Indo-US Science & Technology Forum

Connect

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IUSSTF
Indo-US Science and Technology Forum

Indo-U.S. Science and Technology Forum
Celebrating 18 Glorious Years

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Editor-in-Chief
Rajiv Kumar Tayal
Executive Director, IUSSTF

Editor
Nishritha Bopana
Principal Science Officer, IUSSTF

Editorial Consultant
Manoj Dabas

Layout Design / DTP
Pramod Jha

Opinions
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Comments and Suggestions
Please email the Connect Team at connect@indousstf.org

Design, Production and Circulation
Creative Edge Media and Services Pvt. Ltd.
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New Delhi-110074, India

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From the **Editor-in-Chief**

IUSSTF recently celebrated its 18th Anniversary and with great satisfaction and pride, I can unequivocally state that we have been able to fulfil our mandate to promote cooperation between the two great nations in the space of Science, Technology and Innovation far exceeding all expectations! During these 18 years, our program portfolio, interventions and outreach have all expanded manifold to cater to all segments of the S&T and entrepreneurial ecosystem in both the countries.

We originally started with a small portfolio of networking activities comprising of Bilateral workshops/ Conferences and Virtual Centers. While these continue to be an important dimension of our interventions, we now have several other programs and mechanisms in our basket to carry forward and nurture those initial "point-of-contact" connects all the way, manifesting into long-term relationships. We support R&D programs in strategic areas of Clean Energy, Environment, Water and Affordable Healthcare. We fund translation of S&T driven innovations and ideas into market opportunities. In addition, we have a bouquet of fifteen designer fellowship programs, in diverse areas, to enable capacity building of the next generation of scientists and engineers.

Over the years, we have established an active stakeholder base of close to 600 institutions and 5000 individual scientists and academicians in both the countries. We partner with a large number of constituents of the STI eco-system comprising of federal agencies, academic institutions, national laboratories, industries, professional bodies and industry associations. Through the extended networks of our partner institutions, we reach out to more than 100,000 individual nodes on regular basis.

While resources available to us through committed bilateral support have remained stagnant over the years, we have still managed to grow by roughly 20 orders of magnitude, mainly leveraging the resources from external agencies. Our current portfolio is serviced only to the extent of about 20% by the assured funding from the two Governments and the remaining 80% is catered through the resources we generate ourselves through various extra-mural programs.

IUSSTF is a small yet beautiful organization and our real strength lies in our people. We are blessed with some the most wonderful people and I am immensely proud of each one of them. We are also very fortunate to have always received the unconditional support of all our patrons and stakeholders. We have covered lot of ground during the last 18 years and now are eagerly looking forward to the unlimited possibilities of the future! I invite all of you to be a partner in our journey into the future, just as you have been a co-creator of this success story thus far. We will surely need your participation, support and guidance in realizing our dreams.

Rajiv Kumar Tayal
Executive Director, IUSSTF

Celebrating 18 Glorious Years

The **Indo-U.S. Science and Technology Forum (IUSSTF)** celebrated its **18th Foundation Day** on **21st March 2018** in New Delhi, in the presence of **Dr. Harsh Vardhan**, Union Minister for Science & Technology, Environment, Forest and Climate Change and Earth Sciences, Govt. of India and **Mr. Kenneth Juster**, Ambassador of the United States to India.

IUSSTF, established in the year 2000 as an autonomous bilateral body through an inter-governmental agreement between India and the United States, is mandated to promote, catalyze and seed bilateral collaborations in science, technology and innovation through close interactions among government, academia and industry. In 18 years of its existence, IUSSTF has developed a vibrant program portfolio largely conceived and driven by the scientific and entrepreneurial community from both countries. IUSSTF-supported activities have led to the direct interaction of over 20,000 Indian and American Scientists and Engineers.

Delivering the *Presidential Address* on the occasion of IUSSTF's Foundation Day, **Dr. Harsh Vardhan** remarked that IUSSTF has proved to be a single-point entity that seamlessly brings together the manifold engagements in the U.S.-India collaborative arena in science, technology and innovation into fruition. He reiterated the commitment of the Indian Government to further strengthen this bilateral body enabling it to scale-up its current level of engagements by at least a few orders of magnitude. While quoting several key milestones in the collaborative journey thus far that included the creation of IIT-Kanpur, the Green Revolution, setting up of the Tarapur Atomic Power Plant, the Satellite Instructional Television Experiment etc.; the minister noted that the India-U.S. partnership has come a long way, strengthening with time.

In his *Keynote Address*, the U.S. Ambassador to India, **Mr. Kenneth Juster** remarked that "*partnerships such as ours are built on a foundation of trust and trust is rooted in spending time working together and solving problems together – This is what IUSSTF has quietly but effectively done – bringing scientists and engineers together and build trust*".

An aptly titled Session - ***Talks and Inside Stories with Friends of Forum*** saw the participation of Former Secretaries of the Department of Science and Technology, Govt. of India - Prof. V.S. Ramamurthy and Dr. T. Ramasami who have also been the Indian Co-Chairs of IUSSTF.

In his address, **Prof. Ramamurthy** talked about how both countries have partnered to strengthen the entire S&T ecosystem. He also launched the newly revamped IUSSTF website. **Dr. Ramasami** pointed out that India's strength lies in resource optimization whereas for the U.S. it is value maximisation, and together there is a great opportunity for the two systems to develop not just technology, but S&T solutions for meeting the R&D needs of the global population. Dr. Ramasami also released two compendia titled "*Building Scientific Networks: IUSSTF funded workshops 2014-2017*" and "*IUSSTF Joint Centers – Creating Virtual Partnerships*". These books aimed to capture not only the quintessential spirit and crux, but also the outcomes of all the *Workshops* and *Virtual Networked Centers* that IUSSTF has supported during the last four years - from 2014 through 2017.

Dr. Arabinda Mitra, the Founding Executive Director of IUSSTF, recalled the energy and seamless joint efforts put in by both the Governments to help create the robust IUSSTF of today – poised to confidently move into adulthood. **Dr. Rajiv Sharma**, Secretary, Science and Engineering Research Board, who served as the second Executive Director of IUSSTF, recalled the exciting journey of IUSSTF's two mega-initiatives - the *Joint Clean Energy R&D Center*






(JCERDC) and the *U.S.-India S&T Endowment Fund.*

Other valued stakeholders who shared experiences about their interactions with IUSSTF included **Prof. Pradip Dutta** (Indian Institute of Science, Bengaluru), Co-PI of the "JCERDC-*Solar Energy Research Institute for India and the United States (SERIIUS)* Consortium"; **Prof. Rajan Rawal** (CEPT University, Ahmedabad), Co-PI of the "*JCERDC-Center for Building Energy Research and Development (CBERD)* Consortium", **Dr. Vineet Ahuja** (All India Institute of Medical Sciences, New Delhi), PI of IUSSTF Joint Center on "*Bowel Diseases*" and **Dr. Anurag Agrawal** (CSIR Institute of Genomics and Integrative Biology, New Delhi), PI of Joint Center on *Environmental Lung Diseases* and PI of the USISTEF project titled "*Forced Oscillation Device for Detection and Monitoring of Airway Diseases*".

