. Abdul Kalam. And when I met him for the first time, he asked me, 'Can you make a missile?' And in those days we had no internet. If suppose you want to develop a missile, you have to go and spend a lot of time in the library or you had to be an apprentice under some scientist for a very long time. Only then could you understand and do something. But the spirit and the confidence that Dr. Abdul Kalam generated in his disciples and in people were very different. And my immediate answer was "Yes, I will make a missile". I did not know exactly what were going to be the challenges, problems, and obstacles, but that was the spirit Dr. Kalam could generate in anybody.

Dr. Kalam was an institution himself. He was a person who could bring scientists, technologists, technicians, the problem, the human resources and everybody together with the ideas. He could just throw everything into a churning bowl and come out with the most delicious and satisfying dish. And above all, he was a great humanist, a great integrator of man, machine, material, and ideas. A great generator. And, if you see his public life, he has been called the People's President. The kind of new direction he gave to our youngsters and adults alike was something no President has ever given. And people say he was a dreamer. I say, 'No he was not'. He knew how to convert ideas into reality. He taught me one more thing, 'strength respect strength'. Gandhiji who is treated as a messenger of peace in our country preaches peace, but he never preaches weakness. And Dr. Kalam taught us, 'If you are strong, then India will be strong. If India is strong, then the whole world will respect. People who are strong, they will respect us only when India is strong.' When we started, in the 1980s the research, India was considered as an 'untouchable country'. No country was ready to collaborate with us. No country was ready to sell us anything. And Dr. Kalam taught us that you would come out with the best solutions when you are really cornered. And that's how, if you remember, the Missile Technology Control Regime (MTCR treaty) and the NSG were all created to block India. So, that we will not be able to develop the strategic weapons and the delivery vehicles. We have worked in those restrictive regimes under Dr.Kalam's leadership. He asked us, "Now you have nothing, you are a man on an island, how would you survive?". And those survival instincts are helping us even now. Today India is a developed country as far as missile technology is concerned. And we are having dozens of countries ready to collaborate with us. You name a country and I can tell you where they have collaborated with us. So, that is a paradigm shift Dr. Abdul Kalam has brought to an 'untouchable country' and converted it to the most loved country. Dr. Kalam created a pool of trained scientist. I will say, not only trained but a pool of trained, confident and dedicated scientists. We could've gone

abroad, we could've gone on to lead a very happy life in developed countries, but we have chosen to live here. When we have chosen to live here, we have chosen to face the problems and today we are the most confident people. We are the happiest people. We are doing the best cutting technological research in the country. That is what Dr. Abdul Kalam has taught us. And this legacy of Dr. Abdul Kalam will live in this country for hundreds and thousands of years.

You have represented the country internationally in promoting defense cooperation. What would you say are some of your achievements in that front?

Let me extend the answer from the previous one. From an 'untouchable country', we have become a country with whom everyone wants to collaborate. I have worked as a counselor in the Embassy of India in Russia. It has given me a lot of international exposure. It has taught me how to work along with the foreigners. People have a mindset which you should be able to decipher. You should have the skillset to decipher the mindset of others, talk in the language of your counterpart, think the way he/she is thinking and bring success to the table. This is an idea. It is more of a mind game. The other person would also be playing the same kind of games. So, you have to bring the strength of your country and your counterpart and come up with the best solution. We have close cooperation with Russia, Israel, France and so many other countries internationally. So in my experience, I am leading Indo-Russia Joint venture program. Apart from this, I have delivered many other international programs also. You must have heard of the Long Range Surface to Air Missile, Medium Range Surface to Air Missile. These are the programs with Israel. I have contributed to the formation, conceptualization and then the implementation of these programs. Then there were a few programs in France and one major program that I am doing with Russia. So, this is an international joint venture. The idea is that I should be an orchestra master and I should play the best symphony so that everybody feels very happy and that is what I am doing. And I feel that my international exposure has given me a lot of advantage to run companies like the Brahmos. Future is going to be like this. The technology calls for a huge investment and when you can bring the strength of your partner country, and come up with your strength, you join these strengths. Then it is a win-win situation for both the countries. If you start reinventing the technology, it costs money, time and resources. Every weapon system has taken like 10 years, 15, years, 20 years to invent. So, if you are reinventing the technology, by the time you develop, we shall be in the past. The idea is you identify your strengths, you find out your partner country, come up with the best possible solution and offer it to your customers. This strategy is going be there every time in the future from now. There is one more reason for it, investment. A new weapon system calls for a huge investment, the breakeven numbers are very high, the requirement might not be of that much number. So, the best is, you have a joint venture, come up with a solution, offer it to the user and go to the development of the next level of technology. You may be able to develop that on your own so that would become your intellectual property and you will be able to leverage it some years later. However, the idea is to become (I'll not say superpower), but a generator of technology. That would happen sooner or later. Brahmos has contributed tremendously in solidifying India's position in missile technology today and has significantly aided the 'Make in India' venture. Apart from that, you have served the DRDO and Ministry of Defence. To young researchers and scientists who are passionate about missile technology, what would you say is the importance of focusing research and development within the country.

I would like to tell you that there are varieties of missiles. There are broad categories, one is a strategic missile and one is a technical missile and today India is able to develop surface to surface, surface to air, ship to ship, ship to air, land to ship, etc. It is a cross-platform, you can engage any kind of things which can crawl, swim, fall into the water or fly in the air, anything which can engage is a missile. These missiles have reached a fair degree of maturity in our country. Still, there are certain areas where IIT can work together. IIT holds the best of the minds of the country. When you have reached a level of maturity and you want to go to the next level of maturity, there are always

challenges. Those challenges look small but they call for a very intense and spirited solution. That is what our IIT can offer. There are many problems in which we are certainly going to collaborate. There is a Centre of Excellence setup in IITs, we have a laboratory working in the Research Park. They are also giving projects to the research scholars in IIT. Apart from that missiles are going to be here for maybe another twenty years. You see, missiles are basically kinetic weapons. The way you have in mobiles, where from the press we moved to touch, aftertouch you will be having some kind of touch-free control. In the same way, missiles are also going to be touch-free. You have high power microwave weapons, laser weapons and all kinds of weapons. The defense is going to be basically in the field of cyber, going to be in space (where our space assets, satellites are there to provide support to the country) and under the water (where you have all the connectivity, where your internet cables and data cables are lined). So, under the water, space and cyber. They are going to be the new frontiers after twenty years. DRDO is working in these fields. And as of now, we have a fair degree of working together with IIT. And always there is a scope for more and more, and I am sure we are going to work more and more with IITs to come up with cutting-edge solutions.

Do you have any piece of advice for the current students and research scholars of IIT Madras?

As you know, and you must be proud of it, IIT Madras is ranked as the number one institution by NIRF. And it is difficult to give advice to people who are already number one. But I can always reiterate the old advice. Keep putting mind, body, soul and hard work very sincerely, honestly and maintain this number one position. Be number one in teaching and research. Of course, I can give one more advice, give some break to your body and mind. Listen to some good music, good classical music. Because classical music gives peace to your body and soul. Give a break to your body, play some games. You have world's finest sports facilities in this campus, go swimming, go jogging, go for badminton, tennis, cricket. They will give you a burst of energy. Be happy. IIT Madras is doing a fantastic job for the nation. I am proud of my connectivity to this institution, my roots, mind, body and soul root in this campus.

Academia Analyzed Dr. Kanianthra Mani Chandy, DAA 2018



DAA 2018

Dr. Chandy graduated with a Bachelor's degree in "Light Current" Electrical Engineering (Electronics) from IIT Madras in 1965, and later, with a Master's degree from the Polytechnic Institute of Brooklyn in 1966. In 1969, he obtained his Ph.D. at the Massachusetts Institute of Technology in Electrical Engineering at the Operations Research Center. After working for Honeywell and IBM, Dr. Chandy joined the Computer Science Department of the University of Texas at Austin and served from 1970-1987, including stints as Chair in 1978-79 and 1983-85. Since 1987, he has been at the California Institute of Technology, first as Sherman Fairchild Fellow for two years, and then as Simon Ramo Chair Professor in Computer Science till 2014. He is now an Emeritus Professor at Caltech.

Dr. Chandy's research focuses on distributed command and control systems, and on applications of such systems to crisis management and homeland security. The core problem that Dr. Chandy studies deals with systems that respond to events. Sense-and-respond systems react to significant changes in the state of the environment. Key issues are the definition of a "significant change", the detection of the change, and the execution of an appropriate response to the change. Dr. Chandy has carried out pioneering work in this realm of research.

DR KANIANTHRA MANI CHANDY

"YOU JUST GOT TO THINK BROADLY ABOUT WHAT YOU ARE DOING AND HOW IT IMPACT5 PEOPLE AND HOW MUCH IT CAN BE EXPLOITED"

Batch of 1965 - BTech -**Electrical Engineering**

He received the A. A. Michelson Award in 1985 and the IEEE Koji Kobayashi Award in 1995 for his contributions to computer performance modeling. He was awarded the John Sherman Fairchild Scholarship in 1987. He received the ACM SIGOPS Hall of Fame Award and the ACM Edsger W. Dijkstra prize, with Leslie Lamport, for their paper on distributed snapshots. He received the IEEE Harry H Goode Award in 2017 with Jayadev Misra for contributions to distributed computing. He became an IEEE Fellow in 1990, and was inducted into the United States National Academy of Engineering in 1995. He has received teaching Awards at the University of Texas and at Caltech, and has graduated more than 30 Ph.D. students. Dr. Chandy has written four books and published widely-cited papers on queuing theory and the performance analysis of computing and communication systems; formal reasoning about concurrent computing systems; programming languages for parallel computing; complex event processing for detecting threats such as earthquakes; and mathematical models of electrical power systems.

For his exemplary contributions to research in distributed computing, IIT Madras and its alumni are proud to confer this award upon Dr. Kanianthra Mani Chandy.

How would you describe your time in IIT?

It's been great. Everything was new, and I couldn't ask for anything better.

An awe-inspiring journey that saw IITM, the Polytechnic Institute of Brooklyn, MIT and later the University of Texas at Austin and Caltech. How have these places contributed to your growth as a world-renowned academician?

At IIT, the teaching was really superb. It made the classes exciting, the study exciting and the research exciting. I really wanted to continue to work in research. So, I went to Brooklyn Poly. It was the natural way to go from an IIT because scholarships were available. It was an enriching experience. After this, I went to the corporate world for a while (even here my work was researchbased). This gave me a new outlook towards research. I then went to MIT which was simply wonderful. The teachers were brilliant, the students were great, and it taught me that research was one of the most exciting things one could do. Not only because it was so engaging, but because it could really help mankind.

How do you see the outlook towards research here and in the US?

Over the years there has been a shift in research from fundamental theoretical research towards the kind of research that meets more practical needs. Computer Science, in particular, has built stronger inclinations towards the industry. The key change is that while research was about answering more theoretical guestions in computer science, now it's concerned about expanding its practical applications over exciting avenues such as medicine, social networks, government logistics, NGOs etc.

We have also learned that before joining the University of Texas at Austin, you had worked in Honeywell and IBM. What prompted a shift from a corporate setting to academia? I enjoyed the corporate world very much. My work in IBM and Honeywell was also research-related, so my transition to academia was only natural. An important difference in both kinds of research

is that while in the industry the research is about catering to the needs of the industry, in academia there is the freedom to choose the problem you want to work on.

With close to four decades of experience in academia, how would you assess the change in the academic system in general and in the Indian context? First of all, when I look at the students who come to IIT today I notice that they do a great deal of preparation to come here. The preparation that they do today is far greater than what was required in our days. While this has its benefits, one asks about the ramifications of this. In order for one to make a contribution to research, (or anything for that matter) one must have a broad outlook towards the world. It requires a creative, lateral thinking, for which this massive preparation, course load, regular coaching classes etc. are not very conducive for. On the other hand, when I see the students of IITM they are quite broad minded despite the rigorous training they went through before they joined IIT.

It's been more than 50 years since you graduated from IITM. How do you see the transformation of IITM over the years?

Today everybody knows IITM. Back in my time, it didn't have nearly as much fame. The change is massive. Another massive change is the kind of support IITM gets from the government. Back in my day getting fund money was a very tiresome procedure. Today this has become far easier which is very conducive to research and development. Another important change is the increased presence of women, be it in the student body, or professionals, or academia and it's an extremely welcome change. But the most important change is in the student body, which has become so much more diverse today with students working in so many aspects.

We understand that your research is mostly focused on distributed command and control systems

and their applications. Could you tell us briefly about your research? Yes. There are different kinds of research at different stages in my life. So, I'll tell you about the research I'm doing now, which is guite different from what I did earlier. So, when you look at it there are streams of data that come from everybody. There are sensors everywhere. There are sensors in your phone, sensors on bridges, sensors in hospitals. It's exciting to see what you can do with all these streams of data to make applications more effective and more exciting. Applications that range from detecting intruders into a building, detecting earthquakes, etc. For example, a specific problem I have worked on is putting very cheap sensors into buildings, high-rises, and detecting when the Earth starts to shake so that the people inside get a warning or also determine which buildings have shaken the most. So, this is an example of using very simple kinds of sensors with lots and lots of data with several practical applications. And these can really help humanity, particularly in crisis management by helping the people in a crisis. Earthquakes, being an example, is important for where I live in California.

What advice would you like to give to scholars at IIT-M?

I think the scholars here are too good and are already doing wonderful things. If I were to give them one piece of advice, it is to think of the world really broadly. You have to think about not only the engineering you are doing but the consequences of the engineering that you are doing. And I must admit that I haven't always done that. And sometimes, the consequences are much further downstream, many years down the line. So, getting back to the example of IIT, one fundamental concern is whether it can be used for bad purposes. A typical example is when somebody hacks into the system. So, if a person can hack into the IIT system, they'll be able to do all kinds of really horrible things. So, from the very beginning, you got to think about how other people could exploit your work. This is not something we think about at all. You just got to think broadly about what you are doing and how it impacts people and how much it can be exploited.

Purpose Beyond Profit Dr. Sridhar R Tayur, DAA 2018



DR SRIDHAR TAYUR

"DREAM BIG AND GO OUT MAKE IT HAPPEN."

DAA 2018 Batch of 1986 - BTech -**Mechanical Engineering**

Dr. Sridhar R. Tayur graduated from IIT Madras with a Bachelor's degree in Mechanical Engineering in the year 1986. He went on to pursue his Master's and Ph.D. in Operations Research and Industrial Engineering from Cornell University. Currently, he is Ford Distinguished Research Professor of Operations Management, Tepper School of Business, Carnegie Mellon University, Pittsburgh, USA. Prior to this, he has held positions at IBM, AT&T and Cornell University, and has carried out many consulting projects with a wide spectrum of industries.

Dr. Tayur has been a serial entrepreneur and an active promoter of monetizing Operations Research (OR), and was the first to coin the term "academic capitalist". He is the Founder and CEO of OrganJet, a start-up that facilitates multiple listings and provides affordable access to on-demand private jets for patients. Established in 2011, OrganJet has revolutionized the medical industry, that too in such a remarkable manner that its operations serve as a case study at Harvard Business

School. He is also the Founder of SmartOps Corporation, which created the market for Enterprise Inventory Optimization (EIO) software, and was acquired by SAP AG in 2013. Dr. Tayur has published extensively in Health Care Operations, Supply Chain Management and Inventory Models, and in Manufacturing, Logistics and Services. He has developed several novel OR methodologies and techniques. He has received funding from National Science Foundation, as well as from Tech giants such as Microsoft, IBM and Intel Corporation.

Dr. Tayur has been named one of the four "Masters of Supply-Chain Efficiency" by Fortune Magazine, and a "Most Popular Professor" by Business Week. In 2012, Sridhar received the highest academic recognition in his profession when he was elected as a Fellow of the Institute for Operations Research and Management Sciences (INFORMS). His paper on OrganJet ("Overcoming geographical disparities in access to deceased donor kidneys in the United States") won the Pierskella Best Paper Award in 2015. In 2016, he was invited to the White House by President Obama to highlight his innovations in organ transplantation. Additionally, in 2017, he was honored as a Distinguished Fellow by the MSOM Society and elected to the National Academy of Engineering.

For his pioneering work in monetizing Operations Research, and seamless integration of academia with entrepreneurship, IIT Madras and its alumni are proud to confer this award on Dr. Sridhar R. Tayur.

