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# The Indian Institute of Technology Madras

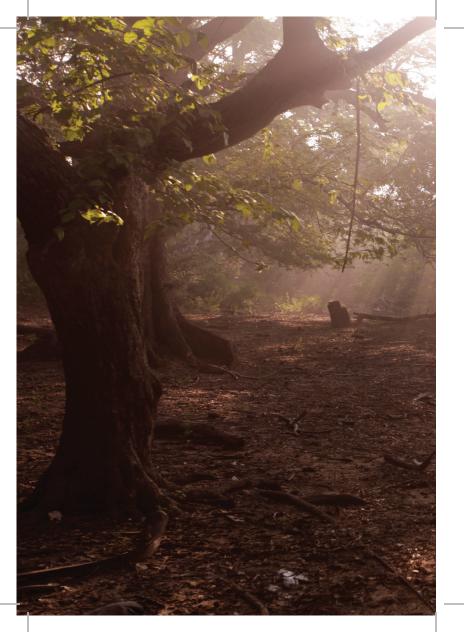
#### Mission

- To create and sustain a community of learning in which students acquire knowledge and learn to apply it professionally with due consideration for ethical, ecological, and economic issues
- To pursue research and disseminate research findings
- To provide knowledge-based technological services to satisfy the needs of society and the industry
- To help in building national capabilities in science, technology, humanities, management, education and research

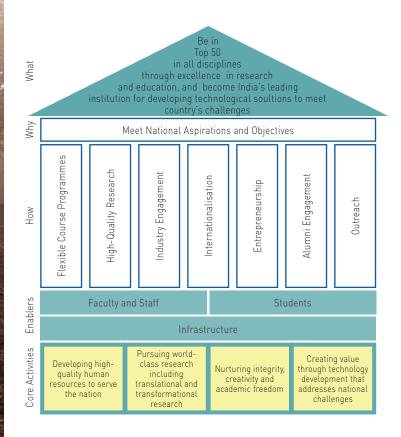


#### Vision

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.



# Strategic Plan 2014-2020



# About IITM

In July 1956, the Indian Prime Minister Jawaharlal Nehru, West German President Theodor Heuss and German Chancellor Konrad Adenauer issued a joint communiqué announcing the set up of a 'technical teaching institution' in India, and Madras, now Chennai, was chosen as the location and home for a new Indian Institute of Technology (IIT). The Madras State Government offered an area of about 632 acres with an abundance of woods, lakes, and land.

On 7th August 1958, an Indo-German agreement was signed to establish IIT Madras (IITM). Twenty German professors, specialists, and five foremen were deputed to this task. German scientific and technical equipment, including training in specialised fields for 20 Indian teachers at German technical universities, were also arranged.

The Government of India commenced activities at the Institute from the academic year 1959–1960. On 20th July 1959, the first batch of students, 120 in number, were admitted, and IIT Madras was formally inaugurated on 31st July.

Chennai, home of IIT Madras, is the fourth largest city of India and the state capital of Tamil Nadu, a southern state in the country. The city, about 350 years old (1639), was formerly known as Madras and later renamed Chennai, which evolved from an old name 'Chennapattanam'. Chennai is a coastal city and boasts the second largest beach in the world. The climate is generally hot and humid. In summer (May–July), the temperature reaches up to 42° C (107° F), while in winter (Dec–Feb) it is about 18° C (64° F). The monsoon season starts in September and lasts till November.

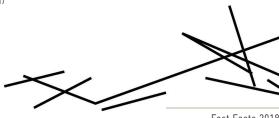
IIT Madras has over the years grown to become a comprehensive centre for technological education and basic and applied research in India, with

nearly 100 laboratories organized in a unique pattern of functioning, a faculty of international repute, a brilliant student community, excellent technical support staff, and an effective administration—all of which contribute to its pre-eminent status. IIT Madras is recognized worldwide for its intellectual leadership and on-going innovation across every major discipline of engineering and pure science. IITM also boasts a global alumni diaspora second to none in terms of its accomplishments.

