Time Domain Astronomy
Studying transient skies
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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, Rahul Nautiyal

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

Design, Production and Circulation
Communication & Outreach Division
AFE Consultants Private Limited
Aravali House, 431/D-22, Chhatarpur Hills
New Delhi-110074, India

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In what has been yet another successful and immensely engaging year for IUSSTF, it is with a sense of pride that I look back at our achievements in 2017! In tune with our track record, we continue to forge ahead bringing the S&T ecosystems of both India and the United States together to work on issues of high relevance such as air and water quality, clean energy, climate change, education, food security, affordable healthcare, etc.

Among the key R&D initiatives that IUSSTF has implemented this past year, under the aegis of the Indo-U.S. Joint Clean Energy Research and Development Center (JCERDC), a new bilateral project on Smart Grids and Energy Storage was formally selected for award. An important objective of this project is to bridge the gap between smart grid, storage and renewable energy research and facilitate its subsequent adoption by distribution utilities in their systems. Also in 2017, with support from the Department of Science and Technology, Govt. of India (DST) and Intel®, IUSSTF announced a research program titled Research Initiative for Real-time River Water and Air Quality Monitoring. The overall objective is to develop tools and constituent blocks that will enable end-to-end water and air quality monitoring systems on smart, networked, low-cost, low-power sensor nodes with large-scale cloud-based data analysis. After a multi-tier review, two projects each in Air Quality Monitoring and Water Quality Monitoring were selected for award.

We firmly believe that a key part of what defines IUSSTF is the quality and commitment of our stakeholders and I would like to take this opportunity to congratulate our PI, Dr. Parameswaran Ajith from the Tata Institute of Fundamental Research, Bengaluru, who was recently named the 2017 Azrieli Global Scholar by the Canadian Institute for Advanced Research (CIFAR). He is part of the Laser Interferometer Gravitational Wave Observatory (LIGO) project that has discovered four gravitational waves so far.

IUSSTF continues to play a pivotal role in catalyzing the strategic science, technology and innovation partnerships between India and the United States through our diverse programs that help build scientific networks, promote innovation and entrepreneurship and train the next generation of scientists and students to become a productive part of a globally-engaged scientific community.

On behalf of the Indo-U.S. Science and Technology Forum, I wish all our readers a very creative and fruitful New Year! We at IUSSTF are taking this opportunity to rededicate ourselves to not only furthering U.S.-India S&T collaborations, but also to reinvent ourselves to focus on activities that are of high-value and high-impact bringing together key stakeholders from both sides!

Rajiv Kumar Tayal
Executive Director, IUSSTF
Studying transient skies

The UNIVERSE, far from being static, is an ever-changing, dynamic place. Time domain astronomy focuses on studying the evolution and changes of a wide variety of cosmic objects, particularly when the changes happen over “human” timescales: hours, days, to a year. These changes can be caused by several physical phenomena: starting from relatively benign flares on stars, to accretion of matter on compact objects, all the way to stellar mergers and explosions. These phenomena are commonly observed in binary stars, novae, supernovae, gamma ray bursts, active galactic nuclei, pulsars, and many more. These are aptly referred to as transients because when an event such as an explosion takes place, the electromagnetic signature radiated as a result is transient in nature. It appears as a flash in the sky for a period and then slowly fades away. By capturing these electromagnetic signatures, astronomers learn about the cosmic objects themselves and the physical processes that govern their evolution.
Exploring the dynamic cosmos

Transients often have tell-tale signatures in various electromagnetic wavelength bands. Astronomers leverage this fact to use telescopes sensitive to a variety of wavelengths – from gamma-rays to infra-red – to survey the night sky in search of transients. These surveys consist of scanning a part of the sky, moving on to other areas, and returning to the first part again and again. When the consecutive images are compared to the first image of that part of the sky, any sources that changed in brightness are detected. These changes can take the form of an increase or decrease in the brightness of a source seen in both images, or the appearance (or disappearance) of an object.

Finding such objects requires continuous monitoring of large areas of the sky. Hence, telescopes dedicated for such “transient surveys” are usually small, wide-field instruments, with a trade-off that they cannot see very faint object. Astronomers use automated and manual data processing to regularly check these surveys for transient sources. Promising candidates are selected for further study with larger, more sensitive telescopes. The most interesting objects are often studied at multiple wavelengths using earth-based and space-based telescopes.

Growth and the study of the transient universe

The Global Relay of Observatories Watching Transients Happen (GROWTH) is a network of observatories with a collection of telescopes around the world positioned in a way that allows the collaboration to observe a transient event uninterrupted by daylight. It is an international partnership created by researchers from seven countries pooling their resources towards common scientific goals. In the words of GROWTH’s PI (Dr. Mansi Kasliwal, Caltech, USA), “GROWTH is primarily looking at optical transients from a host of different observatories to build a more complete picture of the physical processes of their evolution. We have a network of 18 observatories in the Northern Hemisphere. As Earth rotates and daylight creeps in at one of our locations, we switch observations to one of our facilities westward that is still enjoying night-time.”

This is important not only because transients can be continuously monitored, but also because when a transient flashes in the sky, it is an entirely random event. With just one telescope to study it, the initial hours after detection may be missed if the detection happens close to daylight. On the other hand, with a global network, observations and follow up can start as soon as a transient is discovered. For many interesting events such as young supernovae and neutron star mergers, studies in the first 24 hours of explosion can give us the most information about the progenitor sources. Catching their fast-changing signals before they are gone is crucial for astronomers to understand origins and evolution mechanisms of these events.
GROWTH India and its eye to the Universe

India has been very active in the GROWTH collaboration, with a wide range of contributions. We have developed optimal scheduling algorithms for follow-up observations which are being used by various partner observatories. We have used Indian facilities to participate in several observing campaigns. Traveling enabled by the project has been instrumental in communicating our results at international conferences as well as sending our students abroad for training. We have also hosted various visitors from GROWTH institutes.

GROWTH-India will get a major boost with the setting up of India’s first fully robotic telescope, which will be dedicated for time domain astronomy. This 0.7-m wide-field “GROWTH-India” telescope is being set up with generous support of the Science and Engineering Research Board, Department of Science and Technology, and the Indo-US Science and Technology Forum. The telescope is equipped with a sensitive camera that can detect even the faintest transients found by our partner survey telescopes like iPTF and the Zwicky Transient Facility at Palomar, California.

The telescope is being programmed to directly communicate with various ground-based and space-based surveys that are searching for transient sources. Every transient source reported by any astronomer around the world is compared with our pre-defined criteria, designed to select specific transients like young supernovae, gamma ray bursts, gravitational wave events etc. If the transient matches our selection requirements, the telescope immediately swings into action, obtaining data without waiting for human intervention. The fast slewing design ensures that observations can commence within a few seconds of the transient report. In case of gravitational wave events where the exact source position is unknown, the telescope control software uses the smartest algorithms to find an optimal sequence in which to image different parts of the sky. Autonomous software process the data in real-time, looking for new sources in the images, calculating their positions and brightness.

In parallel, an alert is sent to the GROWTH-India team informing them of the details of observations being undertaken. All the data are also transferred to CREST (IIA) in Bangalore and to IIT Bombay. If a strong new source is found, another alert is dispatched. The core team has full control over the telescope and can switch from the autonomous control to manual control whenever desired. All the control software has been designed specifically for this project, and is giving good results in tests.
The telescope is being commissioned at Hanle, Ladakh and is expected to be operational by early 2018.

