IUSSTF
Indo-U.S. Science and Technology Forum

2023-24

ANNUAL REPORT

Catalyzing
Indo-U.S. Science
and Technology
Cooperation

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Technology Cooperation

IUSSTF
Indo-U.S. Science and Technology Forum

INDO-U.S. SCIENCE AND TECHNOLOGY FORUM
Fulbright House, 12 Hailey Road, New Delhi 110 001, India
www.iusstf.org

Contents

MESSAGE FROM THE EXECUTIVE DIRECTOR

It is with great pleasure that I present the Annual Report of the Indo-U.S. Science and Technology Forum (IUSSTF) for the fiscal year 2023-2024. Having assumed the role of Executive Director this year, I am deeply honored to lead this esteemed organization, jointly supported by the governments of India and the United States. Our mission is to foster long-term collaborations in Science, Technology, and Innovation (STI), driven by shared priorities as identified by both the nations.

IUSSTF's steadfast dedication to advancing scientific exchange and innovation is evident in our diverse and impactful program portfolio. Our initiative encompassing workshops, joint research centers, collaborative R&D projects, innovation and entrepreneurship programs, visitation opportunities and strategic initiatives have cultivated meaningful connections between leading researchers from India and the United States. These efforts have not only advanced scientific knowledge but also forged enduring partnerships and friendships.

This year, IUSSTF significantly advanced its mission by strengthening the collaborative framework between Indian and American researchers, driving impactful scientific discoveries and technological advancements. Key initiatives include Indo-U.S. Joint Clean Energy Research and Development Centre (JCERDC) for advancing clean energy solutions, Technology-based Energy Solutions for Promoting Innovations on Net Zero sustainable energy , Solar Decathlon Initiative to encouraging sustainable design and architecture, Indo-U.S. Pacesetter Initiative for accelerating collaborative research, Capacity Building Programs to empowering talent through the IUSSTF Viterbi Program and the Khorana Program for young researchers.

A major highlight was the launch of a special Endowment call in 2023-2024 for joint proposals, themed "Critical and Emerging Technologies: Quantum Technologies and Artificial Intelligence for Transforming Lives." This initiative underscores our commitment to supporting cutting-edge research with transformative global potential. Through this Endowment call, we aim to fund groundbreaking joint projects that address critical global challenges and catalyze technological breakthroughs for societal benefit.

As our goal is to build a sustainable, impactful organization that shapes the future of science and technology, I am fully committed to building upon the strong legacy of our program portfolio and elevating IUSSTF to new heights of impact. My vision is for IUSSTF to become a global leader in fostering scientific collaboration and innovation between India and the United States. We will achieve this by strategically expanding our programs, prioritizing emerging and strategic technologies, and cultivating robust partnerships with key stakeholders.

As we progress, IUSSTF remains dedicated to deepening the Indo-U.S. science and technology partnership. We will actively explore new avenues for collaboration, support the development of strategic emerging technologies, and empower the next generation of scientists and innovators.

I extend my heartfelt appreciation to our Board Members, Partnering Institutions, Stakeholders, Staff Members and all the well-wishers for their invaluable contributions to IUSSTF's success. Together, we are progressing to build a brighter future for India and the United States in STI domain.

Dr. Nisha Mendiratta
Executive Director

Introduction to IUSSTF

IUSSTF: THE GENESIS

The **Indo-U.S. Science and Technology Forum (IUSSTF)** is a bi-national organization jointly created by India and the United States of America, through a formal agreement signed by the two Governments on March 21, 2000. IUSSTF acquired legal status a few months later, when it was registered as a Society under the "Societies Registration Act" in India in June 2000, with its office at New Delhi.

IUSSTF is also the secretariat for the **U.S. - India Science and Technology Endowment Fund**, which was jointly set up later by the two Governments, through a separate agreement in the year 2009.

The **Department of Science and Technology (DST)** of the Ministry of Science and Technology, Govt. of India, and the **U.S. Department of State**, are the arms of the two Governments that oversee the functioning of IUSSTF through a Governing Body, having equal representation from both sides.

IUSSTF: VISION, MISSION, AND OBJECTIVES

Vision

Excellence in Science, Technology, and Innovation space through collaborative initiatives between India and the United States of America.

Mission

- Act as a catalyst to promote long-term scientific collaborations between India and the U.S. through partnership among individual scientists, scientific institutions and the scientific community at large.
- Establish platforms and mechanisms to connect the S&T ecosystems of both the countries to act as a fertile ground for fostering individual and institutional partnerships in a natural and sustainable manner.

Objectives

- Create awareness through exchange dissemination of Information and Opportunities in S&T cooperation.
- Capitalize and build on the scientific and technological synergy leading to long term partnership based on shared values.
- Support an exciting program portfolio that leads to sustainable interactions and strengthens strategic partnerships.
- Nurture contacts between young and mid-career scientists to develop mutual trust, foster excellence and explore new frontiers.
- Encourage public-private partnership to foster elements of Innovation, Application and Enterprise.

IUSSTF PROGRAM PORTFOLIO

Classified by Verticals

1

Innovation and Entrepreneurship

- U.S.-India Science and Technology Endowment Fund (USISTEF)
  - Technology-based Energy Solutions: Innovations for Net Zero
  - Critical and Emerging Technology: Quantum Technologies and Artificial Intelligence for Transforming Lives

2

Strategic Initiatives

- Solar Decathlon Initiative (SDI)
- U.S. - India Artificial Intelligence (USIAI) Initiative

3

Research and Development

- Indo-U.S. Joint Clean Energy Research and Development Center (JCERDC)
- PACEsetter Fund

4

Visitations and Fellowships

- IUSSTF-Viterbi Program
- Khorana Program for Scholars

5

Scientific Networks

- Bilateral Workshops/Symposia/Training Programs
- Indo-U.S. Virtual Networked Centers

IUSSTF PROGRAM PORTFOLIO

(Classified by Nature of Support)

1

IUSSTF Core

- Scientific Networks
  - Bilateral Workshops/Symposia/Training Programs
  - Indo-U.S. Virtual Networked Centers
- IUSSTF-Viterbi Program
- Strategic Initiatives
  - Solar Decathlon India (SDI)
  - U.S. - India Artificial Intelligence (USIAI)

2

U.S.-India Science and Technology Endowment Fund (USISTEF)

- U.S.-India Science and Technology Endowment Fund (USISTEF) Calls
  - Technology-based Energy Solutions: Innovations for Net Zero
  - Critical and Emerging Technology: Quantum Technologies and Artificial Intelligence for Transforming Lives

3

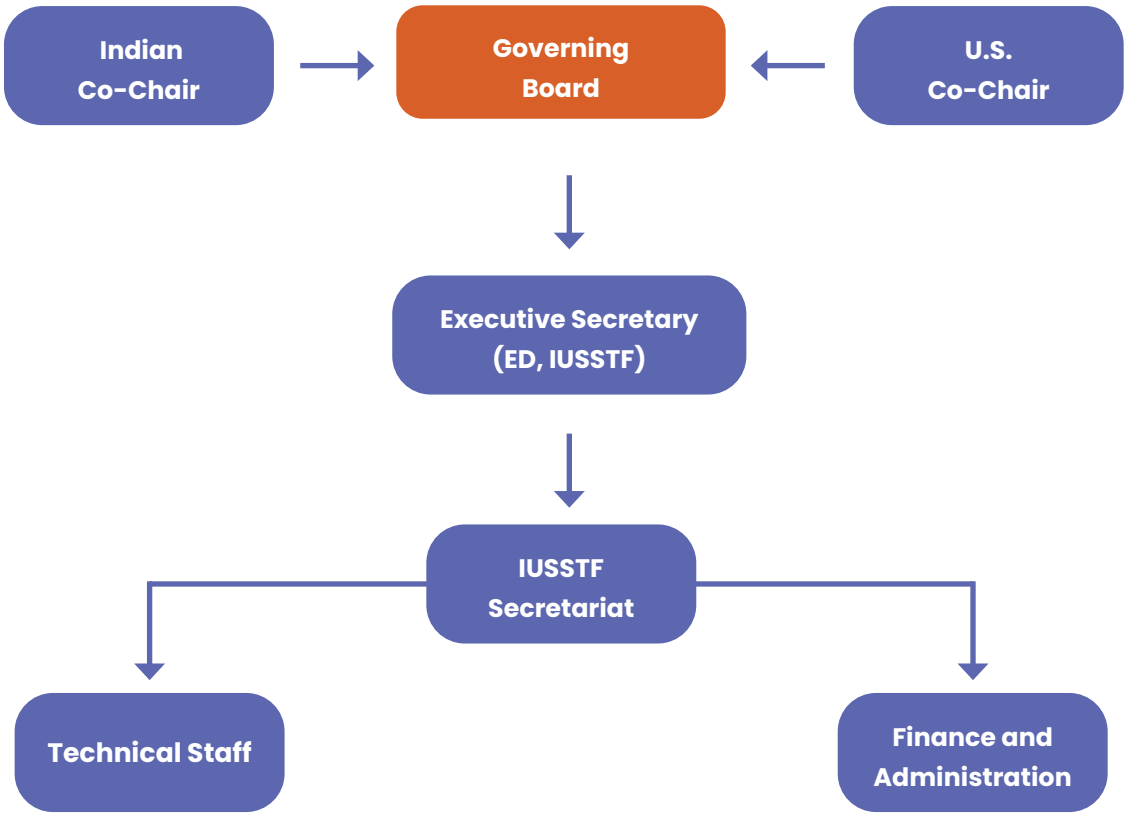
Extra Mural Programs- EMPs

(Supported by External Agencies/ Industry)