IUSSTF currently implements a portfolio of "four" broad program verticals - *Scientific Networks*, *Innovation & Entrepreneurship*, *Research & Development* and *Visitation & Fellowships*. Scientific Networks comprise of short-term engagements such as Bilateral



Workshops/Conferences/Symposia as well as medium-term arrangements through Virtual Networked Joint Centers that aim to encourage collaboration in topical areas of mutual interest. More than 340 Indo-U.S. Workshops and 78 Joint R&D Centers have been supported so far. The Innovation and Entrepreneurship vertical comprises primarily of the hugely popular *U.S.-India S&T Endowment Fund (USISTEF)* that provides grant-in-aid support (upto INR 25 Million / USD 400,000 approx.) to commercialize S&T-based innovations with a significant societal impact. USISTEF has supported 27 projects over the last 6 years at a total investment of approximately INR 609.69 Million / USD 94, 00,000, in the areas of affordable healthcare, safe drinking water, clean energy and environment, livelihood enhancement, women's empowerment and financial inclusiveness, amongst others. 12 products have been co-developed and since been commercially launched through this highly successful program that has effectively brought the Indian and American entrepreneurs together and nurture an ecosystem of technology led innovations. In the Research and Development space, IUSSTF has been entrusted to administer strategic bi-national initiatives that include the Indo-U.S. Joint Clean Energy Research and Development Center; Grand Challenge on Affordable Blood Pressure Measurement Technologies for Low-Resource Settings; PACEsetter Fund to accelerate the commercialization of innovative off-grid clean energy solutions; Real Time River Water and Air Quality Monitoring and Partnerships for International Research and Education. In an effort to address the issue of skill development and capacity building in all areas of science and engineering, IUSSTF currently administers 15 different types of Visitation Programs across disciplines and stakeholder levels and close-to 1500 Interns and Fellows have been trained over the last 10 years.

In his closing remarks, **Dr. Rajiv Tayal**, Executive Director of IUSSTF noted that "*While resources available to IUSSTF through committed bilateral support have remained stagnant over the years - in fact their real value has diminished over time due to inflation, lower interest and currency conversion rates; we have still managed to grow by roughly 20 orders of magnitude over the last 18 years, mainly leveraging the resources from external agencies.*" He concluded by thanking everyone present and added that "*To mark the arrival of our 18th anniversary, we re-dedicate ourselves to the next leg of the journey that is going to be even more glorious, with the excitement and belief that our best is yet to come. With the length and breadth of the two great nations of the world as our arena and the aspirations of their 1.7 billion people as the driving force, sky is the limit for us.*"

As part of the Foundation Day celebration, a **Short Film on IUSSTF** showcasing its journey over the past 18 years was premiered and was very well-received by everyone present. IUSSTF also organized an **Exhibition** depicting its various programmatic activities where stakeholders across programs displayed their accomplishments.

Language of Science Policies

THE VALUE OF NEW IDIOM AND GRAMMAR

National policy is a public statement of priorities and purpose. Public policy for science has long been tempered by the political wills of Nation states for leveraging technology into power equations in the global dynamics. Investment into scientific research in recent times seeks competitive advantages of products and services in the market place or defence priorities for technological self-reliance. Research professionals pursue competitive excellence and peer recognition as their goal. World over, competitive excellence has remained the focus of Science, Technology and Innovation policies in the 21st century. Competitive excellence and resource intensification are the prevailing idiom and grammar of stated science policies of most parts of the world.

T. Ramasami
Former Secretary
Department of Science and Technology
Government of India

Global R&D intensities of countries have come to be evaluated by two critical parameters namely Gross Expenditure on Research and Development (GERD) as a percentage of Gross Domestic Product, and, Number of Full Time Equivalents (FTE) per Million populations. In 2015, annual Global GERD in Purchase Power Parity Terms (PPP) is estimated at about US$ 1.8 Trillion. With Nation states vying to gain competitive advantage over each other, global R&D has become resource and FTE intensive. Both US and India seem to invest at levels of US$ 330,000 per Full Time Equivalent per year on Purchase Power Parity Terms. At that level of US$ 330,000 per FTE, needed investments for serving a global population of 7.5 billion would be the order of US$ 9.9 and US$ 2.97 Trillion for 4000 FTE/ million and 1200 FTE/ million, respectively. Such investments are neither sustainable nor could lead to affordable innovations. More than 66% of the global population may either be under- or un- served by current research and development systems.

Global R&D intensity could be examined in the form of Nations in four quadrants with 4000 FTE per million and 2% GERD/GDP as bench mark parameters as shown in Figure 1.

Nearly 150 (of the total 196) countries including 35 Low Income and 55 Low Middle Income group Nations figure in the quadrant of low resource setting for R&D. Current resource and FTE intensive models of Research and Development adopted by many advanced countries seem to bypass the affordability levels of more than

two-thirds of the human population of the world. Resource intensive R&D in private sector seems to back R&D led innovations which are closer to the market place and earn quicker returns to investors and inventors. When competitiveness is the driving force in innovation systems, corporate level policies for R&D would be dictated by the investor needs and returns in shorter times.

Public, Social, Strategic and Private good form four integrated elements of modern research and development. Public policy support for advancement of knowledge for its own sake was an overriding theme among Nations in the past. Socio economic outcomes sensed and realized by people from scientific research are entering into the foray of public policy for science and emerging as the new idiom. Private good benefits of research and development receive engagement and investment of the private sector in Upper Middle and High Income Group countries. Public and Social good dimensions of R&D in low-resource setting do require an alternate model.

Scientific outputs are measured by numbers of a) scholarly publications and their citations, b) PhDs trained, c) Intellectual Properties created etc. National and societal outcomes gained from R&D are not easy to assess and difficult to measure. S&T output indicators are designed to measure the inter-se performance of scientists and researchers among themselves but not necessarily on the socio-economic benefits and outcomes accrued from research and development. What is measurable is measured! What is needed for developing science policy celebrated by people rather than researchers appears immeasurable currently. Process of innovation is the current grammar. Purpose of innovation is the needed idiom. What is the social value of innovations backed by high resource intensity and hence unaffordable to many?

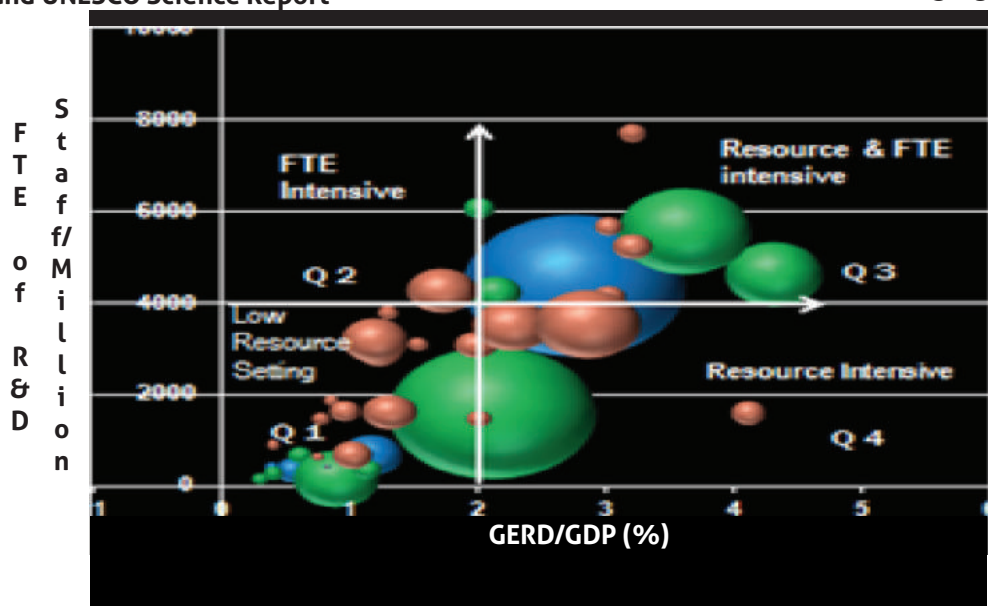
Ranking of Nations based on innovation efforts do not necessarily seem to capture the outcomes in the form of Global share in High Technology Trade of countries. Coupling between ability to develop technologies and share in global high technology trade does not seem strong and direct either.