**GROWTH strikes gold: GW170817**

August 17, 2017 marks the dawn of multi-messenger era in astronomy. On this day, at 12:41:04 UTC, gravitational waves (GW) were detected by the Advanced LIGO and Advanced Virgo detectors. Almost within two seconds of the detection of this event, GW170817, the Fermi gamma-ray burst monitor independently detected a short, hard gamma-ray burst GRB170817A. The IceCube neutrino observatory reported detection of neutrinos within 500s of the GW event. GROWTH-India responded with immediate follow-up observations of the IceCube neutrino fields using the HCT, and ruled out the presence of any electro-magnetic (EM) counterpart in them. In the meantime, the LIGO collaboration localized the source to a sky region of 31 square degrees with an initial distance estimate of 40–8 Megaparsec, in the southern hemisphere, and with component masses consistent with neutron stars. The GROWTH collaboration identified 49 galaxies as potential hosts of the source. An extensive multi-wavelength observing campaign was then launched by various collaborations, to search the EM counterpart, leading to the discovery of a bright optical transient, nearly 11 hrs after the GW detection, in a nearby galaxy NGC4993, ranked 3rd in the list by GROWTH. This transient was also detected in the infrared and ultraviolet wavelengths. The global repertoire of GROWTH was key for complete characterization of this transient, and included contributions from HCT, AstroSat, and GMRT. The early ultraviolet observations revealed a blue transient that faded within 48 hours. Optical and infrared observations showed a redward evolution over ~10 days. Nine days after the GW event, an X-ray counterpart was identified, and fifteen days later, a radio counterpart was identified. The X-ray and radio emission appear to arise from a physical process that is distinct from the one generating the UV/optical/NIR emission. These observations support the hypothesis that GW170817 was produced by the merger of two neutron stars in NGC 4993, that was followed by a short gamma-ray burst and a kilonova/macronova powered by the radioactive decay of r-processed nuclei synthesized in the ejecta. These studies showed signatures of newly synthesized elements, confirming that such mergers are indeed the birthplaces of half of the elements heavier than iron – including most of the gold and platinum in the universe.

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Hanle: the site of GROWTH-India telescope. The dome in the foreground will house the new 0.7m robotic telescope. The dome at the background houses the 2-m Himalayan Chandra Telescope.
Gravitational waves are among the most intriguing predictions of Albert Einstein’s general theory of relativity. A pillar of modern physics, this theory describes gravity as the warpage (curvature) of spacetime. All forms of matter and energy warp spacetime and their acceleration creates “ripples” in that warpage that travel outward from their sources at the speed of light. These ripples in spacetime warpage are called gravitational waves.
Indirect evidence for the existence of gravitational waves was found in the Hulse-Taylor binary where the emission of gravitational radiation causes the binary orbit to shrink and this was identified in the arrival times of radio pulses from one of the binary companions and has since been confirmed in the orbital decay of other binary systems observed in radio.

A century after Einstein predicted their existence, gravitational waves were directly detected by the Laser Interferometer Gravitational-wave Observatory (LIGO) in September 2015. The waves were emitted by a pair of coalescing black holes some 1.3 billion light years from Earth. The discovery not only confirms that modern physics is on a firm footing, but also opens up a new astronomical tool to observe the most powerful events in the Universe. Three prime architects of LIGO, Rainer Weiss, Barry Barish and Kip Thorne, were awarded the 2017 Nobel Prize in Physics “for decisive contributions to the LIGO detector and the observation of gravitational waves.” Since then LIGO has reported gravitational waves from four other binary black hole mergers as well as the inspiral and merger of a binary neutron star. The most recent detections were made by LIGO together with the European Virgo detector.

The first gravitational-wave signals observed were produced by mergers of black holes at cosmological distances of billions of light years from Earth. These observations provide a definitive evidence of the existence of binary systems consisting of black holes, and tell us that stellar-mass black holes could be much more massive than previously thought (Figure 1). These observations also allowed us test Einstein’s gravity, for the first time, in the highly “relativistic” regime, involving velocities close to the speed of light and strong gravitational fields. Upcoming
Neutron stars are the smallest, densest stars known to exist and are formed when massive stars explode in supernovae. Typical neutron stars are heavier than the Sun, but have a diameter of roughly 20 km – objects so dense that the mass of a teaspoon of material from their core is comparable to the mass of a mountain.

Matter in its densest form
In GW170817, the neutron stars, weighing about 1.1 to 1.6 times the mass of the Sun, were tracked for about 100 seconds as they spiraled towards each other and collided. These observations contain important clues about the nature of the dense matter that constitutes these stars – shedding light on a major puzzle in nuclear physics.

Neutron star mergers can be accompanied by spectacular emission of light from all parts of the electromagnetic spectrum – from gamma rays to radio waves. GW170817 was followed up by a variety of space- and ground-based telescopes marking the dawn of multimessenger astronomy.

Follow-up observations by several optical, infrared, x-ray and radio telescopes identified a transient source that was confirmed to be the source of gravitational waves and the gamma-ray burst. Neutron star mergers have been postulated as the engines of short gamma-ray bursts; these observations have, for the first time, confirmed this hypothesis.

Neutron stars are the densest objects we know; a teaspoon of material from a neutron star is comparable to the mass of a mountain! Consequently, neutron-star mergers provide a unique laboratory for exploring fundamental physics, astrophysics and cosmology (see Figure 2). Gravitational-wave signals from binary neutron stars contain important clues about the nature of highly dense nuclear matter that constitutes these stars, which is a major puzzle for nuclear physics. Joint observation of electromagnetic and gravitational waves from such systems provide unique means for testing Einstein’s gravity, and an independent way of measuring the cosmic expansion rate. Electromagnetic observations following the recent neutron-star merger also showed signatures of newly synthesized elements, confirming that such mergers are indeed the birthplaces of half of the elements heavier than iron – including most of the gold and platinum in the universe!
Indo–U.S. Centre for the Exploration of Extreme Gravity

India and the United States have a long tradition of scientific cooperation in the field of gravitational-wave science. LIGO is funded by the U.S. National Science Foundation (NSF) and is jointly operated by Caltech and MIT. Indian scientists have made seminal contributions to the theoretical modeling of gravitational-wave sources and to developing sophisticated data-analysis techniques for detecting weak signals in noisy data. Indeed, the most significant Indo-U.S. collaboration in gravitational-wave science is the ongoing LIGO–India project, which aims to establish a gravitational-wave observatory in Indian soil in collaboration with LIGO. The project is jointly funded by the NSF and the Department of Atomic Energy and Department of Science and Technology (India), with IPR Gandhinagar, IUCAA Pune, RRCAT Indore being the Indian nodal institutions. IUSSTF has played a notable role in seeding the initial activities that eventually lead to the LIGO–India project. The IUSSTF supported Indo-U.S. Center for Gravitational-Wave Physics and Astronomy (2011-2013), with Tarun Souradeep (IUCAA) and Rana Adhikari (Caltech) as PIs supported several activities that eventually lead to the LIGO–India project.

The new Indo–U.S. Centre for the Exploration of Extreme Gravity seeks to further strengthen the Indo-U.S. collaboration in theoretical and observational aspects of gravitational-wave physics and astronomy. Scientists who are part of the Center have been actively involved in the development of LIGO detectors, in the recent detection of gravitational-waves and in deciphering these discoveries by extracting physics and astrophysics from observed signals. The Centre will contribute to developing strategies to address the following fundamental questions in physics using gravitational-wave observations: Is general relativity the correct theory of gravity? Are nature’s black holes the black holes of general relativity? How does matter behave under extremes of density and pressure?
The global visually impaired community has been facing low literacy and employment levels due to a shortage of accessible material and the high cost associated with developing it. This gap with the sighted has further increased with the shift towards digital resources. The assistive technology aids to tackle the issue of digital accessibility have seen limited penetration due to significantly high costs. An affordable digital aid in their tactile script of Braille will have a lasting impact on the quality of life particularly in developing countries like India.
The visually impaired community around the world has been dependent upon Braille, a dot-based script wherein the user perceives characters by the sensation of touch instead of sight. Since the Braille code was invented by Louis Braille in the 19th century, it has been a critical tool in education. Printed Braille material however is bulky, tedious to transcribe and expensive to produce. Consequently, a very small percentage of the total texts produced globally are ever converted into printed Braille. With the shift towards digital content, the gap between the blind and the sighted has further increased with assistive technology aids being predominantly audio-based thereby proving insufficient for literacy. The digital Braille aids have been severely limited by their high costs ranging from USD 2500 – USD 13,000 making them unaffordable for 90% of the population that is living in low-income settings [WHO].