How does it feel to be back in insti after such a long time? Yea, it's been guite a long time. I graduated in 1986. And for the first time, I came back in 2016 which was about two years ago. I thought I had come to a whole new universe. Culturally, it was a lot more different, because people were doing a lot more start-up stuff. I do not think I heard the word entrepreneurship when I was a student. Today I think everybody talks about disruption and things of that type. However, a lot of things remain the same. I could recognize the CLT, the OAT and things of that type. But still, it's more filled out in terms of more hostels and more number of students. As I was joking with you guys earlier, the monkeys are still there I'm sure.

You graduated as a Mechanical Engineer from the institute. However, lately, most of your work has been in Operations Research. What motivated you in that direction? So, in my undergraduate time, we had to take some electives. And I think we had to take some Humanities electives and Operations Research was considered to be under Humanities at that time. I took it and I think I fell in love with it pretty much the first time I chanced upon it. I had not heard of it before but when I saw it I thought, 'This can be very nice!'. And I think I liked it because I could see its promise of so many applications – business applications, engineering applications, healthcare applications and public policy applications. Also, it was all Math models, so I guess there was some innate elegance of Mathematics that I was attracted to. I think when I was graduating, it was not a difficult choice, but it was a choice to be made. I had a lot of Fellowships from Mechanical Engineering schools and even there I was wondering whether I should do heat transfer or CADCAM. A lot of my friends were saying "Hey, we should all try to do Computer Science". But, I looked at it and I asked "What do I really like?" and I said I liked Operations Research. So, that's what I decided to do.

How difficult or easy was that transition from a Mechanical Engineer to the field of Operations Research? During the first two years of the Ph.D. program, I had to "tool up" a lot because in Mechanical Engineering we learned a lot of things that are not directly related to Operations Research and

Operations Management. So, I had to take a lot of Mathematics classes that I had not envisioned before. The other students in the program would have come from Mathematics background or Computer Science background so they had a little bit of temporary advantage because you know they did not do the metal cutting and engineering diagrams. But I would say after the first two-anda-half years of taking courses and learning different kinds of Mathematics, I think it was more or less an even playfield.

In the recent years under the Start-Up India Initiative of the Government of India, many start-ups have been receiving tremendous support in terms of incentives, incubation, funding, and others. This has resulted in a Start-up revolution of sorts wherein guite a few students of the institute have gone on to start really successful enterprises. So how do you perceive the entrepreneurial culture of IIT-M and how different is it from your time?

In those days the main thing was "Don't rock the boat" and do anything that is unsafe and just be an engineer in a big company like L&T or go to IIM. Basically, play it safe by joining a big company. Some of my classmates even went in and wrote the IAS and things of that type. So, it was very mainstream, so to speak. When I came back I saw IIT-Madras as a hub where they were incubating start-ups of all types and students are actually postponing their job by a year or two to join start-ups. In my time it would be unthinkable to even do those things. So, I think it has changed a lot. I think what is interesting is, when I went to the U.S, I myself never thought I would be an entrepreneur because I was mainstream there. I went there and became a professor and was not "rocking the boat" other than choosing Operations Research. Then this thing called the internet came along in the late-90s and I thought to myself, "You know what? I could commercialize some of my algorithms" A lot of my classmates who went to the West Coast had already started companies a year or two ago. So, I was not the first one but the wave was there, although it wasn't the culture here. When I came back here in 2016, it was a pleasant surprise.

What do you think IIT-M can do at the curriculum level or otherwise in order to further encourage students to go into entrepreneurship?

I think IIT-M has done a lot already. I don't know if other schools have done as much. From what I read, IIT-M is already called the Stanford of India and so on and so forth. Other IITs are jealous and are trying to catch up with IIT-M. So I don't know what more IIT-M can do with respect to curriculum changes as, like I already mentioned, they have the incubator. And I think there are some competitions and you get some money as a seed to get started and so on and so forth. The only thing I could think about was to see and connect in a more organized way to the entrepreneurs and eco-systems in the U.S or in Israel just to bring either idea from here to a different market or see the ideas in a different market that could help in cross-fertilization in a lot of activities around the world. I didn't see any kind of organized structural connection between the ecosystems in the U.S and IIT-Madras students. So, maybe something like that could be the next step to build on these foundations.

What would be your advice to the budding entrepreneurs of IIT-M in the light of your own successful stint with SmartOps Corporation?

I think you need money but the question is how much money and who is going to give you the money. My experience is many entrepreneurs actually under-capitalize. By that, I mean that they take less money than they need. Some of it is because they underestimate how long and how difficult things actually are. The second thing is, many entrepreneurs do not want to give up equity and so they want to hold on to it and they try to see how little money they should take. My view is undercapitalization is a problem because then you start running out of money because there are always things you didn't anticipate. You then scramble in to get more money and your mindshare is not building your business. But you know without raising money you can't really build the team and you start doing projects and take in customers who are not really good for your company. You start compromising on guality and I think it's a good opportunity that you kind of let go waste a little bit. So my advice to

budding entrepreneurs is to understand how much money you need and take a bit more maybe. The advice that was given to me was to have one good Venture Capitalist because when you have too many VCs, they start fighting with each other and get bored and that is another distraction you don't need. Building a company is hard enough, so you don't want money problems or VCs giving you problems. So I would say, you keep it as simple as you can.

Could you talk about OrganJet and what is it that inspired you to move into Healthcare Operations and how is that the idea of OrganJet came about in the process? Interestingly, I was finishing up about ten years of SmartOps Corporation and we already had a good partner in SAP and it was guite of inevitable that we would get acquired by somebody most likely SAP. So, I think I was open to something new but I didn't know what. And I thought what I would like to do differently was to do something in the social enterprise space. I had gone to a conference at Harvard Business School as I was a sponsor for a panel there and I thought the idea of applying business skills to solve social problems would be an interesting chapter. Therefore, I was looking to do something in social entrepreneurship rather than double down on software entrepreneurship or something like that. Then, I would say it was purely accidental that I came across this issue of geographic disparity in waiting time. So in Boston, people wait 5-6 years for a kidney and other areas may be less than 2 years. The most famous example is Steve Jobs taking a private jet from California to somewhere else for his transplant. And I thought, "What if you are not a billionaire and you still need a kidney or a liver? Can I apply my business skills to democratize this for the middle class and bring what Steve Jobs had to the middle class? What if you are a professor, a high school teacher or a regular person who does not have a private jet and a few million dollars. If you happen to live in California or Boston where the organ is not available, should you just die because you are not rich?" So that was kind of the motivation and because I had done some work long time ago with my Ph.D. student in the scheduling of private jets, I just thought, I know private jets business so well and there is so much excess capacity for the jets in the U.S. At that time Uber was not created and people called it the Uber of private jets because that's what it is. You kind of need a kidney transplant, you kind of broadcast and somebody with a private jet shows up in 2-3 hours and takes you there and the whole thing costs 10000-15000 dollars which to save your life is not too much and you don't have to be a villain. So, that's how this came about. But, I think within 2-3 years of OrganJet, I have become more famous than with 10 years with SmartOps because, for one, life and death are fundamentally more important to human beings. When you do something in healthcare it is more fundamental to society. Business is good but most people view business as something you have to do make a living and if you make the business a bit better, they say "Good for you, made some money, so what?". But if you do something that improves healthcare and provides access to things like the transplant, then that is considered in some sense as a worthy use of your energy and skills. So, today when I meet people who do not know what I did before, they think I'm an OrganJet guy and they are very surprised that I was a software entrepreneur before.

Given the geographical diversity and vastness of India, do you think something along the lines of OrganJet can be replicated in India? If so, what could be the peculiar challenges one would face in India? I don't know enough about the situation in India to make an informed statement at this time about the geographic disparity. All I know is that like the US (and many other countries), India also suffers from an overall organ shortage. I did try to understand the situation here in India because one of the things I would want to do and why I am engaged with IIT-M is to see if some of the innovations could be brought to India as well. The bigger problem at hand is the shortage of organ supply worldwide, which has resulted in the black market and other bad news of sorts, driven by the fundamental lack of supply. What I have done in the US in addition to OrganJet - and I think it is actually far more useful, having been recognized by President Obama in 2016 at his White House summit where I was invited – is using Nudge videos to increase consent rate by legal next-of-kin of the deceased who were not organ donors. That 2-minute video, done as a project first in New Jersey, now in Nevada and California, changes the chance of a person saying 'yes' from 20% to 50%. As an answer to the guestion, I would ask- can such an innovation, modified suitably to Indian culture and integrated into existing processes, be useful? I would try that first before I try OrganJet.

You said one of the reasons why you still are associated with IIT-M is to ensure that the innovators in the U.S could be connected with the ones working in the social sector in India. So, where do you see the role of students from non-engineering and management background such as the Humanities background students in the process?

I think in healthcare it is not just a science and technology issue. I think science and technology to help people has been there for a while. I think when we really make a difference in the healthcare to the masses, in the U.S for example, sociologists, psychologists, economists etc have been involved. I think centrally you have to make a cultural change that comes about from journalists writing about this. So to me, to make health care much more widespread, much more sustainable and inclusive because it is a basic human right, it has to include people way outside doctors and engineers. I believe the role of such people is especially large when it comes to healthcare.

Finally, what would be your message to the students and research scholars of IIT-M?

In line with the culture prevalent now rather than 30 years ago, I would say, "Dream big. Then go out and make it happen." Over these years, I have tried to upgrade my ambitions to the next level. I started out thinking to keep my head down, not doing anything way too interesting. But when I began software entrepreneurship, it was fun and pushed me into believing I could do more- be it healthcare or social entrepreneurship. I am now working on Quantum Computing with a D-Wave guantum computer from NASA. If we IITM folks are not going to swing the bat and hit the ball out of the stadium, somebody else will! We should free ourselves from the self-imprisonment of low aspirations. Do we want to be just spectators (or commentators) in the game of life, or do we want to be the star players and help create the future?

On Passion Lazar Chittilapilly, DAA 2018



DAA 2018

Shri Lazar T. Chitilappilly graduated from IIT Madras with a Bachelor's degree in Aerospace Engineering in 1983. In 1985, he obtained his Master's from IISc Bangalore. As a scientist-engineer at VSSC / ISRO from 1985, he has been contributing to the field of propulsion for more than three decades with his landmark work on various aspects of High-Speed Air Breathing Propulsion (HSABP) covering design, modeling/analysis, manufacturing, system integration, testing and flying. As Project Director for Air Breathing Propulsion since 2006, he has played an instrumental role in the execution of the project, one that has made the nation proud.

In the early 2000's, when ISRO embarked on the ambitious program of propulsion, Shri Lazar was appointed as Associate Project Director. He went on to become the leader of the Air Breathing Propulsion Project team, a team that successfully flight-tested the Scramjet engine on August 28, 2016 at a hypersonic speed of Mach 6, achieving supersonic ignition and combustion in flight. This



SHRI LAZAR T CHITILLAPILLY

"IT IS GOOD TO BE A SPECIALIST. BUT AT THE SAME TIME DONT LOSE TRACK OF THE SYSTEM AS A WHOLE. AND THAT WILL NEED A LOT OF MULTIDISCIPLINARY **APPROACHE5**"

Batch of 1983 - BTech -**Aerospace Engineering**

was a very challenging program in light of being a late starter compared to the U.S. and to Russia, and given the sensitive nature of the dual-use technology. In order to successfully navigate the associated hurdles, Shri Lazar guided his team to build a strong research network with the IIT's and IISc, thereby giving the program the required forward momentum.

Shri Lazar has also contributed significantly to the development of the scramjet, a perfect example of a complex system which has taken over 50 years of earnest research efforts worldwide, involving vast investment of financial and human resources, to create a successful technology. With this success, India joined an elite club of only three countries (U.S., Russia and Australia) that have acquired an advanced and closely-guarded technology with enormous potential for low-cost access to space and hypersonic global travel. Shri Lazar has proved his leader's mettle in guiding and motivating his team to this remarkable achievement over long years of commitment and hard work in the face of scarce resources. The "Scramjet Engine Flight Experiment" team won the ISRO Team Excellence Award in 2016.

Since 2007, he has also been a part of the ISRO-IIT Space Technology Cell Joint Policy Committee at IIT Madras, and has played a key role in the annual selection of projects to be taken up collaboratively, and in ongoing review of the projects. He is a recipient of the ISRO Performance Excellence Award and IISc Aerospace Engineering Platinum Jubilee Award for Distinguished Alumnus.

For his outstanding contribution to scramjet propulsion technology, IIT Madras and its alumni are proud to confer this award upon Shri Lazar T. Chitilappilly.

Congratulations on winning the Distinguished Alumnus Award! What are your thoughts at this juncture?

Thank you. I was an ordinary student when I was here. And I couldn't imagine then that I will be getting this Distinguished Alumnus award. I was very fortunate. And I know there are many more who have done equally good work or better work than me and I wish them good luck in the years to come.

How were your days at IIT Madras? What are your memories? Could you share some of them with us? Well, in those days it was a 5 year B.Tech program and we started with full-week workshops. That was one of the best experiences we had. We had Saturday NCC parades and OAT and all were lovely experiences. It helped us get moulded into good engineers.

After IIT Madras you went to undertake your masters at IISc Bangalore. So what was that experience like?

When my daughter was young, some would tease her asking her whom she liked most – papa or mama. And she used to look at us and say, "both". So, yeah, I like both my experiences at IIT and IISc. IIT actually helped me to be focussed on overall development. While at IISc, it was more on the research part of it. I was fortunate to have both and it is a good combination.

Your career has been marked by a commitment to research and innovation in propulsion technology. What fuelled your passion for pursuing this field?

Well, you see, propulsion is about how to produce force, or thrust. And that is most important in Aerospace Engineering. Also, I was always very much interested in Engineering Mechanics. And propulsion is, in a way, multidisciplinary. Like, it has lot of fluid mechanics, heat transfer and combustion. So I liked it.

We learned that you led the team at Air Breathing Propulsion Project at Vikram Sarabhai Space Center, ISRO. What would you say your major contributions were? Air breathing propulsion is a new area in rocketry. The rocket or the launch vehicle, that takes off, you see, it constitutes mostly of propellant. And in the propellant, most of it is oxidiser - the oxidiser carried to burn the fuel. In fact fuel is a smaller fraction of what goes up. And oxidiser, is about twothird of the total mass that goes off. And most of the propellant, about three-fourth of it, is consumed in the early part of the flight. Upto about, say, 50 kilometers, where air is available. So we are trying see to how air can be used to replace the oxidiser so that the rocket could be very small and costeffective. But it's complex technology. So far no country has put to use this technology for rocket propulsion. We are developing that and we have had some success. In the early part of my career I was working on air breathing rockets, and in recent times, my focus has been on scramjet.

One of your most remarkable achievements has been the development of Scramjet which has successfully put India on the map with powers like the US and Russia. Could you tell us a little bit about the potential of this technology?

Well, the scramjet is basically an air breathing propulsion mode (of operation) for very high speed hypersonic flight. When the vehicle flies more than mach number 5 (5 times the speed of sound) that's when the Scramjet comes to use. Say for example, our aircrafts which use turbofan and turbojet normally they fly close to mach one. If scramjet propulsion is put to use in an aircraft and if you travel from New Delhi to San Fransisco (which now takes something like 16 hours) Scramjet would be able to do it in 3 hours time. So, scramjet propulsion has got a good application in the future for global travel. Our focus is however on how to make use of this for the launch vehicle.

It was a moment of honor when Scramjet won the ISRO Team Excellence Award in 2016 and this was surely a result of your hard work and leadership. Were there challenges on the way and how did you overcome them?

It was a team effort. I had a big team supporting me and I was just leading it. We had members in the team from various centres of ISRO and we also had a lot of support from the academia and industry. And yeah we had challenges but with team effort we could solve them.

You have been an integral part of IIT Madras through the ISRO-IIT Space Technology Cell Joint Policy Committee in reviewing projects to be taken up. What is your opinion on the current state of research here?

In fact that helped me to be in touch with the academia. At the ISRO-IIT Space Technology Cell many projects are conducted which have contributed in big way to ISRO programmes. And currently the projects are generally independent in nature. I think, in the future, if there are more clustered projects or thematic projects, it will be able to contribute much further.

What are some of the changes you observe in the campus now? Well, campus has not changed much but for some new buildings. It is as lovely as it was then.

Do you have any advice for the current students and scholars of IIT Madras?