- Indo U.S. Joint Clean Energy Research and Development Centre (JCERDC)
- PACEsetter Fund
- Khorana Program for Scholars

Governance Structure

IUSSTF ORGANIZATIONAL CHART



Administrative Mechanism

- Autonomous
- Bilateral
- Non-Governmental
- Not for Profit Society

Funding Source

- Annual Interest from U.S. Endowment Fund with matching contribution from DST, Govt. of India
- Freedom to Secure Private and Other Funding

IUSSTF GOVERNING BOARD

Abhay Karandikar
Co-Chair
Department of Science and Technology,
Government of India

Vishvajit Sahay
Department of Science & Technology,
Government of India

Alka Sharma
Department of Biotechnology,
Government of India

Chintan Vaishnav
Atal Innovation Mission,
NITI Aayog, Government of India

Subhasis Chaudhari
Indian Institute of Technology Bombay

Ramanuj Narayan
CSIR-Indian Institute of Chemical Technology

Mayank Singhal
PI Industries Limited

Jason Donovan
Co-Chair
U.S. Department of State

Elizabeth Urbanas
U.S. Department of Energy

Kumud Srinivasan
Intel® Corporation

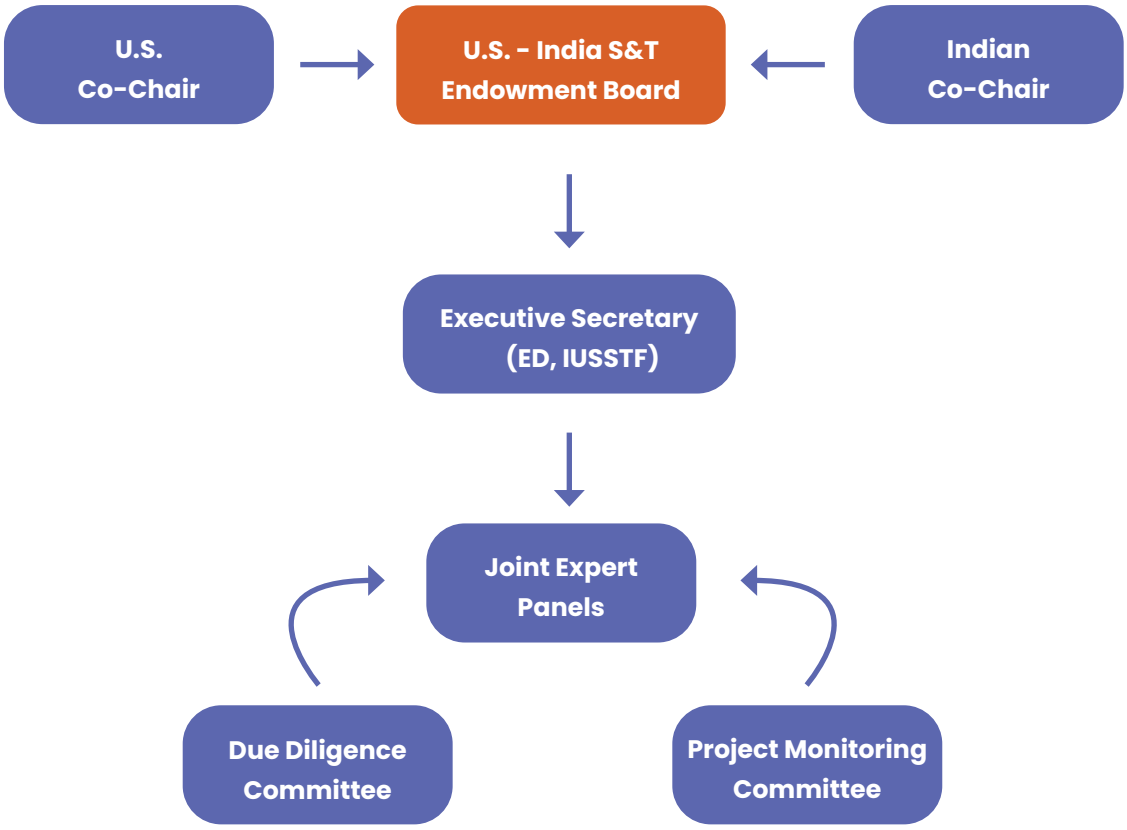
Aseem Ansari
St. Jude Children's Research Hospital

Amita Gupta
Johns Hopkins University

(To be nominated)

(To be nominated)

FUNCTIONAL STRUCTURE FOR USISTEF



USISTEF BOARD

S.K.Varshney
Co-Chair
Department of Science & Technology, Government of India

Praveen Roy
Department of Science & Technology, Government of India

Ajai Kumar Garg
Ministry of Electronics and Information Technology Government of India

Mahesh Kumar
Ministry of External Affairs, Government of India

V. Premnath
National Chemical Laboratory, Pune

Shirshendu Mukherjee
Programme Management Unit (PMU) supported by DBT-BIRAC-BMGF-Wellcome Trust

Anantapadmanabhan Anantaram Sarma
SIDBI Venture Capital Ltd., Mumbai

Mini Shaji Thomas
National Institute of Technology, Tiruchirappalli

Drew Schufletowski
Co-Chair
U.S. Embassy, New Delhi

Representative
U.S. Department of State

Shyam Sunder
National Institute of Standards and Technology Gaithersburg

Ranjan Gupta
Division of International Relations, National Institutes of Health, Bethesda