The lack of available and affordable solutions for digital accessibility of the global visually impaired population of 39 million is reaching an alarming stage with literacy levels of less than 10% and employment of less than 30% even in developed countries. The need for an affordable digital Braille assistive technology has been recognized globally with international organizations such as the World Blind Union, Royal National Institute of Blind People (RNIB), National Federation of the Blind (NFB), etc. advocating the need for technological innovation in the domain. This calls for innovative technology development in keeping with the ground realities of visually impaired users in developing countries – disposable income and affordability, regional language adoption, and the need for robust design for usage conditions of the majority users. Innovision, an Indian venture incubated out of IIT Bombay identified this existing gap and was founded to develop assistive technology solutions with specific focus on innovation for affordability.

The U.S.-India S&T Endowment Fund (USISTEF) funded collaboration titled *Digital Braille accessibility for the blind made affordable by magnetic actuator technology* brings together Innovision and Penn State University to bring a digital revolution to 39 million blind globally at an affordable price. Innovision has been founded by IIT Bombay alumni Shyam Shah and Surabhi Srivastava, and has developed Braille cell actuator technology to bring down the cost of digital Braille aids. The company has pilot tested the technology and benchmarked its performance against the existing competitor products in the market. The collaboration with Penn State University has brought on the product design expertise of
Dr. Shraddha Sangelkar who has a rich background in inclusive design and disability simulation. 

**BrailleMe** – Innovision’s low cost refreshable Braille device comprises of a tactile output interface of 20 Braille characters made up of electromechanically actuated pins for reading which acts as a substitute for a visual screen along with a keypad for typing in Braille. It would enable users to read, type and navigate digital content in their own tactile script bringing computers, smart phones, tablets etc. within their reach. The target is to deploy this product as a Braille tablet in schools in stand-alone mode with SD card/USB drive as a substitute for Braille kits for education. We are also looking at enabling employment opportunities through **BrailleMe** by pairing it with computers via Bluetooth for applications in BPO, IT, coding and data entry jobs.

It is this Braille cell actuator technology, developed in-house by the company in early 2015 which provides the competitive price advantage over commercial piezoelectric Braille displays. This innovation is key to cost-reduction and comprises the core of the intellectual Property held by the company for the product. Dr. Shraddha Sangelkar has been associated with the project since late 2016 and is responsible for product design with specific focus on the user requirements in terms of ergonomics, user interface, training modules for ease of access. The pilot trials of **BrailleMe** are being undertaken by Innovision in India and Dr. Sangelkar’s team at Penn State University in the United States. Since the idea stage when Innovision’s product lead, Shyam Shah, was developing the actuator technology as a student at IIT Bombay, the key stakeholder institutes such as the National Association for the Blind (NAB) have been involved in the product design. Extensive user surveys and expert interviews were carried out by Innovision to incorporate special user needs, potential applications etc. into the architecture of the product. The first prototype of **BrailleMe** was tested with these institutions and users in Mumbai – NAB and Xavier’s Resource Center for the Visually Challenged (XRCVC).

The user feedback was incorporated into the design iterations and the second version of prototype was rolled out and tested in India – NAB, XRCVC (Mumbai), Enable India, Nasscom Foundation (Bangalore), Sarthak, Saksham (Delhi) and the in the U.S. – National Braille Press (NBP), National Federation for the Blind (NFB) and Perkins School for the Blind. **BrailleMe** has also been showcased to the Ministry of Social Justice & Empowerment (Govt. of India), accessibility conferences – Microsoft Disability Conference, ASME Hardware ISHOW New York, Nasscom CSR Conclave, CSR @ Disability and TiECon 2016 in Silicon Valley. The product has also been awarded as the best ICT Innovation for Accessibility by Nasscom Foundation, Best Global Social Hardware Innovation by ASME, TiE International Startup Competition Silicon Valley and Sankalp Award. The partners Innovision and Penn State University have collaborated on inclusive product design and design for manufacturing targeting commercialization of **BrailleMe** by 2018. Field testing and go-to-market strategy validation is currently being carried out in their respective geographies.

The Indo-U.S. Science and Technology Forum congratulates the Principal Investigator of the IUSSTF Joint Center titled “**Indo–U.S. Center for the Exploration of Extreme Gravity**” **Parameswaran Ajith** (Tata Institute of Fundamental Research, Bengaluru) who was recently named the 2017 Azrieli Global Scholar by the Canadian Institute for Advanced Research (CIFAR). Dr. Ajith is part of the Laser Interferometer Gravitational Wave Observatory (LIGO) project that has discovered four gravitational waves so far. He is the only Indian among the 15 exceptional early career investigators to receive this prestigious two-year appointment including $1,00,000 in research support.

We wish Dr. Ajith continuing success!
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 Rs. 2.50 Crores 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
Cervical cancer is one of the most preventable and treatable cancers in the world, yet over half of all cases prove fatal. In India, current estimates indicate 132,000 new cases diagnosed and 74,000 deaths annually accounting for nearly 1/3rd of the global cervical cancer deaths. Indian women face a 2.5% cumulative lifetime risk and 1.4% cumulative death risk from cervical cancer, accounting for 17% of all cancer deaths among women aged between 30 and 69 years. It is estimated that cervical cancer will occur in approximately 1 in 53 Indian women during their lifetime compared with 1 in 100 women in other advanced nations.

Due to a long gestation period, Cervical Cancer can be caught and treated early. Screening programs can drastically reduce incidence by detecting Cervical Cancer at a precancerous stage. Population-based screening has proven to be an effective weapon against this cancer as shown by developed western countries. With timely detection of cancer at an early stage, upto 90% of deaths can be avoided with proper medication. However, in India a lack of Cervical Cancer screening apparatus and trained medical expertise to detect cancer at an early stage remains the main obstacle in implementation of mass screening program.

44% of pathologists work overtime every week and 24% services are outsourced every week. These figures highlight the fact that there are not enough resources for timely diagnosis of Cervical Cancer. Most of the screening centers are located in cities, which are not accessible to the rural women, let alone being expensive. Therefore, it comes as no surprise that less than 5% of eligible rural women (25-64 years) report having had a pelvic exam or Pap smear in the past three years.

As part of their commitment to creating a healthier population and reducing the mortality rate of cervical cancer, the United States and India Science and Technology Endowment Fund (USISTEF) invested in a bi-lateral team of startups - Alexapath Microscopes and AIndra Systems. Together they spent the next two years developing a point-of-care diagnostic support tool capable of serving as a force multiplier to improve the speed of diagnosis, increase the number of cases a cytologist can view each day and extend screening programs to rural communities without the presence of a physician at the point-of-care.

Alexapath (www.alexapath.com) based at the NYU Tandon Future Labs in Brooklyn, New York has developed the ADA smart microscopes for the past four years. The team has engineered a set of universal accessories capable
of upgrading a standard microscope to a digital imaging device, their software allows for both live sharing of specimens via alexapath.com or local acquisition and storage with the proprietary mobile Whole Slide Imaging program. The point-of-care diagnostic system contains three parts that work cohesively to screen and report a PAP Smear sample as normal or atypical. It is comprised of an Autostainer - “IntelliStain”, an Image Acquisition Device - “ADA” and the Artificial Intelligence Algorithm - “Astra”.

