

Monthly Coverage Dossier September 2017



IIT Madras: New eco-friendly cement being tested for use in industry

The manufacturing process of eco-friendly cement is under trial at IIT Madras.

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A low-cost Financial Analytics (FMA) suite on Open Source software platform being developed at IIT Madras will be a cost-effective alternative to proprietary products for banks and insurance companies.

This project by Department of Computer Science and Engineering is being tested. It will help banks and insurance companies avoid spending on proprietary platforms. It will also benefit start-ups that can become implementation partners.

They will be available first of all to banks and financial institutions as a basic infrastructure platform on Linux and Virtualisation of the Intelligent Systems Engineering (ISE), Department of Computer Science and Engineering, IIT Madras. They may



IIT Madras working on low-cost financial platform for banks

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through their own work or through implementation partners, he said. By using open code, banks will have more control over their data, than depending on vendors he said.

IIT Madras will own the source code he said.

A multi-phase use-ITMA flow of cost, and success project for a bank or financial company. A training course on Master Data Online Course through MITM will be launched soon. This will help a bank to use as its house-developed platform. Implement the software he said.

"We will release enhanced versions on regular basis," he said.

V. Venkatesh
 how to pay) about one-tenth the cost of a proprietary product for customer using FMA, to their requirements.

Key people, including experts from the IT industry, are working on the initiative. The project is a CSR initiative from City Union Bank that will offer to cover for next five years, he mentioned.

A bank can add any of the customized module like deep learning on the type of data on top of platform either



300 homes in 4 Telangana hamlets get uninterrupted solar power

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The solar panel has been installed by Light Energy Pvt Ltd, a IIT Madras venture from which has got the technology transferred, while the bank has provided financial assistance in the form of ₹50 lakh.

Pragati Reddy
 The owners of these hamlets, located about 100 km from Hyderabad, are poor and depend on unreliable power supply for their livelihood. They have been having frequent power outage, especially during monsoon and peak demand times.

The project proved for the hamlets in 2015. Since then, solar panels have been installed in all the hamlets. The project is a CSR initiative from City Union Bank that will offer to cover for next five years, he mentioned.

A bank can add any of the customized module like deep learning on the type of data on top of platform either



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**IIT Madras is a campus of choice for
high ranking JEE students**

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Journalist: Bachan Thakur

Professor: Prof. Bhaskar Ramamurthi

Headline: Director Interview: Prof. Bhaskar Ramamurthi (IIT Madras) - “Quality & quantity of our research must go up”

URL: <https://engineering.careers360.com/articles/director-interview-prof-bhaskar-ramamurthi-iit-madras>

Director Interview: Prof. Bhaskar Ramamurthi (IIT Madras) - “Quality & quantity of our research must go up”



While reports of Engineering Institutes not producing employable engineers are doing rounds, Indian Institute of Technology Madras enjoys the status of doing a wonderful job, producing industry-ready engineers. However, the institute doesn't feel content with what it has inherited from the past, rather it strives to constantly bettering itself in all aspects. Prof. Bhaskar Ramamurthi, Director, Indian Institute of Technology Madras wears his heart on his sleeve in sharing where does the institute stand and what are the future aspirations. In a candid conversation with Careers360, the IIT Director also speaks out his mind about the state of research in our country and the way forward to take the field of research to the next level. Interestingly, the institute is on its way to become a university, offering courses like Humanities and Social Sciences. The IIT Director answers many such questions like what does it take to make IIT Madras into what it's today and what are the initiatives being taken to constantly improve the status of the institute. Let's know what is IIT Madras upto.

Excerpts from the Interview:

Careers360: Since you had taken over, what transformation have you tried to bring in IIT Madras? Were you able to see the expected outcome?

Bhaskar Ramamurthi (BR): I took over in September, 2011. We created for ourselves the Strategic Plan 2020, and have been successfully implementing it in all respects. We are on track or exceeding our objectives in all pillars articulated in the SP2020 (<https://www.iitm.ac.in/strategicplan2020>). Rather than repeat the clearly stated goals of the SP, I request you to peruse the document (from the link), in particular the specific objectives in each pillar. We have been meeting or exceeding all our annual milestones.

Careers360: Any new programmes, initiatives that IIT Madras is planning to roll out under your tutelage?

BR: IIT Madras has initiated several new programmes in teaching, research, industry collaboration, infrastructure, international relations, student extra-curricular activities, entrepreneurship, alumni relations, among others.

The UG curriculum has been completely revamped to meet the SP objectives. Students now have more than 40% electives in all disciplines. This enables those who are interested to upgrade to dual degree (B.Tech + M. Tech) programmes in emerging areas such as Data Science, Biomedical Engineering, Energy Systems and the like, from any B. Tech discipline. It also enables the rest to savour a variety of courses and focus on an area that interests them, and which might shape their career in a specific direction.

Our research output has grown manifold, with 500 Ph.D scholars enrolling each year (up from 250 in 2011) and research funding growing at more than 15% per year.

Around 20 Centres of Excellence drive research in areas of great importance to the country such as renewable energy, electric vehicles, combustion engineering, data science, water, housing, etc.

Our funded research from government and industry is growing at a rate between 15% and 20% per annum across several years now. We have by far the highest industry funded research in India.

The country's first university-based Research Park at IITM has now grown to 1.2M sq ft in size (from 4 lakh sqft) with a large number of companies co-located to collaborate with us.

Our incubation cell is amongst the most successful in the country with startups repeatedly winning the most prestigious awards and attracting substantial investments. We are incubating around 40 startups per year.

We have Joint PhD programmes with 15 top universities in Australia, Japan, Taiwan, Germany, and the US, with several scholars enrolled already.

IIT Madras is blessed with the most active and generous alumni and well-wishers among all Indian institutes. We raised a record Rs 55 crores in donations last year.

All of this led to IITM being ranked no. 1 among engineering institutes and no. 2 overall in the country two years in a row by NIRF.

Careers360: IIT Madras is on its way to become a University with offering courses like Humanities, Social Sciences, etc. What's your take on this? Would not it impact the unique identity of IIT Madras?

BR: We remain an institute whose primary focus is engineering/technology, and to an extent, the sciences. However, an institute of our size with more than 9000 students, needs a strong Humanities and Social Sciences faculty to teach these important subjects to our engineering students. We also need a strong Management faculty for the same reason. When we have these faculties, it makes sense to offer degree programmes in a few select areas such as Language Studies, Development Studies and Management, as well as do research in these areas. This gives strength to these departments, and students also benefit from the diversity on campus.

Careers360: What kind of challenges do you face as the director of IIT Madras? What are the aspirations?

BR: The main challenge can be put in a nutshell: how do we meet all our ambitious objectives with the limited resources available. Given India's economic position at this time, we cannot ask for much more, and yet there is a national imperative to excel and achieve stretch targets with these limited resources. We all know what can be done if a team decides to align itself and work cohesively. There is nothing that cannot be achieved. Our aspiration is to scale seemingly impossible heights with the limited resources at hand, produce some outstanding graduates, some great research, a few incredible startups, and solve some of India's persistent developmental problems.

Careers360: Are there any expansion plans in terms of building more infrastructure, campus, facilities like labs, innovation centres, etc?

BR: As mentioned above, we have expanded to 9000+ students, among whom more than 3000 are research scholars. There is a concomitant growth in faculty strength as well. Naturally, this calls for a lot of new infrastructure ranging from labs to classrooms to hostels to faculty housing. Our focus on entrepreneurship and impactful R&D also means we need infrastructure for innovation centres, and centres of excellence. We have built in the last 10 years a lot of what we need, and more additions are in the pipeline as well.

Careers360: How was the last placement season? What type of companies are majorly coming for campus recruitment these days/ Have you seen any shift in placements or the nature of companies which are registering for campus placements now?

BR: The last placement season was very good. Our exit data during the convocation shows that almost all those who were looking for a job were placed, and placed well with generous pay packages. The students who wished to pursue higher studies have been admitted to top universities globally. We do not see any major shift in placement from the mix of core engineering and finance/consulting/banking companies that we have seen over the years.

Careers360: The state of research in India is believed to be pitiful. How do you ensure that there is no such dearth at IIT Madras and what suggestion do you have in this regard so that we as a country improve in this area?

BR: The state of research in the IITs, including IIT Madras, is quite healthy and improving every year. Our research output is comparable in quality and quantity (particularly with the increasing PhD scholar intake) with that of similar engineering/technology institutions in the advanced countries in the top 100. There is tremendous scope for improvement, and this too is happening year after year. It does need more resources, and also a focus on quality. We have this focus and constantly strive to improve the research ambience at IIT Madras. Our international collaborations are meant for this very purpose. It is also important for a country like India with limited resources and challenging development goals, that a good part of the research in engineering/technology be geared to addressing these challenges. At IIT Madras we take pride in the huge amount of impactful research we do, whether it is in water, housing, energy, medical technology, or several other such areas.

Careers360: Facts show that around 80% of the engineering graduates in the country are not industry-ready and employable. What is your take on this and how do we address this challenge?

BR: This is a very complex subject and outside the scope of the IITs, except for our role in outreach. The IIT/IISc system is doing a wonderful job through NPTEL. We created the world's largest repository of video/online courses over the last decade. Now we are rapidly expanding our offerings of MOOCs for the benefit of engineering students as well as those who are employed.

Careers360: None of our institutes/universities figure out in the global top 100. In your understanding, where do we fail? How can we ensure that some of our universities/institute are also at par with the global best?

BR: The IISc and established IITs are ranked quite high amongst engineering/technology institutions. Their ranking drops when compared to comprehensive universities. In order to improve our ranking, we need to increase the quantity and quality of our research, find ways to increase the fraction of foreign faculty and students in our institutes and be seen as global institutions serving the entire world.

Careers360: There are reports of a common engineering entrance on the lines of NEET? What is your opinion on this and what will be its impact?

BR: The IITs use JEE (Adv) for admission, and I am not aware of the thinking with regard to entrance exams for other colleges.

Careers360: The IIT Council and MHRD are targetting 1 lakh engineering seats across IITs at UG, PG and research level. How feasible is that and what do we aim to address through this expansion?

BR: We already have nearly 80,000 students in the system, counting both UG and PG. In the established IITs, the UG-PG ratio is 50:50. This means we are talking about 55,000-60,000 UG students (allowing for a higher ratio in the newer IITs), which translates to an annual intake of 13,000-14,000. We are on course to achieving this since our intake is going up every year as the new IITs ramp up.

**IIT Madras is a multi-cultural
campus**

Date: 5th September 2017

Channel: DD Podhigai

Edition: Electronic

Journalist: Thirunavukarasu

Professor: Prof. C. Sujatha

Alumni/PhD scholar: Sneha G

Headline: Show on UDAAN Scheme to encourage female students in technical education

URL: <https://www.youtube.com/watch?v=czULrpoit3Q>



Date: 25th September 2017

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Edition: Delhi/Bangalore/Hyderabad/Chennai/Kochi

Page no. : 1

Journalist: Madhumitha Srinivasan

Professor: Prof. Nandita Das Gupta

Headline: Lessons beyond the textbook

URL: <http://www.thehindu.com/education/lessons-beyond-the-textbook/article19741279.ece>

Lessons beyond the textbook

College fests are not just fun. They are lessons in time-management, perseverance and multi-tasking

By MADHUMITHA SRINIVASAN

When Nandita Das Gupta came to Chennai to pursue her higher studies at IIT Madras, she could hardly speak two sentences in English fluently.

"Looking back, participating in Madras fest, which is now known as Madras College Fest, made me open up and had no anxiety with a lot of people like me following coordination and participations," recalls Gupta. By the end of her master's degree, she could speak English fluently, she also became a team coordinator person.

Now, as a professor at IITM, and the faculty adviser for cultural activities, Gupta witnesses similar transformations in many of her students.

College is a transitional experience for all students. The transformation is more so when students who regularly involve themselves in activities beyond the classroom, such as organising cultural or technical events that demand much from them and also reward them with skill development in return.

According to the Institute for Voluntary Action by Alexander W. Astor published in 2004, "the greater the student's involvement in college, the greater will be the extent of academic learning and personal development."

Colleges should offer a platform for such an involvement, the outcome of which are learning skills that are beyond the realm of the textbook - leadership, time management, time management, perseverance, multi-tasking, and public speaking, to name a few.

Picking up with skills

Lalita Gupta, 23, had to make a transition decision to use the English as a platform to transition for "to promote shy" self. A student of political science at St. Xavier's, Madurai, Lalita witnessed the one of the many festivals that her college hosted, the biggest and most popular being Madras. As part of the fest series of Madras, her duties included organising journal



One of the most important skills for any job interview or any kind of work is one's interpersonal communication skills.

She is and from the event, updating the social media feed and creating coverage for the event. It was not only at first, she organised, but over the three years to follow that she volunteered for the festivals, she managed to finally break out of her shell.

While these are experiences that also seem to expert while organising a festival, there are several that are unexpected, forcing either learning or realisation upon the student.

A couple of years ago, Anshu Jain was leading a team of 20 volunteers into a "live" college. At the head of external publicity for one of the college festivals at St. Xavier's, it was her responsibility to promote the festival in other colleges to ensure a good turnout. But the problem was that her college festival was scheduled for the same dates as the other college's. So, naturally, she really was popular.

In a matter of practice or training

could have prepared Anshu's

what happened during the peak

she were organised up and

supported by around 100 students

of the rival college. It was a nightmare

I was responsible for the

safety of my team, most of whom

were still learning the ropes of public

ity and promotions. But I sur-

prised myself when I managed to

and managed to get out unscathed

and peacefully without a catastrophe.

It was an exhilarating experi-

ence, but that day, I found some-

thing about myself - that I could

handle such a situation without

losing my head," says Anshu. It is a

learning that she will carry with

her well beyond her college years.

Enhancing employability

Faculty and students agree that

the experience of organising col-

lege festivals gives students expo-

sure to skills that are useful in their

courses, the project management,

coordination, time, marketing,

sales, logistics, and public rela-

tions.

Rob Dwan, Anshu, who is consid-

erably passionate pursuing a B.E. and an

M.Sc. at IITM Madras, made a resolu-

tion to make it voluntary for his

college festival's organising com-

mittee because he knew it would

be a talking point during job inter-

views. He currently holds four

workshops and marketing for college

festivals scheduled to take place from

October 26 to November 2. Each

has eight teams, and each team

has a team of about 25 people. Besides, there are approximately 25 other teams of 10 people each. That's a total of almost 800



Well-rounded growth helps students increase the classroom skills to the learning process.

people working for the festival. The massive scale of the festival - a budget of INR 5 crore, 45-50 events over 70 days, and a footfall of around 15,000 - is the perfect opportunity for students like Nandita to showcase their capabilities and skills that are in their personal resumes.

One of the most important skills for any job interview or any kind of work is one's interpersonal communication skills and that is something that this kind of work can train you for. People with such experiences have usually gained preference over others as far as placements at IITM go. At the end of the day, it's not about what you've just learned, but what you have

learned from that experience, and that is what most companies are supposed to find out at IITM," he explains.

Nandita's statement is not without foundation. Although studies, Talent Acquisition Level, Global Operations, and Global Marketing, are the primary focus of IITM's organisational structure, the most important benefits of such an introduction, perhaps, might be better exposure to the learning process book. The global

of academic, projects, course and placements, are inevitable corner of stress. Without a proper support system, a student who may not have done well in an exam may spiral into depression, leading to global or even suicidal thoughts, says Anshu. When students don't participate in such or cultural festivals, they get exposure to such support skills as a student might students in organising committees

get to work in teams, see their analytical standards to solve problems and take real time decisions," he says.

It cannot be denied that gaining technical or subject knowledge is the main objective of college education, but that knowledge may need to be packaged with the right skills to be more effective in the real world. That is why the main knowledge on this college to create opportunities for each skill should represent activities with an awareness that there do not coincide with the students' academic goals, but rather enhance them.

The always support students being involved in college festivals as we see how it benefits them. It helps them follow their own

**IIT Madras is an industry friendly
Institute**

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Journalist: NA

Headline: NIT Goa to tie up with Madras, Bombay IITs

URL: <http://www.thehindu.com/news/national/other-states/nit-go-to-tie-up-with-madras-bombay-iits/article19612567.ece>

NIT Goa to tie up with Madras, Bombay IITs

Work on new NIT campus from Nov.

SPECIAL CORRESPONDENT
PANAJI

The National Institute of Technology (NIT), Goa, is working on a proposal to sign a memorandum of understanding (MoU) with the Indian Institute of Technology, Madras (IIT-M), to transfer 10 of its students to IIT-M for orientation every year before they proceed for the PhD programme.

The institute is also working on a project to introduce virtual classrooms and blended massive open online courses through mutually interactive sessions with the participation of reputed fac-

ulties from IIT Bombay.

NIT Goa director Gopal Mugeraya told reporters on Friday that the institute will introduce mechanical and civil engineering courses from 2018-19.

Mr. Mugeraya said the construction for the new campus in Cuncolim, South Goa, being built for an estimated ₹1,200 crore, is expected to begin by November. An administrative block and three centres with multiple classrooms will be constructed during the first phase, which is expected to be ready by 2020 with an investment of ₹500 crore.

Date: 4th September 2017

Publication: The Next Silicon Valley

Edition: Online

Journalist: Nitin Dahad

Professor: Prof. Bhaskar Ramamurthi

Headline: New data science and artificial intelligence research center aims to improve AI for India context

URL: <http://www.thenextsiliconvalley.com/2017/09/03/7132-new-data-science-and-artificial-intelligence-research-center-aims-to-improve-ai-for-india-context/>

New data science and artificial intelligence research center aims to improve AI for India context

A new research center is to be established in India to undertake foundational research in many areas of data science and artificial intelligence (AI) applicable in the Indian context, and create societal impact through multidisciplinary interactions with government, academic, research and industrial collaborators.

The center, a collaboration between Robert Bosch Engineering and Business Solutions (RBEI) and the Indian Institute of Technology Madras (IIT Madras), will receive around US\$0.5m per year funding for five years to carry out research in areas like deep learning, reinforcement learning, network analytics, interpretable machine learning, and domain aware AI.

Its activity will include research projects, knowledge management and dissemination, developing prototypes, outreach projects, and setting up collaborative facilities and laboratories among others. The center's mandate requires interaction with industry and other universities, including international student and faculty exchanges. The objective is to advance scientific innovation for societal benefit.

Several technologies currently require large datasets to improve their accuracy and to adapt these technologies for the Indian context. There are basic issues in the way data is collected and shared; these need to be solved in a collective and open-sourced manner. To address this issue, the center is setting out on an ambitious task of creating a portal of curated, India specific data sets that are easy to access and interpret through a set of open tools and interfaces.

As part of Bosch's research and innovation portfolio in India, the center in IIT-M will become part of a network to support 'Digital India'. This research network also includes the Robert Bosch Centre for cyber physical systems at the Indian Institute of Science (IISc.) in Bangalore.

The two organizations say this collaboration is also significant in the global research and innovation landscape. "This partnership is to accelerate research for societal impact, taking a long-term view. It will set a precedent in the way big-data is used to improve our problem-solving capability in industry. At the same time, the collaboration will result in shared outcomes for the benefit of society," said Mr. Vijay Ratnaparkhe, managing director of Robert Bosch.

Prof. Bhaskar Ramamurthi, the director of IIT Madras, added, "IIT Madras has been nurturing its interdisciplinary data sciences and artificial intelligence research group for more than three years now.

The launch of this center in partnership with, and generous support from, RBEI is an affirmation of the rapid growth and impact of the group's research and teaching activities. I am confident it will become a globally acknowledged center working at the cutting edge of various aspects of machine learning, data science and artificial intelligence, leading to work with high social impact."

The Indian Institute of Technology Madras (IIT-M) was established in 1959 by the Government of India as an institute of national importance. The activities of the institute in various fields of technology and science are carried out in 16 academic departments and several advanced interdisciplinary research academic centers. IIT-M is recognized worldwide for its intellectual leadership and ongoing innovation across every major discipline of engineering and pure science. IIT-M has been ranked number one amongst engineering institutions in the India rankings 2016 and 2017 and number two in the category of overall institutions in the 2017 rankings, released by the National Institutional Ranking Framework, Ministry of Human Resources Development, Government of India.

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Edition: Magazine

Page no.: 7

Journalist: NA

Headline: IIT Madras launches platform for raising endowment funds



Director, IIT Madras (Right), presenting the distinguished Alumnus Award to Prof. Anand Raghunathan

IIT Madras launches platform for raising endowment funds

The Indian Institute of Technology Madras launched a platform named the 'Joy of Giving to IITM' for raising endowment funds through alumni. Launched on the occasion of 'Alumnite', the new fund raising platform is intended to aid IIT Madras journey towards global distinction in the fields of engineering education and research. It will work towards raising endowment funds for the institute through alumni and corporations globally. It aims to place IIT-Madras among the 'Top 50' education and research institutes in the world. Crowd-funding is another new initiative of IIT Madras which has brought in Rs. 1 crore in retail funds. Around 250 new donors have joined the initiative with the average donation size being Rs. 35,000. Alumni and funding under Corporate Social Responsibility (CSR) initiatives have cumulatively helped raise Rs. 177 crore in the last eight years from 5,000 donors.

Date: 9th September 2017

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Edition: Magazine

Page no.: 3

Journalist: NA

Professor: Prof. Bhaskar Ramamurthi

Headline: Ashok Leyland and IIT Madras plan battery engineering unit

Ashok Leyland and IIT Madras plan battery engineering unit

IN WHAT IS another triumph for industry-academia connect, commercial vehicle manufacturer Ashok Leyland and the Indian Institute of Technology Madras (IIT Madras) have signed a memorandum of understanding (MoU). Under the MoU, Ashok Leyland will sponsor the Centre of Battery Engineering (CoBE) at IIT Madras.

The CoBE will aim to supplement ongoing research by facilitating collaboration between industry and researchers, that is currently lacking, and to study various battery characteristics not completely understood even among global players.

The Centre will work towards understanding various battery issues and challenges across various applications. It will also undertake high-quality research projects to overcome these challenges. This will involve focusing on the physics part of battery technology as against other research units working on newer chemistries of the batteries.

The Centre will target work in battery engineering and thorough characterisation of batteries through detailed testing, optimising battery performance for different applications and work towards better economics.

CoBE will collaborate with cell manufacturers globally, procure cells and characterise them to create a knowledge centre on



The Centre of Battery Engineering at IIT Madras will engage in thorough characterisation of batteries through detailed testing and optimising battery performance for different applications.

available cells, providing the industry with valuable data to select appropriate solutions. It will also study the impact of partial charge-discharge cycles with varying depths of discharge and operating temperatures on battery life.

The facility will also work on developing the next generation of smart battery chargers and battery management protocols. By working on the design configurations and packaging cells into modules differently, optimisation studies on batteries for different lifetime for different applications will be undertaken.

DRIVING SYNERGIES ACROSS EV BATTERY VALUE CHAIN

Additionally, CoBE will play a larger role of

coordinating synergy with various industry partners to develop a holistic cooperation model across the entire value chain of EV batteries. It will also do consulting work for Ashok Leyland as well as others in niche and IP-intensive areas where there is a need for in-depth testing and development, including simulations.