IITM is a residential institute with more than 580 faculty, 9000 students, and 600 administrative and support staff. Students from 18 countries are enrolled here. The campus is self-contained and is located on a beautiful wooded area of about 250 hectares. It is home to approximately 300 species of trees and plants with quite a large number of native wild ones, which are unique to the tropical, dry, evergreen vegetation. The faunal diversity includes monkeys, blackbuck, spotted deer, black naped hare, and monitor lizard among others.

The Institute has 16 academic departments and several advanced interdisciplinary research centres.

IITM has been ranked as No. 1 Engineering Institute in India for three consecutive years 2016, 2017 & 2018 and No.2 in the Overall category for 2017 and 2018, by the National Institutional Ranking Framework, Ministry of Human Resources Development, Govt. of India (https://www. nirfindia.org)

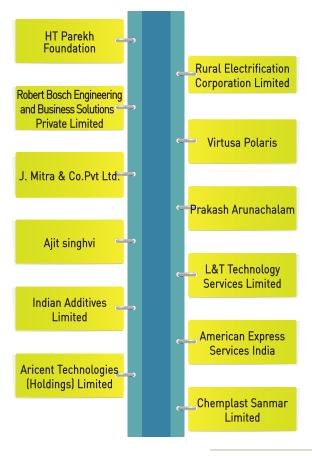


# The IITM Tradition of Philanthropy

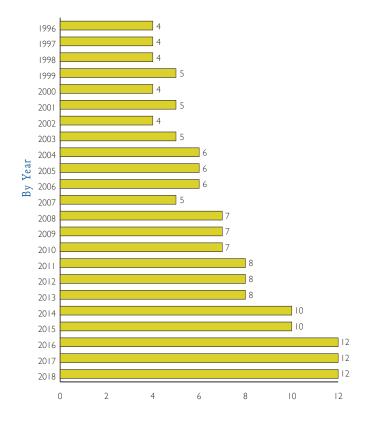
# Major alumni donors

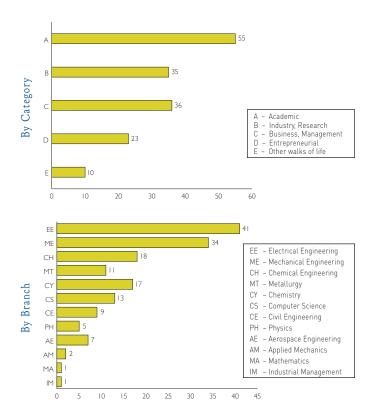


# Major non-alumni contributors



# Distinguished Alumni Awards (Total = 159)





# Grants and Fellowships

# Scholarships





# Scholarships (continued)



# Awards/Prizes



















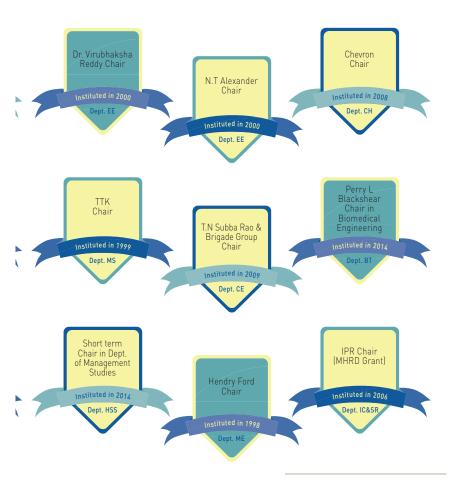




# Chairs and Endowments

# Chair Professorships & Institute Chair Professorships

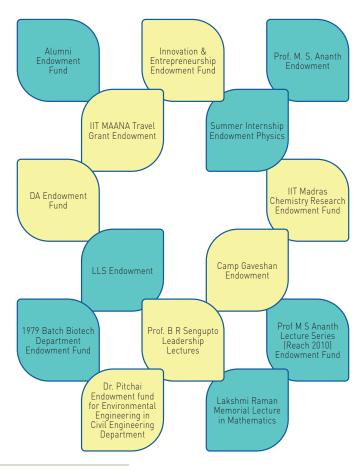


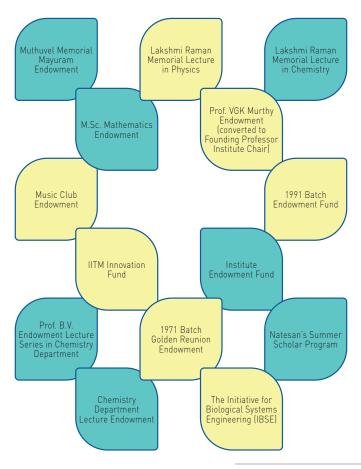


### Chair Professorships & Institute Chair Professorships (continued) 1984 Batch Contributions for Ramachandran Institute Chair Professorship Class of 1981 Chair in ME Instituted in 2015 Dept. ME Dept. HSS Instituted in 2015 Dept. ME Prof. Richard Karp Prof. M S Ananth Institute Chair **RAGS Family** Foundation Instituted in 2015 Institute Chair Dept. CS Dept. CH Instituted in 2015 Dept. HSS Visiting Chair V Balaraman Professorship Endowment in CSE Institute Chair Prof. Sampath Instituted in 2016 Dept. CS



#### Endowments





# Facts and Figures

# Faculty

Department		Faculty in position	
	Faculty Post Docs		
1 Aerospace Engineering		27	1
2 Applied Mechanics		29	4
3 Biotechnology		28	11
4 Chemical Engineering		29	5
5 Chemistry		34	16
6 Civil Engineering		54	1
7 Computer Science & Engineering		30	1
8 Electrical Engineering		66	5
9 Engineering Design		16	4
10 Humanities & Social Sciences		36	3
11 Management Studies		25	3
12 Mathematics		38	4
13 Mechanical Engineering		65	4
14 Metallurgy & Materials Engineering		30	4
15 Ocean Engineering		22	1
16 Physics		55	14
Total		584	81

Visiting Faculty 17
Emeritus 4
Emericas
Re-employed 5
Chair Professors
Inspire Hosted 7