The first thing I would like to say is that there are lot of good opportunities in the country for higher studies, research and development. And industries are also now guite mature. The other thing I would like to request or advice students is that you should look at things in totality. That would make you good designers and ensure that good products come out. It is good to be a specialist, but at the same time don't lose track of the system as a whole. And that will need lot of multidisciplinary approach

In Retrospect V. M. Thomas, DAA 2018



SHRIV M THOMAS

"A5 YOU WALK ALONG THE ROAD TO SUCCESS SOMETIMES KNOWINGLY OR UNKNOWINGLY YOU MIGHT TRAMPLE ON BEAUTIFUL ROSES, DO NOT LET THAT HAPPEN."

DAA 2018 Batch of 1973 - BTech -**Mechanical Engineering**

Shri V. M. Thomas' career illustrates how commitment and vision, along with leadership in building a highly-committed and motivated work force, led to the astounding growth of Johnson Lifts into a leading national player for lifts and escalators.

Shri Thomas graduated from IIT Madras with a Bachelor's Degree in Mechanical Engineering in 1973. He then joined Hindustan Aeronautics Ltd. as a Management Trainee. In 1982, he joined TI Diamond Chain as Production Manager. Two years later, he joined his family venture, Johnson Lifts Pvt. Ltd., as a Director. His tenure at Johnson Lifts has succeeded in transforming this small-scale firm into a well-known brand and a leading manufacturer of lifts and escalators, an Indian company matching the multinationals in every aspect of business.

Shri Thomas' venture into the mechanical engineering industry began with his decade-long service

at HAL, where he implemented the SRE-G7 Antenna manufacturing with Italian collaboration. During his brief stay at TI Diamond Chain, he established the Solid Roller division and introduced new systems and concepts which led to record production. Most notable among his achievements is the tremendous growth of Johnson Lifts into a leading national supplier of elevators and escalators, competing with the multi-nationals such as Kone, Schindler, OTIS, etc. Johnson Lifts as an SSI Unit produced 24 lifts in the year 1984, whereas in 2017, it produced around 10,000 lifts and more than 300 escalators from 4 plants. Shri Thomas' monumental accomplishment exemplifies his managerial and leadership flair, as does governing a company for more than 30 years without losing a single man-hour on account of labor issues. Manufacturing lifts and escalators for national clients such as Metro rail projects, Airports, the Parliament House, the Supreme Court of India, etc., has resulted in prodigious growth in the face of fierce competition in the industry. All his factories are ISO 14001 certified.

Shri Thomas also holds the Directorship of the Joint Venture, Toshiba Johnson Elevator India Pvt. Ltd. His contributions extend beyond the industrial realm. He is an active social worker and a nature lover. Actively connected with YMCA, he was the Chairman of YMCA - Kilpauk during the period 1988-90. He has also served the Lions Blood Bank, Egmore, in the various capacities of Trustee, Secretary and Chairman. He is a passionate farmer, having planted and nurtured over 3000 trees in his farms.

For his business leadership and acumen, and for his social and ecological commitment, IIT Madras and its alumni are proud to confer this award upon Shri V. M. Thomas.

Congratulations on being conferred the "Distinguished Alumni Award 2018"! What thought/feelings are running through your mind on this occasion? Three things went through my mind. First, I became very emotional. Secondly, I felt very proud! And lastly, I thought to myself that I must interact more with IITM.

Can you give us a brief glimpse into your time here at insti? What are some of your enduring memories about and/or with this place?

Plenty of fond memories associated with this place, during your formative years is when you join, and those memories remain with you forever. For example, periodicals, workshop, hostel life, Saturday movies, hostel nights and of course the Mess. The fun we had was enormous those days. There were a lot of fun things I did, but I don't want to reveal it here (laughs).

You worked at HAL, and then at TI Diamonds, before joining Johnson Lifts. Going from aeronautics to manufacturing, and then to escalators and elevators, what has the journey been like? Those days, getting a job was not easy and I always wanted to work in India. I had a few offers, all of which came from the public sector. It so happened, that the offer from HAL was on my birthday. My father said, okay, you take this offer and that's how I joined HAL. Not that I wanted a job in a specific industry! HAL being a public-sector undertaking offers a lot to learn. New technologies and new equipment were there. But the only sad thing is that you're not very accountable and nobody asks you questions. Those days, we used to work on a (cost + 10%) budget. This means; whatever be the cost of an aircraft, we sell it at 1.1 times to the Indian Air Force. So, there wasn't much space for innovation and no space for cutting down costs. This was one major drawback of working in the public sector. Also, talent is rarely recognised there. Hard work doesn't get recognised. You get your standard 25-30 rupees increment annually and promotions based on vacancies and other factors. I thought that this is not the place for me to be working and moved on to TI Diamonds. Now I saw the difference between the public and private sector. In the private sector, it is all about the bottom line. We are always under

stress. There is always a cost to something and we are always looking to reduce that. It could be for the materials, it could be the processes, or it could be to reduce the cycle time cost, or even through innovations. So, we are always under stress to bring down the cost. I remember an incident when my General Manager sent me a note saying, "Mr Thomas, you've drawn 15kg of cotton waste extra, over the budget. Please explain!". If I had drawn 1500 kg of cotton waste in HAL, no one would have guestioned me. This is the major difference between working in these sectors is what I have learnt.

Johnson lifts is one of the market leaders in the elevator industry in India. What were your experiences working with them from the time you joined and to the position you have risen to now? I joined Johnson Lifts in 82', in the 80's the market for elevators were very limited, hardly any market for it back then. The only multinational operating in India at that time was OTIS. The problems I faced when I first joined Johnson Lifts were that basically being a very small-scale unit in private sector, there were no systems or drawings. Quality assurance was a big issue. Another major problem was that of the batch size, in a month we were producing only 2-3 elevators. Every component had to be manufactured in-house, no way we could subcontract it since nobody would come forward to manufacture 3 or 4 components. As the years went by, the market grew, government policies changed and so we changed ourselves according to the changing scenario. For example, we were always on the look-out meaning keeping our eyes and ears open all the time. We used to attend all the Elevator exhibitions all over the world. Two major ones were the lift exhibition in Ausberg near Stuttgart Germany and another in China. So, we used to see what's happening in the industry and we used to get those inputs to India. One important thing is that we were the first to bring in VVF(Variable Voltage and Frequency) drive elevators to India in 1992, even before OTIS could think of it, which gave us a big push. By this time the Govt. had opened up. Then onwards, importing machinery became simple. Earlier to that, even a visit to Europe or USA required an RBI clearance. 50 USD per day used to be a big deal. That was the growing phase of the company.

Throughout your career, you have been associated with companies like HAL, TI Diamonds, and Johnson Lifts; all of which have a strong national focus. What are your thoughts on manufacturing in India and the "Make in India" campaign that has gained momentum lately?

There is no particular reason for my choosing to work in these companies. I wouldn't call myself as a very big nationalist, but I've always wanted to work in India. I didn't want to go abroad. That was very clear to me. I would say it is by choice. Manufacturing looks at 3Ms; materials, machines, and manpower. In today's world, the best of both, machines and materials are available to you. The third thing is manpower. That is the only place where you can cut down costs. India is a country where we have a large number of people available with skills. So, I think we should capitalize this. The recent move of the government, privatization of the defense sector, is a welcome move. It is bound to create many jobs. My thumbs up to the "Make in India" movement and manufacturing in India. It is a good initiative according to me.

We have come to understand that apart from being a top-notch professional, there is a social activist in you! It would be great if you could share with us what you have done on that front? Off late, I'm not all that active. Earlier yes! I was associated with the Blood Bank, YMCA, and also president of the Kerala Catholic Association and other small groups. I'm still associated with YMCA by sponsoring some of their programs and the Blood Bank. But Blood Bank was the one which gave me immense satisfaction, I was a trustee, then a secretary, vice president, and the President. In the 80's and 90's, Chennai used to be a medical center attracting patients especially from the North-East, West Bengal and from Malaysia, Dubai and Abu Dhabi. Many of them come mostly for surgeries and surgeries require blood and they don't know where to go. Those days professional blood donors were thriving, so we stepped in and provided Safe Blood. Hospitals then started directing the patients to us and we would take their calls and act on it. I used to get calls from the people saying "Thank You so much for the blood, you saved my son/father etc", which is a wonderful feeling. Even now, I get requests from friends/associates for blood which is arranged by sending our workmen/colleagues.

What are some changes you observe in the institute; 'insti', as we call it in our lingo; since your time here? I am sure you have visited the institute guite a few times after graduating. Now, all I see are buildings and buildings everywhere! This is a sad thing. In fact, I told someone earlier, that maybe we should have thought of another campus somewhere close by. Then, we could have planted trees and things like that. The 2016 cyclone led to a massive loss in green cover. I am a nature lover. I have planted over 3000 trees in my farmlands. Trees are very close to my heart. This is the only striking observation I can make.

What advice would you give to the current students at IIT Madras?

I don't think there is any Mantra as such! As far I'm concerned it is hard work and sincerity. You will make mistakes, but accept them because, from my experience, no one will "chop" your head off. If you are sincere nobody does that. Second thing is that, keep your eyes and ears open all the time and see what's happening around you. Third thing is that you've got to be innovative, look for alternatives all the time. One advice is that, as you walk along the road to success, sometimes knowingly or unknowingly you might trample on beautiful roses, do not let that happen.

A Peek into the Past Dr. Nagabhushana, DAA 2018



DR NAGABHUSHANA S

WE SHOULD ACQUIRE **KNOWLEDGE AND PURSUE OUR** ACHIEVEMENTS AS IF WE WERE GOING TO LIVE FOREVER TO ENJOY ITS FRUITS."

DAA 2018 Batch of 1989 - BTech -**Electrical Engineering**

Dr. Naga Bhushan graduated from IIT Madras in 1989 with a Bachelor's degree in Electrical Engineering. Later, he obtained a Master's and Ph.D. in Electrical Engineering from Cornell University in Ithaca, New York. With more than two decades of contributions in the telecommunications sector, he is responsible for advancement of communication theory and for innovative implementation leading to the commercial realization of Broadband Wireless Technologies such as 3G (EV-DO) and 4G (UMB, LTE, LTE-A, LTE-U). His role as the Vice President, Technology at Qualcomm Inc. places him at the helm of technologies that are the bedrock of the current smartphone revolution.

Dr. Naga Bhushan has made significant and innovative technical contributions to the design and development of EV-DO, the first high-rate, wide-area wireless packet data system to be widely

commercialized. His main areas of contribution include waveform design, channel coding and modulation schemes, antenna diversity schemes, link adaptation techniques, handoff algorithms, power control, QoS-aware scheduling algorithm and the functional architecture of the forward link demodulator. He has led the design and standardization of the OFDM-based broadcast/multicast service for EV-DO, and of a OFDMA-based wide-band wireless packet data system (UMB) in the 3GPP2 standards forum. He has actively contributed to R&D efforts involving Interference Management/ Cancellation, Heterogeneous Networks, Multi-hop/relays, Ultra-dense networks for LTE-Advanced, LTE for unlicensed spectrum (LAA/eLAA) and direct (peer-to-peer) communication, and New Radio for 5G wireless systems (including mm-Wave bands). He has developed key insights and identified the main design elements that formed the basis of the systems mentioned above.

Dr. Naga Bhushan has published his research and findings in 26 international journals and conferences, and has more than 300 issued US patents spanning 3G, 4G and 5G wireless systems, with over 150 active patent applications. Notable awards and recognitions conferred upon him include a 2 Qualstar (Qualcomm Internal) Award for EV-DO Rev. A (Systems Lead) and cdma2000 Phase 2 Evolution (Design Evaluation and Standards Lead). His active role in the industry has not kept him away from academia, as he has worked in collaboration with Professors from UC Berkeley, Cornell, IISc and University of Cairo, among others. As part of his service to the community, he has served as an Adjunct Faculty for Amrita University, Coimbatore for 5 years, offering a Master's level course titled 'MIMO Communication Systems' and conducting online lectures for the same.

For his groundbreaking innovations in telecommunication technology, IIT Madras and its alumni are proud to confer this award upon Dr. Naga Bhushan.

How does it feel to be back in your alma mater, at IIT Madras again? It's a deeply nostalgic experience. It brings back a flood of memories from some of the best years of my early life. The excitement and thrill of joining and studying in one of the best institutions in the world. The amazing friendships that we form over the years with peers as well as our mentors and teachers and an abiding sense of optimism that is founded on the tremendous opportunities that lie ahead just waiting to be explored. It's a tremendous feeling.

We all have a lot of fond memories of our days in insti, can you please share some of your fond memories?

Oh certainly. Although I may not be able to quote specific instances, in general terms I can say the following. I still remember as if it were yesterday, how excited I was entering the campus and looking at its vast, lush, greenery and exploring the campus at length over the years. I also remember the strong and interesting friendships that I formed with many of my friends who I still keep in touch with after all these years. I remember the scintillating conversations we would have during mess hall dinners, the weekly pilgrimage to the OAT for our Saturday night movies. It's also interesting to contrast life back then to live as we know it today. It was such a luxury to just be able to make a long distance call back then with just one phone for the entire hostel! Whereas now each one of you carries a personal phone in your pocket. It's amazing to think how we survived in a world without the internet or facebook or iPhone or Netflix. Although the last one did not prevent us from bingewatching the one TV channel we had! Especially during the weekends after the exams.

Can you tell us something about your days after IIT? So you had spent a couple of years at Cornell. How is that experience different from the experience you had here in IIT Madras? So, as an undergraduate at IIT Madras, you are thrown in with a bunch of students who have essentially the same curriculum and who go through their undergraduate programme with similar goals and aspirations. In contrast, in grad school, each one of us has our own individual academic

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agenda and we formulate our curriculum based on that. Whereas in the undergraduate phase, you are there to master the knowledge that exists and that is laid out to you in a fairly well-defined fashion. Whereas in graduate school, you are identifying areas where you can contribute, generate new knowledge to the field and develop new insights. So in summary, undergraduate education in IIT is more or less like hunting in a pack whereas subsequent graduate study at Cornell was like a lone warrior with your own individual plan to execute over the years.

We all work very hard to get into IIT because of the very quality of the institution and the experience you get here. How have the experiences in IIT helped you ahead in your life?

So, the rigorous training that one receives in IIT as well as the strong friendship that you forge with friends, with the people that you spend all your time with over four years, were some of the essential tools that I found very valuable in my R&D career later on. After all, a strong passion for knowledge and effective teamwork and collaboration skills are what constitute the cornerstones of success in any professional enterprise. So, I feel that IIT education really did lay very strong foundations for my career.

You spoke about the R&D work that you have done. So, you have had the opportunity to publish your research with and work with some very world-renowned faculty from various institutes, so how do you say that experience in academia and research in general is?

So in academic research, each research project has its own specific timeline or time-scale over which the ideas and the work product becomes useful in real life. As you go through a rigorous academic programme with strong emphasis on research, and later you are in the industry trying to apply these ideas, it helps to form a good intuition about when the right time arises for a specific research idea. So working on various projects with different time horizons, I have been able to develop a sense for it and bring in the right theoretical ideas to practice at exactly the right time, when the industry is ready for it. So in that manner, background in research has helped me in the applied career in my life. In India nowadays there's a startup bubble. There are a lot of startups that are being established. Even our institute has a research park where it incubates startups and lot of students nowadays instead of going for further studies or joining a well-established company wants to join a startup. So, do you think students should join a startup without any prior experience?

It's very good to have such an opportunity. And some students after they have come out of their undergraduate programme may be ready to plunge into entrepreneurship without further academic training or experience in the industry in a more traditional role. But, you need to know if you are that kind of a person. You need to make an honest self-evaluation to see if you would benefit from further training or some additional industrial experience or if you are ready to take the plunge right away. So for instance, as you all know, Bill Gates didn't have to complete his college. He had a very strong vision and a very well laid out plan that he was able to do everything that a college graduate could do and a lot more, without having completed college. Trying to follow in his footsteps there would have been millions of other people who do not complete college but they never do anything close to what Bill Gates achieved. Although the formula may work very well for some people, for a lot of other people a conventional path may be a better option. Especially in the first few years. To gain some real insight into what their strengths and weaknesses are and then exploit that knowledge in their entrepreneurial career. So, each person needs to make his or her own decision based not on emotions but on real well-founded convictions and facts to see whether to take advantage of the option right away or to wait a little bit.

What do you think an institute like IIT Madras can learn from universities abroad? Both in terms of teaching methods and the research and the general academic environment? Do you see a qualitative difference between IITM and institutes abroad?