Peter T. Dabrowski
Tano Capital/Tano Ventures

Tania Fernandez
DreamCatcher Ventures

Somshubhro (Som) Pal Choudhury
Bharat Innovation Fund, Bengaluru

Bryan Byrne
USAID, American Embassy, New Delhi

IUSSTF STAFF MEMBERS

Nisha Mendiratta
Executive Director

Core Staff

Nishritha Bopana
Principal Science Officer

Chaitali Bhattacharya
Principal Science Officer

Rajesh Arya
Controller

Monika Madan
Senior Personal Secretary

Manoj Prasad
Assistant Admin Officer

Anita Vishwakarma
Accounts Officer

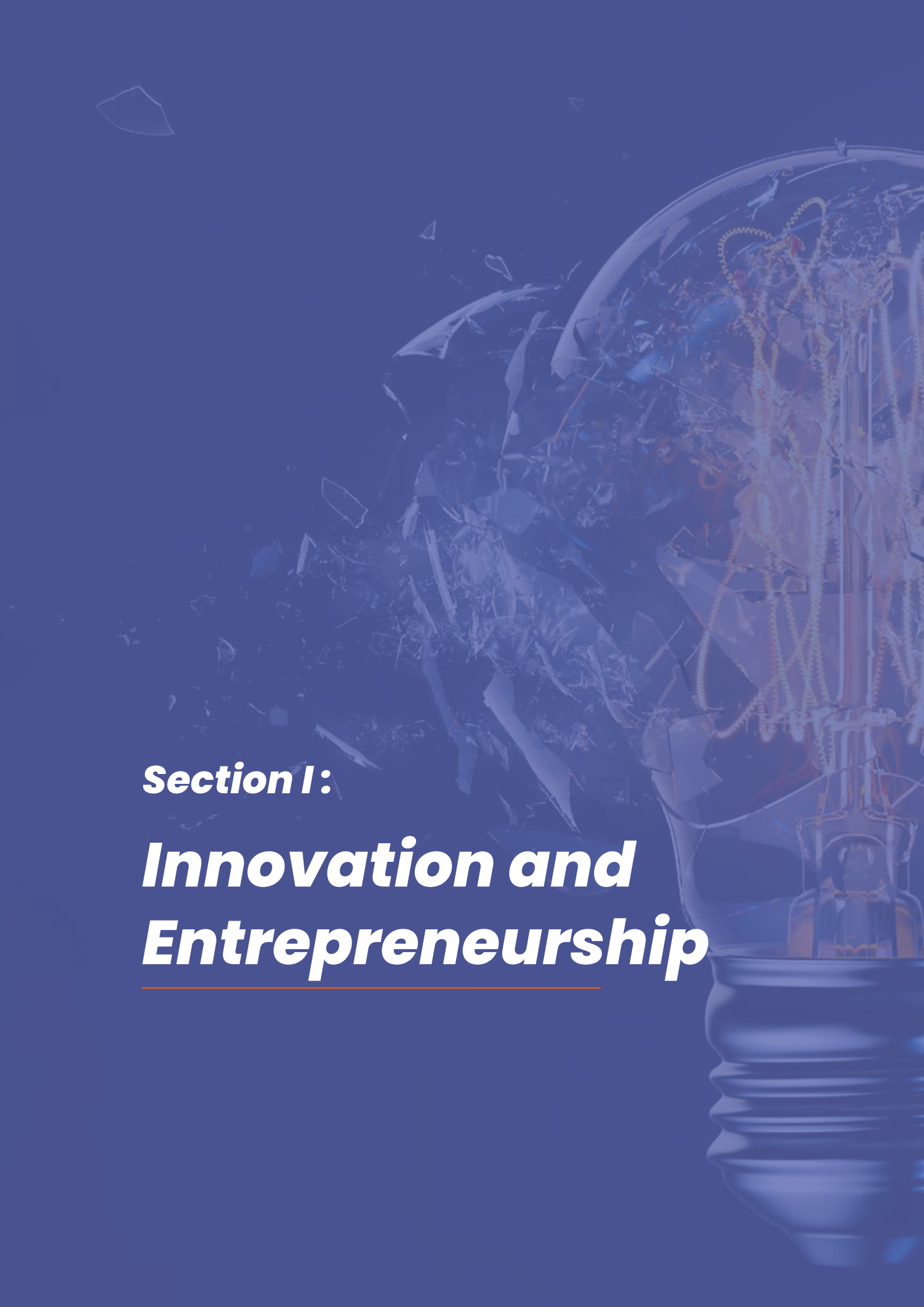
Program Staff

Babulal Chaudhary
Senior Program Officer

Priya Thomas
Program Officer

Subhashree Basu
Program Officer

Rakesh Kumar Singh
Senior Accounts Associate II



Section I :

Innovation and Entrepreneurship

INNOVATION AND ENTREPRENEURSHIP

Innovation is the cornerstone that translates the outcome of scientific research into tangible deliverables of utilitarian value and enterprise is the vehicle to take them to the end-user. In the absence of innovation and enterprise, the real fruits of scientific discoveries will hardly reach a majority of the population. Hence, innovation and enterprise are the vital links that connect science to the general public and fully justify the investment in R&D, a significant portion of which is funded by public money. IUSSTF supports a rich portfolio of schemes to promote innovation and entrepreneurial initiatives that have the potential to impart direct societal impact and improve the quality of life for people, delivered at affordable cost, in addition to generating employment and creating overall economic value for society.

IUSSTF provides grant-in-aid funding support to startup companies under the **United States India Science and Technology Endowment Fund (USISTEF)**, which is our flagship program in the space of innovation and enterprise. This support is aimed at enabling bilateral teams from India and the United States to translate S&T-driven innovations into distinct market opportunities.

A. UNITED STATES–INDIA SCIENCE & TECHNOLOGY ENDOWMENT FUND (USISTEF)

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

Through a highly competitive process, USISTEF selects and financially supports promising joint U.S.-India entrepreneurial initiatives focused on co-developing products or technologies beyond the ideation stage, emphasizing societal impact and possessing significant potential to commercialize within 2-3 years. USISTEF has so far supported 43 joint U.S.-India entrepreneurial projects through 10 regular calls under two broad categories, namely "Empowering Citizens (EC)" and "Healthy Individuals (HI)".

The Program also supported 11 projects in 2020 under a special call that addressed **COVID-19-related challenges** (including monitoring, diagnosis, health and safety, public outreach, information, and communications). In 2022 the fund extended support to 10 projects under the special call **Technology-Based Energy Solutions: Innovations for Net Zero** that are ongoing and announced a special call inviting proposals under the **Critical and Emerging Technologies: Artificial Intelligence and Quantum Technologies**.

B. CRITICAL AND EMERGING TECHNOLOGY: QUANTUM TECHNOLOGIES AND ARTIFICIAL INTELLIGENCE FOR TRANSFORMING LIVES

The U.S.-India initiative on Critical and Emerging Technology (iCET) was launched in May 2022 to strengthen links between the innovation ecosystems of both the nations and enhance bilateral technology cooperation. In line with the iCET, the Indo-U.S. Science and Technology Forum, the secretariat for the USISTEF designed a call for proposals on "Critical and Emerging Technology: Quantum Technologies and Artificial Intelligence for Transforming Lives".

Joint Statement from the United States and India

On June 22, 2023, Hon'ble Prime Minister Shri Narendra Modi and President Joseph R. Biden, Jr., in their joint statement, welcomed the launch of the $2 million grant program under the U.S.-India Science and Technology Endowment Fund (USISTEF) for the joint development and commercialization of Artificial Intelligence (AI) and Quantum Technologies.

The Launch

On July 12, 2023, **Dr. Jitendra Singh**, Hon'ble Minister of State (Independent Charge) for Science and Technology; Minister of State for Prime Minister's Office; Personnel, Public Grievances and Pensions; Department of Atomic Energy; and Department of Space, Government of India and **Mr. Eric Garcetti**, U.S. Ambassador to India in the presence of USISTEF Co-Chairs, **Dr. Sanjeev Varshney**, Advisor and Head (International Cooperation Division),

Department of Science and Technology (DST), Government of India and **Mr. Drew Schufletowski**, Minister-Counselor for Economic Affairs, Environment, Science and Technology, U.S. Embassy, New Delhi, formally launched the call at the American Centre, New Delhi.

The launch event witnessed the participation of key representatives from the DST, Government of India; the Embassy of the United States of America in India; Quantum and Artificial Intelligence experts from industry and academia; Endowment fund awardees; and potential applicants of the award. During the event, select USISTEF awardees demonstrated products/ prototypes developed by them. The exhibits garnered huge interest and appreciation from the dignitaries during their visit to the stalls and interactions with the awardees.

As part of the event, a panel discussion was organised, focusing on **"The New U.S.-India Partnership Call: Essence, Expected Outcomes, and Deliverables."** The discussion brought key industry and academic representatives on a common platform to deliberate on the strengths and complementarities of the Indo-U.S. Quantum and AI landscape, and how these could be capitalized to foster technology co-development and commercialization for advancing societal impact. The session was moderated by Mr. Somshubhro Pal Choudhury, Partner, Bharat Innovation Fund. The panelists were Mr. L. V. Subramaniam (Venkat), IBM's India Quantum Leader; Dr. Tavpritesh Sethi, Associate Professor, Computational Biology and Founding Head, Centre of Excellence in Healthcare, Indraprastha Institute of Information Technology, Delhi; Mr. Ashutosh Chadha, Group Director, Government Affairs and Public Policy, Microsoft India and Mr. Sunil Gupta, Co-Founder and CEO, QNu Labs, Bengaluru.

The Call for Proposals

The call for proposal was announced with an application submission deadline of September 20, 2023. To ensure maximum participation and engagement, we implemented a comprehensive communication and outreach strategy from June to September 2023. Key to this effort were informational webinars conducted on August 10 and August 22, 2023, designed to educate potential applicants about the call's objectives and benefits, and to address their queries. Beyond these webinars, our strategy included the creation of targeted promotional materials, widespread electronic dissemination of information, broadcasting through various online platforms, and direct dissemination via in-person networking meetings. IUSSTF received an overwhelming response of 196 applications (Artificial Intelligence-153 and Quantum Technologies-44) at the close of the Call.

We received applications in the following subcategories:

1. Quantum Technologies: quantum computing, communication, sensing, cryptography, algorithms, imaging, and simulation.
2. Artificial Intelligence: Under trustworthy and explainable AI in areas such as healthcare, agriculture, cybersecurity, education, finance, transportation, earth sciences, and water resource management.

The secretariat completed the preliminary screening of the applications by the end of October 2023. In January 2024, IUSSTF, in consultation with the cochairs of the USISTEB, finalised the Binational Joint Technical Expert Panel. By the end of January 2024, the applications were shared with the experts for evaluation and their subsequent recommendations. Based on the panel's reviews received from the panel, the shortlisted project teams will be invited to virtually present their proposals before the Joint Experts Panel (JEP), scheduled at the end of April 2024.

C. TECHNOLOGY-BASED ENERGY SOLUTIONS: INNOVATIONS FOR NET ZERO

The call for Ignition grants for Technology-based Energy Solutions: Innovations for Net Zero was announced in partnership with Social Alpha to support entrepreneurial initiatives that address the development and implementation of new technologies, tools, and systems that tackle climate and clean energy challenges in the areas of Next-generation Clean and Renewable Energy, Energy Storage and Carbon Sequestration. The proposals were solicited in two categories:

- **Ignition Stage-I Grants:** To help early-stage creative ideas develop a proof-of-concept and/or build a prototype.
- **Ignition Stage-II Grants:** To support a team beyond the idea stage with a workable, validated prototype. The technology must have the potential for significant commercialization within 2-3 years.