Science for public and larger social and global good might call for resource optimized and people-centric R&D priorities. Granted that majority of social needs of the citizens would be referenced to the contextual priorities of citizens of the respective country with widely differentiated states of development among various nations;

Figure 1 : Intensity of Global R&D

Data Compiled from OECD' 16 Word Bank '16 and UNESCO Science Report

Bubble sizes proportional to GERD in PPP terms 2013-15



INTENSITY OF R&D SYSTEMS IN THE WORLD

Q1 Low Resource Setting
Q2 : FTE Intensive
Q3 : Resource and FTE Intensive
Q4 : Resource Intensive

Europe and Middle East
Americas
Australia

public policy for science could also vary in texture from each other. It may seem worthwhile to carry out SWOT (Strength, Weakness, Opportunity and Threat) analysis of Nations in falling in different quadrants in Figure 1. SWOT analysis is presented in Figure 2.

The language of current science policies has relied on competitive excellence and resource intensity. Sustainability and affordability issues of current resource intense models based on competitive excellence are cropping up. There is a case for examining collaborative excellence and strategic alliances and designer partnerships as the new idiom and grammar respectively. Designer partnerships among nations in Low Resource settings with developed R&D infrastructure and those with Resource intense science landscape could become new Grammar. Similarly strategic alliances among innovative small economies with limited domestic market and economies with ability to resource optimize and large domestic market for high technology products, could offer win-win formula for both. In other words collaborations and partnerships could become new language of science policies. Particularly for R&D for global good like addressing the needs of climate change and mitigation of damage from Natural disasters, policies for science might well need to embrace public diplomacy with science as a soft power tool. It is granted that collaboration and partnerships could be effective only when each partner brings unique value to partnerships and share common objectives, co-invest and cogenerate values.

Whereas those countries desirous of emerging as major knowledge powers of the world would like to pursue policies focused on global competitiveness, nations in the Low Middle and Low Income Group would need to prioritize national inclusiveness without compromising on the needs of global competitiveness. The United States of America and India form two good examples for studying the Grammar of Science, Technology and Innovation policies of the world. With annual per capita incomes less than US$ 2000 and above US$ 55000 respectively, India and US represent Low Middle and High income group countries in the world. India and US lead their respective groups of low and high resource setting, respectively.

India with a share of nearly 86% of total investments of 35 Low and 55 Low Middle Income Group countries and as one of the top six investors into R&D could well become a window of the world of Nations in low resource setting for reaching out to the un- and under- served markets of the world. She could well become an ally of the United States in delivering science-led solutions though public and social good.

India presents an example for one such country faced with the need to balance between Global competitiveness and National inclusiveness of her R&D priorities through public policy for science. The United States with an estimated investment of US$ 470 billion is faced with the challenge of sustaining the health care costs at say about 18% of US $ 18.5 Trillion economy.

Seeds for cooperation between the US and India in science have already been sown through the formation of the ***Indo-U.S. Science and Technology***

Figure 2 : SWOT Analysis of Nations in Different Quadrants

Quadrant	Strength	Weakness	Opportunity	Threat
Low Resource	Affordability Meeting Needs of Poor	Weak Base and Leadership	Resource Optimization	Development Bypass
FTE Intensive	FTE Strength	Low Gerd/FTE	Link FTE to Resource	Flight of FTE
Resource & FTE Intensive	Value Maximization	Affordability Meeting Needs of Poor	Leadership	Inability to Serve Poor Markets
Resource Intensive	Innovation Leadership	Affordability	Leadership	Outpriced in Main Markets

Forum and several initiatives to spurn research collaboration in areas of clean energy, affordable innovations etc. Indo-US cooperation in science for public and social good could well become a new paradigm. Both nations face the diversity challenge. Ability of the R&D landscape of the US focuses on value maximization. India brings the benefit of resource optimization. Resource intense model of US is sustainability challenged. India is challenged on account of a weak R&D base. Indian R&D is predominantly public funded. R&D of the US is largely private sector funded. In areas of research for public and social good, where affordability is a premium, Indo US cooperation in science derives high importance in the present context.

Benefits of policy dialogue between US and India leveraging science as a diplomacy tool and Public Private Partnership for R&D for public and social good are indicated. Language of such a policy dialogue calls for the new idiom of collaborative excellence and designer partnership as the alternative grammar. *Indo-US Science and Technology Forum* may have delivered values already as a binational entity. Is it the time for the Forum to undergo transformation into an organ championing for the use of a new language of science policy based on grammar of designer partnerships and idiom of collaborative excellence for delivery of public and social good from R&D? To me, the time seems ripe for the use of new language of science policies of the two most powerful and largest democracies of the world.

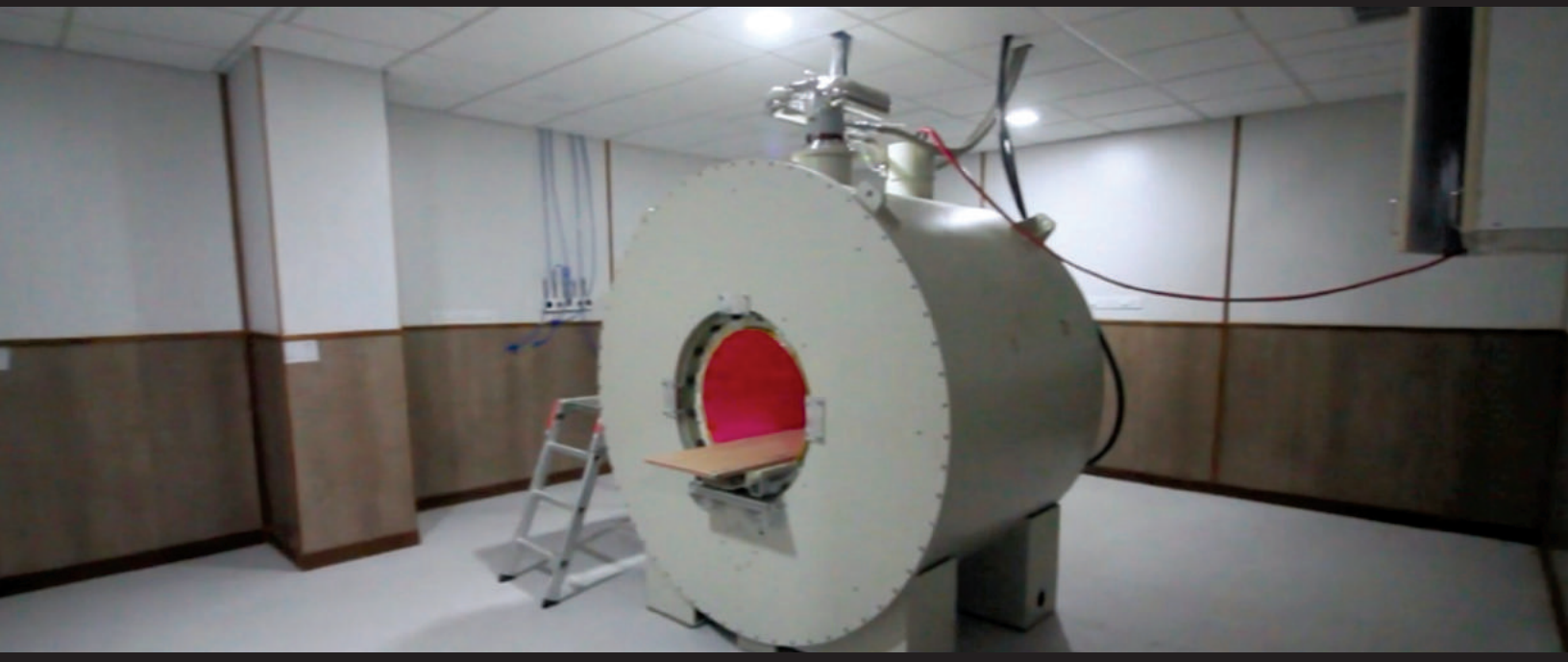
Indo-U.S. Vaccine Action Program (VAP) Small Research Grant Program (R03)

Indian and U.S. scientists who wish to initiate joint collaborative projects in microbiology, immunology or infectious diseases can apply for this small grant program from NIH, which was originally developed for the Indo-US Vaccine Action Program (VAP) but is available to all scientists.