Through this partnership, Ashok Leyland aims to support the EV ecosystem at a national level.

Commenting on the initiative, Kartick Athanathan, head, Electric Vehicles and E-Mobility Solutions at Ashok Leyland, said, "Ashok Leyland has been lending in pioneering technologies and disruptions in the commercial vehicle space. We are confident CoBE at IITM will be a key partner

in the country's electric mobility vision and will help us understand this technology better and stay ahead of global players. We are committed to the government's vision for e-mobility and want to develop the ecosystem which will help us come up with customised EV solutions for our country."

Sharing his views about the MoU, Prof. Bhaskar Ramamurthi, director, IIT Madras, said, "Battery engineering, specifically for electric vehicles, is a very important emerging area of research and innovation. By pledging long-term support and collaborating with the CoBE at IIT Madras, Ashok Leyland is making a significant contribution to this critical technology for India's future energy and transportation needs."

Date: 13th September 2017
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Edition: Hyderabad
Page no.: 5

Journalist: NA

Professor: Prof. Ashok Jhunjhunwala

Headline: New inverter-less solar tech lights up villages

URL: <https://telanganatoday.com/inverterless-solar-power-tech-lights-nalgonda-hamlets>

New inverter-less solar tech lights up villages

STATE BUREAU
Hyderabad

A solar technology developed by IIT-Madras, which works on an inverter-less system, installed in 300 houses in four hamlets of Nalgonda district, has been working flawlessly and providing 24x7 power supply.

The new system was installed in Ramunigandla thanda, Kesya thanda, Jogi thanda and Mantriya thanda of Deverakonda mandal in Nalgonda, according to a press release issued by the IIT on Tuesday.

The inverterless system, comprising a 125W solar panel, a 1kWh battery, an inverter-less controller unit and DC loads operating on a 48V DC internal distribution line, were installed in all houses.

It powers a fan, a tubelight, two bulbs, a mobile charger, a power socket and a remote controller to operate the fan and tube light.



GOING HITECH: A man operates a solar-powered tubelight by remote in his residence in Devarakonda mandal.

The performance of all the installed systems is being monitored remotely, with data being collected via mobile phones and synchronised to a central server. The project was implemented under the aegis of Prof Ashok Jhunjhunwala, Principal Advisor, Ministries of Power and New and Renewable Energy,

Government of India, and Professor (On Sabbatical), IIT Madras.

The technology was commercialised by Cygni Energy Private limited, an IIT Madras-incubated firm, which also carried out the installations. Verizon Data Services India provided financial assistance of Rs 75 lakh under Corporate Social

Responsibility (CSR) for this project. Prof Jhunjhunwala said the Solar DC Inverterless technology with a small 125W solar panel on the home rooftops could change the dynamics of electricity in India as it heralds India's move towards a solar-powered future, without compromising on efficiency or affordability.

Indiravath Pandu, a resident of Kesya thanda, said, "Because of this solar power system, we do not have to worry about power cuts due to weather conditions. Now, we just have to worry about using the solar power wisely," Dasru Nayak, Gram Sarpanch of Kesya thanda, added,

"Most of the people living in these hamlets come from tribal communities and are very poor. All that any of these people wanted a fan, a tubelight and charge mobile phones. This solar system gave us exactly that." For technology related queries,

please write to Aditya Lolla (aditya@tenet.res.in)

Commenting on the project, Kalyani Sekar, Vice-President and Managing Director, Verizon Data Services India, said, "At Verizon, our commitment to empowering communities around us is rooted in the firm belief that technology has the power to make lives better. Verizon India's collaboration with IIT Madras to implement the Inverterless Solar System for 'near off-grid' areas in Telangana is a reaffirmation that we share our success with the community to make the world in which we work better than it was yesterday."

"With payback period being less than 3 years, financial institutions are willing to fund such projects," said Venkat Rajaraman, CEO, Cygni. To know more about the new solar technology, write to Aditya Lolla (aditya@tenet.res.in)

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Professor: Prof. Ashok Jhunjhunwala

Headline: Know how Tamil Nadu is powering up households in Telangana

URL: <http://economictimes.indiatimes.com/industry/energy/power/know-how-tamil-nadu-is-powering-up-households-in-telangana/articleshow/60482276.cms>

Know how Tamil Nadu is powering up households in Telangana

HYDERABAD: Tamil Nadu is set to power 300 households in Telangana using solar energy developed by Indian Institute of Technology (IIT), Madras is being distributed by Southern Power Distribution Company of Telangana Limited (TSSPDCL) and Rural Electrification Corporation.

The solar powered system was transferred to and commercialized by Cygni Energy, an IIT Madras-incubated firm. It has already been installed in all the houses by June this year and the performance and health of all the installed systems are being monitored remotely, with data being collected via mobile phones and synchronized to a central server.

Prof Ashok Jhunjhunwala, principal advisor, Ministries of Power and New and Renewable Energy, Government of India, and professor (on sabbatical), IIT Madras, said, "Today, millions of homes in India either do not have grid connectivity, or suffer from power outages for large fraction of the day. Solar DC Inverterless technology deployed in the 300 homes of Devarakonda, Telangana tackles this problem and shows how, with a small 125W solar panel on the home rooftops, the dynamics of electricity in India could be transformed."

The inverterless system, comprising a 125Wp Solar Panel, a 1kWh battery, an Inverterless controller unit and DC loads operating on a 48V DC internal distribution line, were installed in all houses. It powers a DC fan, a DC tube light, two DC bulbs, a DC mobile charger, a DC power socket and a remote controller to operate the fan and tube light.

The entire project was funded by Verizon Data Services which invested Rs 75 lakh in it.

Ramunigundla Thanda, Kesya Thanda, Jogi Thanda and Mantriya Thanda are the four rural hamlets of Devarakonda Mandal in Nalgonda district of Telangana, about 100 km from Hyderabad which will be illuminated under this proposal.

These hamlets together have around 300 households, most of which fall under 'Low Income' Category. They have been suffering from frequent power outages, especially during monsoons and 'peak-demand' times.

Date: 13th September 2017

Publication: ET Tech

Edition: Online

Journalist: NA

Professor: Prof. Ashok Jhunjhunwala

Headline: IIT Madras & Verizon Data brings solar technology to rural Telangana

URL: <http://tech.economictimes.indiatimes.com/news/technology/iit-madras-verizon-data-brings-solar-technology-to-rural-telangana/60478357>

IIT Madras & Verizon Data brings solar technology to rural Telangana

Ramunigundla Thanda, Kesya Thanda, Jogi Thanda and Mantriya Thanda are four rural hamlets of Devarakonda Mandal in Nalgonda district, Telangana. The hamlets are about 100kms from Hyderabad

Indian Institute of Technology Madras (IIT Madras) and Verizon Data Services India in collaboration with Southern Power Distribution Company of Telangana Limited (TSSPDCL) and Rural Electrification Corporation will now provide power using solar technology to 300 households across four hamlets in rural Telangana.

IIT Madras developed this Solar Technology, which was technology transferred to and commercialized by Cygni Energy Private limited, an IIT Madras-incubated firm, which also carried out the installations. Verizon provided financial assistance of Rs. 75 lakh under Corporate Social Responsibility (CSR) for this project.

Ramunigundla Thanda, Kesya Thanda, Jogi Thanda and Mantriya Thanda are four rural hamlets of Devarakonda Mandal in Nalgonda district, Telangana. Predominantly dependent upon paddy and cotton farming for livelihoods, the hamlets are about 100kms from Hyderabad, located on Nagarjunsagar Road near Mallepalli.

The Inverterless System, comprising a 125Wp Solar Panel, a 1kWh battery, an Inverterless controller unit and DC loads operating on a 48V DC internal distribution line, were installed in all houses. It powers a DC fan, a DC tube light, two DC bulbs, a DC mobile charger, a DC power socket and a remote controller to operate the fan and tube light.

Installations were completed by June, 2017 and everything has been working flawlessly. The performance and health of all the installed systems are being monitored remotely, with data being collected via mobile phones and synchronized to a central server.

The project was implemented under Prof. Ashok Jhunjhunwala, Principal Advisor, Ministries of Power and New and Renewable Energy, Government of India, and Professor (On Sabbatical), IIT Madras.

He said, "Today, millions of homes in India either do not have grid connectivity, or suffer from power outages for large fraction of the day. This is a very serious challenge as majority of the se homes fall under low-income category and cannot afford power even with some subsidy. Solar DC Inverterless technology

deployed in the 300 homes of Devarakonda, Telangana tackles this problem and shows how, with a small 125W solar panel on the home rooftops, the dynamics of electricity in India could be transformed. This project heralds India's move towards a solar powered future, without compromising on efficiency or affordability."

Date: 13th September 2017
Publication: Deccan Chronicle
Edition: Hyderabad
Page no.: 2
Journalist: NA

Headline: Three thandas to get solar power

Three thandas to get solar power

Hyderabad: Keshya thanda and three other thandas have become the first solar DC (direct current) villages in TS. On Tuesday a solar project was launched in Keshya thanda, Ramunigundla thanda, Jogi thanda and Mantriya thanda of Nalgonda district which have 300 households. These thandas will get round the clock power. Under the Corporate Social Responsibility (CSR) scheme Verizon data services has taken up this project at a cost of ₹75 lakh.

Date: 13th September 2017

Publication: The Times of India

Edition: Chennai

Page no.: 14

Journalist: Manash Pratim Gohain

Headline: 3 IITs tie up with 12 Portuguese institutes for joint research

URL: <http://timesofindia.indiatimes.com/home/education/3-iits-join-hands-with-portuguese-institutions-for-joint-research-collaboration/articleshow/60484937.cms>

3 IITs tie up with 12 Portuguese institutes for joint research

Manash.Gohain

@timesgroup.com

New Delhi: Three Indian Institutes of technology (Madras, Roorkee and Gandhinagar) have tied up with 12 leading universities, institutes and research centres of excellence of Portugal for joint research. Under the agreement, a joint fund of £4 million has been established by both the governments on equal contribution basis.

On the invitation from the ministry of science, technology and higher education of the government of Portugal, representatives of the three IITs visited Portugal to explore opportunities for academic and research collaborations ahead of signing the MOU. The delegation visited some of the leading universities, institutes and research centers of excellence in Portugal, including the faculty of sciences and technology in Coimbra University, science and technology park from Porto University, Aveiro University and the engineering school of Minho University. The MOU was signed during a ceremony in the presence of PM Modi and his Portuguese counterpart António Costa.

Date: 13th September 2017

Publication: Data Quest

Edition: Online

Journalist: NA

Professor: Prof. Ashok Jhunjhunwala

Headline: IIT Madras, Verizon Take Solar Technology to Rural Telangana

URL: <http://www.dqindia.com/iit-madras-verizon-take-solar-technology-to-rural-telangana/>

IIT Madras, Verizon Take Solar Technology to Rural Telangana

Indian Institute of Technology Madras (IIT Madras) and Verizon Data Services India have come together to take solar technology to rural Telangana. IIT Madras, in collaboration with Southern Power Distribution Company of Telangana Limited (TSSPDCL) and Rural Electrification Corporation took up this project to provide uninterrupted power using solar technology to 300 households spread across four hamlets in rural Telangana.

IIT Madras developed this Solar Technology, which was technology transferred to and commercialized by Cygni Energy Private limited, an IIT Madras-incubated firm, which also carried out the installations. Verizon provided financial assistance of Rs. 75 lakh under Corporate Social Responsibility (CSR) for this project.

Ramunigundla Thanda, Kesya Thanda, Jogi Thanda and Mantriya Thanda are four rural hamlets of Devarakonda Mandal in Nalgonda district, Telangana. Predominantly dependent upon paddy and cotton farming for livelihoods, the hamlets are about 100kms from Hyderabad, located on Nagarjunsagar Road near Mallepalli.

These hamlets together have around 300 households, most of which fall under 'Low Income' Category. They have been suffering from frequent power outages, especially during monsoons and 'peak-demand' times.

The Inverterless System, comprising a 125Wp Solar Panel, a 1kWh battery, an Inverterless controller unit and DC loads operating on a 48V DC internal distribution line, were installed in all houses. It powers a DC fan, a DC tube light, two DC bulbs, a DC mobile charger, a DC power socket and a remote controller to operate the fan and tube light.

Installations were completed by June, 2017 and everything has been working flawlessly. The performance and health of all the installed systems are being monitored remotely, with data being collected via mobile phones and synchronized to a central server.

The project was implemented under the aegis of Prof. Ashok Jhunjhunwala, Principal Advisor, Ministries of Power and New and Renewable Energy, Government of India, and Professor (On Sabbatical), IIT Madras.

He said, "Today, millions of homes in India either do not have grid connectivity, or suffer from power outages for large fraction of the day. This is a very serious challenge as majority of these homes fall under low-income category and cannot afford power even with some subsidy. Solar DC Inverterless technology

deployed in the 300 homes of Devarakonda, Telangana tackles this problem and shows how, with a small 125W solar panel on the home rooftops, the dynamics of electricity in India could be transformed. This project heralds India's move towards a solar powered future, without compromising on efficiency or affordability."

Commenting on the project, Kalyani Sekar, Vice President and Managing Director, Verizon Data Services India, said, "At Verizon, our commitment to empower communities around us is rooted in the firm belief that technology has the power to make lives better. Verizon India's collaboration with IIT Madras to implement the Inverterless Solar System for 'near off-grid' areas in Telangana is a reaffirmation that we share our success with the community to make the world in which we work better than it was yesterday."

"With payback period being less than 3 years, financial institutions are willing to fund such projects," said Mr. Venkat Rajaraman, CEO, Cygni.

Today, the Inverterless technology has multiple benefits to these hamlets

- Acting as an efficient power back up solution providing quality power
- Supplementing intermittent grid supply during peak summer and rainy seasons
- Reducing the burden on TSSPDCL while supplying power round-the-clock

Indiravath Pandu, a Resident of Kesya Thanda, said, "Because of this solar power system, we do not have to worry about power cuts due to weather conditions. Now, we just have to worry about using the solar power wisely"

Dasru Nayak, Gram Sarpanch of Kesya Thanda, added, "Most of the people living in these hamlets come from tribal communities and are very poor. All that any of these household wanted was just to be able to run a fan, a tube light and charge mobile phones. This solar system gave us exactly that."

Date: 13th September 2017

Publication: Dinamani

Edition: Chennai

Page no.: 2

Journalist: NA

Headline: IIT Madras & Verizon Data brings solar technology to rural Telangana

தெலங்கானா கிராமத்துக்கு தடையில்லா சூரியசக்தி மின்சாரம் சென்னை ஐஐடி ஏற்பாடு

சென்னை, செப்.12: தெலங்கானா மாநிலத்தில் கிராமம் ஒன்றுக்கு சூரிய சக்தி தொழில்நுட்பம் மூலம் நான் முழுவதும் தடையில்லா மின்சாரம் வழங்கும் வசைரிலான திட்டத்தை சென்னை ஐஐடி உருவாக்கி நடைமுறைப்படுத்தியுள்ளது.

தெலங்கானா தென்விந்திய எரிசக்தி விநியோக நிறுவனம் (டிஎஸ்எஸ் பிடிசிஎல்), கிராமப்புற மின்திட்ட கழகம் ஆகியவற்றுடன் இணைந்து ரூ. 75 லட்சம் மதிப்பிலான நிறுவனங்களின் சமூகப் பொறுப்பு (சிஎஸ் ஆர்) அடிப்படையிலான திட்டத்தை சென்னை ஐஐடி நடைமுறைக்குக் கொண்டுவந்துள்ளது.

இதுகுறித்து சென்னை ஐஐடி வெளியிட்ட செய்தி: தொழில் நிறுவனங்களின் சமூகப் பொறுப்பு அடிப்படையில் இந்தத் திட்டத்துக்கான செலவை வெரிஸோன் டேடா சர்வீசஸ் தனியார் நிறுவனம் ஏற்றுக் கொண்டுள்ளது. இத்திட்டத்தின் மூலம் நல்கொண்டாமாவட்டத்தில் ராமுனிகுண்டலா தண்டா, கெஸ்யா தண்டா, ஜோகி தண்டா, மந்த்ரிய தண்டா ஆகிய கிராமங்களில் உள்ள 300 வீடுகள் தடையில்லா மின்சாரம் பெறுகின்றன.

ஒருங்கிணைக்கப்பட்ட சர்வர் மையம் மூலம், செல்லிடப்பேசி மூலம் தகவல்கள் பெறப்பட்டு, இந்தத் திட்டம் முறையாகச் செயல்படுவது தொடர்ச்சியாக கண்காணிக்கப்பட்டு வருகிறது.

Date: 13th September 2017
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Edition: Hyderabad
Page no.: 10
Journalist: NA

Headline: IIT Madras & Verizon Data brings solar technology to rural Telangana

ఐఐఐటిలో విద్యుత్ పునరుత్పాదకత

న్యూఢిల్లీ: పునరుత్పాదక విద్యుత్తు పరిశోధన కేంద్రాన్ని ప్రతిష్ఠాత్మక భారత సాంకేతిక సంస్థ(ఐఐఐటి) ఏర్పాటు చేసింది. 'సెంటర్ ఆఫ్ ఎక్స్‌లెన్స్(సిఐఇ)' అనే ఈ కేంద్రాన్ని ఐఐఐటి, రిస్కా పవర్ వెంచర్స్ ప్రైవేట్ లిమిటెడ్తో కలసి ఏర్పాటు చేసింది. ఈ కేంద్రాన్ని కేంద్ర మానవ వనరుల అభివృద్ధి మంత్రి ప్రకాశ్ జవదేకర్ మంగళవారం ఆరంభించారు. పునరుత్పాదక విద్యుత్తు పరిష్కారానికి ఈ ప్రపంచ స్థాయి పరిశోధన, అభివృద్ధి కేంద్రాన్ని ఏర్పాటు చేశారు. 'స్వచ్ఛమైన విద్యుత్(గ్రీన్ ఎనెర్జీ) పరిశోధనకుగాను ఢిల్లీ ఐఐఐటిలో ఏర్పాటు చేసిన ఈ కేంద్రం ఓ హబ్‌లా పనిచేయనున్నది. ప్రస్తుతం ఈ కేంద్రం ఇంటి కప్పులపైన పెద్ద ఎత్తున సౌర విద్యుత్తును తయారు చేసే పరిశోధన చేస్తోంది' అని ఐఐఐటి డైరెక్టర్ వి.రామగోపాల్ రావు అన్నారు.

Date: 13th September 2017

Publication: The Times of India

Edition: Online

Journalist: Manash Pratim Gohain

Professor: Prof. Ashok Jhunjhunwala

Headline: IIT-M takes solar technology to rural Telangana to ensure round the clock power supply to 300 households

URL: <http://timesofindia.indiatimes.com/home/education/news/iit-m-takes-solar-technology-to-rural-telangana-to-ensure-round-the-clock-power-supply-to-300-households/articleshow/60482794.cms>

IIT-M takes solar technology to rural Telangana to ensure round the clock power supply to 300 households

NEW DELHI: A Rs 75 lakh CSR project is now providing assured power supply round-the-clock to 300 households in four hamlets of Devarakonda Mandal. The Indian Institute of Technology, Madras (IIT-M) has developed this solar technology, which was transferred to and commercialized by Cygni Energy Private limited, an IIT-M incubated firm, which also carried out the installations.

Verizon Data Services India provided financial assistance under Corporate Social Responsibility (CSR) for this project.

Ramunigundla Thanda, Kesya Thanda, Jogi Thanda and Mantriya Thanda are four rural hamlets of Devarakonda Mandal predominantly dependent upon paddy and cotton farming for livelihoods, are about 100kms from Hyderabad. These hamlets together have around 300 households, most of which fall under 'low income' category. They have been suffering from frequent power outages, especially during monsoons and 'peak-demand' times.

The inverterless system, comprising a 125Wp Solar Panel, a 1kWh battery, an inverterless controller unit and DC loads operating on a 48V DC internal distribution line, were installed in all houses. It powers a DC fan, a DC tube light, two DC bulbs, a DC mobile charger, a DC power socket and a remote controller to operate the fan and tube light.

The project was implemented under the aegis of professor Ashok Jhunjhunwala, principal advisor, Ministries of Power and New and Renewable Energy, Government of India, and Professor (On Sabbatical), IIT-M.

"Today, millions of homes in India either do not have grid connectivity, or suffer from power outages for large fraction of the day. This is a very serious challenge as majority of these homes fall under low-income category and cannot afford power even with some subsidy. Solar DC Inverterless technology deployed in the 300 homes of Devarakonda, Telangana tackles this problem and shows how, with a small 125W solar panel on the home rooftops, the dynamics of electricity in India could be transformed. This project heralds India's move towards a solar powered future, without compromising on efficiency or affordability," said Jhunjhunwala.

Date: 14th September 2017

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Page no: 19

Journalist: NA

Headline: 300 homes in 4 Telangana hamlets get uninterrupted solar power

URL: <http://www.thehindubusinessline.com/news/national/solar-power-lights-up-300-homes-in-telangana/article9857582.ece>

300 homes in 4 Telangana hamlets get uninterrupted solar power

OUR BUREAU

Hyderabad, September 13

About 300 homes in four hamlets of Nalgonda district in Telangana are getting 24-hour power supply to meet their domestic needs, thanks to solar power.

The Indian Institute of Technology (IIT) Madras, Verizon Data Services India, Southern Power Distribution Company of Telangana Ltd and Rural Electrification Corporation have joined hands to install a 125 watt solar panel in the hamlets of Ramunigandla, Kesya, Jogi and Mantriya Thanda of Devarakonda mandal in the backward Nalgonda district.

Inverter not needed

The IIT has developed the technology which does not require an inverter and can power a fan, a tubelight, two bulbs, a mobile charger, a



A file photo of the solar LED street lights in Chigurumamidi mandal in Karimnagar. **RM DAYASHANKAR**

power socket and a remote controller to operate the fan and tubelight.

The performance of the installed systems are being monitored remotely, with data being collected via mobile phones and synchron-

ised to a central server. The project was implemented under the aegis of Ashok Jhunjhunwala, Principal Advisor, Union Ministries of Power and New and Renewable Energy, and professor (on sabbatical), IIT Madras.

The solar panel has been installed by Cygni Energy Pvt Ltd, a IIT Madras incubated firm which has got the technology transferred, while Verizon has provided financial assistance to the tune of ₹75 lakh.

Frugal existence

The residents of these hamlets, located about 100 km from Hyderabad, are poor and dependant on paddy and cotton farming for livelihood. They have been facing frequent power outages, especially during monsoons and peak demand times.

The payback period for the project is less than three years, said Venkat Rajaraman, CEO of Cygni.

Kalyani Sekhar, MD of Verizon, said the company is committed to provide inverterless solar system for off-grid areas.

Date: 14th September 2017

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Edition: Chennai

Page no: 2

Journalist: NA

Headline: IIT-M takes solar tech to rural Telangana

IIT-M takes solar tech to rural Telangana: IIT Madras and Verizon Data Services India have come together to provide uninterrupted solar power to 300 households in four hamlets in Telangana. Installations were completed by June, an IIT-M statement on Wednesday said.