After an extensive review process by the Joint Expert Panel, the following 10 projects were announced for award. The details of these projects are given in ***Annexure A.***

The project teams actively engaged in their first milestone activities during the year. Financial and technical reports for these activities were requested from awardees, by IUSSTF for the upcoming Joint Expert Panel Meeting to review the progress.

Ignition Grants Stage-I

S. No	Project Title	Indian Partner(s)	U.S. Partner(s)
1.	Development of a Cyanobacterial Chemical Production Technology for Aviation Fuels from Carbon Dioxide	**Syed Shams Yazdani** International Centre for Genetic Engineering and Biotechnology, New Delhi **Najeeb Bin Haneef** Zaara Biotech, Kochi	**Shota Atsumi** University of California, Davis
2.	Design and Development of Highly Efficient Electrolyser System for Green Hydrogen Generation	**Rohit Srivastava** Pandit Deendayal Energy University, Gandhinagar **Snehangshu Patra**, Eliteck Industries Pvt. Ltd., Kolkata	**Arunachala Mada Kannan** Arizona State University, Mesa **Bishnu Bastakoti** North Carolina A & T State University, Greensboro, North Carolina
3.	Hydrogen Separation from Coal-derived Syngas: A Near Term Opportunity for Commercialization using New Membrane Compositions	**M.S. Santosh** CSIR - Central Institute of Mining and Fuel Research, Dhanbad **M. Viswanathan,** Rensol Power Pvt Ltd, Chennai	**Prabhakar Singh** University of Connecticut, Storrs

S. No	Project Title	Indian Partner(s)	U.S. Partner(s)
4.	Integrated Solution to convert Two GHGs (CO_2) And CH_4 to H_2 rich syn Gas (ISTAG)	**Sumana Chenna** CSIR - Indian Institute of Chemical Technology, Hyderabad **Kishan Gurram** Sravathi Advance Process Technologies Pvt Ltd, Bengaluru **Lingaiah Nakka** CSIR - Indian Institute of Chemical Technology, Hyderabad **Yarasi Soujanya** CSIR - Indian Institute of Chemical Technology, Hyderabad	**Vemuri Balakotaiah** University of Houston, Houston
5.	Ion Exchange Driven Direct Carbon Capture and Sequestration System (IXDCCS)	**Sudipta Sarkar** Indian Institute of Technology, Roorkee **Dipanwita Sarkar** Wastearn Private Limited, Kolkata	**Arup K. Sengupta** Lehigh University, Bethlehem
6.	Carbon Dioxide Sequestration by Industrial Wastes and its Conversion to Artificial Soil	**Raghavendra Ragipani** Indian Institute of Technology, Kanpur **Shashi Bhushan** Tree Green Solutions Pvt Ltd, Hubballi	**Bu Wang** University of Wisconsin-Madison

Ignition Grants Stage-II

S. No	Project Title	Lead Indian Partner	Lead U.S. Partner
1.	Indigenous Battery Materials from Recycled Graphite and Biomass	**Smruti Prakash Barik** Attero Recycling Pvt. Ltd., Noida	**Vinod Nair** Farad Power Inc., Sunnyvale
2.	Commercializing ZincGel Battery for Renewable microgrids	**Manoj Gupta** TP Renewable Microgrid Ltd., Noida **Kanwar Singh Nalwa** Indian Institute of Technology, Kanpur	**Tejas Kusurkar** Offgrid Energy Labs Inc., San Francisco
3.	Motion Free Optical Tracking to reduce cost of electricity by 25%	**Lakshmi Santhanam** Renkube Private Ltd., Yeshwanthpur	**Rajesh Manapat** Arka Energy, Union City
4.	Rechargeable Sodium Battery for Sustainable Energy Storage	**Vilas Shelke** Rechargion Energy Pvt. Ltd., Pune	**Pulickel Ajayan** Rice University, Houston

Section II :

Strategic Initiatives

STRATEGIC INITIATIVES

Strategic initiatives remain a cornerstone of IUSSTF's efforts to drive impactful bilateral collaboration. These initiatives, characterized by formal partnerships and targeted objectives, are designed to deliver long-term, mutually beneficial outcomes. The **Solar Decathlon India**, a key initiative undertaken in partnership with the U.S. Department of Energy, exemplifies this approach. By introducing this renowned competition to India, IUSSTF is actively fostering innovation, facilitating knowledge transfer, and promoting the adoption of sustainable building practices, directly contributing to shared priorities in climate change mitigation and energy efficiency.

A. SOLAR DECATHLON INDIA (SDI)

Solar Decathlon India is a U.S.-India collaboration under an MoU between the Indo-U.S. Science and Technology Forum (IUSSTF) and the **U.S. Department of Energy** and is conducted by the Alliance for an Energy Efficient Economy (AEEE) and the Indian Institute for Human Settlements (IIHS). Solar Decathlon India is supported by the **Department of Science and Technology (DST).**

Solar Decathlon India is a Net-Zero Building Challenge for postgraduate and undergraduate students from Indian institutions. They learn and design net-zero-energy-water, affordable, and resilient buildings to combat climate change through the buildings sector. Student teams partner with real estate developers and develop affordable and industry-ready solutions for real building projects. It is a hands-on, practical, innovation-based challenge that moves the construction and real estate industry towards implementing net-zero solutions developed by students.

In the nine-month-long challenge, students and their faculty mentors learn building science through online self-learning modules and expert mentorship and test their ideas using building simulation software. These final designs have to be innovative, affordable, practical, and market-ready.

The story so far:

- Since 2020, Solar Decathlon India has built capacity and enabled collaborations between 6000+ students and 400+ faculty members of 300+ academic institutions, and 400+ partners in the building industry. This ecosystem spans 25 states and 70 cities in India.
- Student teams have collectively worked on 78 million square feet of new buildings to make them net-zero-energy-water, demonstrating that 33 million tonnes of CO_2 emissions can be abated over the life of these buildings.

Key updates in 2023-2024:

- The SDI 2022-23 challenge (3rd edition) featured 154 teams competing, with 1780 students from 126 academic institutions, guided by 200 faculty mentors. After two years of COVID-19 forced virtual events, Solar Decathlon India (SDI) conducted its 3rd Finals event at Infosys, Mysuru on May 26th – 28th where the finalist teams presented their state-of-the-art net-zero and climate-resilient designs to the Division Jury, composed of industry experts.

- Student teams presented net-zero solutions for 36 real building projects on the final day of presentations, out of which top six teams were selected as divisional winners. These six teams pitched their solutions to a Grand Jury comprising experts from real estate and media. Team V^0, Visvesvaraya National Institute of Technology, Nagpur bagged the coveted Grand Prize for the most promising and investment-worthy design.
- On the side-lines of the SDI Finals, a Building Industry Innovation Exhibit was organized that showcased innovative and disruptive building solutions with the potential to address climate change. The exhibitors pitched their products to a jury for the Climate Smart Innovation Award, which was won by Varun Jami, CoFounder, GreenJams.

Section III :

Research and Development

RESEARCH AND DEVELOPMENT

For years, IUSSTF has played a pivotal role in driving research and development collaborations between India and the United States, fostering innovation and knowledge exchange through a diverse range of initiatives across key sectors of mutual interest. Currently, our core R&D efforts are strategically focused on two flagship programs: the **Joint Clean Energy Research and Development Centre (JCERDC),** which is leading advancements in Smart Grid and Energy Storage technologies, and the dynamic **PACEsetter Fund,** designed to accelerate early-stage innovations.

A. JOINT CLEAN ENERGY RESEARCH AND DEVELOPMENT CENTER (JCERDC)

As a priority initiative under the PACE umbrella, the **U.S. Department of Energy (DOE)** and the Government of India signed an agreement to establish the Joint Clean Energy Research and Development Centre (JCERDC) on November 4, 2010. The **Indo-U.S. Joint Clean Energy R&D Centre (JCERDC)** is a joint initiative of the **Ministry of Science and Technology, Govt. of India** and the **U.S. Department of Energy**. The program aims to facilitate joint research and development on clean energy technologies that may be deployed rapidly and have greatest impact. The JCERDC is based on a public-private partnership model of funding and is a first-of-its-kind initiative. Phase I of the program began in the year 2012 with IUSSTF as the implementing agency. It brought together more than 100 Indian and U.S. academic and industrial partners to work jointly on clean energy research. Based on the success of Phase I, the partnership was expanded to two new research areas: Smart Grids and Energy Storage, under Phase II.

UI-ASSIST: U.S.-India Collaborative for Smart Distribution System with Storage

The ***"UI-ASSIST: U.S.-India collaborative for smart diStribution System with Storage"*** consortium was awarded under Phase II of the program and was selected in September 2017. It was led in India by Prof. Suresh C. Srivastava from the Indian Institute of Technology (IIT) Kanpur, and in the United States by Prof. Noel Schulz from Washington State University, Pullman. The Washington State University and the Indian Institute of Technology Kanpur are leading a group of 30 collaborating entities representing the strongest universities, national laboratories, electrical utilities, and vendors in the field of clean energy.