Both U.S. and Indian scientists are eligible to apply for this program with a collaborator from the other country. Applications are encouraged from organizations/institutions that propose to conduct vaccine-related research through U.S.-Indo collaborations on a variety of infectious diseases, including immunologic characterization. There are three review cycles per year. Accordingly, application due dates are – February 16 (Cycle 1), June 16 (Cycle 2), and October 16 (Cycle 3). This Funding Opportunity will expire on May 8, 2019.

For details, please write to ***Dr. Ranjan Gupta*** [National Institute of Allergy and Infectious Diseases (NIAID), National Institutes of Health (NIH), U.S. Department of Health and Human Services] at guptar@mail.nih.gov or visit: https://grants.nih.gov/grants/guide/pa-files/PA-16-163.html

More information about VAP can be found at: https://www.niaid.nih.gov/research/indo-us-vaccine-action-program



Lightweight, Ultra-Fast MRI Scanners

NEXTGEN MRI

Arjun Arunachalam
Voxelgrids Innovations Pvt. Ltd.
Bengaluru, INDIA

MRI imaging provides a unique view into the interior of the human body and has become an essential tool of modern medical imaging and disease diagnosis.

In many cases, MRI provides important diagnostic information that cannot be obtained with other imaging techniques.

MRI: Current Limitations

During an MRI scan, the human anatomy is subjected to a strong magnetic field under the influence of which, water from within the human anatomy emits radio frequency (RF) signals that are detected and digitized to form an image. However, this process of detecting and digitizing radio signals must be repeated many times over during a scan to acquire sufficient data to build a complete image. This is a time-consuming process that presents a significant clinical limitation as the data acquisition rate during an MRI scan is not fast enough for real time, high resolution imaging of rapidly moving organs such as the heart.

Additionally, there are also serious practical limitations as well that have to be taken into account. For instance, the magnetic field that the magnet of an MRI scanner produces should be strong and highly uniform over the anatomical region that is to be imaged. This is a demanding design specification that inevitably results in bulky, heavy and very expensive magnets that also require liquid helium, an expensive and rapidly diminishing non-renewable resource. In summary, a combination of the clinical and practical limitations listed above have currently limited the widespread adoption of MRI.

Attempted Solutions

Several approaches have been proposed to address the clinical limitation imposed by slow MRI data acquisition rates.

For instance, assumptions can be made about the intrinsic properties of imaged anatomy to exploit redundancies to minimize the volume of acquired data. Alternatively, approaches where multiple MRI RF signal detectors are employed in parallel during a scan can also minimize the volume of data that is acquired. Yet another recent approach is to acquire data partially during a scan and obtain an equivalent representation of the same through mathematical transformations that attempt to extract all relevant signal information from the partially acquired dataset.

While these techniques have all helped make progress in addressing this clinical limitation, they still fall short of fully addressing the problem.

Similarly, with regards to the practical limitations listed above, several approaches have been attempted. For instance, instead of operating at high fields, MRI scanners that employed low field strength permanent magnets have been tried. These magnets do not need liquid helium and therefore are free from complex cryogenics and are inexpensive. However, such scanners severely compromise on diagnostic imaging quality and come with their own set of engineering tradeoffs that have curtailed this approach.

In other attempts, the very basis of the MR Imaging process was sought to be changed by using linearly varying RF transmission signals to modulate the resultant RF signal emitted from the human anatomy. This can help eliminate certain sub-systems from the MRI scanner thus making it lightweight, less noisy and inexpensive. However, such approaches compromise Image resolution and are extremely sensitive to the fidelity of the RF transmission signal, which is compromised at high field strengths due to human tissue dielectric effects.

The Proposed Solution

In the, project supported by the **U.S. - India S&T Endowment Fund**, the solution to these clinical and practical limitations is sought to be achieved through inventive Imaging processes that enable the following:

- Modifications to the specifications of the magnetic field generated by the magnet of an MRI scanner. This has resulted in the development of lightweight MRI magnets for fully body imaging.
- Generation of RF signals from the human anatomy that enable a parallel acquisition of data rather the serial acquisition that is employed currently. This will enhance MRI scan speeds.

The **Societal Impact** of the proposed solution is the following:

- The cost of an MRI scan for a patient is expected to become cheaper by a factor of 3-4. This will provide more people access to this Imaging modality, which at this point is prohibitively expensive for patients from lower income backgrounds.
- The 3-4X speed up factor beyond what current state of the art systems can achieve, can enable greater patient throughput and a higher Return on Investment for a hospital or Imaging center. Alternatively, the 3-4X speed up factor can be employed in real time high resolution Imaging of rapidly moving organs such as the heart. This will greatly enhance MRI's diagnostic utility beyond its traditional application areas.

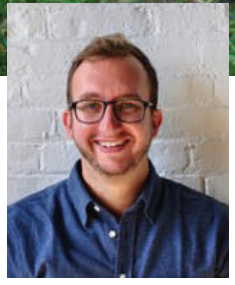
Current Status

The proposed next generation scanner is under development with system integration steps currently in progress. Imaging tests will commence soon after this stage is complete.

The Leveraged Freedom Chair

THE GIFT OF MOBILITY

According to the World Health Organization, over 65 million people in the developing world need a wheelchair, but do not have one. Moreover, many people that do have a wheelchair are still faced with mobility challenges, because their wheelchairs are not designed for the rough conditions of developing countries. Most wheelchairs are designed for smooth hospital floors and nicely paved sidewalks, not rough paths in rural villages. Wheelchair propulsion by pushing on the wheels is inefficient and exhausting over long distances. These challenges limit the mobility of people with disabilities around the world.



Mario Bollini
Chief Technology Officer and Cofounder
Global Research Innovation and Technology (GRIT)
Boston, USA

As undergraduate students at the Massachusetts Institute of Technology, we saw these issues first-hand during summer public service fellowships in Kenya and Tanzania. Wheelchair riders had to travel long distances over rough terrain, a difficult task in their standard wheelchairs. Many used handcycles, which are pedaled with the arms similar to a bicycle, but these were too large to use indoors, leaving them stranded when they tried to attend work or school. Another common issue was maintenance: imported wheelchairs couldn't be repaired locally, so when they inevitably broke in the rough conditions they had to be scrapped.

In 2008, we put a team together and started to come up with a solution to this problem. We studied biomechanics to learn how to make a more efficient wheelchair propulsion mechanism, and we worked with dozens of wheelchair riders and wheelchair manufacturers to design a chair that better fit their needs. For the next three years, we would travel internationally every summer, using fellowships and development grants, to test our designs with riders. We took their feedback seriously, and made significant changes to the design during each iteration. We also designed a biometric recording apparatus, which validated our hypothesis that a lever propulsion system is more efficient than pushing directly on the wheels.

After many rounds of prototyping, we created what came to be known as the *Leveraged Freedom Chair (LFC)*. This wheelchair is pushed with levers on either side of the chair, which are connected to the wheels using a bike chain. Pushing high on the levers generates a lot of torque, making it easy to roll over hills and rough terrain. On smooth ground, pushing at the bottom of the levers enables efficient and fast movement. By combining the properties of a bike gear change system into the simple mechanism of a lever, we could make a product that was competitively priced with other wheelchairs, durable and easy to repair, and which had much greater off-road performance than conventional wheelchairs.