Date: 14th September 2017

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Edition: Hyderabad

Page no: 7

Journalist: NA

Headline: Solar energy leaves four TS hamlets shining

URL: <http://www.thehansindia.com/posts/index/Commoner/2017-09-14/Solar-energy-leaves-four-TS-hamlets-shining-/326442>

IIT-M AND VERIZON PARTNERSHIP

SOLAR ENERGY LIGHTS UP FOUR TS HAMLETS

Hyderabad, The Indian Institute of Technology-Madras (IIT-Madras) and Verizon Data Services India have together brought solar power technology to hamlets in Telangana, bringing joy to 300 households virtually strangled in darkness until recently.

Acting in tandem with the Southern Power Distribution Company of Telangana Limited (SSPDCL) and the Rural Electrification Corporation, IIT-Madras took the project to provide uninterrupted power to 300 homes in four hamlets.

The IIT developed solar technology, which was then transferred to and commercialised by Cygn Energy Private Limited (an IIT-Madras incubated firm), which also carried out the installation.

Verizon provided financial assistance towards the 16 lakh towards the project, as part of its



Kishan Sekar, Vice President at IIT, Verizon Data Services India, oversees a phase of Koyya Thanda village, Telangana, marking the launch of Solar DC project.

Corporate Social Responsibility initiative. Ramasujana Thanda, Koyya

Thanda, Jugi Thanda and Marriya Thanda are the four rural hamlets of Devarakonda Man-

The hamlets together have around 300 houses. All these years, they were experiencing frequent power outages, especially during monsoons and at 'peak-demand' times

dal in Nalgonda district, all situated about 100 km from here, which have been the intensely under the project.

The hamlets together have around 300 houses. All these years, they were experiencing frequent power outages, especially during monsoons and at 'peak-demand' times. The specialised systems, comprising 32 MW Solar Panel, a 1 MW battery, an inverter-less controller and DC loads operating on a 48V DC central distribution bus, were installed in all houses.

It powers a DC fan, a DC tubelight, two DC TVs, a DC mobile



Solar panels on rooftops of rural hamlets of Devarakonda Hamlet in Nalgonda district, Telangana, as part of the IIT-Madras and Verizon Data Services India CSR initiative.

charger, a DC power socket and remote controller to operate fan and tubelight.

Everything has been working flawlessly since the installation of equipment in June this year.

The project was implemented under the aegis of Prof. Ashok Jhaajjarama, principal advisor,

ministries of power and coal and renewable energy. Mr. Jhaajjarama, a resident of Koyya Thanda, said, "Because of the solar power system, we do not have to worry about power cuts due to weather conditions. Now, we just have to worry about using the solar power wisely." Damsi Sagar,

manager of Koyya Thanda, observed, "Most of the people living in these hamlets come from tribal communities and are very poor. All that people in these hamlets wanted was to be able to run a fan, switch on a tubelight and charge mobile phones. This solar system gave us exactly that."

Date: 14th September 2017

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Edition: Delhi/Chennai/Kolkata/Kochi/Ahmedabad

Page no: 19

Journalist: TE Raja Simhan

Headline: IIT Madras working on low-cost financial platform for banks

URL: <http://www.thehindubusinessline.com/money-and-banking/iit-madras-working-on-low-cost-financial-platform-for-banks/article9857943.ece>

IIT Madras working on low-cost financial platform for banks

TE RAJA SIMHAN

Chennai, September 13

A low-cost Financial Analytics (FINAL) stack on Open Source Software platform being developed at IIT Madras will be a cost-effective alternative to proprietary products for banks and insurance companies.

This project by Department of Computer Science and Engineering is being tested. It will help banks and insurance companies avoid spending on proprietary platforms. It will also benefit start-ups that can become implementation partners.

FINAL will be available free of cost to banks and financial institutions as a basic infrastructure platform on Linux, said V Kamakoti of Reconfigurable Intelligent Systems Engineering Lab, Department of Computer Science and Engineering, IIT Madras. They may



V Kamakoti

have to spend about one-tenth the cost of a proprietary product for customising FINAL to their requirement.

Ten people, including experts from the IT industry, are working on the initiative. The project is a CSR initiative from City Union Bank that will offer ₹5 crore for next five years, Kamakoti told *BusinessLine*.

A bank can add any of the customised module like deep learning on the type of asset on top of platform either

through their own team or through implementation partners, he said. By having the code, banks will have more control over their data than depending on vendors he said.

IIT Madras will own the source code, he said.

A start-up can use FINAL free of cost, and execute projects for a bank or financial company. A training course on Massive Open Online Course through NPTEL will be launched soon. This will help a bank to use its in house employees implement the software, he said.

"We will release enhanced versions on regular basis," he said.

Date: 15th September 2017

Publication: The Hindu

Edition: Telangana

Page no.: 3

Journalist: B. Pradeep

Headline: A Nalgonda village switches on solar direct current

URL: <http://www.thehindu.com/news/cities/Hyderabad/a-nalgonda-village-switches-on-solar-direct-current/article19686615.ece>

A Nalgonda village switches on solar direct current

An IIT Madras-developed technology improves power efficiency

B. PRADEEP
HYDERABAD (MCGUIDE DT)

"Eyes, Nose, Lips, Ears..." The choral reading activity to learn human body parts was in progress at the Government Primary School in Keshya Thanda village, about 50 km from here.

Sitting under the ceiling fan with bright lights in their classroom, was the first experience for the six students, all studying in classes from 1 to 5. All this was possible thanks to the Solar Direct Current project implemented by a company.

"You should see their faces when I regulate the fan speed or adjust the brightness with the remote," says their teacher Sunitha.

With a project cost of ₹75 lakh, Verizon Data Services India (VDSI), a technology and communication group has brought in solar technology to 300 rural homes in the district, as part of its CSR initiative. "It's our commitment to empower communities," says VDSI Managing Director Kalyani Shekar.

A first-of-its-kind initiative in Telangana, Solar-DC 'Inverterless' increases energy efficiency as there are no conversions and reaches the consumer directly, according to Aditya Lolla from the Centre for Decentralised Power Systems, IITM.

"For example, in a 100w Alternating Current solar panel, only 55w, or say 55% can be used. But in a Direct Current (DC) panel the efficiency goes up to 90%," he explains.

Costing about ₹25,000 per set, the 'Inverterless', an innovation by the Indian Institute of Technology Madras, includes a solar panel, battery, control unit and an internal line. The system comes with a DC fan, tube light, two bulbs, USB

charger port and power socket.

According to Cygni Energy Private Limited, a Hyderabad-based company which is commercialising the innovation, the appliances can be used with a battery backup power of 4 hours to 12 hours. "We have been monitoring all the installations at our Chennai server through an android-based application run by a local person here. Its flawless, 'Inverterless' will revolutionise rural electrification, particularly those off-grid," believes its CEO Venkat Rajaraman.

For villagers of Keshya Thanda, Ramani, Jogy and Mantriya Thandas, Verizon, Cygni and IITM are all one and the same - 'Solar company', who brought in the change. "We will see you (the solar company) every day," say the villagers.

"Our villages generally record hotter temperatures. During the summers, it goes beyond 40 degrees Celsius and up to 45 degrees. Now, we will use that," says the village headman Ramavath Dasu Nak.

ADITYA LOLLA
IIT Madras



Modern technology: A classroom at the Government Primary School that now has 'Inverterless' Solar-DC power supply at Keshya Thanda in Nalgonda district. • KUNJAM VENKATARAMAN

In a 100w AC solar panel, only 55% can be used. But in a DC panel the efficiency goes up to 90%.

Date: 15th September 2017

Publication: The Banking and Finance Post

Edition: Online

Journalist: NA

Professor: Prof. V Kamakoti

Headline: IIT Madras to design low-cost Financial Analytics for banks

URL: <http://bfsi.eletsonline.com/iit-madras-to-design-low-cost-financial-analytics-for-banks/>

IIT Madras to design low-cost Financial Analytics for banks

In a bid to offer a cost effective alternative to the BFSI segment, the Indian Institute of Technology, Madras is soon going to develop a low-cost Financial Analytics (FINAL) stack on Open Source Software platform.

The project is developed under the supervision of Department of Computer Science and Engineering of the institution and is in the testing phase.

Reportedly, the platform will assist the banks and insurance companies to do away with overspending on proprietary platforms. It also ensures to help the start-ups, if they choose to become implementation partners.

“FINAL will be available free of cost to banks and financial institutions as a basic infrastructure platform on Linux,” said V Kamakoti of Reconfigurable Intelligent Systems Engineering Lab, Department of Computer Science and Engineering, IIT Madras.

The BFSI institutions may have to invest about one-tenth the expense of a proprietary product for customising FINAL to their requirement.

The banks are free to customise the module either through with its own team or with the assistance of implementation partners, he said. By having the code, banks will have more control over their data than depending on vendors he said.

The code generated will enable the banks to sustain more control over their data than depending on vendors he said.

The owner of the source code will be IIT Madras, he said.

“A start-up can use FINAL free of cost, and execute projects for a bank or financial company. A training course on Massive Open Online Course through NPTEL will be launched soon. This will help a bank to use its in house employees implement the software,” he said.

“We will release enhanced versions on regular basis,” he said.

Date: 16th September 2017

Publication: India Education Diary

Edition: Online

Journalist: NA

Professor: Prof. Ashok Jhunjhunwala

Headline: IIT Madras, Verizon take solar technology to rural Telangana

URL: <http://indiaeducationdiary.in/iit-madras-verizon-take-solar-technology-rural-telangana/>

IIT Madras, Verizon take solar technology to rural Telangana



Hyderabad: Indian Institute of Technology Madras (IIT Madras) and Verizon Data Services India have come together to take solar technology to rural Telangana.

IIT Madras, in collaboration with Southern Power Distribution Company of Telangana Limited (TSSPDCL) and Rural Electrification Corporation took up this project to provide uninterrupted power using solar technology to 300 households spread across four hamlets in rural Telangana.

IIT Madras developed this Solar Technology, which was technology transferred to and commercialized by Cygni Energy Private limited, an IIT Madras-incubated firm, which also carried out the installations. Verizon provided financial assistance of Rs. 75 lakh under Corporate Social Responsibility (CSR) for this project.

Ramunigundla Thanda, Kesya Thanda, Jogi Thanda and Mantriya Thanda are four rural hamlets of Devarakonda Mandal in Nalgonda district, Telangana. Predominantly dependent upon paddy and cotton farming for livelihoods, the hamlets are about 100kms from Hyderabad, located on Nagarjunsagar Road near Mallepalli.

These hamlets together have around 300 households, most of which fall under 'Low Income' Category. They have been suffering from frequent power outages, especially during monsoons and 'peak-demand' times.

The Inverterless System, comprising a 125Wp Solar Panel, a 1kWh battery, an Inverterless controller unit and DC loads operating on a 48V DC internal distribution line, were installed in all houses. It powers a DC fan, a DC tube light, two DC bulbs, a DC mobile charger, a DC power socket and a remote controller to operate the fan and tube light.

Installations were completed by June, 2017 and everything has been working flawlessly. The performance and health of all the installed systems are being monitored remotely, with data being collected via mobile phones and synchronized to a central server.

The project was implemented under the aegis of Prof. Ashok Jhunjhunwala, Principal Advisor, Ministries of Power and New and Renewable Energy, Government of India, and Professor (On Sabbatical), IIT Madras.

He said, "Today, millions of homes in India either do not have grid connectivity, or suffer from power outages for large fraction of the day. This is a very serious challenge as majority of these homes fall under low-income category and cannot afford power even with some subsidy. Solar DC Inverterless technology deployed in the 300 homes of Devarakonda, Telangana tackles this problem and shows how, with a small 125W solar panel on the home rooftops, the dynamics of electricity in India could be transformed. This project heralds India's move towards a solar powered future, without compromising on efficiency or affordability."

Commenting on the project, Ms. Kalyani Sekar, Vice President and Managing Director, Verizon Data Services India, said, "At Verizon, our commitment to empower communities around us is rooted in the firm belief that technology has the power to make lives better. Verizon India's collaboration with IIT Madras to implement the Inverterless Solar System for 'near off-grid' areas in Telangana is a reaffirmation that we share our success with the community to make the world in which we work better than it was yesterday."

"With payback period being less than 3 years, financial institutions are willing to fund such projects," said Mr. Venkat Rajaraman, CEO, Cygni.

Today, the Inverterless technology has multiple benefits to these hamlets

- Acting as an efficient power back up solution providing quality power
- Supplementing intermittent grid supply during peak summer and rainy seasons
- Reducing the burden on TSSPDCL while supplying power round-the-clock

Mr. Indiravath Pandu, a Resident of Kesya Thanda, said, "Because of this solar power system, we do not have to worry about power cuts due to weather conditions. Now, we just have to worry about using the solar power wisely"

Mr Dasru Nayak, Gram Sarpanch of Kesya Thanda, added, "Most of the people living in these hamlets come from tribal communities and are very poor. All that any of these household wanted was just to be able to run a fan, a tube light and charge mobile phones. This solar system gave us exactly that."

Date: 19th September 2017

Publication: Edex

Edition: Online

Journalist: Blessy Mathew Prasad

Professor: Prof. Ashok Jhunjunwala

Headline: IIT Madras's latest initiative to bring solar technology to rural Telangana is indeed a bright one

URL: <http://www.edexlive.com/live-story/2017/sep/18/iit-madrass-latest-initiatives-to-bring-solar-technology-to-rural-telangana-is-indeed-a-bright-one-1150.html>

IIT Madras's latest initiative to bring solar technology to rural Telangana is indeed a bright one



IIT-M, in collaboration with Telangana State Southern Power Distribution Company Limited (TSSPDCL) and Rural Electrification Corporation, took up this project to provide electricity

For about six to eight hours every day, the people of Devarakonda, a small village in Telangana live without electricity. However, their age-old problem has now been solved as IIT Madras took their solar-powered technology to these households. The reputable institute, in collaboration with Telangana State Southern Power Distribution Company Limited (TSSPDCL) and Rural Electrification Corporation, took up this project to provide uninterrupted power through solar technology to these households spread across four hamlets in rural Telangana.

The project is implemented under the aegis of AshokJhunjunwala, Principal Advisor, Ministries of Power and New and Renewable Energy, Government of India, and Professor (on sabbatical), IIT Madras. The technology called Inverterless System, comprises a 125 Wp solar panel, a 1 kWh battery, an inverterless controller unit and DC loads operating on a 48V DC internal distribution line. It powers a DC fan, a DC tube light, two DC bulbs, a DC mobile charger, a DC power socket and a remote controller to operate the fan and tube light.



Bright day: The technology called Inverterless System powers a DC fan, a DC tube light, two DC bulbs, a DC mobile charger, a DC power socket and a remote controller to operate the fan and tube light

Date: 20th September 2017

Publication: The Better India

Edition: Online

Journalist: Lekshmi Priya S

Professor: Prof. Ashok Jhunjunwala

Headline: From Darkness to Light: IIT Madras Helps Transform 300 Households in Telangana

URL: <https://www.thebetterindia.com/115913/iit-madras-helps-transform-300-households-telangana/>

From Darkness to Light: IIT Madras Helps Transform 300 Households in Telangana

Despite 70 years of independence, a majority of villages and hamlets in the country continue to dwell in darkness.

Identified as world's largest un-electrified population by World Bank in 2014, issues like lack of proper infrastructure or consistent supply of power remain to be addressed at large.

Barring the hours when daylight is sufficient to make do, many villages still spend close to six to eight hours every day without electricity and depend on age-old practices to light up their evenings.

Thanks to an initiative by the Indian Institute of Technology, Madras (IIT-M), as many as 300 households across Devarakonda Mandal in Nalgonda district of Telangana will now see the light!



Unveiling a stone plaque at Kesya Thanda village in Devarakonda Mandal, Nalgonda district, Telangana, marking the launch of Solar DC project. Source: [Facebook](#).

Implementing solar-powered technology known as the 'Inverterless System', these households wouldn't need to depend on kerosene lamps anymore.

Developed by IIT-M, the technology was commercialised by Cygni Energy Private limited, which is an institute-incubated firm.

With a financial assistance of ₹75 lakh under Corporate Social Responsibility (CSR) by telecom company Verizon, the firm helped install the contraption in every household as well.

According to Edex Live, the premier institute undertook the project in collaboration with Telangana State Southern Power Distribution Company Limited (TSSPDCL) and Rural Electrification Corporation, following which four hamlets Ramunigundla Thanda, Kesya Thanda, Jogi Thanda and Mantriya Thanda in rural Telangana now have access to uninterrupted electricity.

Constituting a 125 Wp solar panel, a 1 kWh battery, an inverterless controller unit and DC loads, which operate on a 48V DC internal distribution line, the device has the ability to power a DC fan, a DC tube light, two DC bulbs, a DC mobile charger, a DC power socket and a remote controller to operate the fan and tube light.

Completed in June, the concerned authorities remain updated about the functioning of all the installed systems through remote monitoring.



source: [Facebook](#)

The data is consolidated via mobile phones and synchronized to a central server.

The project took flight under the guidance of Ashok Jhunjhunwala, who is the Principal Advisor to the Ministries of Power and New and Renewable Energy as well a Professor (on sabbatical) at IIT-M.

“Today, millions of homes in India either do not have grid connectivity or suffer from power outages for a large fraction of the day. This project heralds India’s move towards a solar-powered future, without compromising on efficiency or affordability,” he told Economic Times.

Date: 21st September 2017

Publication: Motor India

Edition: Magazine

Page nos.: 70

Journalist: NA

Professor: Prof. Bhaskar Ramamurthi, Prof. Ashok Jhunjhunwala, Dr. Prabhjot Kaur, Prof. R. Nagarajan and Prof. Devendra Jalihal

Headline: Ashok Leyland and IIT Madras sign MoU to set up 'Centre of Battery Engineering'

URL: <http://www.motorindiaonline.in/batteries/ashok-leyland-signs-mou-for-sponsoring-centre-of-battery-engineering-at-iit-madras/>

Ashok Leyland and IIT Madras sign MoU to set up 'Centre of Battery Engineering'

Ashok Leyland and Indian Institute of Technology Madras (IIT Madras) have signed a Memorandum of Understanding (MoU) that will see Ashok Leyland sponsor the Centre of Battery Engineering (CoBE) at IIT Madras. The CoBE will seek to supplement the on-going research by facilitating collaboration between industry and researchers, which is currently lacking, to study various battery characteristics that are not completely understood even among global players.

Commenting on the landmark initiative, Mr. Karthick Athmanathan, Head, Electric Vehicles and e-Mobility Solutions, at Ashok Leyland, said: "Ashok Leyland has been leading in pioneering technologies and disruptions in the commercial vehicle space. Everything that we do and strive to achieve is linked to our philosophy, 'Aapki Jeet, Hamari Jeet'. Whether it was meeting the BS-III norms with a mechanical fuel pump or being the first OEM to introduce an all-electric bus, Circuit, or the latest innovation, IEGR technology for BS-IV engines – we have always delivered on our promise to help our customers and partners win. With this initiative in battery engineering, we want to be participants in India's aggressive push to stay ahead of the curve as far as electric mobil-



Mr. Karthick Athmanathan, Head, Electric Vehicles and e-Mobility Solutions, Ashok Leyland (left) and Prof. Bhaskar Ramamurthi, Director, IIT Madras, shaking hands after signing the MoU

ity is concerned. We are confident that with the high quality of people and the special list of research initiatives, CoBE at IITM will be a key partner in the country's electric mobility vision and will help us understand this technology better and stay ahead of global players. We are committed to the Government's vision for eMobility and want to develop the ecosystem which will help us come up with customised EV solutions for our country."

Sharing his views about the MoU, Prof. Bhaskar Ramamurthi, Director, IIT Madras, said: "Battery Engineering, specifically for electric vehicles, is a very important emerging area of research and innovation. By pledging long-term support and collaborating with the CoBE at IIT Madras, Ashok Leyland is

making a significant contribution to this critical technology for India's future energy and transportation needs."

Prof. Devendra Jalihal, Head, Department of Electrical Engineering, IIT-Madras, under which the CoBE, functions, signed the MoU. He said: "The CoBE, IIT Madras, is carrying out exciting multidisciplinary research work in several areas related to battery and electric vehicles including battery management systems, battery testing, battery charging and developing national standards for communication between EV and the cloud servers. The CoBE also provides policy inputs to the national Electric Vehicles program. Potentially, the research can lead to greatly reducing India's dependency on imported oil, to reducing

environmental pollution, to greater employment opportunities and to global leadership position."

IIT Madras has a great track record of working with industry leaders and innovators. The institution has come up with solutions which are business worthy and helps take the technological capability of the industry a step further. For Ashok Leyland, being a part of the CoBE is a very significant step in its journey and it has the potential to help the company understand battery technology as it proliferates the market with its electric vehicles with different architectures for different applications. In addition to joining the panel of sponsors of CoBE, Ashok Leyland is also keen on carrying out a fair amount of confidential consulting.

The landmark tie-up will aim to achieve the following objectives:

1. CoBE will work towards understanding various battery issues and challenges in various areas of applications. It will also undertake high quality research projects to overcome these challenges.
2. It will focus on the physics part of the battery technology as against other research units working on newer chemistries of the batteries. CoBE will target to work upon battery engineering and thorough characterisation of batteries via detailed testing, optimising battery performance for different applications and work towards better economics.
3. CoBE will collaborate with various cell manufacturers from across the world, procure cells and characterise them to create a knowledge centre on available cells, providing industry with valuable data to select appropriate solutions.
4. It will study the impact of partial charge-discharge cycles with varying depths of discharge and operating temperatures on battery life.
5. It will work on developing the next generation of smart battery chargers and battery management protocols. By working on the design configurations, and packaging cells into modules differently, optimisation studies on batteries for different lifetime for different applications will be undertaken.

research projects with CoBE over the next few years. This will not only help the company evolve as a competitive player and India-optimised solutions provider for its customers but also help realising its ambition to stay ahead of global practices in this domain as the fourth largest bus maker in the world.

Additionally, CoBE will play a larger role of co-ordinating synergy among various industry partners to develop a holistic co-operation model across entire value chain of EV batteries. It will also be doing consulting for Ashok Leyland as well as others in niche and IPR-intensive areas where there is a need for in-depth testing and development, including simulations. Through this partnership, Ashok Leyland aims to support the EV ecosystem at a national level to bring the industry up to speed considering the limited skills in the country as on date.

Date: 22nd September 2017

Publication: The Statesman

Edition: Delhi/Kolkata

Page no.: 7

Journalist: Abhijeet Anand

Professor: Prof. Bhaskar Ramamurthi

Headline: IIT Chennai proposes high speed Wi-Fi for railways

IIT Chennai proposes high speed Wi-Fi for railways



ABHIJEET ANAND

NEW DELHI, 21 SEPTEMBER

IIT Chennai has suggested Indian Railways the idea of having Ultra High Speed Wi-Fi (UHSW) for rail passengers as it is working on wireless technology for accessing Wi-Fi in trains that will be viable and cost-effective.

However, the premier institute has not received any approval from Indian Railways.

Indian Railways, at the same time, is also looking for alternatives that will be cost-effective. For this it has roped in Centre for Development of Telematics (C-DOT) also.