**IntelliStain**, the automatic stainer, is a hassle free system that is used to load pap samples and run the pap-staining program. The stainer is a walkaway system that provides consistent and error free stains. The output are accurately stained slides that are crisp and clear to view.

The **IAD**, designed and developed by Alexapath, converts the stained slides into a Whole slide image. These images are delivered to a computing unit on which Astra resides.

**Astra**, the AI algorithms analyze the Whole Slide Image (WSI) captured using the IAD and reports the sample as cancerous (HSIL, LSIL, SCC) or normal. The report is viewable on the screen of computing unit. The image is also made available on the Image Viewer for the pathologist to be able to either confirm or reject and finally signoff.

This new point-of-care diagnostic system presents a huge benefit to NGOs that help in pap smear sample collection for screening of squamous cell carcinoma. These NGOs collect the samples from the rural areas or rural health centers and then transport them to an urban center for diagnosis. The samples, at times, take 6 weeks to be reported. This is difficult at several stages since a delay in the report will not only cause low rates of compliance to follow on treatment, but will also prove to be a hindrance in tracing down the woman after a long gap of 6 weeks.

The system is currently in the beginning of the validation phase at few leading centers in Bangalore, like Kidwai Memorial Institute of Oncology. The protocol for the validation has been submitted to the Clinical Trial Registry for India. We aim to screen about 500 women for the validation and compare the results with the traditional method of screening. These 500 women will be from a mix of both rural and urban settings. Two samples per woman will be collected to run it through the **CervAstra** and the existing incumbent system. During this study phase, all the individual components will be validated along with the entire system. The IntelliStain will be rated for parameters like clarity, brightness, background etc. ADA, will validated on the diagnostic accuracy of its digital images. The algorithm Astra, will be rated for its accuracy and time taken for reporting. Cancer Care India, a NGO, are providing expert support to ensure we understand their problems and hurdles in providing services, and further solve them as effectively and efficient as possible.
Global Entrepreneurship Summit (GES) 2017, Hyderabad, INDIA

CELEBRATING YOUNG ENTREPRENEURS

For 7 years, the Global Entrepreneurship Summit (GES) has connected top entrepreneurship talent with investors and startup ecosystems across the globe to innovate the world’s most exciting solutions. In partnership with the Government of the United States of America, NITI Aayog hosted the eighth annual Global Entrepreneurship Summit in India from November 28-30, 2017. The Summit was addressed by the Prime Minister of India, Shri Narendra Modi. The U.S. delegation was led by Ms. Ivanka Trump, Advisor to President Trump.

At GES 2017, over 1500 attendees, including entrepreneurs, investors, educators, government officials, and business representatives represented the full measure of entrepreneurial talent from diverse backgrounds across our nation and the world. Through networking, mentoring and workshops, the GES empowered entrepreneurs to pitch their ideas, build partnerships, secure funding, and create innovative products and services that will transform societies for better tomorrow.

GES 2017 created an environment that empowers innovators, particularly women, to take their ideas to the next level. Women represent tremendous promise for economic growth and prosperity -- but in both developing and developed countries, also face tremendous barriers to building businesses. This year’s theme therefore was “Women First, Prosperity for All” to celebrate entrepreneurial spirit in all its strength, diversity, and entirety. The 2017 GES intends to inspire innovative initiatives, forge new collaborations across countries, and increase economic opportunities, particularly amongst women.”

“The Summit is being held in South Asia for the first time. It brings together leading investors, entrepreneurs, academicians, think-tanks and other stakeholders to propel the global entrepreneurship ecosystem. This event not only connects the Silicon Valley with Hyderabad but also showcases the close ties between the United States of America and India. It underlines our shared commitment towards encouraging entrepreneurship and innovation.

Here at the GES, more than 50 percent of the delegates are women. Over the next two days, you will meet many women who have dared to be different, in their own walks of life. They now inspire a new generation of women entrepreneurs. I hope the deliberations in the summit would focus on how women entrepreneurship can be further supported.

To my entrepreneur friends from across the globe, I would like to say: Come, Make in India, Invest in India - for India, and for the world. I invite each one of you to become a partner in India’s growth story. And once again assure you of our whole-hearted support.”

“Through your own enterprise, entrepreneurship, and hard work, the people of India have lifted more than 130 million citizens out of poverty – a remarkable improvement, and one I know will continue to grow under the leadership of Prime Minister Modi. All of you are helping India’s middle class reach its goal of nearly 500 million people by 2030. You have opened new universities across the country. Your doctors and scientists are discovering medical cures and life-saving technologies. Your engineers and architects have built modern wonders that grace your skies. And Indian spacecraft have traveled to the Moon and to Mars. The people of India inspire us all.

This is the first time India has hosted the Global Entrepreneurship Summit. It is a symbol of the strengthened friendship between our two peoples, and the growing economic and security partnership between our two nations. As President Trump said earlier this year: India has a true friend in the White House.”
Initiative for Research and Innovation in Science

SCIENCE PRODIGIES

This year’s Initiative for Research and Innovation in Science (IRIS) National Science Fair was conducted with great success. As young minds from around the country invested themselves in their science projects, the overall outcome of the Fair resulted in a spectrum of creativity and raw application of the basic sciences providing simple and firm solutions to global level problems.

IRIS encourages young minds in and around the nation to take on scientific research that brings out the best of the country. Thus, it provides an exceptional platform for these students to display their thinking skills and increased creativity in the field of science and technology. Intel India in partnership with Department of Science and Technology (DST), Government of India and IUSSTF, hosts IRIS to promote and nurture scientific research among young Indian innovators, recognize outstanding projects in the field of Science, Technology, Engineering, and Mathematics (STEM), and provides a platform to showcase them at a global stage through the International Science Engineering Fair (ISEF).
After a detailed scrutiny this year, 70 projects were showcased by 102 students competing under a total of 17 subject categories. These students were invited to pitch their ideas at the three-day national fair held from November 16-18, 2017 at the Manekshaw Centre, New Delhi. The event was inaugurated by Ms. Meenakshi Lekhi, Supreme Court Lawyer, Member of Parliament (Lok Sabha) and BJP National Spokesperson. As procedure followed, the selected projects were displayed by the students during the three day long fair, where they presented their ideas to a wide spectrum of audience including school children, parents, scientists, innovators and judges from different parts of the country. These projects were then evaluated by a panel of 30 Judges including Scientific Review Committee; versatile group of intellectual, joyful, high-spirited and innovative researchers, teachers, scientists & corporate individuals, representing different age groups & scientific streams from various reputed scientific institutions. After a detailed three day interaction between the Jury and Students, the top 20 projects representing ‘TEAM INDIA 2018’ were selected & awarded during the grand Award Ceremony.
As a fruitful reward, these young and proud 20 Grand Awardees representing ‘TEAM INDIA-2018’ would now be fine-tuned by Mentors during the mentoring camps and will be made ready to represent India with their innovative projects at the Intel International Science and Engineering Fair (ISEF) to be held at Pittsburg, Pennsylvania, U.S. during May 2018.

ISEF hosts students from over 78 countries, regions & territories and grants the most innovative independent research projects with awards and scholarships worth over USD 4 million. Over the years, Team India has won 121 awards at Intel ISEF, in the fields of biotechnology, medicine, biomedical engineering and mathematics and 25 of these winners have minor planets named after them.