Faculty
Hosted Fellow 1
Professor of Practice
Group A
Officers

# Administrative and Technical Staff



Technical Staff

# Students on Roll

Programme	No. of students on roll
1 B.Tech.	2034
2 Dual Degree	2038
3 M.Tech.	1031
4 PG Diploma VLM	40
5 PG Diploma MRTM	15
6 MBA	117
7 EMBA	39
8 M.Sc.	317
9 MA	233
10 MS	752
11 Ph.D	2843
Total	9459

## Research at IITM

IIT Madras has over 584 academic staff and around 4582 post-graduate students and is internationally renowned for the quality and diversity of its research. The faculty members of Engineering, Science, Humanities and Social Sciences, and Management departments, along with their scholars are involved in active research in frontier areas, publishing in acclaimed international and national journals and obtaining patents.

Our faculty also undertake several application-oriented industrial consultancy projects with industries in India and abroad, as well as collaborative research projects with foreign universities. Undergraduate and post-graduate students have the opportunity to participate in these projects.



#### Upgradation from



# Research Publications (2017)



### Innovation at IITM

# Facilitating the Creative Spirit

The alumni-sponsored Centre for Innovation (CFI) is a 'Student Lab' that provides a forum for the creative output of the budding engineers of IIT Madras. It provides students a platform for bringing form to their ideas. A great workspace, a comprehensive inventory, and ample guidance from faculty and seniors make CFI an asset for the students. CFI is a place where a student can "walk in with an idea and walk out with a product". Almost a decade since its inception, CFI is now home to 11 clubs and 5 competition teams, with over 600 students being involved in activities over the year. The primary interest of these clubs fall on a broad spectrum, and members of the clubs strive to make a positive impact through projects supported by CFI. CFI has augmented the 'tech' space in the institute wherein projects from CFI have gone on to produce high-profile start-ups and internationally acclaimed competition teams apart from bagging laurels at the national and international levels.

To strengthen the innovation ecosystem within the campus, CFI ensures that a pipeline of potential incubates is created through a body called "Nirmaan", which seeks out students with ideas that have commercial potential and puts them through a one-year programme to refine the ideas, develop products, and formulate business plans.

Driven by passion and fuelled by enthusiasm, CFI aims to kindle the spirit of inquiry and foster the spirit of engineering, not just in IITM - but also in other institutes via mentorship.