Bhaskar Ramamurthi, Director of IIT Chennai, is himself involved in the development of this technology as the head of a laboratory on wireless technology. Ramamurthi told The Statesman that this is just a proposal that has been made to the Railways and the Railways has to decide.

Sources told that the technology that IIT Chennai is developing is in a nascent stage.

Apart from providing information to passengers, railway officials say that it will help in operations also.

Railways sources said that C-DOT and IIT Chennai are working on concepts of providing Wi-Fi in trains that will make it viable.

Ten years back, Railways tried to provide Wi-Fi in trains. But the idea was dropped in just a few days as the cost incurred was too high.

A railway official said there are challenges in giving a seamless Wi-Fi connectivity to a rail passenger. Placing land-based transmitters in such a way that wifi signals don't break as the train moves is the main challenge. The official further said there is a challenge to prevent obstruction from the Over Head Electrification (OHE).

Date: 24th September 2017

Publication: The New Indian Express

Edition: Chennai

Page no.: 5

Journalist: NA

Professor: Prof. V Kamakoti

Headline: Suggestions invited for using AI for economic progress

URL: <http://www.newindianexpress.com/cities/chennai/2017/sep/24/suggestions-invited-for-using-ai-for-economic-progress-1661834.html>

Suggestions invited for using AI for economic progress

EXPRESS NEWS SERVICE @ Chennai

GETTING down to the brass tacks, the Central task force on artificial intelligence programme has invited suggestions from experts, industry and public on using AI as an engine for economic growth.

IIT-Madras professor V Kamakoti, Reconfigurable Intelligent Systems Engineering (RISE) Laboratory, Department of Computer Science and Engineering, will head this task force constituted in August last year to explore possibilities to leverage AI for development across various fields.

“Understanding AI is not limited to understanding its underlying technology, but its deployment and its impact. To this effect, the opinion of end-users, the public and

the industry, will be of great value to the task force,” Kamakoti said.

The IIT has launched a website (<http://aitf.org.in>) where suggestions and opinions may be recorded for consideration by the task force.

The mission includes leveraging artificial intelligence for the economic benefit; creation of a policy and a legal framework to accelerate deployment of AI technologies.

The domains of focus will include manufacturing, fintech, healthcare, agriculture/food processing, education and retail/customer engagement to human and robot interaction/intelligent automation, UIDAI/big data, environment, and national security, Kamakoti added.

Date: 24th September 2017

Publication: Business Standard

Edition: Delhi/Mumbai/Kolkata

Page no.: 12

Journalist: Alnoor Peermohamed

Professor: Prof. V Kamakoti

Headline: Task force seeks public opinion on AI

URL: http://www.business-standard.com/article/economy-policy/task-force-seeks-public-opinion-on-artificial-intelligence-117092300823_1.html

Task force seeks public opinion on AI

ALNOOR PEERMOHAMED
Bengaluru, 23 September

A government task force is seeking public opinion on deploying artificial intelligence in manufacturing, healthcare, agriculture and the Aadhaar programme.

The task force, set up in August, has been asked to draw up a policy for the accelerated deployment of AI and a five-year roadmap for its use in government and industry research programmes.

"The job of the task force is to look at how we can use AI and the topic is so big we thought the public should also participate in it," said V Kamakoti, professor of IIT Madras, who is chairing the task force.

The task force includes Gautam Shroff, vice-president and chief scientist at TCS Research; Ashwini Asokan, co-founder and chief executive officer of AI startup Mad Street Den; GH Rao,

SMART MOVES

- The Ministry of Commerce set up a taskforce on artificial intelligence in August
- The taskforce will create a policy for accelerated deployment of AI by industries
- It will also study the potential social impact of deploying AI across sectors
- Experts say AI led economies will drive global GDP growth in the future
- AI has the power to augment government schemes such as Aadhaar

head of engineering and R&D services at HCL Technologies; and representative from various ministries.

The government has embraced digitisation through Aadhaar, India Stack and UPI in payments, and is turning to technology to provide aid, education and healthcare to the poor. AI

provides a mechanism to amplify these digitisation schemes.

Kamakoti said a key job of the task force would be to study the social impact of AI. He added AI should replace hazardous jobs while the government should skill people for working in the era of AI.

AI has been accused of being a technology that will take jobs away from humans but experts believe it will create new types of jobs. AI could create high-end technology jobs while replacing a large number of low-end tasks that can be automated.

"Plucking coconuts from a tree is hazardous. Imagine, I build a robot to climb a tree. It is equipped with a sensor and a machine learning engine that can tell if a coconut is ripe. Now while that hazardous job is eliminated, it is not as if the robot will come to your house on its own, it will need an operator," Kamakoti added.

The government faces a difficult choice in keeping up with the rest of the world in AI development while making sure it does not add to unemployment.

Elon Musk, the founder of Tesla and SpaceX, has stated AI could become a threat to humanity if not kept in check and has sought a ban on drones in war zones. "Until people see robots going down the street killing people, they do not know how to react, because it seems so ethereal," he said in July.

Bill Gates, co-founder of Microsoft, has suggested governments begin to charge a 'robot tax' once AI and mechanisation replace the human workforce.

Union Transport Minister Nitin Gadkari recently said the country would ban self-driving cars as these would add to unemployment. "How can we allow such vehicles when we already have a large number of unemployed people?" he had said in July.

Date: 24th September 2017

Publication: DT Next

Edition: Chennai

Page no. : 5

Journalist: NA

Professor: Prof. V Kamakoti

Headline: IIT-M website ready to get ideas on Artificial Intelligence

URL: <http://www.dtnext.in/News/City/2017/09/24012928/1046720/IITM-website-ready-to-get-ideas-on-Artificial-Intelligence.vpf?TId=112132>

IIT-M website ready to get ideas on Artificial Intelligence

CHENNAI: The Indian Institute of Technology in Madras recently announced the launch of a website (<http://aitf.org.in>) through which people can send them their suggestions on the use of artificial intelligence (AI).

The move comes a month after the then commerce and industry minister Nirmala Sitharaman constituted a task force to focus on AI to focus on the country's economic development.

The website has a link through which the public and people from the industry can record their suggestions and opinions which could later be considered by the team.

V Kamakoti, a professor in the department of computer science and engineering at the Indian Institute of Technology, Madras, was selected to head the team.

The task force, comprising 18 members including academics, experts, researchers and industry leaders, is supposed to explore possibilities

to leverage AI for development across various fields.

It is also supposed to focus on areas such as transportation and agriculture, and submits its first report by De-

ember.

Speaking about how the team would function, Kamakoti said, "Understanding AI is not limited to understanding its underlying technology

but how to use it and its consequences. For this, opinions of AI users both from the public and the industry will be of great value to us."

The task force would attempt to create a policy and a legal framework to accelerate the use of AI technologies in manufacturing, healthcare, agriculture and food processing, education and retail and customer engagement to human and robot interaction, intelligent automation, UIDAI, environment and even national security.



Understanding AI is not limited to understanding its underlying technology but how to use it and its consequences. For this, opinions of AI users both from the public and the industry will be of great value to us.

V KAMAKOTI, on working with artificial intelligence

Date: 25th September 2017

Publication: India Education Diary

Edition: Online

Journalist: NA

Professor: Prof. V Kamakoti

Headline: IIT Madras Prof Kamakoti has been appointed to head this Taskforce on Artificial Intelligence

URL: <https://indiaeducationdiary.in/iit-madras-prof-kamakoti-appointed-head-taskforce-artificial-intelligence/>

IIT Madras Prof Kamakoti has been appointed to head this Taskforce on Artificial Intelligence

Chennai: The Taskforce on the Artificial Intelligence for economic development, constituted by the Government of India, has invited public opinions.

Indian Institute of Technology Madras announces the launch of a website (<http://aitf.org.in>) to aid the Task Force in collecting public opinion. The website has a link through which the public and industry can record their suggestions and opinions for consideration by the Task Force.

The Commerce Ministry, Government of India, had constituted this Task Force in August 2017 chaired by Prof. V Kamakoti, Reconfigurable Intelligent Systems Engineering (RISE) Laboratory, Department of Computer Science and Engineering, IIT Madras, to explore possibilities to leverage Artificial Intelligence (AI) for development across various fields.

Speaking about the functions of the taskforce, Prof. Kamakoti said, "Understanding AI is not limited to understanding its underlying technology but its deployment and its impact. To this effect, the opinion of end-users, namely, the public and the industry, will be of great value to the task force".

The Mission of this taskforce include leveraging Artificial Intelligence for the Economic Benefit of the country; Creation of a policy and a legal framework to accelerate deployment of AI technologies; and a Concrete 5-year horizon recommendations for specific Government, Industry and Research programs.

The Domains of Focus for this taskforce include Manufacturing, Fintech, Healthcare, Agriculture/Food Processing, Education and Retail/Customer Engagement to Human and Robot interaction/intelligent automation, UIDAI/Big Data, Environment and National Security.

Further the taskforce will also look at Enablers for AI Technology development/entrepreneurship/ product commercialization and General/other issues related to AI.

Date: 26th September 2017

Publication: The Economic Times

Edition: Delhi/Hyderabad/Chennai/Kolkata/Ahmedabad/Kochi/Mumbai

Page no.: 8

Journalist: Rica Bhattacharyya & Lijee Philip

Professor: Prof. Krishnan Balasubramanian

Headline: Now, IITs Focus More on Driving Industry-Sponsored Research

URL: <http://economictimes.indiatimes.com/industry/services/education/iits-shift-focus-to-driving-industry-sponsored-research/articleshow/60833690.cms>

Now, IITs Focus More on Driving Industry-Sponsored Research

Rica Bhattacharyya & Lijee Philip

Mumbai: The premier Indian Institutes of Technology (IITs) have started engaging more with industry to drive research partnerships and create new work opportunities for their graduating PhD students, for whom academic roles are almost the only option.

The move is aimed at increasing research collaboration and funding from industry to up to 50% of total research requirement, from 10-15% at present.

While IIT Delhi is exploring more industry placement opportunities for the more than 300 students who will graduate with PhD degrees this year, IIT Madras has hired five experienced industry professionals as industry relation advisors to help develop research collaboration with industry. The institute is also incentivising faculty members to spend two to six weeks in a year on industrial sites.

"Very often the industry does not know what we are doing and we do not know what they want. This time we are making a proactive effort to bridge the gap," said V Ramgopal Rao, director of IIT Delhi. "We need to provide job opportunities for our PhD students, who otherwise typically go for higher studies or take up an academic job."

The other IITs, too, are giving a push to their reengagement with industry to make research work more contextual and industry-driven, and to attract more private funding.

Over the next five years, IIT Delhi is aiming for an even split of sponsored research between industry and the government, up from 10-15% industry funding at present. The institute has seen a doubling of research funding this year.

On Saturday the premier institute organised "Industry Day" on campus where students could connect with industry executives. Students had put on display prototypes of research designs so that industry executives could give guidance on how to make them more commercially relevant.

"All these years' research was more publication possibility driven than industry-driven. Our aim is now to bridge the gap," said Krishnan Balasubramanian, professor of mechanical engineering at IIT Madras.

Bridging The Gap



IIT Delhi exploring more industry placement opportunities for PhD students

IIT Madras hired industry professionals as industry relation advisors

IIT Madras incentivising faculty members to spend time on industrial sites

IIT Kanpur inviting cos being incubated on campus to go commercial

Industry looking for homegrown technology for homegrown problems

ACADEMIA

Very often the industry does not know what we are doing & we do not know what they want. We are making a proactive effort to bridge the gap, said V RAMGOPAL RAO, Director, IIT Delhi

INDUSTRY

Industry needs to have patience for results & academia needs to travel an extra mile to take research to a point where industry can pick it up. PAWAN GOENKA, Managing Director, M&M

The institute is in the process of creating an intellectual property management cell with patent agents who will be industry professionals.

The efforts have led to doubling of industry funding to ₹140 crore in 2016-17 from a year ago. The institute expects industry's contribution to research to touch ₹160 crore in 2018. IIT Madras got a total research funding of ₹500 crore in 2016-17, of which about ₹300 crore was from the government.

The research park occupants at the different IITs also collaborate with the institutes.

Meanwhile, IIT Kanpur is in the process of creating a Section VIII non-profit company to invite companies now being incubated on campus to go commercial. The institute is also trying to create a research park on campus where companies can open office. "All this is to drive more partnership with the private industry," said Indranil Manna, director, IIT Kanpur.

Industry, too, is looking for homegrown technology for homegrown problems. There is increasing acceptance that many of the solutions available overseas are best suited for conditions outside of India. This has led to the need for adapting research to Indian conditions and to increase efforts of collaboration with academic institutions to accelerate R&D and innovation.

"Indian industry needs to spend a lot more on R&D and technology. I consider it a prerequisite for India to become a manufacturing economy with high manufacturing value add," said Pawan Goenka, managing director, Mahindra & Mahindra. Goenka is the chairman of the board of governors of IIT Madras.

Goenka said it is not possible to look at individual projects on a cost-benefit analysis basis. "Not every R&D project can lead to a successful product, but blockbuster products will emerge in some instances and we'll pay for all the R&D investment," he said. "Industry needs to have patience for results and academia needs to travel an extra mile to take research to a point where industry can pick it up."

Gajendra S Chandel, chief human resource officer at Tata Motors, said, "Through this process, we are able to create skilled manpower in line with the organisation mandate of becoming future ready."

The RPG Group is working on a project for reducing timelines for civil infrastructure and a project related to structural designs with the IITs. "For KEC, our decision to partner and collaborate with these institutes is driven primarily by our culture of innovation, and not cost reduction," said Harsh Goenka, chairman of RPG. For Raychem RPG, the core motive for collaboration is exploring long-term basic research projects, where the industry-academia collaborative research works well.

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Page no.: 23
Journalist: Sarah Zia
Professor: Prof. V Kamakoti
Headline: Taskforce on AI seeks public opinion

Taskforce on AI seeks public opinion

Sarah Zia
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NEW DELHI: The government of India has set up an 18-member task force on artificial intelligence (AI) led by Kamakoti Veezhinathan who is a computer science professor at the Indian Institute of Technology Madras to create a framework for the deployment of AI across domains.

"The purpose of the task force is to explore areas where AI can be leveraged for economic transformation and look at its various facets beyond the technology component," explained Veezhinathan. "AI is a complex area and several issues pertaining to ethical usage as well as social acceptance must be carefully considered before a decision is made."

The task force is currently inviting public opinion on various issues related to AI. Interested members of the public can give their opinion and suggestions on any aspect related to AI across 15 domains including manufacturing, healthcare, education, agriculture, security, environment and big data among others, on the website, aitf.org.in. All recorded public opinion will be placed in front of the task force during their meetings.

The 18 members who meet regularly as well as interact virtually plan to submit a set of policy recommendations by December. "The task force plans to focus on specific enablers across domains by integrating the opinions of academia, industry as well as the general public," he said.

According to Veezhinathan, since the key stakeholders will



* AI goes beyond tech GETTY IMAGES

be the industry and the users, it is imperative to ensure that the users engage with this topic and make the discussion inclusive by sharing their opinion. "No matter what is suggested, the success of technology lies in how well users receive it and obtaining the public's suggestion will help us understand their demands and concerns," he added. "Further, this could help us know the requirements of a specific industry if, for instance, a farmer tells us what kind of equipment they need to improve productivity."

AI has been at the centre of debates globally with analysts claiming that despite contributing to GDP growth automation could lead to job cuts across industries. However, Veezhinathan feels that AI can help one transform their skill set and many of those employed in hazardous jobs could be given better working conditions and a newer skill set of managing the AI tools that replace human labour.

**IIT Madras is a research-focused
Institute**

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Edition: Delhi

Page no.: 1

Journalist: Sarah Zia

Professor: Prof. Prafulla Kumar Behera

Headline: IIT-Madras to host dedicated Silicon Detector R&D and application centre

URL: <http://www.htsyndication.com/htsportal/india-education-diary/article/iit-madras-to-host-dedicated-silicon-detector-randd-and-application-centre/22355362>



• Campus of IIT Madras

PT/KE

IIT Madras sets up R&D centre for silicon detectors

Sarah Zia

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NEW DELHI: Indian Institute of Technology (IIT) Madras has set up a dedicated research and development centre focusing on silicon detectors as part of the global Compact Muon Solenoid (CMS) experiment. The CMS experiment, a global collaborative project led by European Organisation for Nuclear Research (CERN) and known for the discovery of Higgs boson, involves more than 3,500 scientists, engineers, and students from 202 institutes in 47 countries. In India, the nine participating (full member) institutions include Indian Institute of Science Education and Research Pune, Indian Institute of Science Bangalore, Tata Institute of Fundamental Research, Bhabha Atomic Research Centre, Saha Institute of Nuclear Physics, National Institute of Science Education and Research, PII, Delhi University and IIT

Madras.

The centre will produce research on applications of silicon technology as well as create capacity for new technologies. "We have been asked to deliver 2000 silicon modules (integrated into full outer silicon tracker detector) by 2024 to CERN," said Prafulla Kumar Behera, associate professor, department of physics, IIT Madras, who is the leading the CMS initiative at the institute.

The centre which will integrate technology, science and manufacturing is estimated to cost Rs6 crores with CERN and the government of India funding it partially.

Currently, a silicon lab exists at IIT Madras but the addition of the centre will help create newer technologies with greater precision in the country. "The plan is to create a technology that uses micro abrasive water jet technology more accurately and precisely to cut hard or composite materials," adds Behera. "If cre-

ated, we would be the first in the country to fabricate this technology that has applications in space and missile industries, among others." According to him, the current silicon detector gets huge radiation due to proton-proton collision and damages the silicon sensor as well as related electronics. The new technology on the other hand aims for a more precise silicon sensor of about 23-250 micro thickness.

Among the equipment the centre intends to buy include advanced machine tools such as 6-axis micro-abrasive waterjet machine which will use water to cut composite material.

In 2016, India became an associate member of CERN, the world's largest nuclear and particle physics laboratory. According to a statement by CERN, India's association with the organisation dates back to the 1960s when high-energy physicists at Tata Institute of Fundamental Research started participating in experiments at CERN.

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Edition: Online

Journalist: Gregory B. Poindexter

Professor: Prof. Abdus Samad

Headline: MeyGen Phase 1A project sets new world record as tidal energy research continues worldwide

URL: <http://www.hydroworld.com/articles/2017/08/meygen-phase-1a-project-sets-new-world-record-as-tidal-energy-research-continues-worldwide.html>

MeyGen Phase 1A project sets new world record as tidal energy research continues worldwide

In August, the 6-MW MeyGen Phase 1A project had a total production approaching 2 GWh, according to Atlantis Resources Ltd. (Atlantis). For monthly production from a tidal stream power station of over 700 MWh, Atlantis said this set a new world record.

Located on the Inner Sound of Pentland Firth, Scotland, MeyGen Phase 1A is the first build-out phase of the MeyGen Tidal Energy Project. Atlantis' marine energy project has four 1.5-MW turbines; one Atlantis and three Andritz Hydro Hammerfest turbines. Edinburgh-based MeyGen Ltd. holds all of the assets of the project and is the entity that has entered into all contracts with suppliers in relation to the project. According to Atlantis, it expects the MeyGen Phase 1A will be operating at full 6 MW capacity from the end of fiscal year third quarter, from Oct. 1 to Dec. 31, 2017.

In other parts of the world, additional marine energy turbine testing has yielded promising results.

Japan

On Aug. 19, NHK World TV reported IHI Corp. and the government of Japan's New Energy and Industrial Technology Development Organization (NEDO) successfully tested the 100 kW Kairyu tidal stream prototype. The testing took place off Kuchinoshima Island in waters off the southwestern prefecture of Kagoshima, Japan.

In June 2015, HydroWorld.com reported NEDO selected IHI Corp. and Toshiba Corp. to research and develop an underwater floating-type ocean current tidal energy turbine system as part of a US\$501 million effort for sustainable, renewable energy.

The research included tow-testing at the site of the powerful north-flowing Kuroshio Current, which travels at rates ranging between 20- and 120-inches per second in which the device produced 30 kW. The Kairyu features two 50 kW 11-m-diameter rotors that have a flow rate of 3 knots and a 20-m-long by 20-m-wide and 11-m-high generator, which features an onboard transformer.

India

The Ministry of Earth Sciences of the government of India is funding a study called, "Design and Testing of an Impulse Turbine for Wave Energy Conversion," being carried out by researchers at the Indian Institute of Technology (IIT) Madras.

The Times of India reported the second week of August, testing began on an oscillating water column (OWC) type of wave energy device at the Wave Energy and Fluids Engineering Laboratory (WEFEL). The facility is located at the Department of Ocean Engineering at IIT-Madras.

According to information from Abdus Samad, IIT-Madras associate professor and led researcher, his group is to develop the OWC impulse turbine to operate with a unidirectional rotor that converts wave energy to generate power.

According to Samad, the major challenges faced in wave energy conversion (WEC) are natural environment, device constraints, mismatch in wave and resonant frequencies and wave conditions. An optimal control scheme is necessary to improve the efficiency, performance and power absorption of a WEC device.

Once lab testing is complete and the data is analyzed, a wave energy turbine constructed by India's National Institute of Ocean Technology (NIOT) will be fitted on a floating backward bend ducted-buoy with an L-shaped OWC for testing in real-water ocean environments. Purnima Jalihal, of NIOT, is acting as project co-investigator, according to Samad.

According to the researchers, wave energy potential could supply about 40 GW to the Indian power grid, which is about 13% of the total production capacity in India.

Date: 1st September 2017

Publication: Careers 360

Edition: Magazine

Page no.: 18

Journalist: Harshita Das

Professor: Prof. R. Nagarajan

Headline: When the Proof of the Course Is in The Career

WHEN THE PROOF OF THE COURSE IS IN THE CAREER

If the United States is your dream destination, read on to know about the sectors that have maximum traction in the job market...

by Harshita Das

When you think out a plan to study abroad, it is not just about choosing a course or a college. A pressing concern is to find out whether that'll be a preferred career choice. As a career takes precedence, it makes sense to do a course that finds traction in the US, one of the largest career destinations. "I am not sure if I will be doing a Master's in the same branch but I will surely opt for a STEM programme, that is Science, Technology, Engineering and Mathematics related subject, which is currently in high demand in the US," says Nandita Verma, who has decided to pursue Master's in US and is currently doing her BE in Chemical Engineering from Jodhpur University, Kullu.

STEM – The preferred choice
Indian students applying for Master's and Computer Science in US universities have increased by 25 percent in 2015-16

as compared to 2014-15. Exponential in engineering the global rise grew by 10.25 in the same period. To cite a statistic, Indian students for the second largest number of countries after China, especially in STEM subjects.

According to the Open Doors annual report 2016, by the Institute of International Education, one out of every six international students in the US is from India. Nearly three-fourths are in STEM fields. "Students completing a STEM course are entitled to a three-year OPT (Optional Practical Training) whereas those completing a non-STEM course are entitled to only one-year OPT. Thus, an increasing number switch from non-STEM to STEM courses. This is precisely why fewer students go for an MBA programme in the USA," says Rajesh Arya, President of Council For American Education.