Over 2,000 LFCs have been produced in India and distributed to over 20 countries around the world. As we've grown our manufacturing and distribution, we've continued to improve the design based on input from wheelchair riders and providers. Distribution continues to be one of the greatest challenges to providing appropriately designed wheelchairs to the people who need them around the world. Our customers are, almost by definition, located in areas with incomplete infrastructure. Finding local partners is a key part of our strategy. Their knowledge of customer needs, and the local landscape, is invaluable to a successful distribution. We're always looking for quality partners who can help us reach the people who need our chair.

The international appropriately designed wheelchair community has made great strides in recent years, with the wide adoption of the WHO standards for wheelchair provision. These standards ensure a minimum amount of adjustability and fit, as well as a set of training steps to ensure the wheelchair is appropriate for its recipient, and its recipient knows how to use the features of each chair. Programs like CLASP, run by USAID and UCP Wheels for Humanity, offer a variety of chairs, bundled in the same container, to ensure that recipients can receive the most appropriate chair for their needs. There is no single chair that is perfect for every rider or every condition, and resources like CLASP are a great new innovation in the field.

Funding is another challenge. Western governments are dialing back their international development funding, and NGOs are starting to replace them. The focus should be on impact per donor dollar, not purely the number of devices distributed. Low-quality chairs are inexpensive (so you can donate many of them), but don't offer outdoor mobility, break easily, and can't be repaired. Appropriate chairs, including the LFC, provide much greater impact because they offer more mobility and longer product life.

Receiving the right wheelchair can be life changing. During one of our first distributions, we saw this firsthand with Ashok. He lived in Jaipur and after suffering a spinal cord injury was sent home in a regular hospital-style wheelchair. He wasn't able to propel the chair outdoors, and became unemployed. After receiving an LFC, he was able to ride over 2km to his village and reopen his tailoring shop. Now, having received the mobility he needed, he can independently provide for his family again. Our goal is to reach as many more Ashoks as possible!

Mxene Phases of Transition Metals

A NEW FRONTIER OF 2-DIMENSIONAL MATERIALS FOR ENERGY

Kaushik Pal
IIT-Roorkee, INDIA

Nikhil Koratkar
Rensselaer Polytechnic Institute, New York, USA

High specific surface area carbon-based materials are the heart and soul of the supercapacitor based energy storage devices. In this context, carbon-based nanostructures like CNTs, Fullerene, CNF and carbon black, have dominated the field until the rise of an extremely amazing 2D carbon allotrope, called graphene. Single sheets of graphene can offer extremely high surface-areas as every single carbon atom is exposed. Apart from that, it offers transcendence mechanical, electrical, thermal and other properties. The down sides of graphene include its hydrophobic nature, difficulties to produce single layers, and defects in sheets that can compromise its properties. Taking inspiration from graphene, scholars are working on development of other 2D materials, one of which is a 2D form of transition metal carbides - **MXene phase**. This metal carbide form has good electrical conductivity, excellent thermal stability, large interlayer spacing, easily tunable structure, high surface area and is also hydrophilic in nature. The development method of MXene phase involves several steps like creation of MAX phase. The basic formula of MAX phase is Mn+1AXn, notation ***M*** belongs to early transition metal; ***A*** referred to group IIIA or IVA element; ***X*** belongs for carbon or nitrogen and ***n = 1, 2***, or ***3***. Until now, more than 60 different pure MAX phases are known. Micro etching of "A" element via fluorination creates MXene phase.

Indo-US Joint Center for Nanoscale Research (IUCNR) @IIT Roorkee

IUSSTF's Virtual Networked Centers program provides a golden opportunity for researchers from both countries to learn new scientific techniques and methodology. As part of the *IUSSTF-funded Indo-U.S. Joint Center for Nanoscale Research*, we aim to establish a strong collaborative program in the area of advanced nanomaterials with a focus on developing sustainable energy-related applications. Indian scientists are trying to make exceptional contribution to solve the energy crisis and related issues and the main inspiration comes from the need to cope with the energy demands of a large population. The Indian energy sector has seen a drastic growth in energy production but this growth has failed to fulfil the growing demand for energy, and development of new materials and technology is the need of the hour. Indian Scientists from Advanced composite Lab (ACL), IIT Roorkee and their U.S. counterparts from Rensselaer Polytechnic Institute (RPI) are actively engaged in energy materials related research. The main field of study for both teams involve development of new materials and devices to make electrical energy storage technique less expensive and long-lasting. In this pursuit Prof. Pal from IIT Roorkee and Prof. Koratkar from RPI are exploring Mxene phases of different transition metals carbides and nitrides. Mxene based materials will be used to fabricate supercapacitors. Synthesis of nanostructured composites with Mxene materials will be done to enhance the performance to an even higher value. The Indo-U.S. team is aiming to come up a novel solution to deal with the problems related to electrical energy storage technology.

Department of Science & Technology
Govt. of India

IUSSTF
Indo-US Science and Technology Forum

Bhaskara Advanced SOLAR ENERGY FELLOWSHIP PROGRAM

Recognizing that climate change, clean and efficient energy and environmental protection are among the biggest challenges facing India and the United States; the **Department of Science and Technology, Govt. of India** through its Solar Energy Research Initiative, and the **Indo-U.S. Science and Technology Forum (IUSSTF)** are committed to tackling these issues by building capacity in these frontier areas.

To nurture future innovators and thought leaders in Solar Energy, the **Bhaskara Advanced Solar Energy (BASE) Fellowship Program** - a dynamic and transformative program has been developed to foster contacts between students and scientists from India and the United States.

Eligibility

For Student Internships

- Indian citizens currently pursuing a Ph.D. on a full-time basis in the field of Solar Energy in a public-funded R&D lab/S&T institution / recognized academic institute / university / college in India;
- Age: Upto 32 years as on 31 December 2018

For Fellowships

- Indian citizens with a Ph.D. in Science, Engineering or Technology
- Applicants must provide proof of independent research work in internationally recognized academic journals.
- Open only to applicants working in the field of Solar Energy
- Age: Upto 40 years as on 31 December 2018
- A permanent position in a public funded R&D lab/S&T institution /recognized universities/ colleges in India.

Broad categories for Research (indicative list)

- Solar Photovoltaics
- Solar Thermal
- Grid Interaction including Smart Grids
- Energy storage
- System Development and Integration
- Other (any other related area in Solar Energy)

Place of work

The applicant should have a letter of acceptance from a reputed U.S. scientific/technological institution where he/she would undertake the research work under the Fellowship/Internship.

The Program is envisaged to:

- provide an opportunity to the best and brightest Indian students and scientists to gain exposure and access to world class research facilities in leading U.S. institutions;
- promote research and capacity building in the frontline area of Solar Energy;
- encourage and motivate outstanding students to take up research as a career path; and
- pave the way for the next generation scientists and technologists from India to interact with American peers, thus helping to build long-term R&D linkages and collaborations.

Fellowship/Internship includes

- Monthly Stipend
- Air-fare
- Contingency allowance

Duration

- Internship: Minimum 3 months and upto 6 months
- Fellowship: Minimum 3 months and upto 12 months

SUBMISSION DEADLINE: 31 AUGUST 2018

For program information contact:

Indo-US Science and Technology Forum

Fulbright House, 12, Hailey Road, New Delhi - 110001, E-mail: energy.fellowship@indousstf.org

Website: www.iusstf.org

Prof. VijayRaghavan appointed Principal Scientific Adviser to the Government of India

Prof. K. VijayRaghavan, Former Secretary, Department of Biotechnology (DBT) has been appointed the Principal Scientific Adviser to the Government of India. Prof. VijayRaghavan served as Secretary, DBT from January 2013 until February 2018. He has also been the Director of The National Centre for Biological Sciences in Bangalore between 1997 and 2013.