The objective of this project was to evolve the future distribution grid that facilitates the continued increase of Distributed Energy Resources (DER) penetration towards a carbon-free electricity system. The project activities have resulted in a fully conceptualized smart distribution grid that optimally utilizes energy storage and distributed generation, while also supporting workforce development and policy recommendations. The developed solutions have been validated on eleven different unique lab test beds, six in India and five in U.S. and deployed at 10 different field demonstration pilot sites, five each in the U.S. and India. The Indo-U.S. collaborative project concluded in September 2023, while the Indian partners were given no-cost extensions until June 2024.

UI-ASSIST: Institutional Engagement

India	USA
• **Indian Institute of Technology, Kanpur** • Indian Institute of Technology, Delhi • Indian Institute of Technology, Roorkee • Indian Institute of Technology, Madras • Indian Institute of Technology, Bhubaneswar • The Energy and Resources Institute, New Delhi • NTPC Energy Technology Research Alliance, Greater NOIDA • Power Grid Corporation of India Limited, Gurgaon • UP Power Corporation Limited, Lucknow • BSES Rajdhani Power Ltd., New Delhi • Synergy, Faridabad • Customized Energy Solution, Pune • Panasonic India Pvt. Ltd., Gurgaon • GE Global R & D, Bengaluru	• **Washington State University, Pullman** • Massachusetts Institute of Technology, Cambridge, • Texas A&M University, College Station • Hawaii Natural Energy Institute, Honolulu • National Renewable Energy Laboratory • Pacific Northwest National Laboratory • Lawrence Berkeley National Lab, Berkeley • Snohomish County Public Utility District No 1., Everett • Burns and McDonnell, Kansas City • ETAP, Operation technology, Inc., Irvine • National Rural Electric Cooperative Association, Arlington • AVISTA Utilities, Spokane • Venkata Consulting Solutions Inc. • Clean Energy Solutions • GE

Joint Outcomes from UI-ASSIST Project

- Customizable cyber-physical synthetic distribution models (CPSyNet)
- Cyber-Physical Resiliency tools
- Distribution market models (DSO-DNO, DSO/DNO, etc), TSO-DSO interaction studies and aggregator participation (DERs, Microgrids and Nano-grids)
- U.S. India federated laboratory setup for cross-technology validation leveraging unique facilities from the U.S. and India
- U.S. India Policy comparison and key recommendations for DERs, Microgrids, etc and social recommendations
- Benchmarking feeders and storage models for Rural/Semi-urban, urban models from India
- Operation, and control (primary, secondary & tertiary) of Microgrids/Aggregated DERs/Nano-grids and AC microgrid protection schemes
- Cyber-physical interdependency analysis for communication technology, demonstrations, Cyber threat detection, cyber-physical co-simulation studies and cyber audits of field pilots
- Actual technology adoption & demonstrations through case studies, setting examples of R&D transformation into field and utility-level implementation frameworks and guidelines
- International research team development and workforce advancements for dissemination of lessons learned in R&D, Demos & International collaborations

Value Addition to National Development

- Evolved future smart distribution network models integrating RES (Solar PV & Biomass), Energy Storage, cyberinfrastructure, smart metering, MEMS, ADMS and EV charging infrastructure.
- Social upliftment specifically through rural pilot providing 24x7 electricity access, meeting irrigation needs, and enhancing local employment and education opportunities.
- Reduced Carbon footprint using green energy sources (IITK pilots alone will reduce approx. 400 Tons of carbon emission per year, NETRA pilot alone will provide approx. 10-fold benefit)
- Evolution of the distribution system operator (DSO) model in the Indian context.
- Indigenous development of ADMS platform demonstrated at IITK (meeting MAKE IN INDIA goal)
- New networked microgrid model in rural areas for reliable power sharing between villages.
- Evolving policy and regulatory recommendations for larger adoption of Smart Distribution Systems.
- Indigenous μ-PMU development utilising Indian NAVIC signal and its commercialisation through Startup

Impact in Numbers

- 700+ Manpower Trained in the Smart Grid area over 6 years (Including M.Tech, Ph.D, Post Docs, Researchers, Students, Professionals, ITI Professionals)
- Publications and Patents:
  - International Journals: 185
  - Conference Proceedings: 244
  - Patents: 4

U.S. Principal Investigator, Noel Schulz, Washington State University (WSU), Pullman and Merrill Smith , U.S. Department of Energy (DOE) visiting the Rural Pilot in Kanpur District, India

Key Activities

- **Site Visits and Project Reviews:** In February 2024, IUSSTF, in consultation with the Department of Science and Technology (DST), GoI, visited pilot sites in Kanpur (rural areas and IIT Kanpur on Feb 10-11) and Delhi (TERI's urban pilots and NTPC's NETRA pilots in Greater Noida on Feb 12-13). Following these visits, the 10th PMC meeting took place on February 13, 2024, at TERI, Delhi.

The PMC Members along with the IUSSTF, DST and Project Team visiting the TERI- BESS Site, the NETRA Pilot and during the PMC Meeting at TERI

- Recognizing the increasing significance of Distributed System Operators in India's distribution sector, the UI-ASSIST team has published a white paper titled **'Transforming the Indian Power Sector- Distribution System Operators: Need, Frameworks, and Regulatory Considerations.'** This paper was launched on May 8, 2023, at MNIT Jaipur.

- The sixth and final UI-ASSIST Annual Update Workshop was held Orlando, Florida from July 12th-14th, 2023. The Workshop was attended by the Project Partners, Experts, Representative from the U.S. Department of Energy and Department of Science and Technology, GoI

UI-ASSIST Team Members and dignitaries unveiling the DSO White paper

- **Joint Project Review:** The DOE-DST Project Completion Joint Review was held in July 2023 to assess the Consortium's strategic vision and goals, scientific/ technical accomplishments, and overall impact. A panel of external experts from India and the U.S., DOE and DST officials conducted the joint review.
- **Knowledge Dissemination Workshop:** The UI-ASSIST project successfully conducted a dissemination workshop on September 26-27, 2023, at IIT Kanpur Outreach Centre, Noida. The workshop brought together power utilities, industries, regulatory bodies, and R&D organizations to share knowledge and insights on integrating DERs and storage into smart distribution systems. The event highlighted the consortium's significant contributions, including the development of synthetic benchmark systems, the establishment of six laboratory testbeds, and the demonstration of advanced distribution system concepts in diverse settings. The panel discussion on "Pathways to Roll Out Smart Distribution Systems" explored the challenges and opportunities in transitioning to a smarter grid. The workshop culminated in the release of a compendium summarizing the key outcomes and deliverables of the project, showcasing the collective efforts of 31 consortium organizations from India and the U.S.

The UI-ASSIST Annual Update Workshop held in Orlando, Florida

INDO-U.S. PACESETTER FUND

In 2013, the Governments of the Republic of India and the United States of America launched **Promoting Energy Access through Clean Energy (PEACE).** In 2015, the Governments of India (through the **Ministry of New and Renewable Energy)** and the United States of America (through the **U.S. Embassy**) jointly established the **PACESetter Fund,** with a total corpus of INR 50 crore (USD 7.9 million).

The objectives of the PACESetter Fund is to support the PEACE initiative by providing early-stage grant funding to accelerate the commercialization of innovative off-grid clean energy products, systems, and business models. The Fund's main purpose is to improve the viability of off-grid renewable energy businesses that sell small-scale (under 1 megawatt) clean energy systems to individuals and communities without access to grid-connected power or with limited/intermittent access (less than 8 hours per day).

There have been two calls under the Indo-U.S. PACESetter Fund so far. The first round of funding was completed successfully in 2020 and included projects such as small-scale waste-to-energy innovation, microgrid remote monitoring and control, development of the world's first pay-as-you-go electricity network, Integrated Home Energy System, community-based solar pumps, and others.

Following this, a second, more focused round of funding supported three distinct projects. The IV Techno-financial Expert Committee (TFEC) meeting, held on November 6, 2023, reviewed these three projects for their administrative closure. A summary of these completed projects and their significant impacts can be found below:

1. Rural Enterprise Model for Branded Packaged Diced and Dehydrated Vegetables and Other Dried Products

The project, "Rural enterprise model for branded packaged diced and dehydrated vegetables and other dried products using hybrid biomass and solar energy," spearheaded by the Society for **Economic and Social Studies (SESS), New Delhi,** has successfully concluded. This initiative aimed to **commercialize the production of packaged dehydrated vegetables in rural areas** using **low-cost, energy-efficient hybrid biomass and solar drying processes** within a **hub-and-spoke Rural Enterprise Model**.