Civil Engineering
The STEM list includes a range of courses and Civil Engineering is one



RAJESH ARYA
President, Council For American Education

Students completing a STEM course are entitled to a three-year OPT (Optional Practical Training) whereas those completing a non-STEM course are entitled to a year of OPT. Thus, an increasing number, switch to STEM courses

DELIVERABLES about almost 60% of international students from India and China, a majority of them opt for areas in STEM (science, technology, engineering, maths)

of the most sought after courses. The US Bureau of Labor Statistics points that the employment opportunities for civil engineers in the US will grow eight percent by 2024, about as fast as the average for all occupations, according to Peter D. Stangorin, Dean of International & Alumni Affairs (IAAO), IIT Madras. "Civil Engineering, especially in specialisation areas like technology and environmental sciences, is quite popular in the US and has increasing scope. All reputed US universities like the MIT, Stanford, Georgia Institute of Technology, Tuor department of Civil and Environmental Engineering offer high the courses."

The selection process requires that students uniformly to university but separate

have to qualify in tests like SAT, GRE, TOEFL, IELTS. At the US level, the curriculum covers design, physics, maths, applied mechanics etc. At the PG level, the course is more area-specific and can specialise in a range of specialisations like Sustainable Design & Construction, Structural Engineering, Geotechnical Engineering, Infrastructure Materials Engineering, Nuclear Risk Management, Transportation Engineering etc.

In terms of job profiles, civil engineers are employed in a range of roles and special roles exist in areas such as water management, flood control, transportation, power generation and distribution, recreation, municipal projects and surveying. The average pay

package for a Civil Engineering graduate ranges between \$50,000 to \$70,000.

Computer Science

The Silicon Valley region in the US is known for a long number of startups and global technology companies like Apple, Facebook, Google, Cisco, Intel to name a few. "Both at the UG and PG levels, Computer Science remains the most popular course and choice. The demand for computer professional continues to be robust and the students are typically able to get a job within three months of graduation. In the coming years, it is expected that technology will continue to be at the top," says said.

All PG graduates are introduced to practical and theoretical aspects of the course. One can learn to design and develop new software and hardware, software-top systems, expertise in e-business, telecommunication and networks.

Computer Science is the largest department at MIT. Some of the other top universities offering this course are Harvard, Carnegie Mellon, University of Michigan, Princeton University and Cornell. The average remuneration package is more than \$70,000.

Some more options

A few more disciplines that are high in demand are: Big Data, Cyber Security, MIS, Applied Mathematics, Financial Engineering and Supply Chain Management. Chemical Engineers and Mechanical Engineers are also in demand and have traditional strong foothold salaries in the US. However, the only one-time college that offers 100-year jobs, is before student pursuing PhD in Mechanical Engineering from University of Illinois, on condition of working with one of the world's leading new opportunities and work on it for better prospects. "You need to start to identify opportunities in your field. Each day your endeavour should be to hold an attractive profile of yourself. If you have a good profile even from a modest the opportunity, you will find a good job title if the profile is good. Finding jobs is tough despite producing from top universities," he sums up.

Date: 2nd September 2017

Publication: Rajya Sabha TV - Gyan Vigyan Show

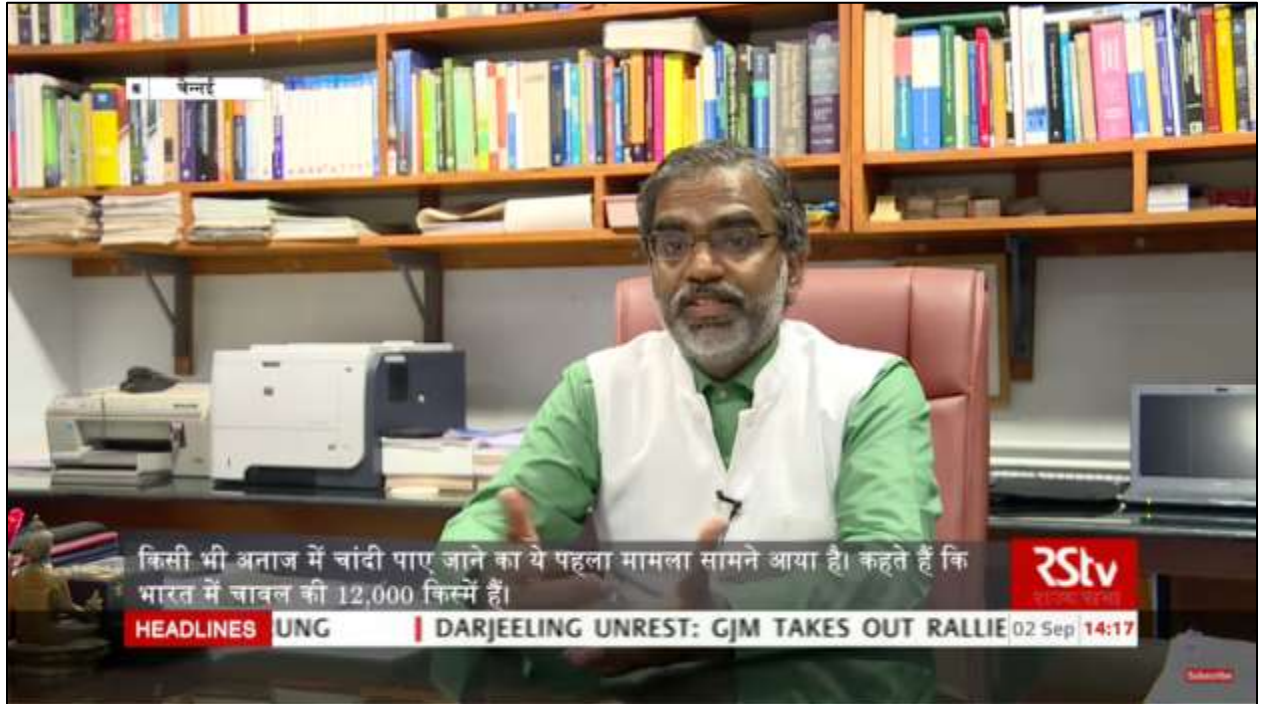
Edition: Electronic

Journalist: Bhavya Khullar

Professor: Prof. T. Pradeep

Headline: "Scientists at IIT- Madras have found a new Indian rice variety that accumulates high amounts of silver."

URL: <https://www.youtube.com/watch?v=Vqgam4nZAME>



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Publication: Rajya Sabha TV - Science Monitor

Edition: Electronic

Journalist: Bhavya Khullar

Professor: Prof. T. Pradeep

Headline: "Scientists at IIT- Madras have found a new Indian rice variety that accumulates high amounts of silver."

URL: <https://www.youtube.com/watch?v=GnBXrPVAc8s&t=1093s>



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Publication: The Hindu- Tamil

Edition: Chennai

Page no.: 4

Professor: Prof. Manu Santhanam & Prof. Ravindra Gettu

Journalist: Lisbon Kumar

Headline: 3-day international conference on construction technology

கட்டுமானப் பொருட்கள்,

தொழில்நுட்பம் குறித்து 3 நாள் சர்வதேச மாநாடு

● சென்னையில் இன்று தொடங்குகிறது

■ சென்னை கட்டுமானப் பொருட்கள் மற்றும் கட்டுமான தொழில்நுட்ப முறை பற்றிய 3 நாள் சர்வதேச மாநாடு சென்னையில் இன்று (செவ்வாய்க்கிழமை) தொடங்குகிறது. சர்வதேச கட்டுமானப் பொருட்கள் மற்றும் தொழில்நுட்ப முறை ஆய்வகம் மற்றும் நிபுணர்கள் சங்கமும், சென்னை ஐஐடிமும் இணைந்து இந்த மாநாட்டை நடத்துகின்றன. இதில், 200 வெளிநாட்டு பிரதிநிதிகள் உட்பட கட்டுமான நிபுணர்கள், ஆராய்ச்சியாளர்கள் 700 பேர் கலந்துகொள்கிறார்கள். பாரம்பரிய கட்டுமான முறை, நவீன கட்டுமான தொழில்நுட்பம், சிமெண்ட் கான்கிரீட் தொழில்நுட்பத்தில் ஏற்பட்டுள்ள

நவீன முன்னேற்றங்கள், ஆராய்ச்சி மற்றும் மேம்பாடு உள்ளிட்டவை குறித்து இந்த 3 நாள் மாநாட்டில் விவாதிக்கப்படுகிறது. இந்த மாநாடு முதல்முறையாக இப்போது இந்தியாவில் நடத்தப்படுகிறது.

மாநாட்டு நிகழ்ச்சிகள் ஐஐடிவளாகத்திலும் எம்ஆர்சி நகர் லீலா பேலஸ் ஹோட்டலிலும் நடைபெறுகின்றன.

மாநாட்டையொட்டி கட்டுமானப்பொருள் கண்காட்சியும் நடைபெற உள்ளதாக சென்னை ஐஐடி சிவில் இன்ஜினியரிங் துறை பேராசிரியர்களும், மாநாட்டு அமைப்பாளர்களான மனு சந்தானம், ரவீந்திரா ஜெட்டு ஆகியோர் நிருபர்களிடம் நேற்று தெரிவித்தனர்.

Date: 4th September 2017

Channel: DD Podhigai

Edition: Electronic

Professor: Prof. Manu Santhanam & Prof. Ravindra Gettu

Headline: IIT Madras to organize International Conference



Date: 7th September 2017

Publication: The New Indian Express

Edition: Chennai

Page no.: 1

Journalist: SV Krishna Chaitanya

Professor: Prof. Arun Menon

Headline: IIT-M to study 'structural distress' in Prez palace

URL: <http://www.newindianexpress.com/states/tamil-nadu/2017/sep/07/iit-madras-to-study-structural-distress-in-president-palace-1653538.html>

IIT-M to study 'structural distress' in Prez palace

SV KRISHNA CHAITANYA @ Chennai

THE National Centre for Safety of Heritage Structures (NCSHS) in IIT-Madras is working on an important assignment. Its engineers have been roped in to investigate the cause of 'structural distress' encountered by the majestic Rashtrapati Bhavan, official residence of President Ram Nath Kovind.

While the Delhi chapter of the Indian National Trust for Art and Cultural Heritage (INTACH) is preparing a comprehensive conservation management plan (CCMP), the NCSHS of IIT-M has been entrusted with the job of diagnosing structural problems and finding solutions while keeping the heritage property intact.

Arun Menon, Associate Professor, Structural Engineering Laboratory, IIT-Madras, told *Express*, "We will be conducting a detailed structural analysis of the Rashtrapati Bhavan and our inputs will be used by the INTACH to prepare the CCMP. This is the first such exercise being carried out in 86 years. We have already conducted non-linear tests on portions of the Presidential palace. For instance, we have been examining the behaviour of the central dome. We have unreinforced masonry, reinforced masonry and reinforced concrete layers. So, we have three layers acting together and there is structural distress; we tried to understand where it came from. We have done some non-linear analysis and the initial test results indicated why cracking happened. There are also problems with sunshades," he explained. ¶

IIT-M, UNESCO join hands for Myanmar heritage work

CONTINUED FROM PAGE 1

MENON said the institute has already submitted the interim report of the analysis carried out during previous Presidency. "Now, we will be carrying out tests on left-out portions and submit a detailed report. The Central Public Works Department (CPWD), which is the caretaker of the Rashtrapati Bhavan, will be executing the CCMP.

Though Rashtrapati Bhavan is a single unified complex, for pragmatic reasons it was decided to break the project in two phases - first the precincts and then the main building of Rashtrapati Bhavan.

In 2015, in the first phase of CCMP, two clock towers in Schedule 'A' and Schedule 'B' areas of Rashtrapati Bhavan (heritage structures built by Sir Edwin Lutyens in 1924 and 1925 respectively) were restored. Restoration work of both the clock towers was done by INTACH while repair of clocks was done by IIT, Delhi. Now, the focus is on the main building, sources said.

Built as a residence for the Viceroy during British rule, Rashtrapati Bhavan is the second largest residence for any head of State in the world, next only to the Quirinal Palace,

Rome, Italy. It took almost 17 years for the construction of this huge monument. Its construction started in 1912 and ended in 1929. Now, the 86-year-old building is showing signs of deterioration. The structure includes 700 million bricks and 3.5 million cubic feet (85,000 m³) of stone, with only minimal usage of steel. It has 355 decorated rooms and a floor area of 200,000 square feet and is consisting of four floors. The British architect Sir Edwin Lutyens was the architect.

Working with UNESCO to restore monuments in Myanmar IIT-Madras is also officially collaborating with UNESCO and providing structural inputs as part of a pilot project in Bagan in Myanmar.

"Bagan is an archaeological zone where there are about 3,200 monuments of which 398 monuments have been damaged in the earthquake. We are looking at unique vault constructions and some of these structures are retrofitted and strengthened with reinforced concrete after massive earthquake in 1975. It is a global effort with partners from different parts of world, but the conservation plan is being prepared by an Indian company and we are working with UNESCO," he said.

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Publication: The Hindu

Edition: Chennai/Delhi/Bangalore/Hyderabad/Kolkata/Kochi/Mumbai

Page no.: 14

Journalist: Shubashree Desikan

Professor: Prof. Ravindra Gettu

Headline: IIT Madras: New eco-friendly cement being tested for use in industry

URL: <http://www.thehindu.com/sci-tech/science/iit-madras-new-eco-friendly-cement-being-tested-for-use-in-industry/article19650901.ece?homepage=true>

IIT Madras: New eco-friendly cement being tested for use in industry

The material and process of manufacturing contribute to reduced CO₂ emissions

SHUBASHREE DESIKAN

A research collaboration between India and Switzerland on a new cement material that can reduce carbon dioxide emissions in the manufacturing process is set to take off into implementation.

The construction sector is a major contributor to global carbon dioxide emissions. Though this is known, it appears difficult to reduce the scale of construction, especially as it is a route to establishing more equitable conditions in developing countries like India. One way of mitigating the emissions factor is the use of Limestone Calcined Clay Cement or the LC3 technology.

Traditional processes that manufacture cement from clinker-limestone or clinker-calcined clay combinations are well known. LC3 effects a synergy between these processes. The combination of the new method and the material properties effectively reduces carbon dioxide emissions by 30% as compared to the traditional way of manufacturing cement. Research on this evolved over ten years in Karen Scrivener's lab at the Swiss Federal Institute of Technology (EPFL) at Lausanne, in Switzerland. Partners in this research are IIT Delhi, IIT Madras and TARA (Technology and Action for Rural Development).

Emissions and substitution

In manufacturing portland cement, limestone and materials like clay are heated together in huge kilns to high temperatures (approximately 1,450 degrees C), so that they fuse without melting to give clinker. "This is the most CO₂-intensive part of the whole process. The carbon dioxide comes both from the burning of the fuel needed to create that temperature and due to the breakdown of limestone into calcium oxide and carbon dioxide. The latter part accounts for 60% of the CO₂ emissions in manufacture of cement," says Prof. Scrivener. The best thing to do would be to substitute CO₂-intensive clinker with a different material.

In India, fly ash - a waste pro-



Challenge: The limitations to traditional processes that manufacture cement from clinker-limestone or clinker-calcined clay combinations are well known. **SHUBASHREE DESIKAN**

duced in the burning of coal for producing energy - is used in the manufacture of blended cement. However this is used in a lower proportions and only where available; therefore, for effectively reducing emissions, more clinker is to be substituted with calcined clay and limestone. This reduces emissions by 30% with respect to portland cement.

Lab to commerce

To take this product from the lab to commercial use requires that the cement be certified by reputed research and testing centres, and for this purpose, Prof. Scrivener's team has collaborated with Indian and Cuban agencies. The results of the Indian tests were published in *The Indian Concrete Journal*, special issue on cements. Nearly ten tonnes each of four blends of LC3 (50% clinker, 30% calcined clay, 15% crushed limestone and 5% gypsum) were produced in India.

To obtain a variation, clays and limestones of two different qualities were used. The LC3 obtained was used to manufacture solid and hollow concrete blocks, door and window frames, low duty paving blocks and roofing tiles, and to make roads. "Good results were obtained from the blends despite the sub-optimal conditions of production of the cement, demonstrating the viability and robustness of the technology," Shashank Bishnoi of IIT Delhi and other authors write in the paper. The authors compared the strength of the various LC3 samples with Ordinary Portland Cement (OPC, a popular type of cement) and Portland Pozzolanic Cement (PPC, a variation of OPC in which locally available fly ash was added). They found that the strength of the LC3 made with low quality clay was comparable to the OPC and the samples of LC3 containing superior quality clay was higher than the

OPC.

In fact, there is an added advantage to the new material when used in coastal areas where reinforced concrete can be damaged by chloride diffusing through the material. "The new cement has less porosity and it is more difficult for the chloride to get in and damage the steel rods," says Prof. Scrivener. This gives the new cement a longer service life.

"From the beginning we have been in talks with the industry and the stakeholders," says Ravindra Gettu, Professor, Department of Civil Engineering, IIT Madras. "In India, the first company [J K Lakshmi Cements] has made the industrial trials at its own expense, and we're working to set up the second set with a different company in a few months," adds Prof. Scrivener.

Though there is an initial cost, the payback times are of the order of five years, adds Prof. Scrivener.

Date: 11th September 2017

Publication: The Times of India

Edition: Chennai

Page no.: 5

Journalist: P Oppili

Professor: Prof. S M Shiva Nagendra

Headline: New sensors to measure pollution real-time

URL: <http://timesofindia.indiatimes.com/city/chennai/new-sensors-to-measure-pollution-real-time/articleshow/60453811.cms>

New sensors to measure pollution real-time

Oppili.P@timesgroup.com

Chennai: Researchers at IIT Madras are planning to install low-cost sensors at different locations across the city for in-situ and in real-time monitoring of air pollution.

Associate professor of civil engineering S M Shiva Nagendra said these sensors, embedded in a device, can be set up anywhere for they require very little space. Seven sensors in the instrument will monitor temperature, humidity, carbon monoxide, carbon dioxide, nitrogen dioxide, ozone and particulate matter.

The present monitoring systems do not provide spatial variability. The data collected is limited to a particular

KEEPING CHECK

▶ With the help of sensors, pollution levels in a particular locality can be viewed easily

▶ The sensor monitor's seven parameters - nitrogen oxide, ozone, carbon monoxide, carbon dioxide, temperature and humidity and particulate matter

▶ When pollutants interact with sensors, the signals will be converted to known concentrations

▶ The data can be synchronised with data at existing pollution monitoring stations

site or location. Moreover, often such stations are situated in green locales where pollu-

tion levels are low. When the low-cost sensors are installed across the city, the data they record can be synchronised with information from existing systems, Nagendra said.

The present monitoring stations were set up for ₹1.25 crore and have a monthly maintenance of ₹5 lakh. The system IIT-M is planning to introduce will not only be cheap but also be zero-maintenance, Nagendra said the system will be eco-friendly and will use solar power for energy.

The team has fixed the low-cost sensors, procured from private firms, in several MTC buses and tested them. A prototype was kept at the late Abdul Kalam's memorial when it was inaugurated by Prime Minister Narendra

Modi.

However, the project has certain limitations. The durability of the sensors under different environmental conditions, standardising calibration procedures and accuracy of data need to be sorted out, said Nagendra adding that once procured, calibration of the sensors will require one month.

Nagendra said these monitors can be part of the Smart City programme and can keep residents informed about pollution levels across the city. Data from the devices will be directed to a mobile app that will enable residents to easily access information about pollution levels with their cellphones, Nagendra said.

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Publication: Times of India

Edition: Chennai

Page no.: 5

Journalist: Adarsh Jain

Professor: Prof. R.I. Sampath.

Headline: This system can predict when one will get diabetes

URL: <http://timesofindia.indiatimes.com/city/coimbatore/scientists-derive-tipping-point-model-that-can-predict-change/articleshow/60454483.cms>

This system can predict when one will get diabetes


Adarsh.Jain@timesgroup.com

Diabetes is a scare for almost every Indian today. But imagine if there is a system that can tell you exactly when the disease will strike you. Professors from Amrita University, IIT-Madras and Potsdam Institute for Climate Impact Research, Germany, have derived a model that can predict this change in a system — be it natural or manmade.

The professors call this the 'tipping point'. "Systems such as financial markets, wildlife ecosystems and climatic conditions of the earth undergo sudden transition, which often leads to catastrophic consequences," said assistant professor, centre for computational engineering and networking, Amrita University, E.A Gopalakrishnan. "This tipping happens

FINDING THE 'TIPPING POINT'

- > System to predict the rate of change
- > Based on food habits and lifestyle, it will predict when one could get diabetes
- > Applicable for climate change, a natural calamity or a stock market crash
- > Scientists from Amrita University, IIT Madras and a German institute first developed a mathematical model to prove this
- > Findings of research published in Nature Scientific Reports last July



neering, IIT Madras, R I Sampath.

Initially, the professors wanted to test this idea in a general model that represents systems which can be in two alternate states such as markets, ecosystems, health of an individual, state of an engine etc. "These systems can be modelled as 'bistable' systems where they transit from a desirable state to an undesirable state under change of system conditions. There exists a range of system parameters for which these systems can be either in desirable state or undesirable state depending upon their initial conditions," explained Gopalakrishnan.

Although different systems have different parameters, the behaviour of these systems can be captured by a common model which considers the transition from one state to another inter-

mediated by a bistable state, said Gopalakrishnan. "Moreover, different systems behave exactly the same way as they approach the tipping point. Our analysis focuses on the universal features of the systems rather than on the system specific information. So by employing such universal features, we can model the transition to stock market crash or the transition to a disease state using the same mathematical equations," he added.

"We need to extend our study to see the possibility of this in a turbulent combustor. We are also interested in extending this to other fields such as healthcare by looking at possibilities of rate induced tipping in health conditions," said visiting professor, Potsdam Institute for Climate Impact Research, Germany, Elena Surovyatkina.

Date: 12th September 2017

Publication: The Better India

Edition: Online

Journalist: Sanchari Pal

Professor: Prof. S.A. Sannasiraj

Headline: How to Grow Back an Island? This Team From IIT Madras May Have the Answer!

URL: <https://www.thebetterindia.com/115110/vaan-island-iit-madras-artificial-reefs-coral-rehabilitation/>

How to Grow Back an Island? This Team From IIT Madras May Have the Answer!

In 2015, a report published by the Tamil Nadu government red-flagged the drastic ecological changes taking place in Vaan Island, one of the 21 uninhabited islands located between India and Sri Lanka. The ecologically critical island had shrunk from 16 hectares in 1986 to about 1.5 hectares in 2015.

Today, thanks to the tireless efforts of a team of researchers from IIT- Madras, the Vaan island is well on its way to recovering its ecological health. The island's surface area has increased by 7.6% i.e from 1.5 hectares in 2015 to 1.64 hectares in 2017!

Located 12 km off the coast of Tuticorin and Ramanathapuram, Vaan island is a low-lying reef island at the southernmost tip of Gulf of Mannar (the first marine biosphere reserve in Asia). The Gulf of Mannar is also one of the most productive seas in the world, with more than 1,50,000 fishermen depending on the marine reserve and its buffer zone for their livelihoods.

Other than being a biodiversity hotspot, the Vaan island also plays a key role in dissipating wave energy before it reaches the heavily populated 170-km long coastal stretch of Tamil Nadu. The space between the string of islets (of which Vaan island is a part) and the mainland is also used by the fishermen to park their boats.