Prof. VijayRaghavan has been elected as Fellow of the Royal Society and as a Foreign Associate of the U.S. National Academy of Sciences. He was conferred the Padma Shri by the Govt. of India on 26th January, 2013. He is also a recipient of the Infosys Prize in the Life Sciences category in 2009. He graduated with a Bachelor of Technology degree in Chemical Engineering from IIT Kanpur in 1975. He completed his doctoral work in 1983 in the field of Molecular Biology and holds a Ph.D. from the Tata Institute of Fundamental Research. He completed his post-doctoral research from the California Institute of Technology. He has been applauded for his research on understanding the cellular and molecular principles of adult muscle development in *Drosophila*. He has combined these studies with those on the development of the nervous system to study the control and development of movement.

IUSSTF congratulates Prof. VijayRaghavan on his appointment as Principal Scientific Advisor to the Government of India and wishes him every success in his new assignment!

2018 HITLAB Innovators Summit: India

HITLAB, a digital health innovation company partners with organizations to shape the future of healthcare and improve lives worldwide. Working with foundations, governments, multilateral agencies, start-ups, corporations, universities, and hospitals across ideation, creation, evaluation, and diffusion aspects, HITLAB strives to improve healthcare access, quality, and affordability by leveraging innovative tools and technologies.

On February 10th, 2018, HITLAB organized the "**2018 HITLAB Innovators Summit: India**" at IIT-Delhi. Executive Director of IUSSTF, Dr. Rajiv Tayal was invited as a Panelist for the session titled "Investing in the future - Experts' take on identifying catalysts to help healthcare entrepreneurs drive impactful change". Key discussion points included identifying the top problems that the healthcare industry wants to see solved by startups; key entrepreneurial asks from the industry (corporates), academia/ govt. and investors; and, top support areas where academia/ govt. can support startups. Other panel discussions deliberated over data-driven digital health trends and India's digital health innovation potential.

Dr. Renu Swarup appointed Secretary, Department of Biotechnology, Govt. of India

Dr. Renu Swarup, Senior Advisor and Scientist "H" at the Department of Biotechnology (DBT), Government of India took over as Secretary, DBT on 10th April 2018. A Ph.D. in Genetics and Plant Breeding, Dr. Swarup completed her Post-Doctoral studies at The John Innes Centre, Norwich, UK, and returned to India join the Department of Biotechnology, Ministry of Science and Technology in 1989. At DBT, she headed the National Bioresource Development Board and was involved in developing, funding and monitoring programs in the area of Energy Biosciences, Bioresource Development and Plant Biotechnology. She was actively engaged in the formulation of the Biotechnology Vision in 2001 and National Biotechnology Development Strategy in 2007 as the Member Secretary of the Expert Committee.

Currently, Dr. Swarup is also the Managing Director of *Biotechnology Industry Research Assistance Council (BIRAC)*, a Public Sector Enterprise that promotes innovative research in biotechnology with a special focus on startups and small and medium enterprises. Dr. Swarup has also been a fervent supporter of women scientists and is credited with initiating the *Biotechnology Career Advancement for Women Scientists (BioCARe)* program. In 2017, she was conferred with the *National Entrepreneurship Award.*

Dr. Swarup has been a member of the IUSSTF Governing Board and has led the *Indo-U.S. Joint Clean Energy Research and Development Center (JCERDC)* Program that is implemented by IUSSTF. We wish Dr. Swarup every success in her new assignment!

Dr. Balram Bhargava appointed DG of Indian Council of Medical Research

Dr. Balram Bhargava, Senior Consultant Cardiologist at the All India Institute of Medical Sciences, has been appointed the new Director General of the Indian Council of Medical Research and Secretary of the Department of Health Research. Dr. Bhargava is a leader in the field of biomedical innovations in India. He founded the *Stanford India Biodesign Centre* - the Indian chapter of the Stanford Biodesign and is its Executive Director. The center is supported by AIIMS, New Delhi and has Stanford University, Indian Institute of Technology, New Delhi, IUSSTF and the Ministry of Science and Technology, Government of India as partners. The program has already yielded twenty patents on low-cost medical devices.

In 2014, Dr. Bhargava was awarded the Padma Shri by the Govt. of India for his contributions to the field of medicine. He is a Fellow of the National Academy of Sciences, India; Fellow of the American Heart Association; Fellow of the Academy of Medical Sciences; Fellow of the National Academy of Medical Sciences; and a Fellow of the American College of Cardiology.

Dr. Bhargava has been a Board member of the IUSSTF-administered *U.S.-India Science and Technology Endowment Fund* from 2011 to 2015. He continues to be a valuable member of the Joint Experts Panel for USISTEF. IUSSTF wishes him all the best for a successful tenure at the helm of ICMR!

Giving WINGS TO TALENT

To address the need for human resource development and capacity building in science and technology, IUSSTF is committed to nurture contacts between scientists and students from India and the United States. It has been unambiguously demonstrated that providing students and young scientists with an exposure to cutting-edge scientific research experiences at a formative stage not only broadens their intellectual horizons but also leads to increased engagements in scientific and technological research careers. In this section of Connect, we share with you the experiences of some of our bright, young Interns and Fellows in their own words!

SERB Indo-U.S. Postdoctoral Research Fellowship Program

Suresh Sundaramurthy
Maulana Azad-National Institute of Technology Bhopal

The SERB Indo-U.S. Postdoctoral Research Fellowship Program for Indian Researchers is an excellent opportunity for all scientists and engineers in the early stages of their careers. I must say that it has been a life-changing experience for me at The City College of New York (CCNY), USA. I worked on *New carbon-based nanocomposites (biochar) from waste biomass and carbon cloth: Experimental and modeling studies to adsorption of H_2S, HCHO from air, sensing of H_2S and ammonia gases, and photo-oxidation/reduction* at the Center for Discovery and Innovation under the mentorship of Prof. Teresa J. Bandosz.

In this research, I developed a novel, eco-friendly filter to remove toxic gases like hydrogen sulfide and formaldehyde from the air and studied applications of these materials also as gas sensors based on conductivity changes. This research can be helpful to tackle the design of both processes and equipment in industrial facilities and pollution control plants.

Prof. Teresa J. Bandosz and her research group of Nano-engineered Materials for Environmental Problems were excellent hosts and they ensured that I had a comfortable stay at CCNY.

I am thankful to IUSSTF for providing me this opportunity.

SERB Indo-U.S. Postdoctoral Research Fellowship Program

Biplab Basak
Indian Statistical Institute
Bengaluru

At the outset, I would like to thank IUSSTF for providing me an opportunity to work at Cornell University, USA - one of the best universities in the world. In India, I worked on crystallization theory – a graph-theoretic approach to study PL-Topology. After getting the SERB Indo-U.S. Postdoctoral Fellowship, I had the opportunity to work with Prof. Ed Swartz, who works on triangulation of pseudomanifolds. I worked with Prof. Swartz on a project to understand the combinatorial properties of three-dimensional normal pseudomanifolds. We are hoping to continue the significant and exciting progress we have already made.

Additionally, the fellowship allowed me to attend several conferences (like Cornell Topology Festival, MSRI Topology Workshop) in the U.S. As a result, I got an opportunity to discuss my work with many outstanding mathematicians. They have helped me to become a more independent and versatile researcher.