As far as teaching goes, I do not see a substantial difference. I think IITs do a very good job of preparing undergrads and master's students very well on the academic front. But with research, you need a critical mass – an ecosystem of a certain size consisting of the most talented people in the

field. You need to attract such people and sustain their interest in working in a system such as the IITs. You need to have a good mix of long-term and short-term focused research projects. And also an industrial companionship that is able to realize some of the research ideas in a commercial front. So, you need to ensure that overall ecosystem, that fosters research and also makes the impact of research very well understood. So that's where I guess IITs can use the American or Western model to achieve better efficiency from their research activities.

You were previously here as a student and then you might have come to visit the campus some other time. But today you are here as a Distinguished Alumnus, how does it feel to come back to the institute as a distinguished alumnus?

I've always been over-awed by the distinguished alumni that I had heard about through our teachers. Although they graduated from IIT so many years ago, our teachers spoke of them as if they were here just the previous year. And they were speaking of these amazing people in such glowing terms and I wondered if I would ever get even somewhat close to people of such stature. And to actually be recognized in that same manner which I never thought would happen is a dream or a fantasy come true. It's an extraordinary feeling to come back here as a DAA.

So what advice would you give to our undergrads now to maybe one day reach the great heights you have and come back here as DAA?

One thing, of course, is to have and sustain a very deep and passionate attitude towards acquiring knowledge. It's also important to have a diversity of interests on various academic fronts, maybe technical, cultural or even philosophical. I found that being familiar with different disparate fields actually lends itself to very unexpected and effective solutions to long-standing problems that are worth solving. So, diversity of interest has been very instrumental in some of the successes I have had, both as a researcher and as a practitioner. Another aspect I would like to bring up is summarized in a Sanskrit verse:

अजरामरवत्प्राज्ञो विद्यामर्थं च साधयेत्

We should acquire knowledge and pursue our achievements as if we were going to live forever to enjoy its fruits. But at the same time,

गृहीत इव केशेषु मृत्युना धर्ममाचरेत्

Should perform charities and humanitarian activities as if this is the last day of your life; with a sense of urgency that it just cannot wait for tomorrow.
So, I say as you seek your path towards material success, make sure that what you do also benefits the society and you can feel proud of what you have done while you enjoy its material rewards. So that is the advice I can pass on to my junior colleagues here.

An Envious Journey Dr. Seeram Ramakrishna, DAA 2018



DR SEERAM RAMAKRISHNA

"I'D SAY THAT MY BRAIN IS LIKE A SPONGE, IT KEEPS ABSORBING. In the process I unlearn what I learned and keep learning new prespectives"

DAA 2018 Batch of 1988 - MTech -Mechanical Engineering

Dr. Seeram Ramakrishna graduated with a Master's degree from IIT Madras in 1988, after having obtained a Bachelor of Engineering Degree from Andhra University. Subsequently, he pursued a Ph.D. from the University of Cambridge, UK, and the General Management Program from Harvard University, USA. He is currently a Professor and Director of the Center for Nanofibers and Nanotechnology in the Department of Mechanical Engineering, National University of Singapore (NUS).

Dr. Ramakrishna's leadership experience includes NUS' University Vice-President (Research Strategy); Dean of Faculty of Engineering; Director of NUS Enterprise; Director of NUS Industry Liaison Office; Founding Director of NUS Bioengineering; Founding Director of NUS Nanoscience & Nanotechnology Initiative, NUSNNI; Founding Chairman of Solar Energy Research Institute of Singapore, SERIS; and Chair of Circular Economy Taskforce. Dr. Ramakrishna is an elected International Fellow of Royal Academy of Engineering, UK; Academy of Engineering, Singapore; National Academy of Engineering, India; ASEAN Academy of Engineering & Technology; ISTE, India; Institution of Engineers Singapore (IES); American Association for the Advancement of Science (AAAS); ASM International; American Society for Mechanical Engineers (ASME); American Institute for Medical & Biological Engineering (AIMBE); ImechE and IoM3, UK; and International Union of Biomaterials Science & Engineering (FBSE).

Dr. Ramakrishna is a highly-cited researcher in Materials Science. Thomson Reuters recognized him among the "World's Most Influential Scientific Minds", and a European study placed him among only five researchers from Singapore with H-index above 100. He has co-authored more than 1,000 SCI-listed international journal papers and five books, which have received in excess of 74,000 citations and H-Index of 127. He is among the world's foremost scientists working on nanomaterials by electrospinning. His work has resulted in patented technologies which are translated into real world products. He advises technology start-ups and investors. He is an Editorial Board member of ten international journals, and an Editor of Elsevier Journal of Current Opinion in Biomedical Engineering.

Dr. Ramakrishna is a Nominated Member of the World Economic Forum Committee on Future of Production-Sustainability. He chairs the Future of Manufacturing TC at the Institution of Engineers, Singapore. He advises Singapore's National Environmental Agency on Circular Economy and Industry 4.0. He authored the book "The Changing Face of Innovation". He is an op-ed columnist and regular speaker on higher education, research and innovation at forums facilitated by United Nations Academic Impact, World Bank, Asian Development Bank, OECD, and UNESCO. Over the past 15 years, he has been serving the global engineering community in various capacities including: Founding Chair of Global Engineering Deans; Vice-President of IFEES; and Board Member of Asia Society for Innovation & Policy.

Dr. Ramakrishna has received several awards and other forms of recognition for his pioneering research contributions, and among these are: 'Fibernamics Award' in Portugal, International Federation of Engineering Educator Societies (IFEES) President's Award as a 'Global Visionary'; and ASEAN Outstanding Engineer Award.

For his visionary work in the fields of nano materials technology and engineering education, IIT Madras and its alumni are proud to confer this award on Dr. Seeram Ramakrishna.

Your academic journey as a student, from Andhra University to IIT Madras, to the University of Cambridge and finally to Harvard is enviable. Could you tell us what was particularly unique about the academic training that you received in each of these places? Firstly, I'm glad that you have taken interest to know what I was thinking when I was of your age. I think it was a fantastic journey. Though I didn't know actually what I was getting into. When I joined Andhra University, not many people from my village went to a university. So, there were not many people who could tell me what to look out for in a university education. But they all were proud of me going to a university. When I reached there, I found students from other regions. This was the first time that I was seeing diversity in motivation, why they came to the university and their aspirations. Professors looked at us as young people who still didn't know the world and treated us like their own children. After AU, I joined Hindustan Aeronautics Limited which had an arrangement to do Masters Program at IIT-M. So, I could learn while I was actually doing a professional engineering job. At IIT, it was a much more open process. The way lectures engage the students, made us think critically and much more broad-based. In a way it was quite different from AU. My fellow students were from across India having different mother tongues and appearances. And of course they didn't look like me! So I was wondering how to fit in. Fortunately, we were able to form teams, play games, etc. While we were learning, we were also debating, discussing topics beyond classroom. IIT professors felt that I had a research element in my brain. I thought I was never made for that. But they advised me to go for a PhD in University of Cambridge. A senior student (Prof. Kamaraj) guided me through the application process.

I ended up in Cambridge University and my world opened up even more. Because students in Cambridge University are from rich backgrounds, not in terms of wealth but in terms of their own intellectual thinking, which is far more deeper, different and broader. My professor there once said, "Seeram, you are doing your Ph.D. I'm not training you to become a technician. Once you finish your Ph.D., you would know how to think on your own and would no longer follow others." It was a fantastic way of saying that I had to build myself.

Then I became a professor but felt a need to have management skills and eventually ended up in Harvard, where it was even more of a different environment. My fellow students were now top artists, the chief of police in NYC, social leaders, entrepreneurs etc.

As each time I went to a different university, my mind opened up more and more. I'd say that my brain is like a sponge, it keeps absorbing. In the process, I unlearn what I learned and keep learning new perspectives. My mind has been changing always, and educational exposure has given me the confidence to open up and share my mind with others while listening to them intently.

A lot of your research has resulted in patents that are applicable in the real world. What do you think guides purposeful research that translates into applicable technology?

In a philosophical point of view, human needs have never changed. Let's say humans have been around for 30,000 years, more or less all the human needs have been the same. They want to have food, security, friends, communication and a place to stay. Nothing has changed if you look at the last 30,000 years. We devise and use different modes and solutions, to address the same needs. What I emphasize to my students is that whatever we do – it's about meeting the needs of the people in different ways and I remind myself and others we are basically engineers. Engineers do advanced research, but it's more about solving a particular problem – providing a solution. So, that's what you call innovation – and when you protect it, that becomes a patent.

That's different from what we call real fundamental science. For example – if you tell me that the cells are there and that they've divided as expected, that's not fundamental science. that's engineering. But if you tell me that perhaps this is the nature of life - the cells are living, there is a life there – if you can give a mechanistic understanding of life that is basic science. In the world, there are only a few people who do basic science. Most of us whether one is a mathematician, biologist, physicist, engineer or some other professional, are all in a broad spectrum of applicationmotivated research. We view it basically, but it's actually not fundamental basic research - it is another form or different intensity of application-oriented research. So, with that, I basically tell all my students, whatever we are doing is always related to solving a certain problem or meeting a certain need. The question is, do you want to build business and do you want to productize them? If that's what your interest is, then go for patenting, that gives you the intellectual property protection - after that, it's about converting a patent into a reliable and useful product. That's basically my philosophy when I think about how to guide and support researchers to realize their own goals in relation to the society.

We learned that you are an editorial board member of international journals and an editor of Elsevier journal of current opinion in biomedical engineering. What are your comments on mushrooming of fake journals in India? How should we tackle a phenomenon like this? The journals are there to support peer-reviewed research. There would be about two million

researchers on the planet and 10 million research papers coming out every year. This much output is being captured by the journals. The rating of universities, and researchers and faculty members' promotions, tenures, rewards, recognitions across the world are related to the scientific output and quality. India and as well as other developing countries are beginning to build high quality and competitive research ecosystems with accompanying rewards and recognitions. Some researchers would try to find shortcuts to grab the benefits. But India has very vibrant journalism and media when compared to other countries. This means that they can change the value system by observing what's going wrong, reporting it and make sure that the system constantly moves from the current state to a higher quality, world-class scenario. That could happen. Because India is not a new country. Critical thinking has always been there as a part of our strong culture.

Could you tell us about your life at the campus? Were there particular places that you liked to hangout at, or were there professors you had nice memories with, or any sports, culture involvement?

Well, I discovered I'm a sportsman after I came to IIT. Because I wasn't doing much of sports, my parents were more worried that if I get into sports, I might get injured and I might get disabled - so it was not a good idea for me to be seriously involved in sports. That was their thinking. Then, when I came to IIT, there were good facilities to start with. We would play tennis, table tennis, volleyball and we also had time because it's very structured in a way where you do attend your lectures, then you have time to dine out or hang out with students. And the second part is, the professors give you a particular assignment and they let you have your freedom to pursue it so that you can manage your time. Hang Out places for me were always the nearby coffee places because I don't get sleep so early. I had to get out and disturb others. I'd have one or two coffees with my friends. The other thing about me is – I have more questions than answers. So, I can keep asking questions and I asked all kinds of questions So, any conversation (including this interview) I'm sure we can go on for hours because I tend to ask naturally inquisitive questions.

How about some memories that you would want to forget?

It's interesting that in my life I've never had any memory that I'd like to forget. It doesn't mean that I haven't had bad experiences. Maybe because I'm a deep thinker in my own way, I learn from every incident. The whole bad experience turns out to be one of my stepping stones for further learning and also makes my own mind clearer. All of us, as we grow up, gain a lot of experience, intentionally and unintentionally. These can be imagined to form knots in one's brain which need to be untied. For that, all you need to do is reflect and give your mind some time and it will untangle on its own.

You come from Andhra, and of late, there are are a lot of Andhra messes around campus. Were there any in your time? If not, what were the food places you visited around campus? Those days, there were not many Andhra messes and Andhra food is known for a few reasons. I come from Guntur – it's known for the hot chili – one of the hottest in India probably. People say that the food from Andhra is very spicy. But it's actually not spicy, it's just chili. Of course, there's also the standard Gongora and the gun powders amongst other things. But we didn't get them around IIT. So we used to go out, to Mount Road – there were a couple of Andhra restaurants there but they were expensive and as a student, you can't go there every other day. So we used to fast intentionally so as to eat enough for our money's worth. We would starve from morning perhaps and go for dinner, eat and come back. Afterward, we used to eat Paan – After eating spicy food, Paan felt good. And we'd feel like we've accomplished something - I'm not sure what we accomplished but we felt like we did!

Could you tell us about research facilities in NUS and about the startup culture in Singapore?

I've been in Singapore for almost 25 years now. I've seen it's transition from an almost no research place to a world-class-research-place. Over the past 15 years, Singapore has started investing substantially in research. Just to give you an idea, India spends less than 1 percent of its GDP on research, whereas Singapore is now spending nearly 2.7 percent of GDP. As India is a large country,

it relies on quality control within the country. When it comes to Singapore, which is smaller, quality control is done globally. This means that the research ideas (which are well funded) are compared and criticised on a global platform. This happens every year. That's one reason why research has flourished in Singapore in such a small span of time.

Could you please tell us about the focus areas in nanotechnology that a country like India and an institute such as IIT Madras should invest in?

For people to understand better, Nanotechnology is – bigger than atoms but smaller than a millimeter. Why that is important is, it is understood then when you engineer materials at that length scale, they seem to have some interesting properties. The best example, is again in India is Ayurveda. Many of the nano concepts are there. Yesterday, I was talking to someone who set up a major educational institution in India and they are actually manufacturing Ayurveda medicines and they wanted me to infuse nanotechnology and I was telling them you guys started it and you're telling me to infuse it! But yes, we're going to do that, and that's in Bangalore. If you consider Ayurveda for example, it already has nanotechnology but has not been very well documented. So by bringing modern scientific methods into technology, India could be a very strong pillar in the medicine sector, in Ayurveda as well as western medicine. Most of them are based on nanotechnology concepts. In India, with 1.3 billion people, I have noticed two things. People are growing older and people are becoming more affluent. They want better medical treatments and health care. So clearly these two sectors meet and India needs to develop its own newer products, formulations, and ways to treat patients. This is one way that nanotechnology could be tailored to meet Indian needs by IIT professors and students.

Second, India needs energy. India relies heavily on coal as well as other forms of fossil fuels but they are polluting the environment. India is not necessarily the top polluter based on per capita but as an aggregate, it still has a lot of pollution. So, if you want to deal with pollution, you need to address the sources of pollution. One way is through energy generation, which is right now based on fossil fuels based – coal, oil, gas etc. Instead of burning them, if we can harness sun energy or other forms of renewable energy that would make India a much more liveable place. IIT usually has all the basic science departments. They have top engineering departments plus management studies and others. All these are needed if you want to come up with a paradigm shift in the way we solve energy problems.

Now, I take from energy to other forms such as water. Water in India is considered sacred. I still remember, the last time I went to Mauritius, there was a very tall Shiva statue and I asked them, 'What is this?' and they said, 'Well, it is donated by the Indian Government' and I said 'Wow, that's fantastic'. Then they said, 'Would you like to see it?' and then they drove me there. They said, 'Okay, since you're here, why don't you take a dip in the lake' and I said, 'Okay, but what is the significance?' and do you know what they said? 'This is our lake, but, some time ago, one saint came with a bottle of Ganges water and poured it there – now it's holy water'. For the Mauritius people, it's very important. I could sense the significance of water around the world. So, water is very important for life, but water chemistry is varied. For example, if you look at water samples from different parts of Chennai – the salinity is different. Also in groundwater, depending on the depths you go in, there are different minerals and different forms of microbes. And if you're looking at how to make these types of water more drinkable, you need a wide range of technologies. And this is where nanotechnology comes in. It's the same story if you want to convert seawater into drinking water.

You see the use of nanotechnology. You see it's usefulness in addressing basic human needs. One more basic need is food. Right now, a lot of food packaging can be improved by nanotechnology. Another is in modern communications. All these devices have a lot of nano concepts. You make the device faster using nanotechnology. You power the batteries in this device and that too is nanotechnology. Essentially you are already using nanotechnology.

Right from food, water, energy to a living environment as well as modern communications technology nanotechnology is applicable in several areas. So, IIT, Chennai, and India can leverage nanotechnology.

Are you aware of any startups at IITM research park that seriously engage with nanotechnology?

I've been coming to IITM since early days of setting up nanotechnology-related projects. There are few professors from IIT Madras who come to my lab. There is a startup dealing with Lithium-Ion batteries. The idea is to make them more durable, with improved heat management. There is also a startup related to water cleaning using nanotechnology. They are looking at purifying water, especially in rural community. There is another startup with a focus on nanofibers for agriculture. I think all these are going very well.