However, years of biotic intrusion, frequent forest fires, coral mining and destructive fishing practices by the fishermen had resulted in the island shrinking from 16 hectares in 1986 to 1.5 hectares in 2015.

Worried by the drastic deterioration of the island, Tamil Nadu government's Environment Department approached IIT Madras for a solution to protect the island and prevent it from disappearing entirely. Their only condition? To do it without large engineering structures that would harm the already-fragile ecosystem.

The Department of Ocean Engineering at IIT Madras (headed by Prof S A Sannasiraj) decided to take up the challenge. Working with Tuticorin-based Suganthi Devadason Marine Research Institute, the IIT-M team designed and studied several small scale island rehabilitation models at their lab before finalising their strategy. Wave dynamic and bathymetry studies were also conducted.

The method they chose revolved around two aspects – coral rehabilitation and artificial reef deployment.

Artificial reef modules mimic the characteristics of a natural reef and can be positioned to make the most of the underwater photosynthesis. Consequently, the plankton drifting across the curved inner surface of the holes provide a steady source of nourishment for the marine creatures (like sea anemones, sea urchins, juvenile fish etc.) that set up their homes within. The holes in the concrete structures also provide juvenile marine organisms with a place to better protect themselves against predators.

However, the most important function of the tiny hollows is to provide a foothold for larval corals. The regrowth of coral reefs around the sinking island reduces the erosive force of the currents and waves. By ensuring good water circulation, the holes in artificial reef modules also enhance wave dissipation while reducing the chance of them being moved about by storm currents.

Speaking to The Indian Express, H Malleappa (Director, Environment Department, Govt. of Tamil Nadu) said,

“Coral mining was once rampant in this area, and that combined with rising sea levels have over the years harmed the island. The objective was to control the erosion of the island and to facilitate coral rehabilitation in surrounding areas.”

This was the first time that this strategy was being used to reclaim an island, though it has been used earlier to break waves and rehabilitate corals in other parts of the world. For example, New York City has been stripping retired subway cars of toxic junk (like wheels, seats, motors etc.) and dumping them into the Atlantic Ocean for years to create artificial reefs!

The IIT-M team used this idea to design a “two-layer submerged reef breakwater system” for Vaan island.

In the first phase, about three sq km of submerged land around the island was seeded with native coral species. Regular checks and careful documentation were done by the IIT-M team to monitor the survival and growth of the transplanted corals.

In the second phase, about 9000 artificial reef modules (small structures of reinforced concrete with holes of varying sizes) were lowered into the sea and placed as a semi-circular constellation at a distance of 250 meters from the island’s shoreline. Each of the specially designed triangular modules is 2 meter in height, 2.5 meters in width, 1 meter in longitudinal length and weighs 1.8 tonnes each.

This was complemented by awareness programmes and eco-development activities among coastal communities to decrease harmful human activity. The results of these efforts soon began being seen. With the coral regrowth on the artificial modules starting in just eight months, there was a marked decrease in erosion as well as an increase in Vaan island’s surface area. Moreover, the fish population around the island increased, thus enhancing the ecological support for local livelihoods.

Following the success in bringing back the Vaan Island, the Tamil Nadu government now plans to use the same strategy to restore two islands that are losing land to erosion. It has approached the Green Climate Fund with a proposal to finance this project. The Vaan Island project was funded by the National Adaptation Fund for Climate Change of the Ministry of Environment, Forests and Climate Change.

With sea-levels rising due to global warming, islands and low-lying coastal areas have become increasingly vulnerable to erosion, inundation and submergence. In this context, IIT-M's project is an important step towards protecting coastal/island ecosystems in India and making them climate-resilient.

Date: 15th September 2017

Publication: Chennai Patrika

Edition: Online

Journalist: NA

Professor: Prof. M.V.Sangaranarayanan

Headline: IIT Madras Professor selected for C.N.R. Rao National Prize

URL: <http://news.chennaiatrika.com/post/2017/09/14/IIT-Madras-Professor-selected-for-C-N-R-Rao-National-Prize.aspx>

IIT Madras Professor selected for C.N.R. Rao National Prize



Chennai, 14 September 2017: A Professor from Indian Institute of Technology Madras has been selected for the prestigious C.N.R. Rao National Prize for research in Chemical Sciences.

Dr.M.V.Sangaranarayanan, Professor, Department of Chemistry, IIT Madras, was selected for this award, instituted by the C.N.R. Rao Educational Foundation for the promotion of Chemical Research in India. The award is constituted by the Chemical Research Society of India, a professional body that promotes and facilitates research and education in all branches of

chemistry. The award has been presented in recognition of his following contributions:

- (i) theory of electron transfer processes at various interfaces using thermodynamic and statistical mechanical models for de-mystifying a large class of experimental observations
- (ii) applications of conducting polymers to electrochemical supercapacitors and biosensors

Prof. M.V.Sangaranarayanan along with his research group has been analysing various fundamental questions on the thermodynamic and microscopic analysis of electrochemical systems. Further, statistical mechanical modelling of electrical double layer, non-equilibrium thermodynamics of charge transport processes, supercapacitors, and biosensors among are his other significant contributions.

Prof. Sangaranarayanan has co-authored two textbooks in physical chemistry and published nearly 120 papers in International Journals.

Speaking about the contributions leading to the award Prof. M.V. Sangaranarayanan, Department of Chemistry, IIT Madras, said, "The theoretical and experimental studies on charge transfer processes in electrochemical systems constitute the most challenging field of research. A variety of sophisticated

theoretical techniques in conjunction with diverse electrochemical experiments has provided significant breakthroughs in the studies conducted by my research group at IIT Madras”.

Date: 15th September 2017

Publication: Telangana Today

Edition: Online

Journalist: NA

Professor: Prof. M.V.Sangaranarayanan

Headline: IIT Madras professor selected for CNR Rao National Prize

URL: <https://telanganatoday.com/iit-madras-professor-selected-for-cnr-rao-national-prize>

IIT Madras professor selected for CNR Rao National Prize

The award is constituted by the Chemical Research Society of India (CRSI), a professional body that promotes and facilitates research and education in all branches of chemistry.



Hyderabad: A professor from Indian Institute of Technology Madras has been selected for the prestigious CNR Rao National Prize for research in Chemical Sciences.

Dr MV Sangaranarayanan, Professor in Department of Chemistry, IIT Madras, was selected for this award, instituted by the CNR Rao Educational Foundation for the promotion of Chemical Research in India.

The award is constituted by the Chemical Research Society of India (CRSI), a professional body that promotes and facilitates research and education in all branches of chemistry.

The award has been presented in recognition of his following contributions including his theory of electron transfer processes at various interfaces using thermodynamic and statistical mechanical models for de-

mystifying a large class of experimental observations and applications of conducting polymers to electrochemical supercapacitors and biosensors.

Prof MV Sangaranarayanan along with his research group has been analysing various fundamental questions on the thermodynamic and microscopic analysis of electrochemical systems.

Further, statistical mechanical modelling of electrical double layer, non-equilibrium thermodynamics of charge transport processes, supercapacitors, and biosensors among are his other significant contributions. He has co-authored two textbooks in physical chemistry and published nearly 120 papers in International Journals.

Speaking about the contributions leading to the award Prof MV Sangaranarayanan said, “The theoretical and experimental studies on charge transfer processes in electrochemical systems constitute the most challenging field of research.

A variety of sophisticated theoretical techniques in conjunction with diverse electrochemical experiments has provided significant breakthroughs in the studies conducted by my research group at IIT Madras”.

Date: 15th September 2017

Publication: Dinamani

Edition: Chennai

Page no.: 7

Journalist: NA

Professor: Prof. M.V.Sangaranarayanan

Headline: IIT Madras Professor selected for C.N.R. Rao National Prize

ஐஐடி பேராசிரியருக்கு சி.என்.ஆர்.ராவ் பரிசு

சென்னை, செப்.14: வேதி அறிவியல் (கெமிக்கல் சயின்ஸ்) ஆராய்ச்சிக்கான உயரிய சி.என்.ஆர்.ராவ் பரிசுக்கு சென்னை ஐஐடி பேராசிரியர் எம்.வி. சங்கரநாராயணன் தேர்வு செய்யப்பட்டுள்ளார்.

இதுகுறித்து சென்னை ஐஐடி வெளியிட்ட செய்தி:

இந்தியாவில் கெமிக்கல் சயின்ஸ் ஆராய்ச்சியை ஊக்குவிக்கும் வகையில் சி.என்.ஆர். ராவ் கல்வி அறக்கட்டளைசார்பில் ஒவ்வொரு ஆண்டும் இந்த விருது வழங்கப்பட்டு வருகிறது. இந்த ஆண்டுக்கான விருதுக்கு சென்னை ஐஐடி வேதியியல் துறை பேராசிரியர் எம்.வி. சங்கரநாராயணன் தேர்வு செய்யப்பட்டுள்ளார். வெப்ப இயக்க விசை அழுத்தம் மற்றும் நுண்ணோக்கிகள் குறித்த ஆய்வுகளை இவர் மேற்கொண்டுள்ளார் எனத் தெரிவிக்கப்பட்டுள்ளது.

Date: 15th September 2017

Publication: Dinathanthi

Edition: Chennai

Page no.: 11

Journalist: Benny

Professor: Prof. M.V. Sangaranarayanan

Headline: IIT Madras Professor M.V.Sangaranarayanan gets National Award

URL: <http://www.dailythanthi.com/News/Districts/2017/09/15023336/Chennai-IIT-ProfessorNational-Award-for-Sankaranarayanan.vpf>

சென்னை ஐ.ஐ.டி. பேராசிரியர்
சங்கரநாராயணனுக்கு
தேசிய விருது

சென்னை, செப்.15-
இந்திய வேதியியல் ஆராய்ச்சி சமூகம் சார்பில் வேதியியல் துறையில் பல்வேறு நிலைகளில் சிறந்து விளங்குபவர்களை ஊக்குவிக்கும் விதமாக ஒவ்வொரு ஆண்டும் விருது வழங்கி வருகிறது. அந்தவகையில் இந்த ஆண்டுக்கான சி.என்.ஆர். ராவ் தேசிய விருதுக்கு சென்னை ஐ.ஐ.டி. கல்வி நிறுவனத்தின் வேதியியல் துறை பேராசிரியர் சங்கரநாராயணன் தேர்வு செய்யப்பட்டுள்ளார்.

இவர் மதுரை காமராஜர் பல்கலைக்கழகத்தில் இளநிலை மற்றும் முதுநிலை வேதியியல் படிப்பினை நிறைவு செய்துள்ளார். பெங்களூருவில் உள்ள இந்திய அறிவியல் நிறுவனத்தில் ஆராய்ச்சி படிப்பு படித்துள்ளார். காரைக்குடியில் உள்ள மத்திய எலக்ட்ரோ கெமிக்கல் ஆராய்ச்சி நிலையத்தில் விஞ்ஞானியாக பணியாற்றி இருக்கிறார். கடந்த 30 ஆண்டுகளாக வேதியியல் துறையில் பல்வேறு ஆராய்ச்சிகளை நிகழ்த்தி அனுபவம் பெற்றவர்.



Date: 15th September 2017

Publication: Malai Malar

Edition: Online

Journalist: NA

Professor: Prof. M.V. Sangaranarayanan

Headline: IIT Madras Professor M.V. Sangaranarayanan gets National Award

URL: <http://www.maalaimalar.com/News/TopNews/2017/09/15091214/1108103/National-Award-for-Chennai-IIT-Professor-Sankaranarayanan.vpf>

சென்னை ஐ.ஐ.டி. பேராசிரியர் சங்கரநாராயணனுக்கு தேசிய விருது

இந்த ஆண்டுக்கான சி.என்.ஆர். ராவ் தேசிய விருதுக்கு சென்னை ஐ.ஐ.டி. கல்வி நிறுவனத்தின் வேதியியல் துறை பேராசிரியர் சங்கரநாராயணன் தேர்வு செய்யப்பட்டுள்ளார்.



இந்திய வேதியியல் ஆராய்ச்சி சமூகம் சார்பில் வேதியியல் துறையில் பல்வேறு நிலைகளில் சிறந்து விளங்குபவர்களை ஊக்குவிக்கும் விதமாக ஒவ்வொரு ஆண்டும் விருது வழங்கி வருகிறது. அந்தவகையில் இந்த ஆண்டுக்கான சி.என்.ஆர். ராவ் தேசிய விருதுக்கு சென்னை ஐ.ஐ.டி. கல்வி நிறுவனத்தின் வேதியியல் துறை பேராசிரியர் சங்கரநாராயணன் தேர்வு செய்யப்பட்டுள்ளார்.

இவர் மதுரை காமராஜர் பல்கலைக்கழகத்தில் இளநிலை மற்றும் முதுநிலை வேதியியல் படிப்பினை நிறைவு செய்துள்ளார். பெங்களூருவில் உள்ள இந்திய அறிவியல் நிறுவனத்தில் ஆராய்ச்சி படிப்பு படித்துள்ளார். காரைக்குடியில் உள்ள மத்திய எலக்ட்ரோ

கெமிக்கல் ஆராய்ச்சி நிலையத்தில் விஞ்ஞானியாக பணியாற்றி இருக்கிறார். கடந்த 30 ஆண்டுகளாக வேதியியல் துறையில் பல்வேறு ஆராய்ச்சிகளை நிகழ்த்தி அனுபவம் பெற்றவர்.

Date: 16th September 2017

Publication: India Education Diary

Edition: Online

Journalist: NA

Professor: Prof. M.V. Sangaranarayanan

Headline: IIT Madras Professor selected for C.N.R. Rao National Prize

URL: <http://indiaeducationdiary.in/iit-madras-professor-selected-c-n-r-rao-national-prize/>

IIT Madras Professor selected for C.N.R. Rao National Prize



Chennai: A Professor from Indian Institute of Technology Madras has been selected for the prestigious C.N.R. Rao National Prize for research in Chemical Sciences.

Dr. M.V. Sangaranarayanan, Professor, Department of Chemistry, IIT Madras, was selected for this award, instituted by the C.N.R. Rao Educational Foundation for the promotion of Chemical Research in India.

The award is constituted by the Chemical Research Society of India, a professional body that promotes and facilitates research and education in all branches of chemistry. The award has been presented in recognition of his following contributions:

- (i) theory of electron transfer processes at various interfaces using thermodynamic and statistical mechanical models for de-mystifying a large class of experimental observations
- (ii) applications of conducting polymers to electrochemical supercapacitors and biosensors

Prof. M.V. Sangaranarayanan along with his research group has been analysing various fundamental questions on the thermodynamic and microscopic analysis of electrochemical systems. Further, statistical mechanical modelling of electrical double layer, non-equilibrium thermodynamics of charge transport processes, supercapacitors, and biosensors among are his other significant contributions.

Prof. Sangaranarayanan has co-authored two textbooks in physical chemistry and published nearly 120 papers in International Journals.

Speaking about the contributions leading to the award Prof. M.V. Sangaranarayanan, Department of Chemistry, IIT Madras, said, "The theoretical and experimental studies on charge transfer processes in electrochemical systems constitute the most challenging field of research. A variety of sophisticated theoretical techniques in conjunction with diverse electrochemical experiments has provided significant breakthroughs in the studies conducted by my research group at IIT Madras".

Date: 16th September 2017

Publication: Dinamalar

Edition: Chennai

Page no.: 4

Journalist: NA

Professor: Prof. M.V. Sangaranarayanan

Headline: IIT Madras Professor selected for C.N.R. Rao National Prize

**சென்னை ஐ.ஐ.டி.,
பேராசிரியருக்கு
சி.என்.ஆர்., விருது**

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பேராசிரியர் தேர்வு
செய்யப்பட்டு உள்ளார்.

சென்னை, ஐ.ஐ.டி.,யின்
வேதியியல் துறை பேராசி
ரியர், சங்கர நாராயணன்.
இவர், 20 ஆண்டுகளுக்
கும் மேலாக, பல்வேறு
ஆராய்ச்சி பணிகளில்
ஈடுபட்டுள்ளார்.

எலக்ட்ரான் மாற்றம்
குறித்து, வேதியியல்
ஆய்வு பணிகளை மேற்
கொண்டதை பாராட்டி,
வேதி அறிவியல் ஆராய்ச்
சிக்கான, சி.என்.ஆர்.
ராவ் விருதுக்கு தேர்வு
செய்யப்பட்டு உள்ளார்.

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வனமான, ஐ.ஐ.எஸ்., சில்
ஆராய்ச்சி படிப்பை
முடித்துள்ளார்.

Date: 18th September 2017

Publication: The Pioneer

Edition: Delhi

Page no.: 6

Journalist: Kumar Chellappan

Professor: Prof. Sundara Ramaprabhu

Headline: IIT-Madras' no wear & tear tech to soar GDP

URL: <http://www.dailypioneer.com/nation/iit-madras-no-wear-and-tear-tech-to-soar-gdp.html>

IIT-Madras' no-wear & tear tech to soar GDP

KUMAR CHELLAPPAN ■
CHENNAI

Scientists of the Indian Institute of Technology-Madras and National Thermal Power Corporation Ltd, the country's power giant, have succeeded in developing a path breaking and innovative material capable of rejuvenating considerably the country's Gross Domestic Product.

"This innovation will help us to minimise the wear and tear as well as damages caused to components of the machines," Dr Sundara Ramaprabhu, Head, Alternative Energy & Nanotechnology Lab, IIT-Madras who led the team of research scholars in the three-year long research, told The Pioneer.

Beilstein Journal of Nanotechnology, an international peer-reviewed journal has published the findings of the IIT-Madras team in its latest issue.

The country loses 4 per



Dr Rashmi Shende (left) with Nisha Ranjan testing the nano-lubricant in IIT-Madras laboratory in Gurug.

cent of its GDP every year because of corrosion, wear and tear, according to Baldev Raj, former director, Indira Gandhi Centre for Atomic Research (IGCAR), Chennai. The nano-lubricant developed by Dr Ramaprabhu and his team will resolve this issue.

Machines get damaged because of continuous friction between its parts. Though

lubricant oils are deployed to bring down the friction, they are not that effective and needs replacement quite frequently. What Dr Ramaprabhu and his team did was to change the character of the lubricant oils used in some of the critical components. The NTPC, which was looking forward to means to increase the longevity of its machines and bring

down the operational costs had contacted Dr Ramaprabhu with their problems.

Dr Ramaprabhu, an authority on nano materials, studied the normal lubricant oil and decided to make certain alterations in its structure. With the help of Dr Rashmi Chandrabhan Shende, a Nagpur-born physicist, Dr Ramaprabhu converted the normal lubricant oil to nano-lubricant oil. This he did by dispersing nano particles in the lubricant oil with the aid of probe sonicator, a device used to suspend nano particles uniformly in the oil.

The nano-particles were made out of graphene oxide and the nano-lubricant was termed as "nitrogen-doped reduced graphene oxide". The result we got with nano-lubricant was a pleasant surprise.

The coefficient of friction as well the wear and tear got reduced by 20 per cent. The operational temperature fell by 15 per cent when the nano-lubricant was deployed in the Induced Draft Fan, the most

crucial component in a power generator," explained Dr Ramaprabhu.

Velayudhan Pillai Iyan, deputy general manager (research and development) NTPC, who worked with Dr Ramaprabhu, said that it was a dream come true. "We are using nano material in a power generation unit for the first time. The results were simply superb. The operational temperature came down drastically. The wear and tear got reduced and the longevity of the engineering components was considerably increased," Iyan told The Pioneer over telephone from the Greater Noida laboratories of NEIRA (NTPC Energy Technology Research Alliance).

The IDF is the component which sucks out the coal-burnt gas from the boiler of the power unit. "The energy consumption level of the IDF showed remarkable reduction when we used this nano-lubricant oil in place of the routine oil. If this nano-lubricant is deployed in all the 71 units of

the NTPC, the operational costs would come down by ₹60 crore per year," said Dr Ramaprabhu.

Rashmi Shende said this was the tip of the ice berg. "We can deploy nano-lubricant oil in all systems which use lubricants. The composition may need some alterations," said Rashmi. Nisha Ranjan, a Ph.D scholar will continue the research project for new nano lubricants.

Nano-lubricants may soon replace all kind of lubrication oils in various engineering applications like motor vehicle engines and other mechanical systems. "This is an ongoing research. Right now we have developed nano-lubricants for power generators. More such products are on the anvil," explained Dr Sundara Ramaprabhu, who had developed nano materials for treating effluent water and purifying polluted river waters. Perhaps he has the solution for cleaning the waters of Ganga. Are you listening, Prime Minister Modi?

Date: 19th September 2017

Publication: The Economic Times

Edition: Delhi/Mumbai/Pune/Hyderabad/Chennai/Kochi/Ahmedabad

Page no.: 18

Journalist: Hari Pulakkat

Professor: Prof. Balaji Narasimhan

Headline: Climate and the City

URL: <http://economictimes.indiatimes.com/news/science/how-cities-are-planning-to-tackle-the-menace-of-climate-change/articleshow/60739118.cms>

Climate and the City

As scientists begin to understand cities better, administrators are using this knowledge to make them resilient to climate change

Hari Pulakkat

The urban landscape of Indian Institute of Space and Astronautical Sciences (IISAT) in Thiruvananthapuram is a testament to the fact that cities are not just a collection of buildings and roads, but a complex system that can be designed to be resilient to climate change.



How Climate Change can be Devastating for Cities

EXTREME HEAT Because of urbanisation, heat islands are forming in cities. In a city, the temperature is higher than in the surrounding areas. This is because of the heat that is trapped in the city. This is because of the heat that is trapped in the city. This is because of the heat that is trapped in the city.

How Cities are Planning for Climate Change Internationally

CHICAGO The Green Line Program includes a number of projects that will help to reduce the city's carbon footprint. This is because of the heat that is trapped in the city. This is because of the heat that is trapped in the city. This is because of the heat that is trapped in the city.

Scientists are also trying to make cities more resilient to climate change. This is because of the heat that is trapped in the city. This is because of the heat that is trapped in the city. This is because of the heat that is trapped in the city.

Some of the ways that cities are planning for climate change include: building more green buildings, using renewable energy, and creating more green spaces. This is because of the heat that is trapped in the city. This is because of the heat that is trapped in the city. This is because of the heat that is trapped in the city.

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Date: 21st September 2017

Publication: Skill Outlook

Edition: Online

Journalist: NA

Professor: Prof. M.V. Sangaranarayanan

Headline: IIT Madras professor selected for CNR Rao National Prize

URL: <http://skilloutlook.com/education/iit-madras-professor-selected-cnr-rao-national-prize>

IIT Madras professor selected for CNR Rao National Prize



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Speaking about the contributions leading to the award Prof. M.V. Sangaranarayanan, Department of Chemistry, IIT Madras, said, "The theoretical and experimental studies on charge transfer processes in electrochemical systems constitute the most challenging field of research. A variety of sophisticated theoretical techniques in conjunction with diverse electrochemical experiments has provided significant breakthroughs in the studies conducted by my research group at IIT Madras".