#### Vision

"To promote informal learning and foster innovation and invention in technology, with a focus on technologies aimed at contributing positively to the environment and to the society"

#### Research Park

### A non-profit Section 8 Company, promoted by IIT-Madras

- Governed by a Board of Directors consisting of Eminent Industrialists, Academicians and Senior Government Officers.
- To catalyse collaborative research between industry and academia, enable technological innovation & nurture entrepreneurship.

### Total Built up Area of 1.2 Million sqft

 Research Blocks catering to IT, Mechanical, Electronics, Biosciences, and Energy sectors, Incubators, plus Multi-Level Parking, Conference Halls, Auditorium, Creche, Gymnasium, Food-Courts, Workshops/fab labs.

#### Commencement of Operations

- Phase I March 2010
- Phase II July 2017



#### Three Pillars of Innovation

#### Industry R&D Centres

- Obligated to undertake joint R&D work with IITM, Sponsor PhDs, Interns, etc.,
- 60+ R&D Centres (Private Sector/MNCs, PSUs, SMEs)
- Total value of R&D projects taken up jointly by IITM and Industry R&D Centers: Rs. 40 Crores
- Total Number of Patents Filed 67 and Granted 21.

#### IITM Centres of Excellence

- Where commercialisation of research is the key focus
  - » Centre of Excellence in Wireless Technology
  - » Healthcare Technology & Innovation Centre
  - » Centre for Battery Engineering and Electric Vehicles
  - » Advanced Manufacturing Technology Development Centre
  - » Centre for Urbanization, Buildings and the Environment

# Deep'Tech Start-up Incubation eco-system, spearheaded by IIT Madras Incubation Cell

- Today, IIT-Madras is India's leading Deep Technology Startup hub with Innovation (founded on science/engineering breakthroughs) & Impact as key differentiators/drivers. Spearheaded by its nodal incubator, IITM is empowering entrepreneurs to address national challenges through successful, self-sustaining companies.
- IITMRP houses 4 incubators of IIT-Madras: IITM Incubation Cell (nodal incubator of IITM and a non-profit Section 8 company, est. 2013) and sector-specific incubators: IITM's Rural Technology & Business Incubator (a Society, est. 2006), Bio- and MedTech incubators (www. incubation.iitm.ac.in).

- 150+ deep tech startups incubated till date (http://www.incubation. iitm.ac.in/portfolio/allstartups)
  - » Founders (261): Students (4%), Faculty (17%), staff (5%) and Alumni (38%) of IIT-Madras; and external entrepreneurs (36%). 49 Cos. have IITM Faculty as cofounders (36) or minority shareholders, underlining the translation of cutting edge research to industry and society at large
  - » Sectors: Manufacturing, IoT, energy/renewables, healthcare/ medical devices, water, edu-tech/skill development, agri-tech, robotics, AI, ML, data analytics, AR/VR, Enterprise
  - » 35 startups have raised total investment of Rs 800 crore from angel investors/VCs
  - » 63 generate cumulative revenue of Rs 134 crore cumulative turnover in FY 2016-17
  - » Direct Jobs created: 2500
  - » Patents filed by incubatees: 60+
- Incubation Support provided by IITMIC to the startups: Workspace with
  infra suited to both hardware & software companies & access to domain
  experts from industry colocated in IITM Research Park (https://youtu.
  be/uBS1ukNUA0w); Business support services (accounting, company
  secretary, legal and IP), training & networking; Seed & early stage
  funding (Rs 15 crore spent till date by incubators) and connection to
  angel investors and VCs; Mentoring in tech/design & market entry by
  eminent experts from IITM Faculty, Alumni and Industry heads
- To accommodate the expanding footprint of entrepreneurial activity at IITM, IITMRP has allocated 100,000 sq. ft. for incubation & startups

#### IITMRP Industry R&D Centres — Significant Milestones

 BHEL R&D Gateway has completed 62 projects so far and implemented 33 of them commercially.