SERB Indo-U.S Postdoctoral Fellowship for Indian Researchers:
Webpage: http://www.iusstf.org/program/serb-indo-us-postdoctoral-fellowship-for-india-researchers
E-mail: fellowship@indousstf.org

IUSSTF-Viterbi Program

Amit Agrawal
Birla Institute of Technology and Science, Goa

This was one of my best research experiences in the field of network-security and testbeds. I got an opportunity to work at Information Science Institute (ISI) under the guidance of Prof. Clifford Neuman who is the Director of "Center for Computer Systems Security" at ISI. I worked on Project VISOL (Virtually Isolated DETER Experimentation) which aims to extend the isolated domain of a DETER experiment to external virtual machines that are virtually isolated and capable of communicating only with the DETER testbed through an IPSec tunnel. I was able to successfully implement the project idea and had a chance to test it on DETER testbed which is a state-of-the-art scientific computing facility for cyber-security researchers engaged in research, development, discovery, experimentation, and testing of innovative cyber-security technology. Throughout my project, I received immense support from my Professor and we often used to discuss about possible designs that would be suitable to meet the specification. I also used to attend weekly talks at ISI related to fields like NLP and AI which helped me to get an insight into the latest ongoing research in these fields.

As much as I enjoyed my work, I also used to travel a lot on weekends - Universal Studios, Hollywood Walk of Fame, California Science Centre, Natural History Museum, Corral Canyon trail, Museum of the Holocaust, Six Flags Magic Mountain, San Diego Zoo, Las Vegas – are some of the amazing places I explored. I would really like to thank IUSSTF for giving me such a wonderful opportunity.

IUSSTF-Viterbi Program

Anjana Asok
Birla Institute of Technology and Science
Pilani

It is quite an experience to work with top researchers in your field of interest. Along with that, it is more interesting, when you are a part of a group of interns enthusiastic to explore and ready to share experiences! As a part of the IUSSTF Viterbi-India program, I had an incredible experience with the right combination of work and fun. At the University of Southern California, I worked with Prof. Mike Chen on the development of a hardware aware approach to deep learning in CNNs. Working on this helped me to get a different perspective to analog and mixed-signal design where we start thinking from the scratch about the components to be used in circuit design.

The work environment was very stimulating with my lab mates and mentor constantly willing to help. The weekly group meets form a platform for your work to be analyzed, and the whole research group engages in giving you feedback. The group discussions were an important learning experience for me, which involved getting different perspectives, ideas and thoughts on a particular problem. The Professor was really encouraging and in the first meeting itself, his suggestion was to "Go, explore the city". On weekends, we had a lot of fun going out to places. Each outing - the Hollywood trek, Universal Studios and San Diego, Griffith's Observatory came with its own set of memories and experiences. I am really grateful to IUSSTF for the opportunity, support and mostly for making the summer of 2017 one to cherish!

IUSSTF-Viterbi Program:
Webpage: http://www.iusstf.org/program/iusstf-viterbi-program
E-mail: viterbi-india@indousstf.org

United States-India Science and Technology Endowment Fund

Commercializing Technologies for Societal Impact

The governments of the United States of America (through the Department of State) and India (through the Department of Science & Technology) have established the **United States - India Science & Technology Endowment Fund (USISTEF)** for the promotion of joint activities that would lead to innovation and technopreneurship through the application of science and technology. The Endowment Fund activities are implemented and administered through the bi-national **Indo-US Science and Technology Forum (IUSSTF).**

CALL FOR PROPOSAL

Mandate

The fund aims to select and financially support promising joint U.S.-India entrepreneurial initiatives that address the theme of *"Commercializing Technologies for Societal Impact"* through a competitive grant program.

Funding

Grants size up to **INR 25 Million or** approx **USD 400,000***.
** all grants are awarded denominated in Indian Rupees (INR) only and subject to prevailing exchange rate*

We Invite

Bi-national teams of entrepreneurs and innovators with:

- Innovative product or technology beyond the idea stage
- High societal impact
- Significant potential to commercialize within 2-3 years

Eligibility

- Proposals must include a minimum of one partner from each country
- The bi-national teams can include:
  - (i) Incorporated companies including start-ups; or
  - (ii) Non-incorporated entities; or
  - (iii) Individuals or consortia from academia, government laboratories, non-government R&D institutions

Priority Areas

Healthy Individual:

- Biomedical devices & diagnostics
- Food and nutrition products
- Preventive & curative measures to improve health

Empowering Citizens:

- Agriculture
- Education
- Financial inclusion
- Information and communication technology
- Water

For more details please visit:
www.usistef.org | www.iusstf.org

Call Announcement : May2018

JANUARY - 2018

Nanomaterials and nanotechnologies for clean energy generation and storage

10-12 January 2018
Coimbatore, INDIA

This Indo-U.S. Workshop on ***Nanomaterials and nanotechnologies for clean energy generation and storage*** organized by **P. Radhakrishnan** (PSG Institute of Advanced Studies, Coimbatore) and **Pradeep Haldar** (SUNY Polytechnic Institute, Albany, NY), brought together top scientists, engineers, researchers and industry collaborators from the U.S. and India in the area of nanomaterials and nanotechnologies for clean energy generation and storage. The goal of the workshop was to present industry best practices and roadmaps for the execution of effective and fruitful collaboration, technology commercialization opportunities, state-of-art research and breakthroughs in nanomaterials and nanotechnologies for clean energy. The workshop was attended by 35 Indian and 8 American participants. In addition to talks, the workshop also had a panel discussion among the invited speakers and industry delegates and oral presentations by 10 research scholars from various institutions across India.

FEBRUARY - 2018

Recent advances in magnetism and spintronics

05-06 February 2018
Mumbai, INDIA

The topic of Magnetism and Spintronics has emerged as one of the most important areas in Condensed Matter Physics today. Both India and the U.S. are actively involved in activities related to this field. While magnetism in materials has been of great interest for many

decades, the topic of spintronics has attracted a large number of researchers to this field due to the application potential and fundamental importance from the physics point of view. A large number of novel devices, materials and applications have emerged in the recent past. This Indo-U.S. Workshop on ***Recent advances in magnetism and spintronics*** organized by **Shiva Prasad** (Indian Institute of Technology Bombay) and **Hariharan Srikanth** (University of South Florida), provided a forum for exchanging ideas on topics ranging from bio/nano magnetism to skirmions.

FEBRUARY - 2018

Discussion meeting on mechanics/ materials interface

18-22 February 2018
Coorg, INDIA

Over the past two decades or so, a number of new materials have been developed, which are finding applications in defence, aerospace, automobile, electronic, biomedical, and energy (generation as well as storage) sectors. The deformation and failure mechanisms are unique to each of these new classes of materials. More importantly, they differ vastly from the conventional metals and alloys. Therefore, it is imperative that their mechanical behavior is understood in detail from both mechanics and mechanisms perspective. Such knowledge is crucial not only for designing better materials but also for the mechanical design of fail-safe structures. The objective of the ***Discussion meeting on mechanics/materials interface*** organized by **R. Narasimhan** (Indian Institute of Science, Bangalore) and **Pradeep Guduru** (Brown University, Rhode Island) was to bring together experts from the U.S. and India to discuss exciting new developments in the field of Mechanics of Materials. The lectures were delivered by 12 renowned academicians from the U.S., 15 scientists of repute drawn from Indian academic and research institutions and three graduate research students. Several topics of contemporary research interest were discussed at the meeting. These pertained to recent advances on ductile fracture of anisotropic materials and mechanics of deformation of novel materials like magnetostrictive materials, graphene and ultra-hard ceramics. Other lectures focused on recent developments in experimental mechanics such as using Digital Gradient Sensing and Digital Volume Correlation and mechanics of non-crystalline materials. The program ended with a panel discussion wherein the experts deliberated on fundamental research, academic curricula, collaborative research and technological implications of the field of mechanics of materials.