What do you think are the avenues for IIT Madras and NUS to collaborate on? and also what aspects of each other can they actually learn from?

Several years ago, when I was Dean of Engineering at NUS, we were engaged with the HRD Ministry in the government of India when I established a joint PhD program between IIT-M and NUS. It was the first time I think that IITs agreed to have a joint PhD programme with an International University. We signed a contract, and it's now being followed by most major IITs. So yes, we have already established a collaboration. I have a couple of students who work with me who are a part of this joint Ph.D programme. First thing about this is that all the administrative clearances are done – the policies are understood on both sides and support is available. More importantly, say you had to fly from Chennai to Delhi. It would take you probably the same amount of time to fly to Singapore, it's basically very close. Secondly, Singapore has a good Indian diaspora. You'll feel very much at home. Those students who'd miss what they get in IITs or in Chennai, will have access to the same things in Singapore also. There's the comfort of language, high quality research infrastructure and good policy understanding in IIT. If you asked two hundred years ago, the place to go for research and studies in the world was UK followed by Germany and France. In the last hundred years, it has moved to the United States and in the last twenty years, you can actually see Japan, Korea, China, Singapore playing a huge role in terms of new research innovations. Singapore is one of the important actors in this area and the cultural affinity between Singapore and India means that IITs and NUS can and should and will and already are working together. My suggestion is that the future is not totally representative of the past. Even if it didn't happen in the last 10-20 years, it doesn't mean that it'll not happen. Because the necessary conditions are already there, it's just a question of when. I've noticed the change in the minds of Indian students, compared to the previous generation – who were all focusing on get a job. But students now, if I were to ask them, they'd say, 'Sir, I want to do the job, but I also want a complete life'. What that means is, you want to do research, you want to learn in a balanced way – a way that they call 'work-life-balance'. What that means is that these generations, would prefer a variety of things and that one of them would be Singapore. And that's where IIT and NUS can explore these avenues.

Why Should We Organize? Dr. Noshir Contractor, DAA 2018



DR. NOSHIR CONTRACTOR

"AT IITM, I WAS SURROUNDED BY THE SMARTEST PEOPLE I EVER WAS SURROUNDED BY BECAUSE OF THE QUALITY OF **STUDENTS AND THE QUALITY** OF THE FACULTY HERE."

Dr. Noshir S. Contractor graduated from IIT Madras in 1983 with a Bachelor's degree in Electrical Engineering. He received his Master's degree in Communication from the Annenberg School of Communication at the University of Southern California where he also carried out his doctoral research in Communication, obtaining his Ph.D. in 1987. Having served on the faculty of University of Illinois at Urbana-Champaign till 2007, he is currently the Jane S. & William J. White Professor of Behavioral Sciences at Northwestern University, USA.

Dr. Contractor is well known for the Multi-Theoretical Multi-Level (MTML) Framework he developed along with Peter Monge. This is described in detail in his book, "Theories of Communication Networks", which received the 2003 Book of the Year award from the Organizational Communication Division of the National Communication Association. He was also one of the principal investigators of the Virtual Worlds Observatory project, and has co-edited a book on "Predicting Real World Behaviors from Virtual World Data" in 2014.

His contributions to the field of behavioral sciences and communication are numerous and outstanding, and he has been described by Sir Tim Berners-Lee, one of the world-renowned inventors of the World Wide Web (WWW), as "a true intellectual leader and curator of the web community". Dr. Contractor has presented and published more than 250 research papers in international conferences and esteemed journals in the area of social communication networks, and has contributed chapters to prominent books. The long list of honors and accolades received by him includes: International Communication Association Fellow in 2015; National Communication Association Distinguished Scholar Award in 2014; and Outstanding Member Award, Organizational Communication Division, International Communication Association, in 2000.

Dr. Contractor has been part of software development projects such as Recommender system for scaling up health innovations in Bihar, India and the assembly of interdisciplinary teams. Recently, he has been funded by the Bill & Melinda Gates Foundation to develop "Novel Approaches to Measuring Demand-side Community Perceptions and Barriers to Family Planning via Social Network Analysis" in Kenya, and by the National Aeronautics & Space Administration (NASA) to design, monitor and mitigate against challenges that will be faced by international crews on missions to Mars. He serves on the Board of Trustees for the Web Science Trust and has served on many Advisory Boards, including the European Union FP7 Network of Excellence in Internet Science-EINS, Canadian Health Services Research Foundation and the US National Academies of Science (NAS) Decadal Survey of Social and Behavioral Sciences and Applications to National Security. He has held external university appointments at Stanford University's School of Engineering, Columbia University's Center for Organizational Innovation and Fudan University's School of Management in Shanghai.

For his revolutionary contributions to computational social science, social networks and human communication systems, IIT Madras and its alumni are proud to confer this award upon Dr. Noshir S. Contractor.

How would you describe your time at IIT Madras? Are there any fond memories you would like to share? Well, it was guite a few years ago. I graduated from here in 1983, so that's 35 years ago. I arrived on the campus 40 years ago, 4 decades since I got here in 1978. At the time the Btech programme was 5 years. Some of the fondest memories I have of my days here was the fact we had an environment that was conducive towards being creative in every way we could. The faculty as well as students had a lot of freedom and autonomy and gave us a lot of encouragement to be creative in many different ways. And so one of the best memories I have is to be surrounded by the smartest people I ever was surrounded by because of the quality of students and the quality of the faculty here. And I think that it was clearly a very formative stage in my own life in terms of where I wanted to go and what I wanted to do. And the training is just something I am always going to be grateful for.

From Electrical Engineering to Communication and Behavioural Science. What prompted the change? Could you tell us a bit more about your journey post-IITM? I will say that even before coming to IIT, I wasn't sure that I wanted to be an engineer. But my father like many Indians said no if you have to get a degree then you should try and get a degree in engineering or in medicine. Given that I really couldn't stand the sight of blood, the only option I had was engineering. And back when I was getting ready to graduate from school, my father said, "Oh he doesn't want to go to engineering school because he won't get into IIT." And my mother begged me saying "Please prove your dad wrong. Write the entrance exam, see if you can get in just to prove it to your dad". I did write the entrance exam, I was able to get in and so then my dad said, "If you have gotten in, you have to go". And at the time I was in Lucknow. But he insisted I come to IIT Madras rather than go to IIT Kanpur which would have been right down the road from Lucknow. And his reasoning was that he felt that IIT Madras was a very serious place. At the time, the director was P.V Indiresan and he knew of P.V Indiresan from times when my dad was getting post-graduation degree at the Indian Institute of Science in Bangalore and so he felt that people in Madras knew what they were doing and were more serious. So he sent me here. And I have to say that I told him at the time that

there was a good chance I may not stay in engineering. He said that it was okay as long as I had an engineering mindset, that'll be good forever. And he was absolutely right. He is with me here today, with me on this trip, my sister and my dad. I am really grateful that I had this degree because frankly the rest of my life was shaped by the fact that I began to think like an engineer and that happened right here at IIT Madras. So here I had classes on things like communication networks and electrical power in transmission and distribution networks, etc. and that gave me a background. I'll have to say that once you have taken those kinds of classes, the way that makes you think has analytically shaped my life following that. I ended up getting a Ph.D. in Communication as a social scientist. After that I have stayed sort of in the mix between social sciences and engineering throughout at the University of Illinois Urbana-Champaign, I was very involved with folks at the National Centre for Computing Applications where the Mosaic browser first came out of the University of Illinois Urbana-Champaign, in 1993, 25 years ago. So I have always been involved at the intersection of technologies and communication and how they are shaping societies and how society is shaping them. Today I continue to be interested in that in the context of what is called as web science. Once you had a computer you had computer sciences, so now when we have the web we should think of something called web science, which is looking at how the web is shaping the society but also how the society is shaping the web. One of the things I'm particularly thrilled about is that on this visit, in a couple of hours from now, we are going to officially inaugurate IIT Madras as the first Indian university that has been invited to become a member of the prestigious Web Science Trust Network of Laboratories. I must say that it is with great pride that I was able to, as a member of the board of trustees of the Web Science Trust, to nominate and have my fellow board members approve inviting IIT Madras to be a part of this elite network of laboratories.

With over 250 research papers, you have made a mark in the area of communication and organization research. Could you tell us something about your research?

My overarching interest is to understand the socio-technical factors that explain how networks form and for these factors explain how they perform. I think that one of the things that I am, again, very grateful for is that I have a large number of collaborators from a lot of different disciplines who have helped me able to publish what I have been able to do, etc. I am a big fan of interdisciplinary work because I think some of the problems we face today in society aren't problems that can be solved by a single discipline. I would say that there is not a single project that I have done that did not involve somebody from another disciple. And most of the time it is engineering disciplines, including computer science of course, but also mechanical engineering, civil engineering, etc. The reason I do that is because many of the grand societal challenges that we face in life today, whether it is in the area of disaster response, global health issues, innovations, etc., and most recently whether it's in the area of how we are going to successfully send a manned mission to Mars, in all of these areas the questions that we have to address at the end of the day have to do with how we organize. And how we organize is at the end of the day, a social science issue. It benefits a lot from technologies. I like to say that there is a distinction people make between the hard sciences and soft or social sciences. I think the hard sciences are really hard, but I think the social sciences are the harder sciences – not soft sciences. It's going to take a long time for us to figure out how we can organize. Along the way, the benefits are that technologies are creating novel forms of organizing. The ways in which we can organize today were certainly not true when I was an undergraduate student right here at IIT Madras. Thanks to the web we have peer production networks like Wikipedia, where people come together to work etc., there is lots of interests in flash organizations, for instance, if you look at websites like Kaggle, where people come together to engage in software development. So, the new technologies are giving us new ways of organizing and that means we need to do more research to see how we can be more effective at organizing using these technologies. My vision is to help us not only understand but also enable novel forms of organizing.

Considering its wide varied application, how are computational social sciences likely to evolve in the coming years?

It is very interesting you ask that guestion because in the next year, 2019, it will be 10 years since we published an article in Science magazine where we introduced the idea of computational

social science. So we are coming up to a decade and it has prompted me to think about what have we accomplished in this decade and where do we go from here. I think that, again, Computational Social Science (CSS) is not going to replace other methods used in the social sciences, there's going to be interviews, survey, ethnographies, other forms of archival research etc. and as well as experiments. But what computational science brings to the table is that we are now able to address challenges at scale because it relies very heavily on really large data being able to get access and bring both computational power not only to collect the data but to analyze the data, to do simulations and computational modeling based on that. To me it gives social science an opportunity to take an analogy we know from the natural sciences and the life sciences where we have a lot of work done in basic science and then we have fields like engineering that takes the basic sciences and makes something from it. I think one of the criticisms that has been made of the social sciences is that, "yeah you might tell us in retrospect how to understand something, but how can you help us make it better?" And I think, one of the advantages of CSS is that it gives us some more tools that will allow us not only to gain insights about how we are as a social system but how we can improve as a social system. An example is the work we are doing right now on trying to help NASA put together the best dream team crews to go to Mars or in the near term go back to the moon. One of the challenges is that when you take the situation like Mars and you take 6 people from as many as 6 different countries and send them on a mission to Mars, at present rocket propulsion pace, that is going to be 9 months to get to Mars, probably a year on Mars and 9 months back. And when you get closer to Mars, the latency in communication is going to be as much as 21 minutes. So this is not a team that has an exit strategy. You have to stay with them throughout. So how do you put together a team that you think will really get along well, that will have the chemistry to work in an isolated confined extreme environment of a space capsule going all the way to Mars? How do you make sure they don't fall apart in terms of their interpersonal relationships? And if you suspect that something is going to happen, can you forecast it sufficiently in advance so that you can take mitigating steps to try to help reduce that level of tension that might build up?, etc. CSS is a way for us to analyze data upfront, where right now we are studying crews who are put into isolated, confined and controlled environment at NASA's Johnson Space Centre in Houston, Texas to simulate long-distance space exploration where they are actually put. We get to, metaphorically, but also literally, poke and prod them while they are in these confined spaces for 45 days right now. There is one that is coming up that we are doing also in collaboration with the Russians where they will be in there for 4 months or so. But all of that data is being used by us to build computational models to predict what happens in these groups. We are collecting data from them every single day, sometimes many times a day and we are building models that will allow us to simulate what will happen in this context. So just like today it is commonplace if you look at the design of a Boeing 787 or the Airbus, all of that design is done through computational science. No one actually builds it until all the simulations are done. We hope the benefit of CSS, is that we would be able to do the same kinds of things when it comes to understanding designing teams, not taking chances on it, being able to anticipate what the problems are and taking it from there.

Despite its immense popularity, in recent times Recommender systems have been facing flak, especially in light of the Facebook-Cambridge Analytica controversy. What do you think are the major challenges in the application of Recommender systems and how can these be addressed? I think that the Cambridge Analytica story has certainly caught the attention and in some cases the fear of the larger public. There are several ways in which I think those dilemmas have to be dealt with. One is, if you recall, the Cambridge Analytica data were originally collected for research by a faculty member who was trying to see if they could predict somebody's personality characteristics based upon their actions, interactions and transactions within Facebook. From a social science point of view, that is a very interesting idea. If there are ways of being able to do that, surveys, which is how we collect data on personality variables today, are not very scalable. That is, they take a lot of time and effort. So one of the things that has been happening in the broader areas of CSS, but also Network Sciences as well, is that we are trying to find ways in which we can harvest data that will allow us to understand people's behaviors, actions, attitudes, etc. their relationships with other people based on

text analytics and other kinds of technologies that we are using. And I think those efforts are really very important but a story like Cambridge Analytica is going to jeopardize, undermine and make it more difficult for us as researchers to do that. That said, as a citizen, it scares me to see this level of privacy invasion. And frankly, there was more and more discussion even in the last couple of weeks, that while the story we are talking about revolves around Facebook, the amount of data Facebook has about us is actually quite small compared to what Google, for example, has about us. So there is a lot of privacy issues. It is pretty clear that self-regulation might be replaced in the not too distant future by some government regulation. I think Europe has been ahead of this already, in terms of the GDPR – general data protection regulation. Those kinds of issues are also likely to come up in the US Congress. Part of the challenge is, the US Congress needs to be better educated about the web before they can make regulations about the web.

In terms of recommender systems, in particular, one of the challenges of any recommender system is that it is always trying to create a balance between knowing enough about you, that's where the privacy comes in, and being able to make a recommendation to you on the one hand, but on the other hand it also runs the risk, that if it tells you exactly what people like you do, like Amazon, for instance, "all these people bought these things, like you did, so you should buy another thing like them", what it does is, it creates, a very conservative system, where there is not much likelihood of change. You are going to start living in what is sometimes called, a filter bubble. Everyone around you is exactly like you and that's the only people you see. And you see what they see, read what they read, buy what they buy, listen to the songs they do, etc. and you start creating these conservative bubbles, if you may, and that's not good for innovation. That is not good for dialogue. One of the ironies of every technology that has come down the pipeline is that we say "Oh this new technology is democratizing, it'll help create a dialogue between people who have different points of view". Instead what we see historically and repeatedly is that every technology gets used to basically reinforce an echo chamber where people live in a particular echo chamber just like them. And we have seen that in Facebook, we saw that in the elections in the US, in Brexit, that people were only surrounded by social media and networking platforms by people like themselves and as a result when the election results were different from what they thought, they were shocked because none of the people they were interacting with on Facebook could have possibly voted in the other direction. I think that one of the interesting ways in which we address these issues is to recognize that in recommender systems we have to break the conservative loop there. I don't mean conservative as in the liberal-conservative. I mean conservative as in continuing to give you what you have and allow you to change a little. And I think there is a lot of movement both on the research side as well as commercial social media platforms where people are recognizing that it is important to be able to expose you to things that you may not normally see. There is some advantage to that. From a commercial point of view, they will say "Now if you show me things that I don't like or I'm not likely to like, then I am not going to spend so much time on your platform". So that is the tension they face. They have to inject just enough diversity and not too much so that you can continue to get the benefits of a recommender system. But in addition to getting the benefits of the recommender system, you will also have the opportunity to be exposed to something new and probably move in a different direction than where you are so far.

Drawing from Social Sciences and Industrial Engineering & Management Sciences, your work on social networks is a perfect example of interdisciplinary research. How do you see the current state and scope of interdisciplinary research in India?

I think it is going to be very important in the Indian context. I think it is already very important in the Indian context. As I said, all the major societal changes that we face today are not going to be solved by a single discipline. They need excellence across disciplines. So I think that one of the reasons why (given that a lot of these big societal challenges are in fact in the developing world) we need interdisciplinary research to come in.