- TCS interacts with IITM on Data Centre Power Reduction, Energy Consumption in High- Rise Buildings, Smart Water Network and generated 10 patents so far.
- Caterpillar India has executed R&D projects with IITM worth over 2 crores, recruited over 18 IITM Students and offered internships for over 127 students.
- Saint Gobain Research India has undertaken 21 R&D projects with IITM faculty and students that has resulted in launching over 20 new products in the market.
- Trivitron Healthcare's collaborative engagement with IITM has resulted in shaping three innovative solutions - a) Diabetic Retinopathy Software Analysis Kit b) Android based wireless ECG c) Slow infusion syringe pump.
- Vortex Engineering developed world's lowest power consuming ATM in collaboration with IITM.
- Titan Industries Innovation Hub's collaboration with IITM on material characterisation and coating etc., has resulted in generation of 5 patents.
- Centre for Automotive, Energy Materials, ARCI has set up and commissioned India's first pilot plant for Lithium-ion battery line for EVs/HEVS.

#### IITM Centers of Excellence - Significant Milestones

- Centre of Excellence in Wireless Technology leads India's 5G R&D efforts jointly with IITs, IISc and Industry and has been granted 18 international patents.
- Healthcare Tech & Innovation Centre, developed healthcare solutions for Arterial Stiffness and Cardiovascular Diseases, Eye-PAC, suitable for non-specialists to diagnose vision ailments in large number of people, and a Mobile Cataract Surgical Unit with Sankara Nethralaya.

- Centre for Battery Engineering and Electric Vehicles—One stop technology centre for batteries and EVs, promoting industrial academia joint innovation and commercialization.
- Advanced Manufacturing Technology Development Centre has developed several new machines jointly with Indian Machine Tools Manufactures and a precision grinder whose import is not permitted.

#### Deep-Tech Start-up Incubation eco-system - Significant Milestones

IITM Start-ups are deep-technology companies

- IITM Incubation Cell's pioneering efforts to support India's Startup activities was recognized by the Indian Government Department of Science and Technology's National Award for the 'best emerging Technology Business Incubator' in May 2017.
- IITMIC was also placed in 1st position by 'Entrepreneur India' Magazine in their annual edition of 'Top 45 Incubators in India'.
- Economic Times Start-up Awards 2016 and 2017: for two consecutive years 4 of 5 finalists, under 'Best on Campus' category (Ather Energy, Planys Technologies, Hyperverge, Detect Technologies & MaximL Labs) and the eventual winners Ather Energy Pvt. Ltd. (2016) and Detect Technologies (2017) were all IITM incubated startups. Moreover, Aibono (Airwood Technologies) won the 'Best Social Enterprise award' in 2017
- Oct'2017 IITMIC signed MoUs with several OIL PSUs (as incubator partners) at the 'Startup Sangam' launch function in Delhi. Several incubated startups (Planys, Detect, MaximL, Digas, others) to be funded by BPCL, GAIL, HPCL, EIL & ONGC
  - » IITM company, Planys Technologies funded by ONGC and BPCL
  - » Digas funded by HPCL
  - » Vasitars funded by IOCL

- » Detect, MaximL, Aerostrovillos and Swadha Energies approved for funding by BPCL
- Dec'17: 'Uniphore Software System' gets global status John Chambers, Chairman & former CEO of Cisco leads Series B round with 10% stake in Uniphore and this is his first investment in a startup outside USA
- Dec'17: Tanuj Jhunjhunwala (CEO, Planys Technologies) won INAE Young Entrepreneur Award 2017 (previous awards: "Startup in Hydrocarbon Sector — Rising Star" award at Petrotech 2016; Entrepreneur Award 2016 by the Japanese Takeda Foundation)
- IITM Startups make National Impact (Sept'17): Hon. PM launched 'Saubhagya' scheme & delivered promise of complete electrification of India by Dec'18...."solar power packs of 200-300 Wp with battery banks for un-electrified households located in remote and inaccessible areas, comprises 5 LED lights, 1 DC fan, 1 DC power plug." The work quoted emerged from research at IITM, & being commercialized by IITM startups: Intelizon, Cygni Energy & Chakra Networks



- Dec'17: IITM incubated Stellapps Technologies was adjudged at #2 in the coveted "Cloud Solutions" category of the Financial Express IT Awards that saw the likes of IBM, Infosys, TCS, L&T
  - » Deloitte top 50 fastest growing Tech companies in India in 2016: Stellapps Technologies was placed 2nd all over India, and Nadhi Technologies stood at #36
- 2016 started with launch of Startup India movement (16 Jan'16) by Hon. PM, where IITM's startup ecosystem at the Research Park was recognized as a model to be replicated across the country.
- IITM incubated company, Ather Energy raised Rs 205 crore by Hero Motor Corp (Oct'16). The deal valued the 3yr old company at Rs 680 - 790 crore
- Innonano, received \$18 million venture funding for its innovative water filter, Amrit, which provides arsenic-free drinking water at a cost of less than 5 Paise/ Litre.