Building on SESS's prior success in fruit processing, this project focused on vegetables. The **hybrid system** utilizes **biomass dryers (150–200 kg capacity)** with **solar driers (50 kg capacity),** leveraging **renewable, local biomass and free solar energy**. Produce is partially sun-dried (30-40% moisture removal) before final drying in biomass units to achieve less than 10% residual moisture for extended shelf life.

Packaged dehydrated vegetables **eliminate the cold chain,** empower farmers with processing capabilities, and offer easy transport and wide retail access. Their key advantage is making seasonal produce available off-season at **competitive price-points,** bridging market gaps.

- **Project Deliverables:**
  - **Established Rural Enterprise Model:** A fully operational hub-and-spoke model for producing and marketing branded packaged diced and dehydrated vegetables and other dried products.
  - **Integrated Hybrid Drying System:** Successful deployment and optimization of a hybrid biomass and solar energy drying system for efficient, cost-effective vegetable dehydration.
  - **Validated Dehydration Protocols:** Developed and tested specific protocols for dehydrating various vegetables, ensuring product quality and shelf life.

- **Demonstrated Economic Viability:** Achieved proof of concept for a sustainable rural enterprise through assessing production costs and market viability.
- **Branded Packaged Products:** Developed and initially introduced branded packaged dehydrated vegetable products to the market.

- **Project Impact:**
  - **Value Addition to Agricultural Produce:** Transforms perishable vegetables into high-value, long-shelf-life products, significantly enhancing farmer income.
  - **Rural Job Creation:** Creates new employment opportunities within rural communities, particularly empowering women through participation in processing and packaging.
  - **Economic Empowerment:** Strengthens the rural economy by generating additional income streams and fostering local entrepreneurship.
  - **Enhanced Food Security:** Reduces post-harvest food wastage by preserving surplus produce and provides a stable supply of nutritious food products year-round.
  - **Environmental Sustainability:** Promotes sustainable practices through the efficient use of renewable biomass and solar energy, reducing reliance on conventional energy sources.
  - **Improved Market Access for Farmers:** Enables farmers to access wider markets beyond their local season, leveraging the off-season demand for dehydrated products.

Solar Drying of Vegetables before biomass drying and packaging of the dehydrated vegetables.

2. Solar Dryer-Based Self-Employment Model for Rural Tribal Communities, Women and Differently-Abled Persons

The project, led by **The Energy and Resources Institute (TERI), New Delhi,** in partnership with the **Society for Energy, Environment and Development (SEED), Hyderabad,** that established a self-employment model using a hybrid solar-biomass dryer with thermal storage, was successfully concluded. The goal was to design, develop, and commercialize this technology for rural clusters, providing a sustainable livelihood by processing perishable vegetables. The hybrid system (150–200 kg biomass, 50 kg solar) ensures cost-effective, continuous drying using renewable energy. Produce is partially solar-dried before final biomass drying (<10% moisture) for extended shelf life, eliminating cold chains and improving market access.

- **Project Deliverables:**
  - **Two prototype hybrid solar-biomass dryer systems** were developed, fabricated, and installed (one at TERI, Delhi, and one at SEED, Hyderabad), with a second, modified prototype currently under fabrication based on expert recommendations.
  - **Comprehensive testing** on various produce (carrots, mangoes, onions, tomatoes) established validated drying standards, assessing the hybrid model's efficacy under solar-only, biomass-only, and storage-only conditions.
  - An **intelligent control system** was integrated for airflow regulation based on humidity and temperature, enhancing efficiency and product quality.
  - **Community needs assessment surveys** were completed in selected villages/ areas, identifying tribal, women, and differently-abled beneficiaries.
- **Project Impact:**
  - Establishes a viable self-employment model for rural tribal communities, women, and differently-abled individuals through value-added agricultural processing.
  - Transforms perishable produce into high-value, long-shelf-life products, reducing post-harvest losses and increasing farmer income.
  - Creates local employment, fostering economic empowerment and strengthening rural economies.
  - Contributes to enhanced food security by preserving seasonal produce for year-round availability.
  - Promotes environmental sustainability through the use of renewable hybrid biomass and solar energy.
  - **Stakeholder consultations** with local institutions, banks, and prospective buyers were partially completed to establish supply, market, and finance linkages.
  - **Process documentation,** including survey forms, system descriptions, site requirements in local languages (Marathi, Telugu), and dryer manuals, was prepared.
  - **Detailed theoretical calculations** for selected crops were performed, outlining energy requirements and drying percentages for solar, thermal energy storage (TES), and biomass components, with heat transfer enhancement achieved in the modified TES system (35.3% increase in heat transfer rate).
  - The modified integrated system features a **significantly reduced footprint** (43.7% less overall area) and improved aesthetics and operational performance.
  - Represents a significant technological advancement with its continuous, round-the-clock drying capability, unique in the Indian market.
  - Shows strong potential for wider adoption and impact, with plans for a detailed feasibility report for scaling up.

Solar-biomass hybrid dryer with thermal energy storage at TERI, New Delhi

3. Intelligent solar charge controller for increasing energy output & life cycle batteries and revival of under-performing old SPV & their batteries

The project, "Intelligent solar charge controller for increasing energy output & life cycle batteries and revival of under-performing old SPV & their batteries," led by Customized Energy Solutions India Pvt. Ltd., Pune, has successfully concluded. This initiative tackled the critical issue of rapid battery degradation in off-grid solar power systems.

Research consistently shows significant capacity loss in off-grid solar batteries, with 2-3 year old batteries often at 50% of original capacity, and 5-6 year old batteries at just 20-30%. This severe degradation drastically limits solar installation effectiveness and longevity. While "equalizing charges" can reverse this degradation, determining optimal frequency and duration is complex, varying with battery usage and age. This project aimed to automate this crucial process. This project represents a significant leap forward in optimizing off-grid solar energy systems, promising a future of more reliable and sustainable power for communities worldwide.

- **Project Achievements:**
  - An **advanced algorithm** was created, capable of detecting battery health and automatically determining appropriate equalizing charges.
  - **Automated micro-controllers,** embedded with the **Charge Equalization System** (CES) algorithm, underwent thorough laboratory testing, proving effective and reliable.
  - A **CES controller** has been successfully installed and is operational at the **Irshalwadi site,** providing real-world validation.

- **Project Impact:**
  - **Extended Battery Lifespan & Increased Energy Output:** The CES controller is expected to extend lifespan and improve energy output of solar power plants by an estimated 25% to 30% by preventing battery degradation.
  - **Revival of Underperforming Plants:** This technology offers a remarkable opportunity to revive old and underperforming solar plants, restoring their capacity by **30% or more.**
  - **Empowering Local Communities:** Recovered battery capacity directly benefits local communities, enabling them to power more devices like home appliances, lighting, milling, and agro-processing machines.
  - **Accelerated Adoption through Open Source:** CES plans to promote the algorithm on an **open-source platform,** accelerating market deployment and ensuring more beneficiaries gain access to reliable solar PV hybrid energy sources, thereby driving economic development.

Solar Panels and VRLA Battery Bank installed at the Sites

Section IV :