It goes unsaid that IRIS has gained a stupendous fame and is on a rise to experience increased popularity and quality participation since its inception. IUSSTF prides itself in playing a vital role in the functioning of the event in order to provide these gifted minds such a wonderful platform at a young age upon which they are encouraged to build their stepping stones to success. With hopes to witness more of these inspiring little beings bring pride to our country, we wish ‘Team India 2018’ All the Best for their upcoming ISEF 2018!
## Top 20 Grand Award Winners

<table>
<thead>
<tr>
<th>Domain</th>
<th>Project Title</th>
<th>Students</th>
<th>Mentor (s)</th>
<th>School</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering: Material &amp; Bioengineering</td>
<td>An Economical Early detecting and dosage monitoring tool for PEM</td>
<td>Swasthik Padma</td>
<td>Mohammed Suhail C S</td>
<td>St Aloysius P U College</td>
</tr>
<tr>
<td>Computer Science</td>
<td>An Inexpensive Solution for Visual Acuity Testing in Preverbal Children using Deep Convolutional Neural Networks</td>
<td>Ishita Mangla</td>
<td></td>
<td>Delhi Public School R K Puram</td>
</tr>
<tr>
<td>Computer Science</td>
<td>Architecture tweaking Image Analysis Software for Automated Detection of Land Features in Satellite Images</td>
<td>Param Singh Gujral</td>
<td></td>
<td>La Martiniere for Boys</td>
</tr>
<tr>
<td>Engineering: Electrical &amp; Mechanical</td>
<td>ExoHeal - A modular exoskeletal device based on utilizing neuroplasticity and mirror learning to retrain the motor cortex and recover motor function in patients with hand stroke/paralysis</td>
<td>Zain Ahmed Samdani</td>
<td></td>
<td>Al Yasmin International School</td>
</tr>
<tr>
<td>Earth &amp; Planetary Science</td>
<td>Studying planetary system formation through analysis of exoplanetary data</td>
<td>Antara Raaghabi Bhattacharya</td>
<td></td>
<td>GD Somani Memorial School</td>
</tr>
<tr>
<td>Computer Science</td>
<td>Connecting doctors for good using a Peer to Peer Lung Cancer Detection Program</td>
<td>Parth Raghav</td>
<td></td>
<td>Pusa Public School</td>
</tr>
<tr>
<td>Computer Science</td>
<td>Machine Learning Approach to Cancer Identification</td>
<td>Shinjini Ghosh</td>
<td></td>
<td>South Point High School</td>
</tr>
<tr>
<td>Physics</td>
<td>Determining space debris orbits for collision prediction using Chaos Theory</td>
<td>Aswath Suryanarayanan</td>
<td></td>
<td>Devi Academy Senior Secondary School</td>
</tr>
<tr>
<td>Plant Sciences</td>
<td>The Plant Doctor - An Artificial Intelligence Based Collaborative Platform for Plant Disease Identification and Tracking for Farmers</td>
<td>Kaushik Kunal Singh</td>
<td></td>
<td>Inventure Academy</td>
</tr>
<tr>
<td>Mathematics</td>
<td>Proof of the analogue of Szemerdi's theorem for rectangles,n*n lattice,cuboid and n-orthotope</td>
<td>Nishant Dhanhar</td>
<td></td>
<td>Delhi Public School, R K Puram</td>
</tr>
<tr>
<td>Mathematics</td>
<td>Solving a Mathematical Mystery: Schinzel's Conjecture</td>
<td>Sacheth Sathyarayanan</td>
<td></td>
<td>National Public School, Chennai</td>
</tr>
<tr>
<td>Cellular &amp; Molecular Biology</td>
<td>A novel approach to a p53 stabilizing agent to accelerate cell apoptosis to prevent malignancy and initiate cell arrest</td>
<td>Shuvayu Dasgupta</td>
<td>Syed Roshan Ali</td>
<td>La Martiniere for Boys</td>
</tr>
<tr>
<td>Microbiology</td>
<td>Biodetoxification of hexavalent chromium using anabaena cylindrica</td>
<td>Naisargik Lenka</td>
<td></td>
<td>DAV Public School, Unit-8</td>
</tr>
<tr>
<td>Microbiology</td>
<td>Insights into Bacterial Pathogenesis- Establishing Quorum Sensing as a novel virulence regulator</td>
<td>Harshit Jindal</td>
<td></td>
<td>Maharaja Agarsain Public School</td>
</tr>
<tr>
<td>Plant Sciences</td>
<td>Efficient and economical control of pests in rice through seedlings raised in soilless media using Nano biopesticides</td>
<td>A Siva bharathi</td>
<td></td>
<td>NSN Matriculation Higher Secondary School</td>
</tr>
<tr>
<td>Cellular &amp; Molecular Biology</td>
<td>Epigenetically repressing endocrine disruptors through algal derivative for an obesity free world</td>
<td>Tanya Goyal</td>
<td>Sharren Mangalam Charnu Ganesh</td>
<td>Maharaja Agarsain Public School</td>
</tr>
<tr>
<td>Microbiology</td>
<td>Fabrication of Highly Specific Genosensor for the Detection of pathogenic E coli Using Uniquely Designed Molecular Tag from 16s r RNA Gene</td>
<td>Kunal Singh</td>
<td></td>
<td>Maharaja Agarsain Public School</td>
</tr>
<tr>
<td>Domain</td>
<td>Project Title</td>
<td>Students</td>
<td>Mentor (s)</td>
<td>School</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>---------------------------</td>
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<td>---------------------------------------------</td>
</tr>
<tr>
<td>Behavioral &amp; Social Science</td>
<td>Creating self-designed mazes for autistic people to map their analytical skills</td>
<td>Tanya Kaur Talwar</td>
<td>Akshat Gupta</td>
<td>Amity International School, Pushp vihar</td>
</tr>
<tr>
<td>Medicine &amp; Health Sciences</td>
<td>Non-invasive self-detection of asymptomatic acute myocardial infarction using BioElectrics: A translational investigation of transcutaneous blood analysis</td>
<td>Akash Manoj</td>
<td></td>
<td>The Ashok Leyland School</td>
</tr>
<tr>
<td>Environmental Sciences</td>
<td>Cost effective, Real-time monitoring of pollution in water bodies using a portable floating device</td>
<td>Pranav Shikarpur</td>
<td>Siddharth Viswanath</td>
<td>Bangalore International Academy</td>
</tr>
</tbody>
</table>

**Special Award Winners**

<table>
<thead>
<tr>
<th>Domain</th>
<th>Project Title</th>
<th>Students</th>
<th>Mentor (s)</th>
<th>School</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biochemistry</td>
<td>Sugar Testing Exhalometer</td>
<td>Rakshith Vyas</td>
<td>Ananth Gagan pappala</td>
<td>Sri Prakash Vidyaniketan</td>
</tr>
<tr>
<td>Behavioral &amp; Social Science</td>
<td>Electrical learning aid for visually challenged children for gaining confidence to take up Engineering field which can elevate their status equal to sighted children and help in maintaining social relationship in the society.</td>
<td>G Manasa</td>
<td>G Sushanth</td>
<td>Devnar School for the Blind</td>
</tr>
<tr>
<td>Cellular &amp; Molecular Biology</td>
<td>A novel approach to a p53 stabilizing agent to accelerate cell apoptosis to prevent malignancy and initiate cell arrest</td>
<td>Shuvayu Dasgupta</td>
<td>Syed Roshan Ali</td>
<td>La Martiniere for Boys</td>
</tr>
<tr>
<td>Environmental Management</td>
<td>STINK MAP Monitoring Environmental Pollution by Detecting and Classifying Odours using a Simple and Easy to use Mobile Probe</td>
<td>Lalitha Pingali</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Mathematics</td>
<td>Vector to People (V2P) Disease Prediction : A Differential Equation Approach</td>
<td>Ayush Sachdeva</td>
<td>Siddhant Mal</td>
<td>Springdales School</td>
</tr>
<tr>
<td>Mathematics</td>
<td>Proof of the analogue of Szemeredi’s theorem for rectangles,n*n lattice,cuboid and n-orthotope</td>
<td>Nishant Dhanek</td>
<td></td>
<td>Delhi Public School, R K Puram</td>
</tr>
<tr>
<td>Chemistry</td>
<td>A Nano Solution to Giga Nano Problems</td>
<td>Eshan Bajaj</td>
<td></td>
<td>Ryan International School Kharghar</td>
</tr>
<tr>
<td>Environmental Sciences</td>
<td>Cost effective, Real-time monitoring of pollution in water bodies using a portable floating device</td>
<td>Pranav Shikarpur</td>
<td>Siddharth Viswanath</td>
<td>Bangalore International Academy</td>
</tr>
<tr>
<td>Computer Science</td>
<td>RoadVisor A Smartphone App to Sense Bumpy Conditions of Indian Roads</td>
<td>Shreya Sandurkar</td>
<td></td>
<td>Amanora Pearson School</td>
</tr>
<tr>
<td>Computer Science</td>
<td>iThink: A wearable self-learning neurotransmitter with embedded database and trained neural networks for encoding EEG raw data enabling Brain to Text(BTT), Brain to Speech(BTS) and Brain to Command(BTC) for real-time BCI and machine learning applications.</td>
<td>Aman Shrivastava</td>
<td></td>
<td>St. Paul College Hudkeshwar</td>
</tr>
<tr>
<td>Plant Sciences</td>
<td>Efficient and economical control of pests in rice through seedlings raised in soilless media using Nano biopesticides</td>
<td>A Siva bharathi</td>
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</tr>
</tbody>
</table>
Opportunities for RESEARCH INTERNSHIPS IN SCIENCE AND ENGINEERING In India