#### To conclude, in the last seven years

- Faculty working with industry jumped from about 10% seven years back to about 50%
- Industry funded R&D grown from Rs.50 crore to Rs.90 crore in three years
- Students more inclined towards entrepreneurship than going abroad
- IITM faculty are now world-leaders in several areas, making a social & industrial impact
- IITM now has a thriving ecosystem for Innovation: IITM Research Park, Industry Collaborations, Startups, IITM Incubation Cell
- IITM Startups are disrupting the tech environment, providing new and exciting solutions to old problems

- Innovations in Robotics, AI, AR/VR, IOT, nano-technology and battery tech
- Impacting Transport, Energy, Water, Infra, Air Quality, Education, Manufacturing, Finance, Agri, Skill Development, Healthcare, Automation...

#### **CSIE**

The Center for Social Innovation and Entrepreneurship (CSIE) at IIT Madras was founded in August 2010 with a focus on teaching and research related to social enterprise in India. It aims to bring together the innovation and entrepreneurship aspects of IITM by promoting knowledge and understanding that will be relevant to solving the socioeconomic problems in the country.

CSIE seeks to distinguish itself through its focus:

- on delivering social enterprise knowledge primarily to engineering students, with the aim of developing their ability to develop and deliver technology solutions that create social impact
- on academic research that will seek to address problems exclusively within the Indian context

#### Mission

To build an environment that will facilitate the creation of social enterprise knowledge through research and empower students to apply their entrepreneurship abilities to develop solutions for greater social impact through academia.

## Industrial Relations

In keeping with the objectives of the Strategic Plan 2020 and with a view to strengthening relations with the Industry so as to foster applied and sponsored research projects, the Office of the Industry Relations (IRO) under Industrial Consultancy and Sponsored Research (IC&SR), was set up in 2015.

The office aims to undertake multi-disciplinary work across departments to provide solutions relevant to the industry and to create prototypes that demonstrate the application of research and provide an impetus for the industry partner to test commercialization possibilities. IRO also spearheads the "Industry Connect" programme, which reaches out to a wide range of industries. Some of the major industries are in the area of Solar energy, Automotive technology, Catalysis and Data Sciences.

IITM has been associated with over 1000+ Industries and in particular during 2017; more than 170+ new industries joined hands with IITM. Major new partners in 2017 include Indivumed GmbH, Robert Bosch Engineering & Business Solutions, Essel Green Energy Private Limited, Gas Authority



of India Limited, Bharat Heavy Electricals Limited, Amara Raja Batteries Limited, Exide Industries Limited, Polaris Consulting & Services Limited, Exicom Tele-Systems Limited and Oppo Mobiles (I) Private Limited.

Here is a snapshot of the Sponsored Research Projects and Consultancy assignments that came to IIT Madras during last five years.

Financial Year	Sponsored Research Projects value in ₹ (Crores)	Consultancy Assignments value in ₹ (Crores)
2017-2018	321.40	111.22
2016-2017	182.49	80.61
2015-2016	164.34	62.32
2014-2015	92.78	53.21
2013-2014	182.41	44.72

## Number of patents

Financial Year	No. of patents filed		No. of patents granted	
	National	International	National	International
2017-2018	102	18	9	1
2016-2017	106	20	14	8
2015-2016	94	14	1	15
2014-2015	73	53	10	7
2013-2014	117	19	5	9

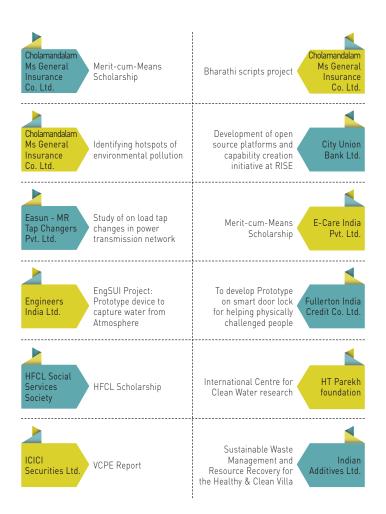
# CSR at IITM

IIT Madras has worked with Industry in four ways to help fulfill its Corporate Social Responsibility (CSR) obligations.