The work that we see, for the most part, say in the US for example, is focused on problems that they see in the world that are not always exactly the same as the problems that we may have in

India. An example of this is work that, I have concluded now, something we did in India on scaling up global health solutions. So the project, funded by the Bill and Melinda Gates Foundation, noted that in places like Bihar and largely in the developing world, not so much in the West, that there is a real problem in terms of neonatal mortality. The rate of neonatal mortality continues to be 12 times higher in India and the developing world as compared to developed world. The good news is we have examples, we have a lot of experiments, demonstrations, and testing that there are inexpensive solutions, literally a topical solution called chlorohexidine, which, if applied on the umbilical cord of a child at the time of birth can reduce the neonatal mortality by 20% or 25% in some studies that have been done. So the question then is how do we get people to use it? How do we scale up its use? How is this an interdisciplinary issue? You had people in global health who were interested in finding the right solutions that were inexpensive, good etc. But if you want to actually make this happen, the interdisciplinary team has to include not only public health scientists who come up with these ideas but teaming up with social scientists who can tell you how you can take an idea like this and scale it up. It's one thing to have a solution that can be used by health workers to reduce neonatal mortality. It is a somewhat different issue to get there and for the mother, in particular, to be able to accept this. And that is an issue that has to do with cultural norms in many places. Some of it is literacy, but not all of it is literacy. It very easy for a person to say "well if the people only knew the correct facts from science, then there would not be any problem". Well, we know that's not true. There are lots of people around the world, who will tell you "I don't care what facts you tell me about climate change, I am still entitled to my beliefs". And the same is true in areas of health etc. So having an interdisciplinary team where you combine people who come from different branches of science and engineering, with people who have more insights about social behavior. What makes people persuaded about something, how does network influence how you act? We know for a fact that our social networks determine what we do. We don't live in an atomistic world where we act as individuals. Our networks are shaping us and we are shaping those networks. So all of this requires us to have an interdisciplinary approach. And the problems that we have sometimes in India are different from the West. So interdisciplinary research in India by Indians for Indian problems is definitely an important challenge we face.

Taking off from that, how do you see the outlook towards research in general and interdisciplinary research in particular, here and in the US?

I think that in India there has always been this idea that people at the top of the academic ladder will be interested in going into research. That may be changing It is certainly not true in the West. In Europe, US, etc. the students who rank the highest from an undergraduate background often go into professions rather than going into research. In India one of the things, due to which we actually have suffered in the US is, as the Indian economy is doing better, more and more students who are graduating from the top IITs like IIT Madras are not necessarily thinking of coming to the US as we did, to get PhDs. They are looking to get a job here or get into the IIMs and not necessarily go into an academic career. So as much as I'm really happy that graduates from IIT Madras are contributing directly to the Indian economy, my academic hat makes me unhappy about that because we are not getting some of the best students that we did from places like India. To answer your question, we know obviously that more needs to be done to incentivize the top Indians to be able to stay in research. When I was a high school student, the families always joked that if you want to be happily married you should go into the IAS or get into IIT. But at the time it was at that transition point. I think that one of the things that India would need to compete very seriously against China in particular, is that, I'm not sure that I have seen India make as many investments in research, both at the undergraduate and graduate level in attracting the talent that's necessary to do the kind of research that, for example, China is doing. I see that if you look at the two big powers that are around the corner, this is one area where I believe, based on my knowledge, that India is not investing in basic research at the level at which China is. And in the decades to come, that's going to be a big comparative disadvantage as I see it for India.

More than 3 decades have passed since you graduated from IITM. How do you see the transformation of IITM over the years?

Some things haven't changed and some things have changed. I think it's fair to say that the stature of IITM as a top-tier institution in this country and the world remains unchanged. That continues to be the case. I was gratified just to go up to my guest house room right now and see a calendar that showed IITM ranked as the number 1 engineering school and I took a picture of that as it continues to strengthen me and give me pride that I was a student at this institution. Of course, a lot has changed. The talent and the skills of the students who are here are much higher than what it was during my time. I had dinner a few weeks ago with a colleague of mine at Northwestern University, who a few years ago, got a distinguished alumnus award from IIT Powai. He and I were chatting at lunch and we both agreed that neither of us would get into IIT today because the students that are now getting into IITs are so smart that you would never be able to compete with them. So we were grateful that we got in when we did because the talent is so much higher now. In terms of the physical layout, the campus still brings back the old memories. There's still the Gajendra Circle and all the beautiful landscaping that I remember here, except that there are a lot more buildings and a lot more students here since I was here. But on the other hand, the facilities are great. I was here a few years ago with my batch when we were here for our 25th-anniversary reunion and we had an opportunity to see many of the new facilities and I think those were great signs that IIT Madras is keeping up with everything that they need to do, to be competitive.

I would like to say that in the US, probably today the best-known Indian brand, is not a corporation. It is IIT. So IIT in my mind has the best and the highest global brand equity of any Indian entity. I can go to any place there and if I were to say that I was a student at IIT, everyone recognizes me. Not just within universities but also in industry, in Silicon Valley. I think that IIT Madras is a big part of the development of that brand equity and I don't see that changing anytime soon.

What would be your message for the students and scholars of IITM?

My message to IIT Madras students is to continue to be creative, to take the initiative to think outside the boundaries, to make sure that you are able to leverage and able to build on all the resources that a place like IIT provides, both physical resources and intellectual resources in terms of the excellent faculty that you have here. I would say, continue to push the boundaries. Look for other ways in which you can be the next generation's scholar. One idea that I have been pushing is the notion of interdisciplinary work. Working with people from other areas, it doesn't mean that you have to change and become something else. For me, the path was that I took an undergraduate degree in electrical engineering and then switched to it. That's not necessarily what I would advocate. But whatever is your passion, in whichever areas of engineering or humanities, etc. that you are getting your undergraduate degree in, think about how what you are doing will benefit by collaborating with people across different disciplines to address the big societal challenges. Because as I said, most of those challenges don't have single disciplinary solutions. So be creative about it and enjoy yourself. I think that one part that I really remember fondly from my days in Madras was how much fun we had. It was not necessarily a place where we had comfort resources. There was no AC, no mobile phones. But we had a lot of fun. We could go and spend the nights outside Taramani, the village out there. And they had these little coffee shops that stayed open all night. We would study for our periodical exams that were on Monday, Wednesday and Friday mornings, every week. We would go out there and have fun. That bond that was built there continues to be very valuable. So my message to students is to have fun, be bold, be creative but most importantly, enjoy it.

IIT Madras Happened To Me Dr. D.V. Satya Gupta, DAA 2018



DAA 2018

Dr. D. V. Satya Gupta graduated from IIT Madras in 1974 with a Bachelor's degree in Chemical Engineering. He obtained Master of Science and Doctor of Science degrees in Chemical Engineering from Washington University, U.S., in 1976 and 1979, respectively. Dr. Gupta is one of the world's preeminent experts on well stimulation technology including fracturing, which, along with horizontal drilling, has made the US almost self-sufficient in energy in recent years. He is a prolific inventor whose inventions and co-inventions have resulted in more than 150 U.S. and international patents in application of chemical technology for oil and gas production enhancement. He is also the author of more than 70 technical papers and co-author of Chapters on 'fracturing fluids' in several books. Since 2015, he is a Technology Fellow at Baker Hughes, a GE company.

Prior to his service at Baker Hughes and affiliated companies, Dr. Gupta had diverse appointments and responsibilities at reputed firms and institutes such as Gulf South Research Institute and

DR D V SATYA GUPTA

"NOTHING IS ON THE TABLE. YOU DON'T KNOW ALL THE ANSWERS **50 YOU ALWAY5 HAVE TO LOOK** FOR KNOWLEDGE."

Batch of 1974 - BTech -**Chemical Engineering** Pennzoil Technology Center. His technological developments in the field of chemical engineering include: encapsulated breakers, polymer-specific enzyme breakers, long-term release production assurance products, premium performance aqueous fluid systems, non-aqueous fluid systems, and ultra-light weight proppants. Currently, along with an elite group of two other technology experts, he consults with executive management on technology matters, and mentors technical talent at one of the largest oil field service companies in the world. For his contributions to the industry and company, he was awarded the Baker Hughes Lifetime Achievement Award in 2012, one of only 12 who have been honored with this accolade during the 108-year history of this esteemed company.

Industrial contributions apart, his academic endeavours are exemplified in being an active member of the American Chemical Society, American Institute of Chemical Engineers, National Association of Corrosion Engineers and Society of Petroleum Engineers. He was the 2014-15 Society of Petroleum Engineers' Distinguished Lecturer on the topic of "How to Frac with little or no water", a topic on which he has given seminars around the world. He was awarded the 2017 Society of Petroleum Engineers' International Completions Optimization and Technology Award for his work in the area of fracturing. He has chaired several symposia on Green Corrosion Inhibitors and Fracturing Fluids, and co-Chaired the 2016 American Society of Mechanical Engineers' Hydraulic Fracturing Conference. He is on the Editorial Board of SPE technical journals, and the Hydraulic Fracture Quarterly Technical Journal. At the behest of the U.S. Department of Energy, he has been on the Industry Advisory Committee for the University of Oklahoma Fracturing Fluid Characterization Facility. He has presented at U.S. Environmental Protection Agency's Hydraulic Fracturing Study Group as an invited speaker on "Unconventional Fracturing Fluids".

For his singular contributions to the development of well-simulation and fracturing technology, IIT Madras and its alumni are proud to confer this award upon Dr. D. V. Satya Gupta.

Could you recollect your journey at IITM?

Yeah, It was sort of strange. IIT was never in my plans. And it so happened that I'm glad it happened. More than the education we got here, the friendships we made here as well as one of the things I learned was teamwork and critical thinking more than bookish knowledge. I was also involved in the hostel affairs, I was also a mess secretary and also the General Secretary. It taught me guite a bit on how to interact with people and some management skills, of course at that time I didn't know that's what it was but overall later in life it all came back. So overall it was a very fun experience.

How does it feel to be one of this year's DAAs?

It is very humbling to be chosen as one among guite a few numbers of people who graduated over the years. It makes me feel very proud and at the same time humble. It's something that I will cherish for the rest of my life.

Why do you think you chose oil and energy industry as your area of exploration?

It's strange. I didn't choose oil and gas, it chose me. As part of my doctoral thesis, I worked in the area of biomedical engineering actually. I worked on encapsulations. So when I was getting out of the University there was a job offer from Gulf research mainly to look at encapsulating corrosion inhibitors and also when I was at IIT, there was a retired director from Central electrochemical research, he taught us electrochemical corrosion so I knew little bit about corrosion and I knew how to encapsulate. So that's how I got into the industry and then I got a big contract with the USA air force for encapsulating corrosion inhibitors for aircraft coatings and that's how I indirectly got into the Industry.

You are working as a Technology Fellow at Bakers Hughes. How has your experience been so far? For the last 3 years, I have been a Technology Fellow. There are three of us in the company with this position. It's like being an emeritus professor in a university. We give advice to management in the areas in which we should be investing. So the three of us have different backgrounds, I concentrate on chemistry, chemical engineering, material sciences etc. So I look at what is the emerging sciences that

would then be applicable to develop a technology. A few years ago we started nanotechnology and now we are looking at different kinds of biomimetic technology, trying to imitate nature and from that find applications whether in chemistry or polymers. So it's a lot of fun, I work with a lot of universities to see what research they are doing and we also fund some of them. Its freelance, it gives me a chance to touch base with what is going on not only in our industry and look into other industries to see if I can transfer the technology to our use. So it's a lot of fun.

Could you elaborate on your contributions to the Pressure Pumping Technology? I started as I said with the encapsulations in the 80's. So one of the challenges was we used a lot of natural polymers for fracturing applications. So I started looking into encapsulating some oxidizers and enzymes to be able to degrade them. Once I started, based on some of the polymer technology, I started getting more and more fracturing knowledge. And in the early to mid-80's, there was a lot of effort in developing tight gas in North America so I started working in that area and recently in the last 10 years the Shale Oil Revolution has happened and since I'm working in this field for a long time, industry has recognized me as one of the experts in that area. In terms of Pressure Pumping, even though I have worked in cementing the technology, Fracturing Technology is what I am considered as an expert at. Last year, the Society of Petroleum Engineers gave me an award for my contributions in the completions and production optimization for my work in the area of Fracturing Technology. Also, I have worked on a lot of non-water based technologies. This essentially is my contribution to the industry.

You have been very successful in research and have more than 70 international patents and more than 80 US patents, what do you think it takes to be successful in research? Curiosity. You need to be Curious. Nothing is off the table. You don't know all the answers so you always have to look for knowledge. The reason behind most of the patents that you have mentioned was the team effort, I had really amazing co-inventors along with me. So it is very essential to have a good team working with you. The patent is just an invention, for it to become an innovation you need to make money from it (because I work in the industry, we need to make money out of it). If there is no commercial interest and no commercial value, the company won't spend money on applying for the patent. So it's not just developing the technology but you also need people in operations, sales and across the value chain who believe in you and your technology and push it forward. Research is just a part, applications – the way you apply your research is very important and more than anything you need to be curious, you need to look at what is happening around you and not only in the industry you are in so that you could try and use them in your research too.

What motivated you to pursue your higher studies and build your career in the USA? I never wanted to go to the US. When I was in my final year I and my friend were applying for universities abroad but I never had the plan to study abroad but I applied as a backup option. I ended up not getting a job but acceptance letters with the scholarship from all the universities I applied for and that friend who was applying got a job but not even one acceptance from the universities. Till today we reminisce that it would have been the other way round. Then after coming out of the University, I got a job and I just fell into the system. And the system there is in such a way that you wouldn't want to be out of it.

How does to feel to come back to the campus of IITM? Do you follow the research activities going on in our campus?

First, I'm very glad to see that they have preserved the environment, whether it is the animals roaming around and the trees. It's very nice to see that it's been preserved in spite of buildings here and there. So yeah, the atmosphere is still there as it was during my time. Unfortunately, I don't follow as much as I should. I hope to in the future. I follow a lot of technical literature at least in the areas of my interest. I feel I should spend a little bit more looking at pure research which is what I generally look for so I can translate it into our applications. Generally, I have not but going forward if somebody approaches me, I'm sure I can contribute. I am involved with a number of universities in the US like the University of Texas and I also guide some of the students in their Ph.D. thesis. I would be glad to do the same here too.

According to you, what are the major impediments faced by the research scholars in our country? I haven't focused much on Indian Research scenario so my views might be a little tainted. A lot of the

research done here is mostly academic, I am not sure if Indian industries, in general, spend as much time and capital on research as Western countries and also technological development in India is less compared to Western countries. So what that does is, if someone wants to work at the doctoral level, they have very limited opportunities in the industry, so they end up in a University or in a government lab and funding becomes an issue. If you are in a government lab and you are a good researcher, you would want to develop knowledge in a very short amount of time which isn't feasible in the position you are in and people get frustrated.

The other major thing is thought process. One of the things I see is (IITs are an exception), IIT teaches you what I call system thinking whereas typical Indian education is very linear and very singular thinking. They are very good in pure sciences but when it comes to technology, they are in a box, they don't know how to integrate various things into a system. That is one of the advantages of IIT education had at least in those days, I hope it still is the same now.

Any final words of advice to students of IITM?

I think you are very lucky one way or the other that you are in IIT. Once you enter IIT, it makes you one of the privileged ones. The bookish education you can get anywhere, but the knowledge and wisdom you gain here are really useful. The friendships that form here are one of the most memorable ones. Most important aspect is how to find knowledge and as long as you get that it doesn't matter where you end up. Don't plan for a lot of things because you can plan all you want but somebody else decides what happens.

Follow Your Passion, Success Will Follow Dr. Mas A. Subramanian, DAA 2018



Dr. Mas Subramanian is a graduate of University of Madras with Bachelor's and Master's degrees in Chemistry earned in 1975 and 1977, respectively. In 1982, he completed his doctoral research from IIT Madras in Materials Chemistry, and joined Texas A&M University as a Post-Doctoral Fellow. He worked at DuPont Company from 1984 to 2006 as a Research Scientist. Since 2006, he is the Milton Harris Chair Professor of Materials Science at Oregon State University. Since 2006, he is also the Signature Faculty Fellow of Oregon Nano science and Micro technologies Institute. He has served as Director of Materials Institute, Oregon State University from 2006 to 2013.