FEBRUARY - 2018

Nanotechnology regulatory science

21-22 February 2018
Hyderabad, INDIA

Nanotechnology is enabling the development of new personal care products, in vitro diagnostics and in vivo imaging agents for early disease detection. While some of these exciting advances that are proven to be safe and effective need to reach patients soon, challenges in reproducibility of these complex technologies is leading to very slow progress in clinical translation. One of the main goals of this Indo-U.S. Symposium on ***Nanotechnology regulatory science*** organized by **S. Chandrasekhar** (CSIR-Indian Institute of Technology, Hyderabad) and **Sunil Krishnan** (MD Anderson Cancer Center, Texas) was to educate the community on regulatory perspectives, and develop collaborations between India and the U.S. in the field of nanotechnology regulatory science. This symposium focused on the regulatory aspects of Nanotechnology, a relatively nascent field where global consensus and standards are still under development. It brought experts from regulatory agencies such as the U.S. Food and Drug Administration (FDA), U.S. Consumer Protection Safety Commission (CPSC) from the United States and DCGI and other national and state regulatory entities (DBT, DST, ICAR, ICMT, TERI and FSSAI) in India to discuss key topics of bilateral interest and possible collaborations in this field. Key areas that were discussed at the meeting included nanomaterial drugs, devices, consumer products and clinical trials.

MARCH - 2018

Emergency medical delivery system integrating unmanned vehicles

05-07 March 2018
Bengaluru, INDIA

Emergency medical situations can occur at any time, and often do occur on roads in congested urban areas, or in rural areas that may not have easy and fast access to emergency medical personnel. The recent advancements in geospatial localization and optimization have been quite dramatic and drone technology is being evaluated by technology companies for delivery of commercial goods. While this is interesting and could be lucrative for the companies; the application of such technology for alleviating and responding to road traffic congestion and accidents and medical response to rural or congested urban situations could be much more impactful. Another

important and potential application of drone technology is transportation of vital organs, whose timely delivery to hospitals (where it is required) is prevented by heavy traffic in metro cities. When implemented, such a system could be transformative in changing the emergency medical landscape in India. To address this challenge, the Indo-U.S. Workshop on ***Emergency medical delivery system integrating unmanned vehicles*** organized by **Kota Harinarayana** (Aeronautical Society of India, Bengaluru) and **C. 'Nat' Nataraj** (Villanova University, Villanova) brought together some of the leading experts from the U.S. & India in Engineering, Emergency Healthcare, and from regulatory and legal domains. It facilitated brainstorming sessions over two days on the state of the art in emergency healthcare across the globe, where engineering and medical domains must work hand-in-hand. The workshop deliberated on the need to augment new technologies for addressing the ever increasing demands and the gaps in the current technologies, along with a consideration of legal and regulatory issues. The goal of this workshop has been to create a white paper and a proposal for submission to the prospective funding agencies in order to significantly advance the collaborations between India and the United States.

MARCH - 2018

Transcription, chromatin structure, DNA repair and genomic instability

06-10 March 2018
Bengaluru, INDIA

Eukaryotic genome is tightly packed via chromatin structure. Hence, chromatin structure plays important roles in regulation of gene expression. Alteration of chromatin structure and gene expression is strongly associated with a growing number of diseases. Further, genomic integrity is highly challenged by DNA damage via intrinsic and extrinsic factors. When DNA damage leads to chromosomal abnormalities and translocations, it may impede transcription, which severely alter gene expression and in turn threaten cellular existence, thus leading to cancers, ageing, and a variety of other diseases. Fortunately, cells employ various DNA repair mechanisms like excision repair or double strand break (DSB) repair (homologous recombination and non-homologous end joining) pathways to maintain genomic integrity. Intriguingly, DNA damage and DNA repair factors also regulate transcription and chromatin structure. Thus, transcription, chromatin structure and DNA repair are not mutually exclusive processes, but rather highly co-ordinated events to regulate genome organization, integrity and expression. Mis-regulation of these highly co-ordinated events is strongly associated with various diseases including cancers, and hence therapies can be developed by understanding the detailed regulatory

mechanisms of chromatin structure, transcription and DNA repair with their cross-talks. However, most of the scientists are working quite independently in these three distinct areas. Therefore, this workshop on ***Transcription, chromatin structure, DNA repair and genomic instability*** organized by **Sathees C. Raghavan** (Indian Institute of Science, Bangalore) and **Sukesh R. Bhaumik** (Southern Illinois University School of Medicine, Carbondale), brought scientists working on these distinct areas of chromatin structure, transcription and DNA repair toward understanding intricate mechanisms with disease pathogenesis and therapeutic developments, as well as facilitate interdisciplinary scientific interactions and collaborations to fast explore cross-regulatory mechanisms of genome organization, integrity and expression with drug discovery.

MARCH - 2018

Functional Materials (ISFM-2018): Energy and biomedical applications

13-15 April 2018
Chandigarh, INDIA

In the present era, there is an incredible growth of Advanced Functional Materials that can improve the performance of various advanced technologies. The scientific community is devoting efforts to harness the potential of materials to cure challenging diseases as well as to solve energy related issues. In the interest of minimizing environmental damage, various renewable forms of energy production have enjoyed substantial progress technologically and economically during the last decade. But much still needs to be done to ensure that our energy infrastructure can stay on a sustainable footing. This cannot be achieved through one technological solution alone, but requires the utilization of several energy production and storage technologies and measures to improve energy efficiency. Various methods of energy harvesting such as solar photovoltaics, thermoelectric etc., could be employed on a large scale, lessen the burden on conventional energy production systems. Moreover, the efficiencies of these energy harvesting mechanisms could be further enhanced by the synthesis of various functional materials. This Symposium on **Functional Materials (ISFM-2018): Energy and biomedical applications** organized by **Raju Kumar Gupta** (Indian Institute of Technology Kanpur) and **Vikas Berry** (University of Illinois at Chicago), focused on these niche areas and presented an opportunity for scientists and engineers in India and the U.S., working in academic institutions and industry to partner and collaborate with each other to leverage their expertise to accelerate research goals and achieve faster commercialization leading to affordable devices based on Functional Materials.

IUSSTF
Indo-US S&T Forum

Indo-US Science & Technology Forum

Who we are

The Indo-US Science and Technology Forum (IUSSTF), established under an agreement between the Governments of India and the United States of America, is an autonomous, not for profit society in India, co-funded and co-governed by both the governments. IUSSTF promotes and catalyzes Indo-US collaborations in science, technology, engineering, biomedical research and innovation through substantive interaction among government, academia and industry.

What we do

Foster excellence by capitalizing on the scientific and technological synergy
Disseminate information and create awareness through scientific exchanges
Build linkages through networking between academia and industry
Explore new frontiers by nurturing contact between young and mid-career scientists
Pave way to sustainable interactions and establish long term relationships
Encourage public-private partnership to inculcate elements of innovation and entrepreneurship

We support

Exciting and innovative collaborative programs cutting across disciplines and institutions

- Academia-Industry Connect Programs
- Advance Schools & Training Programs
- Bilateral Workshops & Symposia
- Flagship Events
- Knowledge R&D Networked Joint Centers
- Programs on Innovation and Entrepreneurship
- Public-Private Networked R&D Joint Centres
- Research Fellowships for Faculty
- Special Initiatives for Strategic Partnerships
- Student Internships & Visiting Professorships

We invite

Proposals which are peer reviewed both in India and USA for awards

Bilateral Indo-US Workshop/Symposia & Indo-US Training/Advanced Schools

Submission Deadlines	Award Announcements
1 March	31 July
31 August	31 January

Indo-US Public-Private Networked Centres & Indo-US Knowledge R&D Networked Centres

Submission Deadline	Award Announcement
31 August	31 January

How to contact us?

Indo-US Science and Technology Forum
Fulbright House
12 Hailey Road,
New Delhi - 110 001

For program details visit:
www.iusstf.org

IUSSTF: Catalysing Indo-US Science, Technology and Innovation Collaborations for 15 Years!