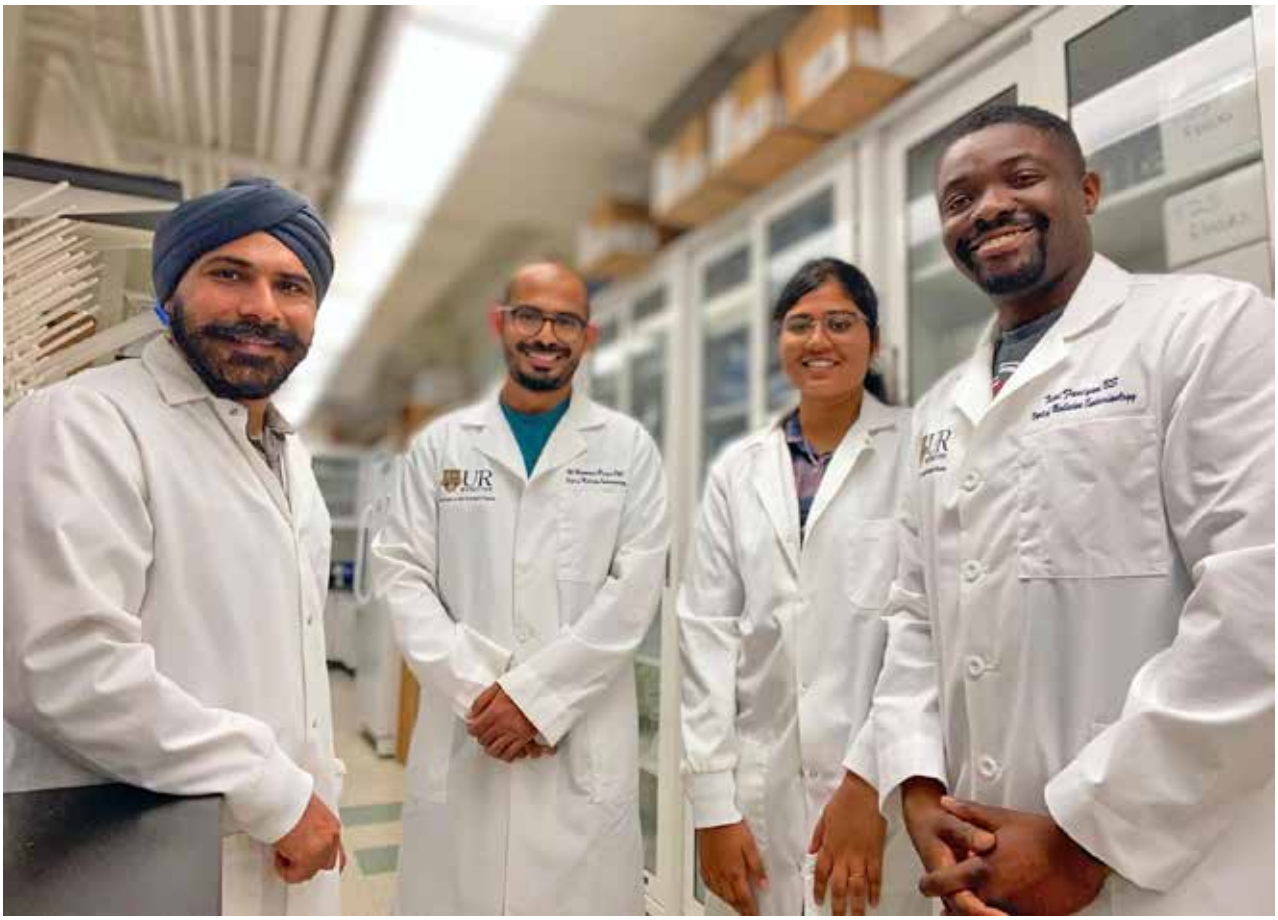
Visitations and Fellowships

VISITATIONS AND FELLOWSHIPS

A core objective of the Indo-U.S. Science and Technology Forum (IUSSTF) is to cultivate connections between scientists and students from both India and the United States. Providing students and young scientists with early exposure to cutting-edge scientific research broadens their intellectual horizons and significantly enhances their engagement in STEM careers.

These vital early career exchanges foster lasting relationships among students and their mentors, laying the groundwork for future collaborations on significant scientific initiatives throughout their professional journeys. IUSSTF achieves this by collaborating with various Federal agencies, industry partners, professional bodies, and non-profit organizations to administer a wide array of visitation programs across diverse disciplines and academic levels.

IUSSTF's long-standing support for these initiatives has already benefited nearly 2000 individuals. Currently, two key ongoing programs include the **IUSSTF- Viterbi Program** and the **Khorana Program for Scholars**.



IUSSTF- VITERBI PROGRAM

The Indo-U.S. Science and Technology Forum (IUSSTF) and The Viterbi School of Engineering, University of Southern California (USC) have partnered to support the **IUSSTF-Viterbi Program**.

The IUSSTF - Viterbi Program is a dynamic student internship program that creates long-term, sustainable, and vibrant linkages between the two nations. The program provides an opportunity for Indian students pursuing a bachelor's or master's degree in electrical engineering, Computer Engineering and Computational Sciences at a recognized institution of higher education and learning in India to undertake 8 week summer internship at the Viterbi School of Engineering.

- **Call for 2023:**
  Against the call for applications for 2023, 15 Interns were selected to pursue internships at USC for 10-12 weeks. USC organised an orientation session on 16th May 2023 at the campus for the interns. The details of the students are given in ***Annexure I***.

- **Call for 2024:**
  The 2024 call was announced with a submission deadline of 15 November 2023. IUSSTF received 343 applications. After an initial screening of applications by IUSSTF based on the eligibility criteria, the University of Southern California (USC), shortlisted 130 applications for further review. IUSSTF constituted a Selection Committee comprising of eminent subject experts to review the 130 shortlisted applications. Committee members graded the applications and met virtually on **07th February 2024**, to select the list of final awardees. A total of 15 students have been chosen for the award and have identified potential mentors at USC. The students will avail their internships during the summer of 2024. The list of the selected students is available as ***Annexure II***.

2023 Viterbi-IUSSTF Summer Internship Program Participants

KHORANA PROGRAM FOR SCHOLARS

The **Department of Biotechnology (DBT)**, Govt. of India, **Indo-U.S. Science and Technology Forum (IUSSTF)** and **WINStep Forward** are partnering to support the prestigious Khorana Program for Scholars named in honor of Dr. Har Gobind Khorana, who won the Nobel Prize in 1968 for his work at the interface of Chemistry and Biology while a member of the University of Wisconsin-Madison faculty.

The Khorana Program for Scholars is a prestigious internship program for Indian students currently enrolled in graduate and post graduate programs in Biotechnology, Life Sciences and allied areas to undertake a summer research internship at U.S. Universities Funded by the Department of Biotechnology, the program is implemented by IUSSTF in partnership with WINStep Forward.

Call for 2023:

66 scholars awarded under the 2023 call for applications availed their internships from May 2023 onwards.
List of the 66 scholars is available as Annexure A

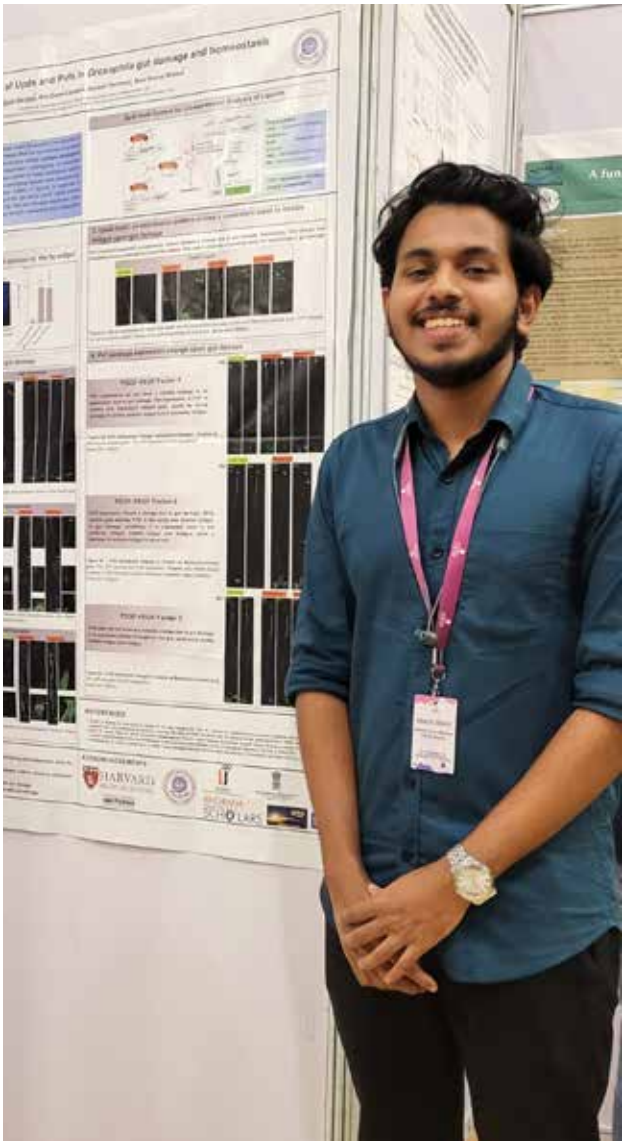
Call for 2024:

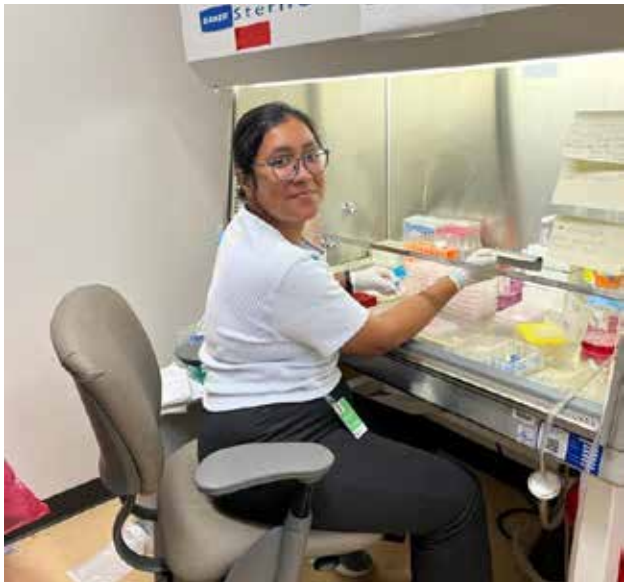
For the 2024 call for applications, the submission deadline was 31st October 2023. IUSSTF received a total of 884 applications, out of which 764 met the eligibility criteria. A three-tiered screening process was followed to select meritorious students. The screening committee shortlisted 217 applicants for the final review. The Final selection committee meeting was held on 10th February 2024 to select 75 scholars.