Dr. Subramanian is internationally recognized for breakthrough discoveries in the field of superconductors, dielectrics, magnetism, catalysis, thermoelectrics and inorganic pigments. His research focuses on designing new inorganic solid state functional materials for emerging applications in electronics, energy conversion and the environment. His notable discoveries include: zeolites as precursors to electronic ceramics, new Bi and Tl-containing superconductors, catalysts for

DR. MAS A. SUBRAMANIAN

"LUCK FAVOURS THE PREPARED MIND. 50, YOU HAVE TO **ALWAYS BE PREPARED TO ACCEPT WHATEVER HAPPEN5** AND STILL PROCEED FURTHER.

Fischer-Tropsch synthesis, colossal dielectrics, colossal magnetoresistance oxides, and Skutterudite Thermoelectrics. His work on fluoro aromatic synthesis is one of his most notable achievements. Dr. Mas Subramanian's scientific discoveries have been featured in leading international newspapers and magazines such as The New York Times, National Geographic, National Public Radio, BBC News, CNN, Sydney Morning Herald, The Hindu and Times of India. In 2009, Dr. Subramanian and his team discovered a new class of highly-durable, non-toxic intense blue color pigments-based manganese oxides. This discovery of "MAS Blue" received world-wide attention since it has been over 200 years since the last durable blue pigment -- CoAl2O4 (circa. 1802) -- was discovered.

Dr. Subramanian has authored 350 publications in esteemed journals such as Science, Nature, Journal of American Chemical Society, Physical Review Letters, et al., and holds 57 US patents. He has delivered more than 200 invited talks all over the world. He has been honored with many accolades, including the 2016 Oregon Academy of Science Outstanding Scientist Award, F.A. Gilfillan Memorial Award for Distinguished Scholarship in Science in 2013, Chemical Research Society of India (CRSI) International Medal in 2012, the 2012 U.S. National Science Foundation Creativity Award, and the DuPont Charles Pedersen Medal in 2004. He has also served as a visiting professor at Institut de Chimie de la Mati?re Condens?e de Bordeaux, University of Bordeaux, France, and as the Normandy CNRS Chair of Excellence at CRISMAT Laboratory, University of Caen, France. He is the Editor of two leading international journals -- 'Solid State Sciences' and 'Progress in Solid State Chemistry'. He has also served on the Editorial Board of journals such as Chemistry of Materials, Materials Research Bulletin, and Journal of Solid State Chemistry.

For his discovery of "Mas Blue" and other outstanding contributions to the field of materials chemistry, IIT Madras and its alumni are proud to confer this award upon Dr. Mas Subramanian.

Life at IIT Madras

When asked about his life at IIT Madras and some great incidents, he smiles and says, IIT Madras has shaped his life in a very great way and has got a very crucial role in his life. As he says, "I was very naïve when I got into IIT Madras. But the time that I spent here groomed me in a very good way". Apart from his professional work, his doctoral research, he had also met his wife, Dr.Rajeevi Subramanian, at the institute. He recollects to have seen her for the first time while walking towards Gajendra Circle from the Central Library. He feels good to be back to IIT Madras and looking at how well developed IIT Madras is, as compared to what it was back then. But what fascinated him the most is the lush green campus and the wildlife, which is still well maintained and developed. He seems to be extremely satisfied of how IIT Madras, during its course of development, has maintained an efficient balance between the modern development and natural greenery, without compromising on either of the two! "Every time I step into the campus, I see new buildings and other new things around, yet the greenery maintained, rather increased. And so, even today, when I enter, it's still the same IIT campus for me", he happily mentions.

DAA Conferral

"I feel very honoured and deeply humbled to have received this award from my Alma Mater", as he promptly responds to this question. He has received many awards by now, but this is going to be one of the most special ones to him, he remarks. He feels really good to have been chosen as a Distinguished Alumni Awardee.

Difference between University of Madras and IIT Madras

In his perspective, they are similar and different in their own ways. The teachers at University of Madras are pretty good and just stick to the teaching part. While the faculty at IIT Madras, do not only focus on academics, but on a much broader perspective. And about the atmosphere that exists in these places, he says that IIT Madras offers a good atmosphere for the students here! He also finds the greenery and wildlife as a differentiating point between the two esteemed institutions. He ends this

saying that the former just has teaching, while the latter has learning and values, which makes it all the more interesting.

Academics as Career

He states that he has always had a passion towards chemistry, and with the course of time, he narrowed down on Solid State Chemistry. His love for the chemistry was also shown by the tie he was wearing, which had the all the elements of the Periodic Table. He has always loved to go deeper into anything related to Chemistry, and thus gradually developing his intent towards making a career with this. He worked as a research scientist for around 22 years at DuPont and then joined Oregon Sate University, still continuing to follow his passion there since 2006. He also mentions that regular achievements were his driving force towards continuing further. He says that research is something that he loved doing and was something that enthralled him. Thus, now, he is teaching and mentoring students at the Oregon State University and well as simultaneously pursuing his own research interests there, which is not one but many.

Current Research Interests

Currently, he has been focussing on research areas related to electronics, environment and energy. To mention about few projects, he talks about one of them, converting waste heat to electricity (Thermo-electric), few others on superconductors and some about making environment friendly materials, like inorganic pigments. "We focus mainly on 3 areas, but primarily on creating new materials or making new discoveries, thus giving rise to more research and other discovery opportunities", he says.

Accidental Discovery of Blue Pigment as Motivation

"Research is a process that we go through. We can't predict anything. Although we have some goals, these can not be achieved so easily sometimes. But, many a times, we end up at something else different from our actual goal. As is rightly said, Luck favours the prepared mind. So, you have to always be prepared to accept whatever happens and still proceed further".

This blue pigment, that he accidentally discovered, was heartily accepted by him kindled his minds towards going ahead in making other such inorganic colour pigments, which he did end up making.

Research in India and Abroad

As he recalls from his time, he says that now, the infrastructure and the instructional aids used by the academia in India has definitely improved. In his view, he doesn't see very major differences on the basis of infrastructure and other such things. On the contrary, things like unavailability of electricity is something that India still has got a lot more scope to improve on. "In terms of the quality of education being offered, there is not much difference between institutions in India and abroad. India has always been improving on this too." As far as the student-teacher relationships are concerned, they seem to be certainly different from the eyes of our Distinguished Alumnus. In detail, he points out at the barrier between the student and the teacher in India which in pretty much non-existent abroad, especially in the US. He says that this has also been changing in India, slightly adapting to the western system, but can't be fully accomplished due to the existence of what we call "Culture". And hence, he says that the barrier is bound to remain but the scenario has constantly been changing towards the better.

Oregon State University

After spending 22 years in the industry, he developed the crave to sharing his experience and expertise and thus, inspire young minds. He chose Oregon State University over the others for a couple of reasons. Firstly, it was a small university, in a very peaceful place along the west coast of the US. And secondly, this was where Linus Pauling, an American Chemist and Human Rights Activist, had studied too! Mr. Subramanian happens to admire him for the way he did research and also for the fact that he also won the Nobel Peace Prize, thus winning 2 Nobel Prizes in 2 different fields, unshared. "I have always wanted to go to Oregon State University and I ended up getting an offer that I couldn't refuse. By now, around 14 students have completed their PhDs under me and are now working in industry, academia and other fields too. The Oregon State University is a very nice place. I'm planning to continue here at the same place in the future too."

Non-Core Careers over Research

He readily accepts the fact that most IITians are choosing non-core careers over research. He feels that it's bound to happen, owing to the advancement in various fields and growing opportunities there. "I am not very concerned personally because even the non-core subjects can interact with scientific disciplines. After the discovery of my pigment, I realised how Arts and Science can come together." He also states that many things which are used by him in his experiments were created by someone or the other from various other fields. He very rightly feels that the world needs a balance between both of these, research and non-core, for development, and hence, people getting into the latter can't be blamed for it.

Final Message

As a part of his final message to the students of IIT Madras, he says,

"Follow your passions and success will follow! Of course, passion is just not enough. One has to work hard and drive oneself for success. But before that, you must dream big. You can't achieve everything you dream about. So, dream big and try to achieve it as much as possible. One more very important thing, based on my experience, is to have a mentor. I always had a mentor in all walks of my life. Choosing the right mentor is very important in your career and your life too. You might be very smart. Of course, you are an IITian, the best among the best. But still, sometimes you will need help. Whenever you are in a difficult situation where you have to navigate through difficult times, you need some help, advice and motivation."

An Innovator With Business Acumen Shri. Rajesh Jha, DAA 2018



Shri Rajesh Jha received his Bachelor's in Computer Science from the Indian Institute of Technology Madras in 1988, and an M.S. in Computer Science from the University of Massachusetts, Amherst in 1990. He serves on the Advisory Board for the College of Information and Computer Sciences at the University of Massachusetts, Amherst, and the Jagran Foundation in Bellevue, Washington. He is the holder of multiple patents from his early days as a software engineer.

Shri Jha joined Microsoft in 1990, developing multiple product releases with the Microsoft Works team. He moved on to create multimedia technologies in the Consumer Division and, as a Director of Development, worked for several years developing early versions of cloud-delivered services. Continuing on his path of success in the company, Mr. Jha then became the Corporate Vice President for Microsoft Exchange, Microsoft SharePoint, Microsoft Project and Microsoft Outlook. He oversaw the early planning, subsequent execution and scale-out of the cloud-based commercial services that grew into Microsoft Office 365.

SHRI. RAJESH JHA

A LEADER AND MOTIVATOR WHO BELIEVES IN REINVENTING PRODUCTIVITY AND COLLABORATIONS.

As Executive Vice President of Microsoft's Office Product Group, Shri Jha leads the development and service engineering teams for Microsoft Office - spanning Office 365, Office applications, SharePoint, Exchange, Skype, Project and OneNote. Most recently, he served as Corporate Vice President, leading teams that helped reinvent productivity and collaboration, including delivering Office 365 cross platform and through the cloud. Office 365 is one of the fastest-growing commercial services in the industry, and is used by businesses, governments and educational institutions worldwide, providing powerful security controls, advanced analytics, and voice communication. Office 365 provides industry leading productivity, communication and collaboration services that are used by hundreds of millions of users on their PCs or mobile devices - secure, trusted and powered by intelligence to allow users to achieve more. By pioneering new online services, Shri Jha and his team are at the forefront of enabling Microsoft Corporation's transformation to a mobile-first, cloudfirst world a reality.

For his exceptional business acumen coupled with innovations in software and productivity systems, IIT Madras and its alumni are proud to confer this award upon Shri Rajesh Jha.



Star Donors





OCT-18

Mr. V. Shankar [1981/BT/ME]



Shankar Family Scholarship and S. Venkitaramanan Scholarship

The Initiative for Biological

Systems Engineering (IBSE)

1993 Batch Silver Jubilee

Reunion Fund

Prakash Arunachalam



DEC-18

FEB-19

George Mathew [1993/BT/CH]



MAR-19

Kris Gopalakrishnan [1977/ MSc/PH] & [1979/MT/CS]



Gopalakrishnan-Deshpande Centre(GDC) and Ph.D program with NTU

Leadership Lecture Series 2018



Dr. Kamala R. Krishna Manager of Process Research, Chevron's ETC 10th July 2018



Mr. Siva Dhandapani 17th July 2018

AL REALITY AND HEALTHCARE".

Dr. Pulickel Ajayan ment – VAJRA Colloquium Series 27th July 2018



"How did Humans Evolve the Ability to Deny or Ignore Reality IN THE FACE OF OBVIOUS FACTS?" Dr. Ajit Varki

IIT Madras Distinguished Professor 6th August 2018

"DOWNSTREAM TECHNOLOGY AND SERVICES".

"PROCESS CONTROL IN THE SEMICONDUCTOR INDUSTRY".

Process Development, Applied Materials (AMAT), Silicon Systems Group

"HAPTIC5: SCIENCE AND TECHNOLOGY OF TOUCH FOR ROBOTICS, VIRTU-

Professor, Rice University, Mechanical Engineering and Materials Science Depart-



"VAJRA COLLOQUIUM SERIES".

Dr. Srinivasan Parthasarathy

Professor of Computer Science and Engineering & Director of Data Mining Research Laboratory at Ohio State University 13th August 2018



Shri. R.G. Chandramogan 7th September 2018



"AGREEMENT AND LEADER ELECTION IN A DISTRIBUTED WORLD".

Dr. Gopal Pandurangan Professor of Computer Science, University of Houston, Texas, USA 16th August 2018



Dr. Ashok S. Krishna

29th October 2018



"HOW THINGS GROW — THE UNSEEN FORCES THAT DRIVE MASS ADOP-TION OF TECHNOLOGIES".

Mr. Shamanth Rao Growth Consultant & the CEO of RocketShip HQ, Brooklyn 23rd August 2018



HALF A CENTURY".

Shri. Venkatesh Mannar 6th April 2018



"CHANGE AND CONTINUITY: UNIT VECTORS OF THE CAMPUS CHRONOTOPE".

Dr. R. Srinivasan Head, Ignite, Tata Consultancy Services 24th August 2018

"DIFFERENTIATION THAT MADE THE DIFFERENCE".

Chairman and Managing Director, Hatsun Agro Products Ltd

"Gedanken Experiments in graduate School".

Retired Vice President of Downstream Technology from Chevron

"FROM CAMPASTIMES TO PRESENTIMES — A PERSONAL JOURNEY OVER

Special Advisor on Nutrition to the Tata Trusts & Special Advisor to the Tata Cornell Agriculture and Nutrition Initiative of Cornell University



Travel Grant

Travel Grant was established in 2001. Its scope was enlarged in 2010 to support undergraduate travel also. The program partially reimburses expenses incurred abroad by students and allows them to travel overseas for competitions, summits, workshops, conferences and internships. In 2018-19, about 208 students received grants. The total amount granted towards student travel is about 89.11 Lakhs.

Financial Year vs No. of Student Beneficiaries



Boeing Funded Travel grants

Boeing Travel Grant can be used for travel expenses connected with presenting a paper or project at an international conference related to Aerospace & Defence (A&D) or A&D related technology. So far 80 students have been benefitted through this and Rs.57 lakhs disbursed. In 2018-19, about 7 students received grants. The total amount granted towards student travel is about 2.1 Lakhs.

Boeing Travel Grant Statistics



25 faculties are supported with travel grants for research-collaboration visits. The total amount granted towards faculty travel is about 13.90 Lakhs







Awards and Scholarships

Srimathi Marti Annapurna Gurunath Award for Excellence in Teaching

Prof. Dr. Jayalal Sarma M N, Department of Computer Science and Engineering received "Srimathi Marti Annapurna Gurunath Award for Excellence in Teaching" instituted by Dr. Marti G Subrahmanyam [1967/BT/ME]

Citation Prof. Jayalal Sarma

- Dr. Jayalal Sarma M N, received his Ph.D. in Theoretical Computer Science, from the Institute of Mathematical Sciences, Chennai in 2009. He did his postdoctoral research at the Institute for Theoretical Computer Science, in Tsinghua University, China until 2010. He joined IIT Madras in the Department of Computer Science and Engineering as an Assistant Professor in October 2010. Since July 2016, he is an Associate Professor in the Department of Computer Science and Engineering.
- Dr. Jayalal's research interests are in theoretical computer science, particularly in computational complexity theory. He has guided three PhD students and several masters' students and has published in several international conferences and journals in this research area. He was awarded Young Faculty Recognition Award (YFRA) at IIT Madras in 2014.
- He was instrumental in developing a complexity theory research group at the Department of Computer Science and Engineering, IIT Madras. He introduced a course sequence for this research area and aligned them the relevant UG courses which enabled students to learn the ideas in a systematic fashion. He was also involved in redesigning several core courses in the Department of Computer Science and Engineering and aligning them carefully with one another.
- Dr. Jayalal is highly passionate about teaching. He believes that every course must have a story to it rather than being a set of topics being taught. He also spends considerable amount of time in discussions outside class hours, especially students who need the help and guidance.
- D The institute is proud to confer upon him the "Srimathi Marti Annapurna GurunathAward for Excellence in Teaching" for his demonstrated proficiency and innovativeness in teaching.





Ram Shriram Merit Scholarship



Ram Shriram contributed \$ 50K towards "Ram Shriram Merit Scholarship (RSMS)" for economically backward students. 54 students have received this scholarship for the current year.