Indo-US Science and Technology Forum (IUSSTF) announces the Research Internships in Science and Engineering (RISE) to provide unique opportunities for science, technology, engineering and medical students from the United States to undertake internships in national laboratories, federal research centers, academic research institutes, and private R & D laboratories in India. Objective of the internships are to provide students exposure to Indian S&T milieu, gain practical skills and develop collaborative networks. Internships are envisaged as a source of mutual cultural and professional enrichment for both the interns and their host institutions.

<table>
<thead>
<tr>
<th>Internship duration</th>
<th>Internship provides</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 months</td>
<td>Monthly stipend • Accommodation • Airfare</td>
</tr>
</tbody>
</table>

Eligibility

- U.S. Citizens or permanent residents and Indian Citizens
- Open to science, engineering, technology and medical disciplines
- Ph.D and Master students currently enrolled at a regionally accredited institution of higher education in U.S.

US institutions interested in sending students and Indian institutions interested in hosting under the RISE program may contact us.

For program information contact:
Indo-US Science and Technology Forum
12 Hailey Road, Fulbright House
New Delhi-110 001
internship@indousstf.org

For Application Guidelines & Format
www.iusstf.org

Submission deadlines
31 May
30 November

Award announcements
15 July
15 January
The Women Entrepreneur Quest (WEQ) instituted by Anita B.Org India in partnership with Department of Science and Technology (DST), Government of India and the Indo-U.S. Science and Technology Forum (IUSSTF) is a first of its kind contest in India that identifies and rewards women entrepreneurs who are founders of technology startups. The partnership is in support of Government of India’s policies and programs focused on promoting entrepreneurship in India and realizing Prime Minister Modi’s vision of Startup India.
EQ recognizes 10 talented women every year for their achievements in innovating cutting edge technology solutions and products, along with building successful and sustainable businesses. The objective of the WEQ-Silicon Valley Learning Program is to have the WEQ Top 10 winners experience the ecosystem and culture of the entrepreneurial Mecca that is Silicon Valley, in turn inspiring them to take their business to greater heights. During the visit, the winners get to network with experienced leaders, professionals and peers. They receive guidance and inspiration from some of the best minds in the Valley. The winners get to visit leading technology companies, startups, accelerators, incubators and universities. The Program is also a great platform for each of the WEQ Top 10 to showcase their business to the Silicon Valley ecosystem.

Over the years WEQ has grown from strength to strength and the quest to reward exceptional women entrepreneurs in technology continues. The WEQ 2017 attracted 257 applications from across India. The final selection process included 25 women entrepreneurs, who made topnotch pitches to a panel of esteemed judges in Bangalore. Finally, on 17th November, the WEQ 2017 Top 10 were announced at a grand award presentation ceremony organized at AnitaB.org’s annual conference, the Grace Hopper Celebration India (GHCI) 17. The conference is the largest gathering of women technologists in India and had 3,600+ attendees.

The WEQ 2017 Top 10 are Bhavjot Kaur, Co-Founder at Clinikk Healthcare; KausambiManjita, Co-Founder at Storeo.io; Madhulika Mukherjee, Co-Founder and CTO at Survaider; and Monika Shukla, Co-founder and CEO at LetsEndorse (all from Bangalore); Meghna Saraogi, Founder and CEO at StyleDotMe (Delhi); PallaviBishnoi, Co-Founder and COO at Real Time Renewables (Lucknow); Radhika Choudary, Co-Founder at Freyr Energy Services (Hyderabad); Sai Gole, Co-Founder and COO at LeanAgri (Pune) and SupriyaRathi Bagri, Founder and CEO at RoboVR and Vishakha Singh, Co-founder at VicitInfot Tech (both from Mumbai).
To address the need for human resource development and capacity building in science and technology, the 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!
Bhaskara Advanced Solar Energy (BASE) Internship Program

Being a research scholar in the field of Solar Energy in India, the BASE internship was a window for me to experience the latest scientific research related to my work. I am very thankful to IUSSTF for giving me this excellent opportunity. As a result of this opportunity, I was able to design and develop the advanced transient photovoltage/current system, which has provided me a very insightful understanding of the device physics of organic solar cells. The valuable experience gained at the University of Colorado, Boulder has helped me to develop a more complex system like charge extraction by linearly increasing voltage (CELIV) at my parent institution in India. Most importantly, I was able to develop international scientific collaborations related to my research.

Professionally and personally, I must say that it was life-changing experience! I experienced snowfall for the first time in Boulder, a city at the foothills of the Rocky Mountains. The participation in Halloween was memorable and an opportunity to interact with the local people. I will always cherish my internship experience and memories! It has fostered confidence in my work and another approach towards my life. I am proud to be part of the BASE internship program!

For more information on the Bhaskara Advanced Solar Energy (BASE) Internship Program:
E-mail: energy.fellowship@indousstf.org
During the summer of 2017, I got an opportunity to visit University of Nevada, Las Vegas, under the BHAVAN Internship for a duration of three months. I worked at the Center for Energy Research, UNLV on Building Integrated Photovoltaic systems. This was the best research experience of my life yet! I am thankful to IUSSTF for providing me this amazing opportunity. UNLV has a very beautiful campus in the city of Las Vegas. The location which has ample solar radiation is a heaven for researchers like me. The program was extremely helpful and I learnt a lot of new things. The internship has greatly broadened the scope of my research. I worked on Earth Air Heat Exchanger Systems coupled with Roof-top Photovoltaic/Thermal (PV/T) system especially developed for arid regions of the United States.

Besides my research work, I visited the PTC power plant, and gained hands-on experience on CPV, SAIC Dish etc. The cultural learning was a value addition experience for me. Summing up, this was an enriching experience where my professional skill-set grew manifold and reinforced my desire for further research in this area.