Date: 22nd September 2017

Publication: The Economic Times

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Page no.: 7

Journalist: Hari Pulakkat

Professor: Prof. Balaji Narasimhan

Headline: Climate and the City

URL: <http://economictimes.indiatimes.com/news/science/how-cities-are-planning-to-tackle-the-menace-of-climate-change/articleshow/60739118.cms>

Climate and the City

As scientists begin to understand cities better, administrators are using this knowledge to make them resilient to climate change

Hari Pulakkat

The urban landscape of India's largest city, Mumbai, is being transformed by a new wave of urban planning. As scientists begin to understand cities better, administrators are using this knowledge to make them resilient to climate change.



How Climate Change can be Devastating For Cities

Climate change is set to have a devastating impact on cities, particularly in the tropics and subtropics. The impact will be felt in the form of more frequent and severe weather events, rising sea levels, and more frequent and severe droughts. Cities are particularly vulnerable to these impacts because of their high population density and their reliance on infrastructure that is often not designed to withstand these impacts.

How Cities are Planning for Climate Change Internationally

Cities around the world are beginning to plan for climate change. Some cities are focusing on reducing greenhouse gas emissions, while others are focusing on building resilience to the impacts of climate change. For example, some cities are investing in green infrastructure, such as parks and green roofs, to help reduce urban heat island effects. Other cities are investing in coastal protection, such as sea walls and levees, to help protect against rising sea levels.

Some cities are also investing in water management infrastructure, such as rainwater harvesting and greywater recycling, to help reduce water consumption. Other cities are investing in disaster preparedness, such as evacuation routes and emergency shelters, to help protect against natural disasters. These efforts are essential to ensure that cities are able to withstand the impacts of climate change and continue to thrive in the future.

As the world's population continues to grow, cities will become even more important. It is essential that we take action now to reduce greenhouse gas emissions and build resilience to the impacts of climate change. By doing so, we can ensure that our cities are able to provide a high quality of life for all of their residents in the future.

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Date: 23rd September 2017

Publication: Rajya Sabha TV - Gyan Vigyan Show

Edition: Electronic

Journalist: NA

Professor: Prof. Rama Shanker Verma

Headline: Story on 'Use of Microgravity to find a cure for Cancer'

URL: <https://www.youtube.com/watch?v=ul91DO3pczM>



Date: 23rd September 2017

Publication: Rajya Sabha TV - Science Monitor

Edition: Electronic

Journalist: NA

Professor: Prof. Rama Shanker Verma

Headline: Story on 'Use of Microgravity to find a cure for Cancer'

URL: <https://www.youtube.com/watch?v=EkLMS1D3q3c>



Date: 26th September 2017

Publication: DD News

Edition: Electronic

Journalist: Priyanka & Phillip Mathew

Professor: Prof. Ashok Jhunjunwala, Prof. Bhaskar Ramamurthi & Dr Prabhjot Kaur

Headline: Solar DC Inverterless System



Date: 29th September 2017

Publication: India Science Wire

Edition: Online

Journalist: Ratneshwar Thakur

Professor: Prof. Nitish R Mahapatra

Headline: Study identifies genetic link to heart disease in Indian population

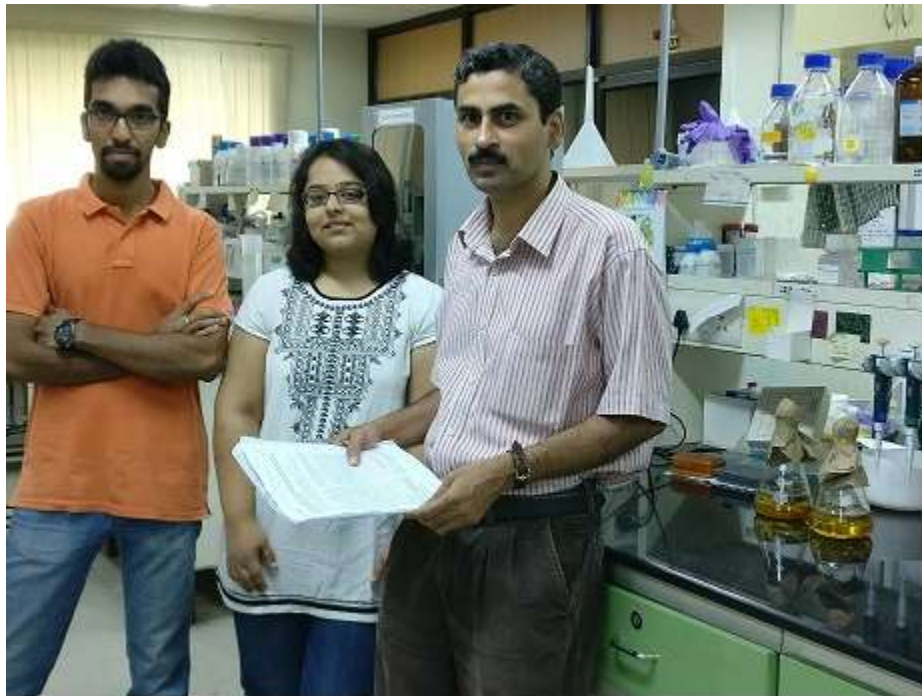
URL: <http://vigyanprasar.gov.in/isw/heartdisease.html>

Study identifies genetic link to heart disease in Indian population

About 35 to 40 percent Indians carry a set of genetic variations which puts them at higher risk of heart disease, finds a new study.

A team of Indian researchers has discovered that carriers of a set of genetic variants in the Chromogranin A (CHGA) gene called 'CHGA promoter haplotype2' may be at higher risk for cardi ovascular and metabolic disorders. An estimated 35 to 40 percent of Indian population may be carrying this genetic variant.

The study is based on analysis of genomic DNA samples from over 750 individuals from Indian population. The research findings have been published in Journal of Biological Chemistry.



Research team at IIT-Madras.

" We hope these findings would help unravel biological pathways and mechanisms underlying these complex diseases and would help in the development of therapeutic as well as preventive strategies," said Dr. Mahapatra.

Though the CHGA promoter haplotype is present in other ethnic populations, it occurs more frequently in populations of South Asian ancestry. “It is a protein of neuroendocrine origin and is secreted along with hormones like catecholamines. Earlier studies had suggested its role in regulation of cardiovascular and metabolic diseases but there was no data about it in South Asian populations,” said Lakshmi Subramanian, first author of this paper.

“We studied genomic DNA of Indians and discovered a specific set of changes in the CHGA gene sequence called Haplotype2 which contributed to increased CHGA gene expression, and ultimately increased CHGA protein levels in plasma. When the clinical parameters of those in the study were compared, Haplotype2 carriers displayed higher levels of metabolic and cardiovascular traits like plasma glucose, blood pressure and body mass index,” explained Dr. Nitish R. Mahapatra, Professor at IIT-Madras.

However, he said, these results need further validation in animal models as well as large-scale studies in individuals with metabolic syndrome. “We hope these findings would help unravel biological pathways and mechanisms underlying these complex diseases and would help in the development of therapeutic as well as preventive strategies,” said Dr. Mahapatra.

“Basic research in cardiovascular biology is in a very nascent stage in India with only a handful of researchers working in this field. This new study significantly contributes towards understanding molecular basis of cardiovascular and metabolic diseases. This is a fast emerging area with tremendous therapeutic and diagnostic potential,” commented Dr Shyamal K. Goswami, a professor at School of Life Science, JNU, who is not connected with the study.

The study was led by Dr. Nitish R. Mahapatra at Indian Institute of Technology -Madras, Chennai, in a collaborative effort with Dr. Ajit S. Mulasari at Madras Medical Mission, Chennai, and Dr. Madhu Khullar at PGIMER, Chandigarh. (India Science Wire)

Date: 29th September 2017

Publication: Scroll

Edition: Online

Journalist: Ratneshwar Thakur

Professor: Prof. Nitish R Mahapatra

Headline: Lab notes: Scientists identify a gene that puts Indians at higher risk of heart disease

URL: <https://scroll.in/pulse/852266/lab-notes-scientists-identify-a-gene-that-puts-indians-at-higher-risk-of-heart-disease>

Lab notes: Scientists identify a gene that puts Indians at higher risk of heart disease

About 35% to 40% Indians carry a set of genetic variations that puts them at higher risk of heart disease, finds a new study.

A team of Indian researchers has discovered that carriers of a set of genetic variants in the Chromogranin A gene called CHGA promoter haplotype 2 may be at higher risk for cardiovascular and metabolic disorders. The study is based on analysis of genomic DNA samples from over 750 individuals from Indian population. The research findings have been published in Journal of Biological Chemistry.

Though the CHGA promoter haplotype is present in other ethnic populations, it occurs more frequently in populations of South Asian ancestry.

“It is a protein of neuroendocrine origin and is secreted along with hormones like catecholamines,” said Lakshmi Subramanian, first author of this paper. “Earlier studies had suggested its role in regulation of cardiovascular and metabolic diseases but there was no data about it in South Asian populations.”

Dr Nitish R Mahapatra, professor at the Indian Institute of Technology, Madras, who led the study said, “We studied genomic DNA of Indians and discovered a specific set of changes in the CHGA gene sequence called haplotype 2 which contributed to increased CHGA gene expression, and ultimately increased CHGA protein levels in plasma. When the clinical parameters of those in the study were compared, Haplotype 2 carriers displayed higher levels of metabolic and cardiovascular traits like plasma glucose, blood pressure and body mass index.”

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Date: 29th September 2017

Publication: Bio Tech Times

Edition: Online

Journalist: Ratneshwar Thakur

Professor: Prof. Nitish R Mahapatra

Headline: Study identifies genetic link to heart disease in Indian population

URL: <https://biotechtimes.org/2017/09/28/scientists-discover-genetic-link/>

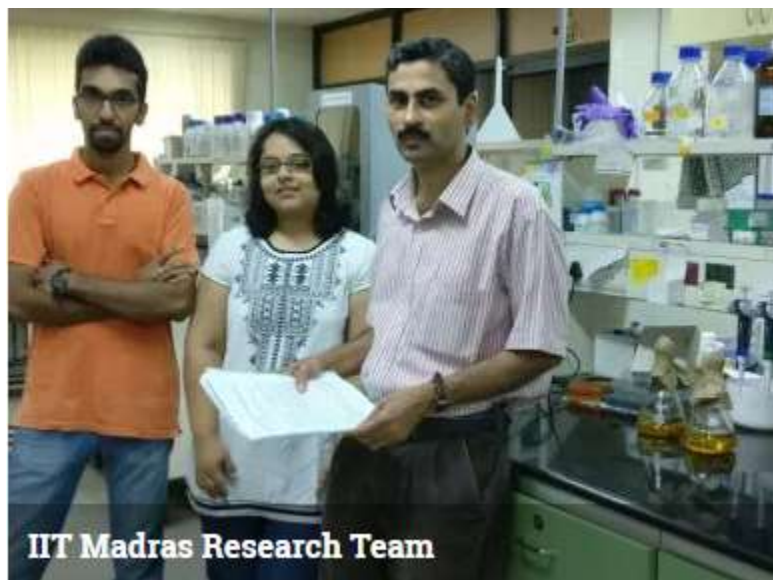
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New Delhi, September 28: About 35 to 40 percent Indians carry a set of genetic variations which puts them at higher risk of heart disease, finds a new study.

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Date: 29th September 2017

Publication: APN Live

Edition: Online

Journalist: Ratneshwar Thakur

Professor: Prof. Nitish R Mahapatra

Headline: Study identifies genetic link to heart disease in Indian population

URL: <http://www.apnlive.com/science/study-identifies-genetic-link-to-heart-disease-in-indian-population-28428>

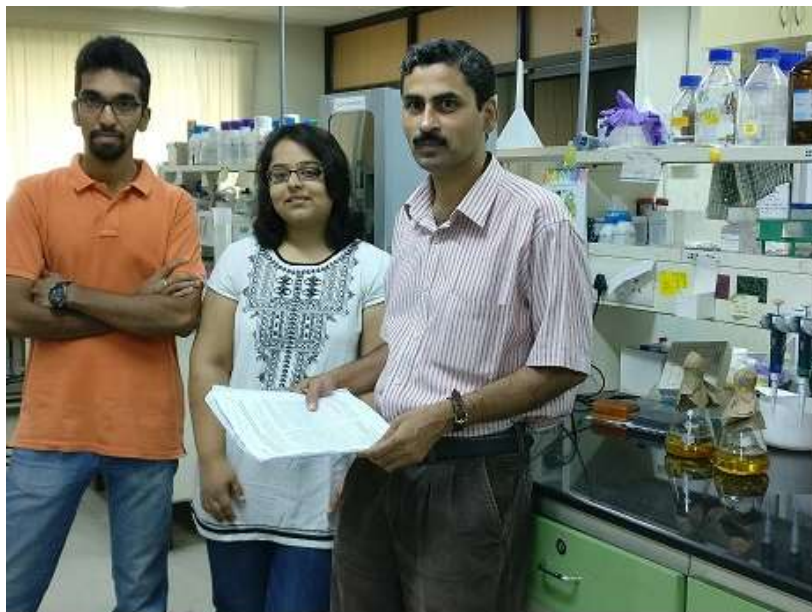
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PERSPECTIVE

Lighting Up Lives

Solar innovation by IIT Madras drives economic growth in rural India

Aditya Lolla, Project Officer, Center for Decentralized Power Systems, Indian Institute of Technology Madras

Rural India, home to about 833 million people, is gradually ushering in new growth opportunities for the corporate sector, and is set to become a vital cog in the country's growth story over the next decade. However, one of the biggest hindrances to this narrative is the lack of access to good quality, reliable power supply.

Many studies have already established the direct link between energy access and higher incomes, thereby validating a high correlation between energy availability and human development, especially in developing countries. Today, nearly 300 million people in rural India lack access to grid-connected power while those who do have access, endure poor quality grid power, with either no power or power outages for a large part of the day. It is in this context that solar energy, when it is made affordable, introduces a completely new paradigm with an opportunity to directly target remote communities and bridge infrastructural, economic and social gaps.

India is blessed with a high level of solar irradiance. With the prices of solar panels falling rapidly, especially in the past few years, solar power is set to become commercially mainstream, encouraging many entrepreneurs as well as private investors. What is needed now is the development of energy-efficient systems, which can reduce the power requirement from solar panels and take advantage of the falling prices. Decentralised rooftop solar photovoltaic (PV) can offer the most affordable power solution, irrespective of whether the grid is present or not. Solar-DC Inverterless, a technology developed by the Indian Institute of Technology, Madras, is one

such energy-efficient innovation that is lending weight to this narrative.

In a traditional alternating current (AC)-based solar power solution, direct current (DC) power generated at the solar PV panel needs to be converted to AC for being combined with the grid. An AC-to-DC converter is required when solar and grid power is to be used to charge the battery (which is inherently DC) and a DC-to-AC converter is needed to run AC appliances. Now, losses in each of these converters is at least 15 per cent at the lower power levels (less than 1 kW), and the total losses in the system would be nearly 45 per cent, excluding battery losses. As a result, the affordability of solar power takes a beating. Incidentally, all appliances today are becoming DC based and employ AC-to-DC drivers, adding to inefficiencies and costs.

Solar-DC Inverterless overcomes this chal-

lenge as it involves moving to DC appliances on a 48V DC internal distribution line within homes with charge controller (inverterless), allowing the entire system to operate on DC. A single AC-to-DC converter is required to draw power from the grid, if desired. It leverages the power advantages that DC appliances bring and couples it with an extremely energy-efficient charge controller. This system is 90-94 per cent efficient and as a result, the system sizing requirement falls by more than half as compared to an equivalent AC-based solar solution. Ultimately, this results in a per unit cost of around Rs 4 and an energy bill saving of 50 per cent compared to its AC counterpart.

But what does this mean for rural India?

The solar-DC system broadly has three benefits. It reduces the power bill significantly for lower-income rural homes. It provides power backup for grid loadshedding and ensures 24x7 good quality power sup-



A home in Kundhal, a village near the Nellore town, running on Solar-DC Inverterless



Local entrepreneur installing Solar-DC Inverterless in a home in Jang Thakur hamlet in Nagpada, Telangana



A home in Belagavadi village in Karnataka powered by Solar-DC Inverterless technology

ply. Further, it makes decentralised solar the most affordable option for powering homes in the lower tier of the energy ladder.

Today, Solar-DC Inverterless is powering more than 10,000 households across 11 states in India. In Rajasthan, as many as 71 villages with 4,000 households in Jodhpur and Jaisalmer districts have been fully electrified using this technology. In Assam, as of August 2017, about 6,000 off-grid homes have been installed with these systems, leading to 100 per cent electrification in about 90 villages. It has also been deployed at several places that have grid connectivity but suffer from frequent and long hours of load shedding. Several other proof-of-concept deployments are being carried out in different states including Andhra Pradesh, Odisha, Tamil Nadu and Telangana. From villages in Rajasthan's

Thar desert to fluvial villages along the Brahmaputra river in Assam, from tribal hamlets in the Nigh forest reserve in Tamil Nadu to cotton farming hamlets in Telangana, Solar-DC Inverterless has made its way into different types of terrains and homes. In each of these places, there was a conscious effort to develop an ecosystem for the implementation of Solar-DC Inverterless technology to ensure the sustenance and evolution of the technology. A pool of local technicians for repair and maintenance work had to be developed, which, in turn, created a platform for budding local entrepreneurs. Consequently, feedback coming in from all these places is suggesting significant gains, not just in terms of power consumption but also in terms of education, health and rural entrepreneurship.

For instance, consider Belagavadi, a vil-

lage two hours north of Bengaluru in Karnataka, with 220 Homes running on this technology. The statistics available from the Bangalore Electricity Supply Company suggest that grid consumption in many of these households has reduced by 40 per cent post the deployment. More interestingly, a new dynamic emerged where in more people chose to stay back in the village even during the hot summer months compared to the previous years when they would migrate to Bengaluru in search of temporary work during these months. As a result, local productivity is on the rise. This clearly points towards a correlation between good quality, affordable power and local jobs/business development, leading to a greater impact on the economic development of the poorest and the most vulnerable.

The more obvious benefits brought about by extending the hours of available light through solar energy were visible at all the deployment sites, with women taking up activities like making handicrafts and children studying even after sundown. A simple innovation is enabling vulnerable groups overcome an issue bigger than poverty—poverty of their aspirations. Therefore, it is crucial to build on the momentum that has been created by making available high quality, clean power to rural homes at an affordable cost. The need of the hour is the creation of a conducive financial and institutional environment to unlock the true potential of solar energy and bring about huge improvements in education, health care, irrigation, communication and tourism in rural areas.

Solar-DC Inverterless has shown how the most vulnerable population, operating with predictable access to power, can usher in economic activity that is otherwise not possible. It underlines how improving access to solar power can play a telling role in pulling communities out of poverty and improve socially and financially inclusive solutions. India is on the cusp of a solar power revolution. The time has come for India to leverage the promise of solar energy in its truest sense. ■



Light for the first time in the pitch-dark nights of Bhopej ka Gaur – Solar-DC Inverterless in Rajasthan

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Professor: Prof. Nitish R. Mahapatra

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URL: <http://www.downtoearth.org.in/news/carrying-set-of-genes-puts-you-on-higher-risk-of-cardiovascular-diseases-study-58765>

Carrying a particular set of genes puts you on higher risk of heart diseases: study

About 35 to 40 per cent Indians carry a set of genetic variations which puts them at higher risk of heart disease, finds a new study.

A team of Indian researchers has discovered that carriers of a set of genetic variants in the Chromogranin A (CHGA) gene called 'CHGA promoter haplotype2' may be at higher risk for cardiovascular and metabolic disorders. An estimated 35 to 40 percent of Indian population may be carrying this genetic variant.

The study is based on analysis of genomic DNA samples from over 750 individuals from Indian population. The research findings have been published in Journal of Biological Chemistry.

Though the CHGA promoter haplotype is present in other ethnic populations, it occurs more frequently in populations of South Asian ancestry. "It is a protein of neuroendocrine origin and is secreted along with hormones like catecholamines. Earlier studies had suggested its role in regulation of cardiovascular and metabolic diseases but there was no data about it in South Asian populations," said Lakshmi Subramanian, first author of this paper.



Research team at IIT-Madras. Credit: India Science Wire



“We studied genomic DNA of Indians and discovered a specific set of changes in the CHGA gene sequence called Haplotype2 which contributed to increased CHGA gene expression, and ultimately increased CHGA protein levels in plasma. When the clinical parameters of those in the study were compared, Haplotype2 carriers displayed higher levels of metabolic and cardiovascular traits like plasma glucose, blood pressure and body mass index,” explained Dr. Nitish R. Mahapatra, Professor at IIT-Madras.

However, he said, these results need further validation in animal models as well as large-scale studies in individuals with metabolic syndrome. “We hope these findings would help unravel biological pathways and mechanisms underlying these complex diseases and would help in the development of therapeutic as well as preventive strategies,” said Dr. Mahapatra.

“Basic research in cardiovascular biology is in a very nascent stage in India with only a handful of researchers working in this field. This new study significantly contributes towards understanding molecular basis of cardiovascular and metabolic diseases. This is a fast emerging area with tremendous therapeutic and diagnostic potential,” commented Dr. Shyamal K. Goswami, a professor at School of Life Science, JNU, who is not connected with the study.

The study was led by Dr. Nitish R. Mahapatra at Indian Institute of Technology-Madras, Chennai, in a collaborative effort with Dr. Ajit S. Mulasari at Madras Medical Mission, Chennai, and Dr. Madhu Khullar at PGIMER, Chandigarh. (India Science Wire)

**IIT Madras is an innovation and
entrepreneurship hub**

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Alumni: Tanuj Jhunjunwala & Daniel David

Headline: Industrial inspections cost companies millions, these Indian Drones and ROVs startups can change that

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Industrial inspections cost companies millions, these Indian Drones and ROVs startups can change that

For industries with large plants, rigs and facilities, monitoring assets to assess safety, production and maintenance is imperative. However, given the scale, especially in the oil and gas industry, these processes are expensive, complex and often risky.

Industries often witness shutdowns for days together to carry out these inspections, costing them lakhs of rupees on a daily basis.

In India, for industries like oil and gas, shipping and ports, the technology used for inspection and maintenance, especially underwater, is primitive and expensive and there are several limitations in terms of depth. Workers put their lives on the line to carry out these jobs.

Identifying these problems with underwater monitoring, Planys Technologies, a team of alumni from IIT Madras has developed a remotely operated vehicle (ROV) that can operate under water and carry out these inspections

"There are some foreign products and very few service providers in India but they cater only to the deep sea segment. So when inspection has to be done in shallow water segments, one has to find a foreign service vendor who does this for deep sea and has specific equipment designed for the inspection, which is bulky as well as expensive. The operational logistics of importing the equipment and crew becomes complicated and time consuming," says Tanuj Jhunjunwala, co-founder of Planys Technologies.

The ROV built by them is essentially an underwater drone. The equipment, unlike the existing ones, is portable. It is small enough to fit in an Indian SUV to be taken to the location and launched to carry out the inspection.

What started out as a contest for the best underwater vehicle in India built by students is now a startup founded by Tanuj Jhunjunwala, Vineet Upadhyay, Rakesh Sirikonda, Dr. Prabhu Rajagopal and Prof. Krishnan Balasubramanian in 2012.