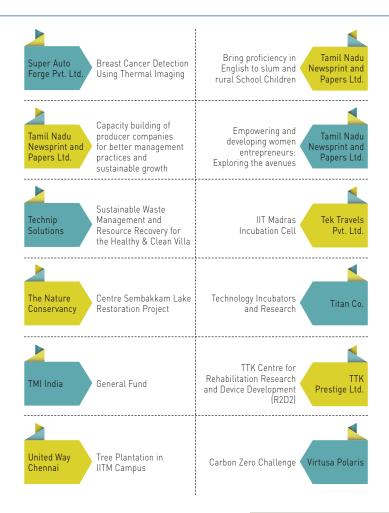
- Support for IITM incubators
- Support for socially relevant projects lead by IITM faculty
- Designing R & D programmes with Industry
- Support through scholarships for economically challenged IITM students

The following are the corporates supported IITM initiatives through CSR:







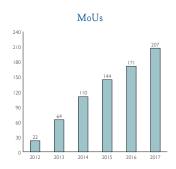


## International Relations

IITM's vision is to elevate the Institute's global engagement world-class standards. leveraging its highly-regarded alumni as "catalysts" in the process. The mission develop strong and sustainable international partnerships with research laboratories, academic industry institutions. entrepreneurs in order to meet the aspirations of IITM's faculty & student communities

# Strategic objectives

- Faculty exchanges where research interests converge
- Research scholar exchanges where faculty collaborations are active
- Joint degree programs where faculty & student collaborations are strong & sustainable
- "Study Abroad" programs
- MoUs with like-minded institutes







### Members of Board of Governors

Dr. Pawan Goenka

Chairman, BoG

Managing Director, Mahindra & Mahindra

Prof. Bhaskar Ramamurthi

Director

Indian Institute of Technology Madras

#### Council Nominees

Prof. Dipankar Banerjee

Department of Materials Engineering Indian Institute of Science, Bangalore

Mr. Kris S. Gopalakrishnan

Co-founder Infosys & Chairman, Axilor Ventures Private Limited Dr. P. Anandan

Managing Director

Microsoft Research Lab India Private Ltd.

Dr. B.N. Suresh

Vikram Sarabhai Distinguished Professor Indian Space Research Organization

#### Senate Nominees

Prof. T. Sundararajan

Department of Mechanical Engineering Indian Institute of Technology Madras

Prof. R. Sundaravadivelu

Department of Ocean Engineering Indian Institute of Technology Madras

# State Government Nominees

Dr K P Indiradevi

Director

Directorate of Technical Education

Government of Kerala

Dr. Tariq Thomas, IAS

Collector & Development Commissioner Administration of the UT of Lakshadweep

Dr. Utpal Sharma

Principal (BRAIT) Cum Special Secretary (IT) Dr. B.R. Ambedkar Inst. Technology Campus Port Blair Shri. K. Vivekanandan, I.A.S.

Director

Directorate of Technical Education

Government of Tamil Nadu

Dr. S. Sundaravadivelu.

Special Secretary to Government (DP&AR)

Chief Secretariat , Puducherry

#### Secretary

Dr. Jane Prasad, IP & TAFS

Registrar

Indian Institute of Technology Madras

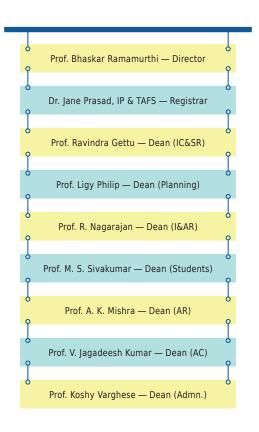
#### Invitee

Prof. Koshy Varghese

Dean (Administration)

Indian Institute of Technology Madras

# The IITM Directorate / Dean Council



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