For more information on the Building Energy Efficiency Higher & Advanced Network (BHAVAN) Fellowships:
E-mail: energy.fellowship@indousstf.org
I am working in the field of algal biotechnology, which deals with bioprospecting of indigenous microalgae and their role in biofuels and bioremediation. I availed the prestigious B-ACER fellowship in 2016 that gave me an opportunity to visit the National Renewable Energy Laboratory (NREL) in Golden, Colorado and work under the eminent scientist, Dr. Philip T. Pienkos. This helped me to get a first-hand exposure on large scale algal cultivation and transcriptomics techniques which further strengthened my ongoing research at IIT Roorkee. During my tenure, I resided with my supervisor and his wife Laurie. Both of them were wonderful hosts, cooking Indian dishes once a week and also giving me native taste in the deserts of Colorado. They made me feel so welcome! Fellowships such as these are groundbreaking when it comes to collaborative research and people-to-people interactions. I feel honoured and privileged to have been part of such wonderful program which bestowed on me not only outstanding mentors but friends for a lifetime!
Water is a natural resource critical for human existence. Unfortunately, we have been mindlessly exploiting it for centuries leading to a situation where large parts of the world face severe water scarcity. The need of the hour is for scientists to collaborate and come up with ideas to address this problem. This is what Water Advanced Research and Innovation (WARI) fellowship does. I want to thank the IUSSTF and Department of Science and Technology (DST), India for giving me this opportunity to work at Water Science Laboratory, Daugherty Water for Food Institute (DWFI) at University of Nebraska-Lincoln (UNL), Nebraska, US as a WARI Intern. This is helping me understand the broader aspects of water related issues confronting the world and also get an idea of future contaminants. I would rather call it more of an intellectual opening for a budding scientist like me. The experience I gain here would not only help me to evolve as a scientist but will also help me serve my country by applying the experience gained here to address local water issues.

Being at the University of Nebraska-Lincoln has immensely helped me to not only better understand my own self in a better way, it has also changed my perception about life. Being here and experiencing a different culture, a different lifestyle, and a different language will always remain a fond memory for the rest of my life. I am now so much more aware of the Lab culture and R&D work here at the University of Nebraska-Lincoln. I can hardly wait to get back and begin passing on my learnings to my peers as I believe innovation becomes more probable when knowledge is disseminated. Being placed outside ones’ comfort zone, away from friends and family, is scary, but it is also an opportunity to try new things.

I would like to thank IUSSTF, my supervisors in India, and here in Lincoln, for making available to me this wonderful opportunity!
S.N. Bose Scholars Program

To nurture future innovators and thought leaders, the Science & Engineering Board (SERB), Department of Science and Technology (DST), Govt. of India, the Indo-U.S. Science and Technology Forum (IUSSTF) and WINStep Forward have partnered to develop a dynamic and transformative student exchange program between premier institutions in India and the United States. The program is named in honor of Satyendra Nath Bose (1894 - 1974), a visionary Indian physicist best known for his work on quantum mechanics in the early 1920s. The class of particles that obey Bose-Einstein statistics, Bosons, was named after him.

ELIGIBILITY:
- US Citizens/Permanent Residents/Indian Citizens
- Students pursuing a Bachelor’s or Master’s degree at an accredited institution of higher education in the United States
- Open to students from all disciplines of Science & Engineering

SCHOLARSHIP INCLUDES:
- Stipend: INR 50,000
- Airfare
- Placement at leading Universities and Research Laboratories in India

THE MISSION OF THE PROGRAM IS TO:
- Introduce talented American students to the long-standing tradition of scientific inquiry and innovation in India;
- Encourage students to consider a career in Science and Technology;
- Foster interactions between next generation of pioneers in Science and Technology; and,
- Build long-term R&D linkages and collaborations across disciplines, cultures and geographical boundaries.

Submission Deadline: February 1, 2018

For program information contact:
Prof. Aseem Z. Ansari
University of Wisconsin Madison
Madison, WI 53706
E-mail: azansari@wisc.edu;
qnaved@winstepforward.org

Dr. Nishritha Bopana
Indo-US Science and Technology Forum
Fulbright House, 12, Hailey Road
New Delhi - 110001
E-mail: bose@indousstf.org

www.iusstf.org

For application guidelines, please visit http://www.iusstf.org/story/53-75-For-US-Students.html
Scientific Imperatives for a coordinated Indo-U.S. Investigation of the Indian Ocean, 2016-2020 and Beyond

09-11 September 2017
La Jolla, USA

The Indian Ocean remains one of the most poorly sampled and overlooked regions of the world ocean. As a result, many important scientific questions that pertain to the role and the response of the Indian Ocean to global warming are not well understood. This stimulated the Second International Indian Ocean Expedition (IIOE-2). This expedition officially started in 2016 and will continue through 2020 and beyond. A workshop titled *Scientific Imperatives for a coordinated Indo-U.S. Investigation of the Indian Ocean, 2016-2020 and Beyond* was organized by Satheesh Shenoi (Indian National Centre for Ocean Information Services, Hyderabad) and Raleigh R. Hood (Horn Point Laboratory, University of Maryland). The aim was to identify scientific priorities, establish multinational and U.S. - Indian collaborations and ascertain available scientific assets to meet the scientific challenges of implementing IIOE-2. The participants discussed existing deployments and data sharing efforts under programs, such as Argo floats, repeat hydrography (currently through GO-SHIP: http://www.go-ship.org/), the Research Moored Array for African-Asian-Australian Monsoon Analysis and Prediction (RAMA), and the Indian Ocean tsunami warning system and means of strengthening these. They also discussed existing Indian-Ocean specific coupled physical-biogeochemical models and identified major shortcomings in these models that could be filled with focused field and satellite based studies.

Indo-U.S. workshop on Drug Re-Purposing for Improving Radiotherapy of Cancer

13 November 2017
Chennai, INDIA

The *Indo-U.S. workshop on Drug Re-Purposing for Improving Radiotherapy of Cancer* and a satellite meeting of the Indian Cancer Congress, was organized at Sri Ramachandra University (SRU) by Bilikere S. Dwarakanath (Sri Ramachandra University, Chennai) and Sunil Krishnan (MD Anderson Cancer Center, Texas). The workshop was attended by invited experts in clinical and experimental radiation oncology and bio informatics from USA and India. Re-purposing of existing drugs as adjuncts to chemo-radiotherapy is receiving attention for overcoming the limitations of new drug discovery involving high cost and long development time. A group of professionals at the National Cancer Institute, USA and other institutes from USA and India formed a consortium in 2014 to work in the area of drug repurposing as adjuvant to radiotherapy of tumors. This workshop was intended to take stock of the progress of work under the consortium and also plan for the future roadmap by involving experts in related fields, besides members of the consortium.

The first technical session gave an overview of the current trends in radiation oncology covering biomarkers of radiation response, drug repurposing for radiotherapy of brain tumors, particle therapy, phytochemicals as radiosensitizers, normal tissue protection and clinical trials with repurposed drugs. The second session was devoted to the bioinformatics part of the consortium activities following an overview about
the approach. The progress on the identification of FDA approved drugs based on multiple in silico approaches targeting k-ras were discussed with considerable amount of discussion on the choice of molecular targets, methods and future strategies. The last session took stock of the wet-lab studies related to be bio-evaluation of shortlisted drugs carried out at three labs of the consortium, with emphasis on pixantrone evaluated at all three centers. A brainstorming on the future road map of the consortium focused on many aspects including molecular targets, newer bioinformatics approaches, harmonization of lab methods, planning of animal studies and emphasis on clinical evaluation of promising drugs as well as collaborations including potential sources of financial support.

Environmental Geotechnics is an engineering philosophy that facilitates incorporation of the influence of environmental effects (either man-made or natural) on conventional geotechnical engineering practices. It is gaining significant attention of engineers, researchers, environmental scientists, and policymakers. This philosophy emphasizes the importance of considering the natural and anthropogenic environment in the design and construction of geotechnical structures.