It has built two ROVs, one in 2015 called Mike and one in January 2017 called Beluga. These have the ability to reach high depths. They have been built with a flexible form factor to reach inaccessible places. They have two full HD cameras, high intensity LED illumination for low light conditions and can reach depths of up to 200 meters.

They have been built to carry out several functions underwater like ultrasonic thickness gauging, cleaning, acoustics and scientific survey and can give live and stable visual feedback to the surveyor.

There are also sensors mounted on the ROV, which allow clients to collect data from the underwater rigs and plants.

Planys doesn't sell these ROVs. It provides them as a service, following a hardware-as-a-service business model.

"We are open to selling it in the future, but the product is still maturing. It will take us maybe a year to bring it to a final architecture," says Tanuj.



Planys currently operates in sectors such as ports, offshore rigs and dams. It counts Vizag Port and Chennai Port as its clients. It also works with private players that have small private ports and terminals.

Under the offshore sector, it has PSUs in Sinai as clients, for which it carries out visual inspection and data collection of structures underwater.

It is also working on checking dams for damages and repairs. It is currently working with DRIP, which is World Bank's 300-dam project in India.

But it's not just underwater structures that present inspection challenges. Oil and gas, petrochemical, fertiliser industries have high structures that need to be inspected regularly. Shutdowns happen and scaffoldings are built, which are dangerous for humans to climb and carry out inspections.

Another IIT Madras-based startup DeTect Technologies has a simple answer for this – drones.

Daniel David, CEO of DeTect says that there are two major issues with this, one being safety and the other domain expertise.

"They don't have faith in drones flying and being safe, especially because winds are so high at such heights and could hit the asset, becoming counterproductive. Drone companies also don't often have the domain expertise required to deal with inspections. All the founders of DeTect have a background in Nondestructive Testing (NDT), which is inspecting without harming the surface," he adds.

Having prior experience in the oil and gas structure with its first offering, DeTect has built drones and has automated the entire flight and even has mechanisms to pull it back. Through an algorithm it built, it can identify the areas of interests, corroded areas, hotspots, and critically, collect the data and give clients automated reports.



The value addition it has from other drone companies is the fact that it not only automates the drone's flight but also generates detailed reports.

It has also created a proprietary technology to increase the accuracy of GPS systems on drones.

"This opens up another market for us of internal inspections in boilers, stake inspections and more," Daniel says.

DeTect works with petrochemical, chloro-fluoro, and fertiliser industries. It counts companies such as Coromandel, Reliance, BPCL, HPCL among its clients.

The business model of DeTect is also similar to that of Planys. Every time it is called for inspection, it charges for the service based on the number of days. However, some of its clients are on annual contracts where a team of DeTect sets up at the industry and goes whenever called in.

Planys, on the other hand, charges based on the number of days the inspection takes. In some cases where it's a big job that would take several days, it charges a lump sum amount. It also depends on the type of inspection. Only visual inspection may cost lesser than if data collection is also involved. Complexity of the project too plays a role.

Its first ROV, Mike has clocked over 1,000 hours at sea. Tanuj says that they currently have an 80-90% product market fit and are looking at making more ROVs. The idea is to make four by the end of this fiscal

and have a fleet of 25 in three to four years. It is also working on upgrading one of the ROVs for harsher weathers in offshore areas.

While its focus will be on catering to clients in India for the year across sectors, it will then look at international markets.

In the case of DeTect, Daniel says that the drone market is yet to stabilise. There are other players offering these services but lack the value addition that DeTect has.



It is now working on acquiring as much reputation as possible in India while simultaneously getting international clients.

In fact, DeTect's other major focus is its first invention—the first sensor in the world that can monitor the thickness of pipelines till temperatures as high as 350 degree Celsius.

It has developed a complete system that sits on the pipeline with IoT capabilities, which directly sends reports to the cloud and at a low cost.

This also solves a similar problem for industries that have long pipelines. While they are the greatest assets, they are also the greatest danger due to the leakages that cause environmental damage, huge losses and lead to safety issues. And there is no technology that can measure the thickness of these pipelines at high temperatures.

The scope for these startups is immense, especially given that they have developed cutting edge technology that isn't otherwise available. Even in terms of growing the business, with technology that saves companies lakhs of rupees, steady revenues will flow.

In fact, Planys says that it is already generating good revenues and is confident of reaching an operational breakeven this year.

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Journalist: N Ramakrishnan

Professor: Prof. M Manivannan

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FROM THE INCUBATOR

Bringing that sense of touch and feel to human anatomy

Merkel Haptic Systems makes simulators to train healthcare professionals

N RAMAKRISHNAN

One brings the technical and academic knowledge and expertise. The other brings in years of experience marketing and selling medical equipment. The two have combined to take to market a unique technology that was so far confined to the laboratory at the Indian Institute of Technology Madras - that of using haptics, or the science of touch - to making simulators to train medical professionals.

The two - M Manivannan, Professor in the Biomedical Engineering Group, Department of Applied Mechanics, IIT Madras, and PBC Paul, with over two decades of experience in the healthcare industry - have come together to bring to market a range of products to make training healthcare professionals on vari-

ous procedures simpler. Two of these products, a laparoscopy surgical simulator and an in-vitro fertilisation training simulator, both with haptics feedback, have been launched.

Merkel Haptic Systems Pvt Ltd, the company founded by Manivannan, has licensed these products to a Singapore-based company for about \$1 million. The products integrate virtual reality with haptics to change the way doctors and medical professionals are trained.

A mechanical engineering graduate, Manivannan completed his Master's and PhD from the Indian Institute of Science, Bengaluru, before heading to the US, for a post-doctoral fellowship in haptics at MIT. He served as chief software architect of Yantric Inc, a spin-off company of MIT Touchlab, before joining IIT Madras in June

2005. He set up Merkel Haptic Systems, of which he is the Founder Chairman, at IITM's Touchlab. Paul, an electronics engineering graduate from Bangalore University, worked with two multinational companies, before joining Merkel Haptic Systems as its Chief Executive Officer, with a 30 per cent equity stake in the venture, in 2016.

Commercial products

Manivannan had taken up a few projects, all inside the laboratory, but none that was commercially implemented. That was when Merkel Haptic's advisory board suggested that Manivannan develop products commercially. The advisory board includes S Gopalakrishnan, one of the founders of Infosys; MM Murugappan, Vice-Chairman, Murgajappa Group; Steven M Lavelle, one of the inventors of Oculus; Mandayam Srinivasan, Director, Touchlab, MIT, Boston; and Swami Manohar, who has expertise in computer graphics, visualisation and virtual reality. It

was in 2016 after he joined Merkel Haptic, says Paul, that Manivannan and he drew up a strategy plan for the company.

They decided not to follow the mannequin model - where the training is done on a mannequin - that other medical equipment companies do. Instead, they decided to integrate haptics with simulation, where with a head-mounted device, the person will get a virtual view of the anatomy and thanks to haptics, they will actually feel the needle being moved or the probe being inserted. When they do this procedure in real life for the first time, it will appear as if they have done it before, says Paul.

Merkel Haptic, according to Paul, has built the software and programmed into the head-mounted device. There are a few more similar products in the pipeline, including one for advanced cardiac life support, for reducing infant mortality rate and

one that helps doctors prepare for a neuro surgery. "We are working on nine products," adds Paul.

The idea in licensing out the products is Merkel Haptic does not want to get into their manufacture as the company's expertise is in technology. Merkel Haptic ensures that the products it licences are made in India so that they are much cheaper than imported ones. To give an idea of the cost, says Paul, a fertility simulator available in the market costs about ₹50 lakh, that too one without haptics feedback, whereas a simulator made by Merkel with haptics feedback will cost about ₹25 lakh. On an average, the cost will be lower by at least 40 per cent on all ranges of products, says Paul.

Manivannan says the challenge is to quickly get more products into the market, before competition gets a foothold.

He is confident that India can be a good base for low-cost manufacture of simulators with world class quality. "We can then export them," he adds.



• **M Manivannan**,
Founder Chairman,
Merkel Haptic Systems.
N RAMAKRISHNAN



• **PBC Paul**,
Chief Executive Officer,
Merkel Haptic Systems.
N RAMAKRISHNAN

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Here's India's Top #45 Technology Incubators

With change in value indicators for a start-up from last year, a similar change is what we have brought in our second edition of 100 brilliant start-up incubators' ranking this year, which reflects in our ranking methodology. That's why this year it is a complete overhaul in the ranking with four out of top five spots being sealed by incubators at India's premier public institutes of higher education.

While the start-ups and investments went through restructuring, the mentorship and support ecosystem has only gone from strength to strength. From the last year's list, when we unearthed around 120 incubators, the number has scaled to more than 190, including technology business incubators housed at various government universities and technical institutes, entrepreneurship-led private incubators, incubators based in private universities, corporate incubators, and incubators that are part of knowledge parks.

As you scroll through our first list of top incubators focusing on technology and technology-enabled areas across sectors to pick which one suits you best as an entrepreneur, we wanted to emphasize that accelerators are not part of the ranking, as confused by one of our readers last year when names like **Microsoft** and **Google** weren't visible. Nonetheless for this year's ranking, we have cherry picked each one of the 100 incubators (as you will see in other sector-specific lists we release from here onwards) to take you one step closer in exploring the true potential of your billion-dollar idea. Happy Incubation!

1. **IIT Madras Incubation Cell, RTBI, Bio and Medtech Incubator** - IIT M Research Park - The incubator was recognized by Department of Science and Technology's National Award for the 'best emerging technology Business Incubator' in May 2017. It provides concept to scale-up support to start-ups and is home to 127 tech start-ups primarily in the areas comprising manufacturing, energy/renewables, IoT, biotech, water, wastewater, healthcare/medical devices, deeptech, agritech, edtech/skill development. 44 companies have graduated so far generating 2,500 jobs and more than 65 intellectual properties.
2. **Centre for Innovation Incubation and Entrepreneurship - IIM Ahmedabad** – It offers deep expertise to nurture early-stage ideas in agriculture, healthcare, energy and digital technologies. The incubator runs national scouting programs including the flagship one - Power of Ideas held every alternate year. It also runs several sector-specific accelerator programs including ICT, energy, healthcare, water and food and agriculture sectors. Out of 59 start-ups that graduated from CIIE, 82 per cent of them are still active creating around 3,000 jobs. The incubator also has largest mentor pool of more than 350 mentors.
3. **Nadathur S Raghavan Centre for Entrepreneurial Learning - IIM Bangalore** – the incubator offers Blended Entrepreneurship Model that includes - MOOC'S (Online Courses), workshops, go-to-

market orientation and seed funding support. Some of the other programs include Do-Your-Venture MOOC, India Innovation Challenge in association with Texas Instruments and DST, Women's Startup Program, NSRCEL Social - Not for Profit Incubator supported by the Michael and Susan Dell Foundation. The total valuation of 55 active companies from the incubator is around \$1 billion with highest job creation of 4,500.

4. **Society for Innovation and Entrepreneurship - IIT Bombay** – The incubator has collaborative incubation programs with the government, industry, PSUs and academia such as Centre of Excellence under Nidhi - CoE to support 70+ start-ups, Plugin: with DST and Intel for Hardware & Systems Start-ups, Scube: An accelerator program with SAP for social enterprises, India Russia Bridge for Innovations (IRBI) for entrepreneurs to explore Russian market. With more than 300 mentors 63 start-ups have graduated from the incubator out of which 41 are still active.
5. **Amity Innovation Incubators** – The incubator has dedicated mentors recognized by Wadhvani Foundation and National Entrepreneurship Network. It also deploys its own funds in start-ups. The incubator has consulted different academic institutes both from India and abroad on setting up its Incubator Developmental Frameworks for successful incubation. More than 50 of its start-ups continue to exist after incubation with more than 35 IPs and above 3,000 jobs generated.
6. **Foundation for Innovative and Technology Transfer - Technology Business Incubator - IIT Delhi** - The incubator has institutional infrastructure with state-of-art laboratories/testing and fabrication facilities that helps to nurture innovation and entrepreneurship. An innovation and research park is also established in the campus for research, innovation and product development. It can accommodate nearly 100 start-ups. The graduated start-ups have a combined turnover of more than \$600 million. The mentor network is also strong with more than 250 mentors on board.
7. **Global Incubation Services – Bengaluru** – it is perhaps the only incubator that also have an acceleration program and special focus on women entrepreneurs. It focuses on clean energy, internationalization initiatives, and linkages with corporates through CSR initiatives. The incubator has a strong mentor pool of over 200 mentors and over 140 start-ups that graduated so far out of which more than 110 are still active. Hence, it has a high success rate.
8. **Kerala Startup Mission – Thiruvananthapuram** – It is Kerala's nodal agency for start-ups. The incubator has set up mini fablabs in 20 engineering colleges across Kerala to boost entrepreneurship. The incubator is at par with IIM Bangalore in terms of job creation with more than 4,500 jobs and scores high when it comes to number of active start-ups – 110 and number of IPs generated - 20.
9. **Startup Village – Kochi** – The incubator which was ranked at the top in 2016's ranking shifted last year from physical to digital-first incubation called SV.CO. It helps students to build campus start-ups by having unique industry partnerships with Facebook, Google, Paytm and Freshworks. It offers membership fee-based access to the SV.CO Collective - a community to support college students to build start-ups and once in a year exposure to Silicon Valley events. The start-ups have generated 3,154 jobs so far. The incubator was ranked at number 10 on the top 25 list.
10. **BITS Pilani – Hyderabad** - The program is hosted by BITS Pilani's Hyderabad campus which is equipped with state-of-art laboratories and operates on BOT (Built Operate and Transfer) model to support other incubators. The start-ups have raised Rs 1.4 crore in external funding and created eight IPs. The incubator was the 11th among top 25 incubators this year.

11. **Intel India Maker Lab – Bengaluru** – Ranked at number 14 in this year’s top 25 list, it is a unique corporate incubator for hardware and systems start-ups in collaboration with government and academia. It hosts Intel India Maker Lab Demo Day for graduating start-ups to showcase demo of their products and engage with investors and other ecosystem people. The incubator provides platform to the start-ups to showcase their solutions at key industry events like Bengaluru ITEBiz.com; IESA Vision Summit; NASSCOM IoT CoE; CeBIT India. It boasts of having all of its more than 35 graduated start-ups still active despite only 36 mentors (apart from Intel India volunteers) – lesser than other incubators. Interestingly more than 20 IPs have been generated by these start-ups.
12. **Amrita Technology Business Incubator - Kollam, Kerala** – At number 15, the incubator has tie-ups with ecosystem partners and mentors in Silicon Valley, Germany, Netherlands and Singapore. It launched programs including on cyber security along with an entrepreneur-in-residence program and an accelerator. Its selection by NITI Aayog for scale-up to world-class incubator standards was the high point.
13. **T-Hub – Hyderabad** - India's largest incubator, T-Hub, at the 16th spot, is ideal for corporates to scout the best ideas, curate and scale up. It works closely with government’s Invest India program to curate start-ups that will represent India across the world. Some of the initiatives taken include, T- Source: To connect with corporate; T- Connect: Help with peers, mentors and investors; T- Scale: Help in business development, hiring, growth hacking; T- Bridge: For national and international market access etc. So far 92 start-ups have successfully incubated at T-Hub out of which 77 still exists.
14. **Malviya Centre for Innovation, Incubation & Entrepreneurship - IIT BHU, Varanasi** – Among the most significant incubators in Northern region apart from Amity University and IIT Delhi. At 19th position, the incubator offer after-care services such as ongoing linkages back to current and new clients of the incubator, local commercial linkages, access to information, developing business plans, business counseling, co-entrepreneurship and angels program, etc. Five out of eight graduated start-ups that raised funding have been valued at Rs 5.5 crores with five IPs generated.
15. **Centre for Innovation and Entrepreneurship - IIIT Hyderabad Foundation** – 20th top incubator this year offers deep tech research support and seed fund of up to Rs 25 lac. It runs multiple programs including, Disha – A summer program for students, who have an idea to make it a start-up; Avishkar- Accelerator program that provides funding and takes start-ups to prototype and first customer; Tech4Social – A three month structured program that provides funding, mentorship and workshops for early stage social start-ups; FastApps - A three month structured program that provides start-up an opportunity to appify their idea in record time. 740 jobs have been created by around 35 active start-ups.
16. **Science and Technology Entrepreneurs’ Park TBI – IIT Kharagpur** – It is the first-of-its-kind incubation centre supported by Ministry of Textiles to value add in new product commercialization in the areas of technical textiles including application in defense sector. About 20 start-ups and 3 existing industries are likely to be provided with the service from this infrastructure. Companies like Capillary Technologies, Data Resolve and Sankalp Semiconductors are among its incubatees. The incubator made it to the 23rd spot this year.
17. **iCreate – Ahmedabad** – Among the leading incubators in Gujarat beyond IIM Ahmedabad and ranked at number 24, it offers dedicated start-up lifecycle coach for each incubated project. The

incubator is also a part of the India-Israel Innovation Bridge. It has established India's largest IoT Lab with Cisco and is in the process of conducting an annual SUN (StartUp Nest) event that includes a national level iCreate Innovation Challenge on doubling farmers' incomes and an event on Campus to showcase the complete Gujarat Start-up ecosystem.

18. **Lovely Professional University Incubation Centre - Phagwara, Punjab** - As many as 30,000 students and 5,000 faculty members act as an ideal testing/prototyping market for the incubatees and have a large network of business and technical mentors. It is developing 10,000 square feet of co-working space and also runs special faculty development programs to drive entrepreneurship culture within the University. In September last year, it launched the Startup School to boost entrepreneurship.

Below are the 27 incubators (from the rest 75) in the same category.

1. **Nasscom Startup Warehouse** - The incubator offers six months program across its 11 centres including the virtual incubator at Gurugram. So far around 300 start-ups have graduated from its incubators. It has Google, Microsoft, IBM, Facebook, Amazon, etc. among its industry partners to lend support to start-ups.
2. **Indian Angel Network Incubator** - India's largest angel network's incubator is powered by The Indus Entrepreneur (TiE) Delhi-NCR chapter and runs virtual program for 12 months that can be extended up to 18 months. Last year, it partnered with UK-based sustainable technologies company Johnson Matthey to offer incubation to ventures in cleantech space.
3. **SIDBI Innovation and Incubation Centre - IIT Kanpur** - The incubator has launched an incubation fund called Invent for start-ups in social sector with Rs 7.5 crore corpus. It aims to support 40 start-ups.
4. **Manipal University TBI – Manipal Institute of Technology**. The incubator focuses on technology and knowledge-based businesses and encourages students of the Manipal Group and people in the Manipal region for entrepreneurship.
5. **Innovation Center - IIIT Bangalore**. The incubator this year launched I-MACX Studio to support social innovation and entrepreneurship by conducting hackathons and competitions.
6. **Startup Oasis – Jaipur** - The incubator is supported by Rajasthan State Industrial Development and Investment Corporation and CIIE, IIM-Ahmedabad. It has incubated 95 start-ups so far. The start-ups have raised Rs 5 crore so far. It also focuses on social segment.
7. **IIT Gandhinagar Incubation Centre (IIC)** - The incubator is among the six incubators approved last year for setting up centre of excellence for start-ups as per NIDHI programme by DST. It also has a 'Women in Startup' program for women entrepreneurs.
8. **Incub@TE - Tata Elxsi** - Bengaluru-based incubator set up by the design arm, Tata Elxsi of the Tata Group offers 18-24 months of incubation.
9. **Venture Factory – Bengaluru** - The incubator is supported by Imperial Innovations UK, Tata Sons etc. It is also the first private incubator supported by Department of Science & Technology, Government of India.
10. **Centre for Incubation and Business Acceleration** - The incubator has so far incubated 63 start-ups that have generated 500 jobs and raised Rs 10 crore funding. It has its own seed funding program of up to Rs 50 lac. The incubator is based in Assagao and Verna in Goa.

11. **91Springboard** - There are 13 centres for co-working offered by 91Springboard that has a community-led model of incubation where start-ups are part of 200 entrepreneurs working every day.
12. **Progress Pacific Incubator – Hyderabad** - NASDAQ listed global software giant Progress Software's incubator in India offers its 'SaaS and mobile-ready app development platform' and its cloud platform without taking any equity or offering funding.
13. **Startups Valley TBI - Amal Jyothi College of Engineering** - The incubator along with a rural technology business incubator and a training centre was launched in May this year. Around 18 companies are part of the Startups Valley. The incubator based in Kerala's Kottayam district was set up with assistance from DST.
14. **Idea Factory - ACME Group**. Energy and telecom company's incubator based in Gurugram supports businesses in the related sectors and offers seed funding.
15. **Information Technology Business Incubator (ITBI), JSSATE- STEP - J.S.S. Academy of Technical Education** - Noida-based JSS Academy of Technical Education runs incubator with funding option of up to Rs 25 lac and follow on funding via angels and VCs on case-to-case basis.
16. **Business Incubator Program – Bengaluru** - The incubator was launched last year by US-based automated test equipments producer National Instruments to focus on start-ups and SMEs working towards the 'Make in India' and 'Startup India'.
17. **StartUpWave - Intelicap & TiE Ahmedabad** - It is a virtual pre-incubation and incubation platform for entrepreneurs to access support and services online.
18. **Coimbatore Innovation and Business Incubator** - The incubator is part of the \$1.2b Sakthi Group and has partnered with IIM-Ahmedabad for mentoring support. It also has an accelerator called FORGE in Coimbatore.
19. **IotaCell Incubator** - Bengaluru-based incubator focuses on students as, "there is lot of free time (relatively), scope of experimentation, team formation is easy and very low opportunity cost," and takes equity or consulting fee or both for seed funding and support offered.
20. **Women's Business Incubation Program – Thiruvananthapuram** - The only women-only incubator in India offering 60 days incubation.
21. **Unicorn Growth Centre - White Unicorn Ventures** - The early stage fund cum co-working space runs incubation space in three centres in Mumbai.
22. **Non-resident Indian TBI - Infopark, Kochi** - It is a first-of-its-kind incubator for NRI entrepreneurs in India. The incubator says, "The number of NRI's venturing as entrepreneurs in Kerala is very much disproportionate to the total \$55 billion in remittances and 25 million NRI's in number. Hence, there was a need for such an incubator."
23. **Graphic Era University – TBI** - The incubator based in Dehradun has incubated more than 20 start-ups. It has set up the science and technology entrepreneurs' park for emphasis on entrepreneurship development.
24. **Shri Mata Vaishno Devi University Technology Business Incubation Center Society – Jammu** - The first and only incubator in Jammu and Kashmir, and Himachal Pradesh, focuses on entrepreneurship development in the region and largely across North India across biotech, engineering and business development.
25. **Abhiyan - IIM Lucknow** - Mentoring, infrastructural and financial support is available to the student entrepreneurs.

26. **Innovators' Destination for Entrepreneurship and Amelioration of Society (IDEAS) - IIT Jodhpur** - The incubator helps students to work on ideas that solve critical issues and creates products and services through science and engineering.
27. **Incubation Centre - IMT Ghaziabad** - The incubator is an emerging one in Delhi NCR and its flagship event Start-up Fair offers networking platform for its start-ups and students to pitch to investors.

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