Nature of Scholarship

- For the year 2017-18 Seven Scholarships of Rs.1,20,000/- each for B.Tech/DD student from 2017 batch onwards. 60 scholarships (20 scholarships for each batch) of Rs. 40,000 each to 2016, 2015 and 2014 batches among MCM scholarship recipients. Based on CGPA.
- ▶ For the year 2018-19 Renewal of 40 scholarships (20 Scholarships of Rs. 40,000 each) for 2016, 2015 batch among MCM recipients based on CGPA. Renewal of 7 Scholarships of Rs.1,20,000/each for 2017 batch based on CGPA and selection of 7 new students from 2018 batch
- ▷ For the year 2019-20 Renewal of 20 Scholarships of Rs. 40,000/- for 2016 batch among MCM recipients based on CGPA. Renewal of 7 Scholarships of Rs.1,20,000/- each for 2017, 2018 batches based on CGPA and selection of 7 new students from 2019 batch.
- ▷ For the year 2020-21 Renewal of 7 Scholarships of Rs.1,20,000/- each for 2017, 2018, 2019 batches based on CGPA. Selection of 7 new students from 2020 batch.
- ₽ Criteria for selection
- D Based on JEE advanced rank and parental income below Rs. 5 Lakhs (for fresh sanction).
- ▷ Renewal based on Minimum CGPA 8 by the end of previous academic year and student should not have any backlogs.
- ▷ The student should not receive any other scholarship other than MCM.



Young Faculty Recognition Award (YFRA) 2018

YFRA was sponsored by our alumnus Dr. P Balasubramanian [1971/ BT/ AE & 1973/ MT/ IM] and Mr.Manohar Anand (2011/ BT/CS. 6 IITM Faculty received this award on Teachers' Day function 5th September 2018. Dr Arun Kumar Thittai, Dept. of Applied Mechanic. Dr Mathava Kumar S, Dept. of Civil Engineering. Dr Amitava Ghosh, Dept. of Mechanical Engineering Dr Anand T N C, Dept. of Mechanical Engineering. Dr Parasuraman Swaminathan, Dept. of Metallurgical & Materials Engineering. Dr Sriram Venkatachalam, Dept. of Ocean Engineering.



Keshav-Rangnath Excellence in Research Award

Keshav-Rangnath Excellence in Research award was instituted by alumnus Dr. Prakash Keshaviah (1967/BT/ME & 2015 Distinguished Alumnus) in order to recognize excellence in journal publications. These awards are presented jointly to a scholar and a faculty member during Alumnite.

- MEO9DO44- P Suresh (Guide Dr.Krishnan Balasubramanian Co Guide Prof Prabhu Rajagopal)
- ME14D405 A R Harikrishnan (Guide:Dr.Saritkumar Das Co Guide: Dr.Sateesh Gedupudi)



Donor Name: Dr. Y B G Varma Family <u>Award Objective</u>

The faculty follow an academic process by which students are motivated to learn; have a positive influence on how they think, act, and feel; they guide students successfully through the exploration of creative, critical thinking, and problem solving processes; and encourage students to think, empowering them to find their own creativity.

Scope of Award

Faculty of Department of Chemical Engineering IIT Madras, teaching undergraduate and graduate programs – full semester course including electives.

> The Award A Silver medal with gold Plating Cash award - Rs. 30.000/-A Certificate



Prof. Dr. YBG Varma Award for **Teaching Excellence**

Shoma and Prasad Setty Student Distress Fund

A "Student Distress Fund" under the auspices of IIT Madras and sponsored by Shri. Prasad Setty [1992/BT/ CH], covers potential unexpected expenses incurred by a student due to causes like personal or medical emergencies. A Committee comprising the Dean of Academic Courses and Dean I&AR review applications and decide on the sponsorship of the student. Annual interest accruals from the endowment are used for this purpose. The student's case must be referred to the Committee via the student's Faculty Advisor, and Head of the Department. The following students received Shoma and Prasad Setty Student Distress Fund for 2018-19

S.No	Student Name	Roll No.	Department
1	Shilpa Thakur	OE15S009	Ocean Engineering
2	Ravikrishnan R	HS12H033	Humanities and Social Sciences
3	Sarvesh Kumar	MA13D023	Mathematics
4	M. Ravinder	CE15B036	Civil Engineering
5	Ajmeera Balaji Naik	CS14B034	Computer Science and Engineering
6	Chavi Chhabra	MA17M004	Mathematics

Dr V Ramamurti Faculty Fellow Endowment Launch 14th August 2018

The event started with a talk by Prof. Amrutur V Anilkumar (1982/BT/ME) Professor of practise of Aerospace and Mechanical Engineering, Vanderbilt University, USA on "a new Paradigm for top class engineering education". The Faculty fellowship program was inaugurated with lamp lighting by Mrs Ramamurthi and Mrs Rama Sivaraman (D/O Late Dr. V Ramamurthi) and his family in the presence of Director Prof. Bhaskar Ramamurti and Prof. Amrutur V Anilkumar. MoU was signed by Prof. V Anilkumar (representing alumni donors) and Ravindra Gettu, Dean IC & SR.

SSAN Ananya Educational Trust

SSAN Ananya is a trust set up with the noble intention of helping deserving students who require financial help during their education at IIT Madras and inspiring them to be a part of a unique brand of citizens who believe in the importance of 'paying forward' the interest free loan. So far twelve students have been benefited through this scheme. Five Students have received Rs. 3.37 Lakhs in 2019-20

for more information - Visit: http://ssantrust.org/)"







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Reunion

More than 300 alumni & their family attended the event. 1973, 1983, 1993, 1998, 2003, 2008 & 2013 batches had their reunion. Dean, I&AR and Director addressed the meeting. Tech Expo, an exhibition of student's projects was held. Panel discussion on alumni's role in Institute's growth was held.

28th

December

2019 DISTINGUISHED ALUMNI AWARDEES ANNOUNCED ON THE **REUNION DAY**

- DMr. Puttige Ramadas (1970/M.Tech/ME) Managing Director, Ace Manufacturing Systems Limited, India
- 🖯 Mr. Harcharan singh (1970/B.Tech/MT) President and CEO, Glopec International Inc, Canada
- Dr. Cherukuri Murali Krishna (1984/Ph.D/Phy) Senior Investigator National Institutes of Health, USA
- 🔁 Dr. Kanniks Kannikeswaran (1984/B.Tech/MT) Founder of American School of Indian Art (ASIA) Indo-American Musician, Scholar, Composer, Writer and Music Educator, Cincinnati, USA
- Derof. Srinivas Devadas (1985/B.Tech/EE) Edwin Sibley Webster Professor , Electrical Engineering and Computer Science, MIT, USA

¹ Mr. Vivek Sankara<mark>n (1985/B.Tech/ME)</mark> President & COO, Fri<mark>to-Lay North Am</mark>erica, PepsiCo, Inc., USA Prof. Kaushik Bhattacharya (1986/B.Tech/ME)Howell N. Tyson Sr. Professor of Mechanics and Dependence of Materials Science, and Vice Provost (Research) California Institute of Technology, USA わMr. Swaminathan Sivakumar (1987/B.Tech/EE) Intel Senior Fellow, Technology and Manufacturing

Group Director of Lithography, Portland Technology Development, Intel Corporation, USA ¹ Dr. G. Ayyappan (19<mark>88/M.Tech/ME) Programme Director (Space Transportation Systems)</mark> ¹ Prof. Srinivas Peeta (1988/B.Tech/CE) Jack and Kay Hockema Professor, Civil Engineering, Purdue University, USA

🖯 Mr. Ashish Dikshit (199<mark>0/B.Tech/EE) Managing Director Aditya Birla Fashion</mark> and Retail Limited, India Dr. Parthasarathy Ranganathan (1994/B.Tech/EE) Google Distinguished Engineer, USA





IITM Researchers and PG alumni of all batches were back to their campus for 2019 Reunion on March-30th. It was a celebration of alumni with their families from various batches and it was an opportunity to reconnect, engage with other batch mates, share their memories and experience with each other. For the very first time Open House was organised for an interaction between alumni and current research scholars.

¹978 Batch Ruby Reunion

- 1978 batch alumni had their ruby reunion on Jan 15th 2019 at IC & SR auditorium
- 60+ alumni along with their family attended the event
- Director, Dean-IAR, IIT MAA President addressed the alumni
- On Jan 16th the batch had their own program in Andaman



Researchers & PG Reunion 2010



59th Institute Day

The Institute Day was celebrated on April 26, 2018. Mr. B. Santhanam [1978/BT/CE], President & Managing Director, Saint Gobain India Pvt. Ltd. Chennai (Distinguished Alumnus of IITM) was the Chief Guest of the day. Out of 12 DAA, 9 received awards on the Institute Day. 62 Alumni sponsored Institute day prizes were distributed to the students.

26th April

AWARDED DAA

- 🔁 Shri. Lazar T Chitillapilly [1983/BT/AE] Project Director, Air Breathing Propulsion Project, VSSC, ISRO, Thiruvananthapuram
- Dr. D.V. Satyanarayana Gupta [1974/BT/CH] Technology Fellow, Baker Hughes, a GE company, Tomball, Texas, USA
- Dr. Kanianthra Mani Chandy [1965/BT/EE] Simon Ramo Professor of Computer Science, Emeritus, California Institute of Technology, Pasadena, California, USA
- Dr. Noshir Contractor [1983/BT/EE] Jane S. & William J. White Professor of Behavioral Sciences (McCormick, SoC, Kellogg), Director of SONIC Research Group, Northwestern University, Evanston, Illinois, USA
- Dr. Nagabhushana Sindhushayana [1989/BT/EE] Vice President, Technology, Qualcomm Inc, San Diego, California, USA
- Shri. V.M. Thomas [1973/BT/ME] Vice President, Technology, Qualcomm Inc, San Diego, California, USA
- Dr. Noshir Contractor [1983/BT/EE] Jane S. & William J. White Professor of Behavioral Sciences (McCormick, SoC, Kellogg), Director of SONIC Research Group, Northwestern University, Evanston, Illinois, USA
- Dr. Seeram Ramakrishna [1989/MT/ME] Director, Center for Nanofibers & Nanotechnology, Professor of Mechanical Engineering @ National University of Singapore
- Dr. Sudhir Kumar Mishra [1996/MT/ME] CEO & MD, BrahMos Aerospace, Distinguished Scientist & Director General (BrahMos), DRDO, New Delhi









On 5th June 2018, Carbon Zero Challenge (CZeroC) 2019 an All India Energy and Environment Innovation Competition was launched



Canadian Friends of **IITM** Launch

On September 4th 2018, "Canadian Friends of IITM" was launched. It is a platform for our alumni based in Canada to engage with each other and with their alma mater more effectively.



A Day at IIT Madras

Alumni Relations office coordinated with academic Section and organized "A Day at IIT Madras" on Jun 23, 2018. Top 300 rankers of JEE Mains 2018 were invited to make prospective students aware of the life at IIT Madras. 60+ students attended the event with their parents.





IBSE 2nd Colloquium



IBSE 2nd Colloquium was held on Jun 29, 2018. Speaker of the event was Dr Anurag Agarwal, Director, CSIR-Institute of Genomics and Integrative Biology, New Delhi. Topic : "Enjoying a Three-way Marriage: A story of Maths, Biology and Medicine"

23rd June

A felicitation ceremony for the 2018 graduating students going to North America for higher studies was organised by the IIT Madras Alumni Association of North America (IITMAANA) & the IITM Foundation, in association with the Office of Alumni Affairs (OAA) on the evening of 18th July at Hotel Ramada Plazza, Chennai. 50+ students attended the event.



On Apr 27, 2018 Faculty Nite was held. The event was partially funded by the Office of Alumni Relations. Several faculty and their families attended the event.

ΠΤΜΑΑΝΑ & ΠΤΜ Foundation Dinner Reception



AlumNite 2018

AlumNite 2018 was held on the 19th July, 2018. Six "Named Chairs" were launched for the very first time. The "Joy of Giving" website which was launched during the 2017 AlumNite, has raised Rs. 1.30 crore through its crowd funding platform.

A "Distinguished Alumnus Award 2018" was presented to Dr.MAS A Subramanian (1982/PhD/CY), currently Milton Harris Chair Professor of Material Science at Oregon State University.

The Director, IIT Madras, conferred Prof. Raghu Rengaswamy the "YBG Varma Award" (instituted by the family of Prof. Varma) for "Excellence-in-Teaching" in the Department of Chemical Engineering. They also presented the "Excellencein-Research" Award instituted by Dr. Prakash Keshaviah, and the "JC Bose Patent Award" (funded by Mr. Anil Kumar, Kundan Kumar, G M K Raju).

The "Graduating Class Gift" of Rs.14 lakhs was presented to the Director, IIT Madras, by the 2017 I&AR Secretary, Ms. Vineesha Badabhagni; this will be deployed towards creation of a web portal for the Placement Cell. Several other academic awards and prizes were given to students.



19th

July



Daan Utsav Celebrations 'Joy of Giving' Week

The occasion of Daan Utsav was celebrated on 2nd October, 2018 with a sumptuous lunch organised for the security personnel of the institute. This event was funded by Office of International and Alumni Relations.



55th Convocation









was held on 20th July 2018. Dr. Rajiv Kumar, Vice Chairman, NITI Aayog was the Chief Guest of the day, he handed over the degree certificates to the 2018 Graduates. 18 Alumni sponsored prizes were also given to the students under different categories.

IT Madras CSR Conclave

IIT Madras CSR Conclave was held on 10 December, 2018. Technology Conclave for Social Impact program (Day session) 38 Corporate CSR Managers attended this program. Industry Academia Collaboration for Social Impact program (evening session) 33 CXO's attended the evening session. KPMG formally signed as a Knowledge Partner



On Mar 3, 2018 Faculty Recognition Luncheon was held to express our gratitude for playing a pivotal role in supporting our fundraising activities & international relations. Around 30 faculties attended this event

3rd March

10th

December













IITM Alumni Singapore Chapter Meet IITM Alumni Chapter Meet in Singapore was held on Jun 2, 2018. 110+ Alumni attended the event





IITMAA Kerala Chapter Alumni Meet IITMAA Kerala Chapter Alumni Meet was held on 11th August, 2018. 70+ Alumni attended the event.





On Mar 17, 2018, IITM's Alumni Chapter Meet was held in Bangalore. 300+ Alumni based out of Bangalore attended this event.

IITMAA Japan Chapter Alumni Meet Japan alumni meet was held on 27th Aug, 2018. 15+ Alumni attended the event.





IITM Alumni Delhi Chapter Meet

- The IITM Delhi Chapter Meeting was held on Sunday 17th Feb 2019 at India International Center, Annex Court, Lodhi Estate, New Delhi.
- The event saw a participation of 84 alumni.

Heritage Centre Day

Heritage Centre Day was celebrated on Mar 3, 2018. Alumni, faculty (current & retired), students, and campus residents had a chance to view the exhibits.







Book Meet





CGI Information Systems & Management Consultants Pvt. Ltd sponsored MCM scholarship for 25 students with a contribution of Rs. 17.5 Lakhs. CGI exchanged an MoU with IITM and interacted with the scholarship recipients on Feb 13, 2019.



Book Meet of 'Disrupt and Conquer: How TTK

"Meet the Author Session" was held on Jun 7,

2018 as Mr. T T Jagannathan, Distinguished

Alumnus of IIT Madras and Chairman of TTK

Prestige has co-authored a book Disrupt and

Conquer: How TTK Prestige Became a Billion-

Dollar Company.

Prestige Became a Billion-Dollar Company'



31st

January

Winter Course on Computational Brain Research

The Center for Computational Brain Research (CCBR) at IITM conducted a winter course on machine intelligence and brain research. This is a two-credit course and consists of a workshop component and an additional teaching component. The workshop component was held from January 2nd to January 9th, 2019 at the IC & SR building, IIT Madras. The workshop held at IIT Madras was attended by over 300 delegates who witnessed informative talks by over 25 esteemed speakers over the course of Seven days.

3rd PAN IIT Biotech Conference

Held on Jan 31st2019 to Feb 2nd 2019 in IC&SR Auditorium

More than 40 speakers & delegates attended the event

250+ participated in the conference

Young researchers and accomplished Scientists across the world have gathered to exchange their ideas on Cancer Precision Medicine and Personalized Therapeutics with themselves and with the Interested Students and faculties. It was a three day meet from January 31st2019 to February 2nd2019 organized by Department of Biotechnology, Bhupat and Jyoti Mehta School of Biological sciences, IIT Madras under Prof. S. Mahalingam and supported by International & Alumni Relations, IIT Madras and The Mehtafamily Foundation, Houston, USA.













Yearwise Receipts



Yearwise New Donors



Monthwise Receipts





Yearwise Receipts



(₹ in crore)

119



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