Indo-U.S. Workshop on Environmental Geotechnics

01-02 December 2017
Bombay, INDIA
An Indo-U.S. Symposium on *Improving Clinical Outcome after Stroke: Establishing Acute Stroke Care Pathways in India* was organized by Padma Srivastava (All India Institute of Medical Sciences, New Delhi) and Pooja Khatri (University of Cincinnati). Stroke burden will only grow exponentially in upcoming years with an aging and growing population and there is an urgent need to create public awareness of signs and symptoms of stroke and optimize stroke care in India. The goal was to raise the level of stroke care in India as much as possible within the current resource framework. The Symposium was a platform to bring together U.S. and Indian internationally recognized stroke experts, and key stakeholders in India, to create a practical consensus-based guideline and tool-kit that would be published in the International Journal of Stroke with open access. This Indo-U.S. symposium laid the groundwork for further academic and clinical activities focused towards the development of cutting edge tertiary and community care programs targeting cerebrovascular disorders.

**Curbing Whitefly-Plant Virus Pandemics - The Departure from Pesticides to Genomics Solutions**

Whitefly Bemisia tabaci causes direct damage and also is a major vector for viruses, and therefore poses serious threats to the world’s food security. The insect had been in the news in 2015 as it devastated the entire cotton crop of north India. There has been a complete failure in management of whitefly due to the potential of this pest developing resistance to diverse groups of insecticides in a short span of time. The U.S. has also witnessed heavy losses due to this pest, which has been efficiently managed over time as whitefly research in United States is at very advanced levels. This workshop titled *Curbing Whitefly-Plant Virus Pandemics - The Departure from Pesticides to Genomics Solutions* was organized by Pankaj Rathore (Punjab Agricultural University, Ludhiana) and Judith K Brown (University of Arizona) and brought together experts of diverse fields to devise strategies for futuristic research to formulate a strategy for the management of this pest.
The disorders affecting human prenatal and postnatal growth are important contributors to childhood mortality and morbidity. The socioeconomic and healthcare burden that results from disorders of human growth calls for interventions that can prevent and manage these conditions better. A genetic diagnosis is now increasingly being sought by parents as well as health professionals engaged in providing health care to such families. Further the recent availability of advanced molecular techniques like microarray and next generation sequencing have made it possible to identify the causative gene/mutation in a number of conditions. However, there is not much information available regarding genetic aetiology of a number of conditions and a lot of research interest is being diverted to this aspect too. Towards this end, the Indo-U.S. Symposium on Human Genetic Disorders of Prenatal and Postnatal Growth co-organized by Sankar Hariharan (Government Medical College, Thiruvananthapuram) and Maxmillan Muenke (National Institutes of Health) brought together eminent clinicians and medical scientists from India and the U.S. to deliberate on various genetic disorders affecting human prenatal and postnatal growth and promote interactions to explore collaborative research in this field.

In order to develop new techniques to reliably predict long-time dynamics in molecular systems, it is crucial that researchers working in this field meet and discuss recent developments and current challenges. Srihari Keshavamurthy (Indian Institute of Technology Kanpur) and Christopher Jarzynski (University of Maryland) organized an Indo-U.S. bilateral workshop on Simulating Long Time Reaction Dynamics: New Developments and Challenges that invited experts from India and the U.S. working on the development and application of techniques to model long time reaction dynamics, in order to review the current status of the field and facilitate future collaborations in designing efficient simulation methods. It helped develop collaborations between leaders as well as upcoming scientists from India and the U.S. who are actively working on the development and applications of enhanced sampling methods, techniques for the computation of free energies of chemical reactions, statistical methods for equilibrium and nonequilibrium processes, reaction dynamics and energy flow, and machine learning techniques.

Indo-U.S. Symposium on Human Genetic Disorders of Prenatal and Postnatal Growth
08-09 December 2017
Thiruvananthapuram, INDIA

Simulating Long Time Reaction Dynamics: New Developments and Challenges
07 December 2017
Agra, INDIA
The Indo-U.S. Symposium on Intrinsically Disordered Proteins: Forms, Functions and Diseases addressed some of the fascinating and emerging issues in the integrative biology of IDPs from structure and dynamics to functions and diseases. Current understanding of disorder-to-function and disorder-to-disease relationships is grossly incomplete and conducting this workshop was beneficial by bringing scientists who study both aspects of IDPs together in a single forum. In India, there is a growing interest in various aspects of IDP-research; however, there has not been any attempt so far to bring them together on one platform to discuss the current state of fascinating IDP biology, challenges, profound questions and emerging methodologies. This meeting was organized by Samrat Mukhopadhyay (Indian Institute of Science Education and Research, Mohali) and Elizabeth Komives (University of California, San Diego) brought together outstanding researchers from the U.S. and India.

Organometallic Chemistry bridges the boundary between two of the major areas of chemical sciences: inorganic and organic chemistry. Balaji R. Jagirdar (Indian Institute of Science, Bangalore) and Matthew S. Sigman (University of Utah) had organized an Indo-U.S. Workshop on Organometallic Chemistry: From Fundamentals to Applications which had discussions on various topics related to organometallic chemistry with emphasis towards the possibility of expanding the scope of the field towards multidisciplinary areas. It aimed to provide a platform for discussion to explore solutions to some of the pressing issues faced by our modern society such as production of alternative fuels, chemistry to mitigate climate change and the development of new drugs would likely have components that are a direct result of organometallic chemistry. The workshop strived to promote opportunities for discussion during the program, at poster sessions and other gatherings.
Indo-U.S. Fellowship for Women in STEMM

Department of Science and Technology (DST), Government of India and Indo-U.S. Science and Technology Forum (IUSSTF) jointly announce the "Indo-U.S. Fellowship for Women in STEMM" (Science, Technology, Engineering, Mathematics and Medicine) with an aim to provide opportunities to Indian Women Scientists, Engineers & Technologists to undertake international collaborative research in premier institutions in U.S.A, to enhance their research capacities and capabilities.

Qualification and Eligibility

I. Women Overseas Student Internship

Indian women applicant currently pursuing Ph.D. degree in Basic Sciences, Engineering or Technology including Agricultural and Medical Sciences (M.D./M.S.) on a full-time basis at any recognized academic institution/R&D institute/university in India. Unemployed Women applicants who have completed Ph.D./M.D./M.S. are also eligible to apply.
- Age: 21-35 years (as on 28.02.2018)

Program is envisaged to:
- Provide opportunity to bright Indian women students and scientists to gain exposure and access to world class research facilities in U.S. academia and labs.
- Promoting research and capacity building for Indian women students and scientists in different frontline areas of Science, Technology, Engineering, Mathematics and Medicine (STEMM).
- Pave way for the next generation Women Scientists and Technologists from India to interact with American peers, thus helping to build long term R&D linkages and collaborations.
- Encourage, motivate and provide opportunity to outstanding women with break in research career to gain grounds again in their respective research areas.

II. Women Overseas Fellowship

Indian women applicant having Ph.D. degree in Basic Sciences, Engineering or Technology including Agricultural and Medical Sciences (M.D./M.S.) and holding a regular position at any recognized academic institution/R&D institute/university/college in India.
- Age: 27 - 50 years (as on 28.02.2018)

Duration: For a period of 3-6 months

Proposed Area of Work:
- Agricultural Sciences
- Atmospheric and Earth Sciences
- Chemical Sciences
- Cognitive Sciences
- Engineering and Technology
- Life Sciences
- Mathematical and Computational Sciences
- Medical Sciences
- Physical Sciences

Internship/Fellowship Includes:
- Monthly Stipend
- Return Airfare
- Health Insurance
- Contingency
- Conference Allowances (applicable for Module II)

Last date of Submission: 28th February 2018

For online application submission, guidelines and formats; visit www.iusstf.org or write to wisfem@indousstf.org

For program information contact:

Namita Gupta
Director/Scientist F, KIRAN Division,
Department of Science & Technology
Technology Bhavan, New Mehrauli Road, New Delhi-110016

Dr. Chaitali Bhattacharyya
Indo-U.S. Science and Technology Forum
Fullbright House, 12 Halley Road, New Delhi 110 001
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.

- **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

**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

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

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

For program details visit: www.iusstf.org

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