Khorana Scholars 2023 at St. Jude's Children's Research Hospital, Tennessee

Khorana Top Host U.S. Institutes (2008- 2024):

Name	No. of Scholars
University of Wisconsin - Madison	111
Massachusetts Institute of Technology, Cambridge, MA	29
Indiana University	20
University of Illinois at Urbana- Champaign	19
Harvard Medical School, Boston, Massachusetts/ Harvard University, MA	19
St. Jude Children's Research Hospital, Memphis, Tennessee	18
John Hopkins University / School of Medicine, MD	17
Michigan State University	15
University of Michigan, Ann Arbor, MI	11
University of California, San Diego	9
University of Nebraska, Lincoln	9
Purdue University, West Lafayette	8
Rice University, TX	8
Stanford University, California	8





Khorana Scholars 2023 during the respective internships in the USA

Section V :

Financial Matters

FINANCIAL MATTERS

IUSSTF's funding is derived from three primary sources:

- Direct support from the U.S. Government.
- Direct support from the Indian Government.
- Extra Mural Programs (EMPs).

U.S. Government support is provided through annual interest accrued from two established endowments, the IUSSTF and USISTEF endowments. The Indian Government provides matching grants on a semi-annual basis, complementing these endowments.

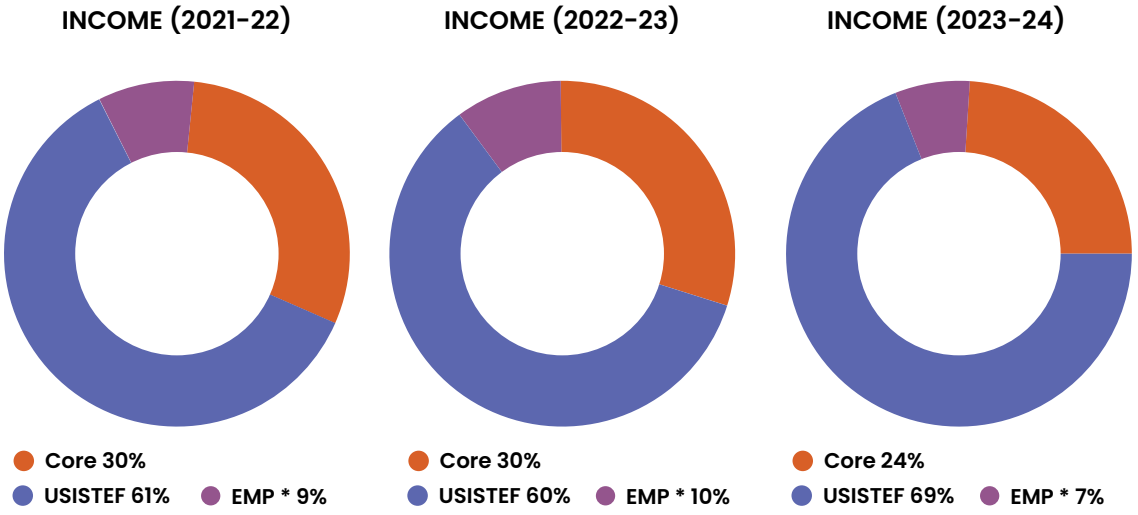
Funding for Extra Mural Programs (EMPs) is secured through project-specific grants from various federal agencies, including DST, DBT, MNRE, and industry partners. These grants support the implementation of designated programs, with IUSSTF receiving a nominal management fee.

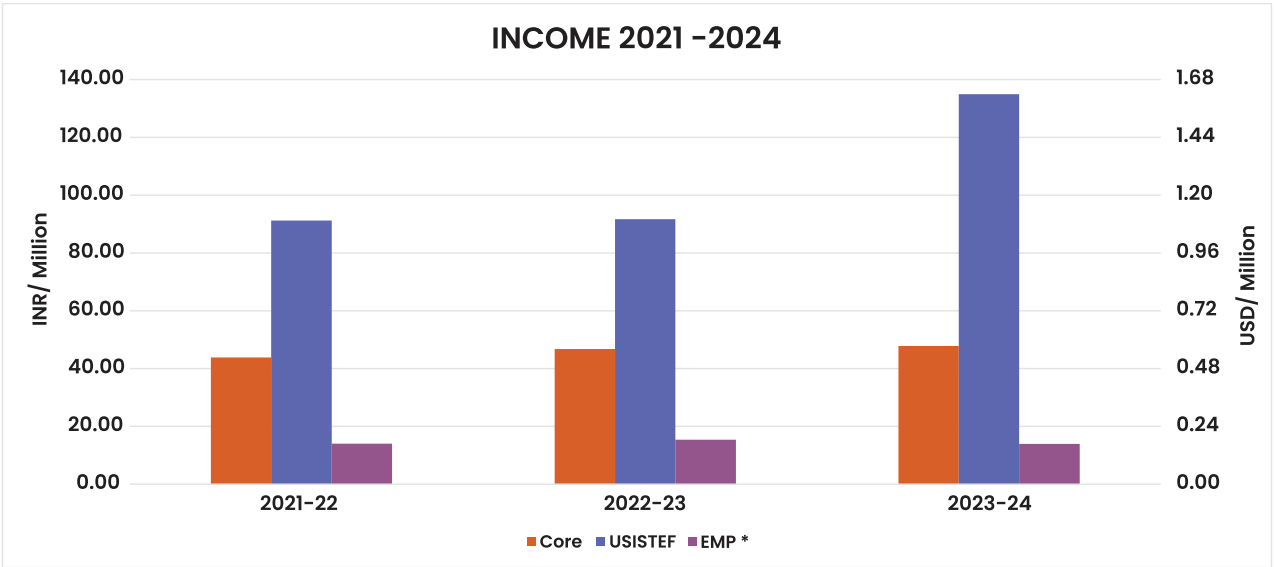
(A) Overall Income (2021-2024)							
S.No	Head	2021-22		2022-23		2023-24	
		(INR/ Million)	(USD/ Million)	(INR/ Million)	(USD/ Million)	(INR/ Million)	(USD/ Million)
1.	Core	43.84	0.59	46.78	0.58	47.81	0.58
2.	USISTEF	91.20	1.23	91.69	1.15	134.92	1.63
3.	EMP *	14.03	0.19	15.34	0.19	13.95	0.17
	TOTAL	**149.07**	**2.01**	**153.82**	**1.92**	**196.68**	**2.37**

All the figures are as per audited financial statements of the respective years

** EMP income excludes targeted funds received from the funding agencies*

1 USD= 83 INR (2023-24); 80 INR (2022-23); 74 INR (2021-22)



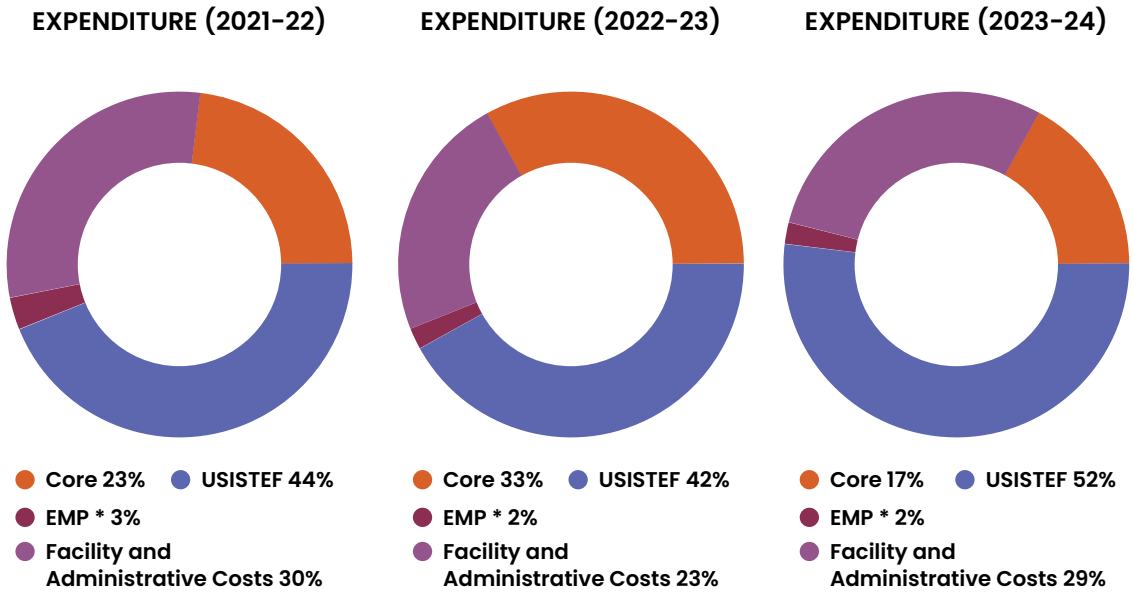


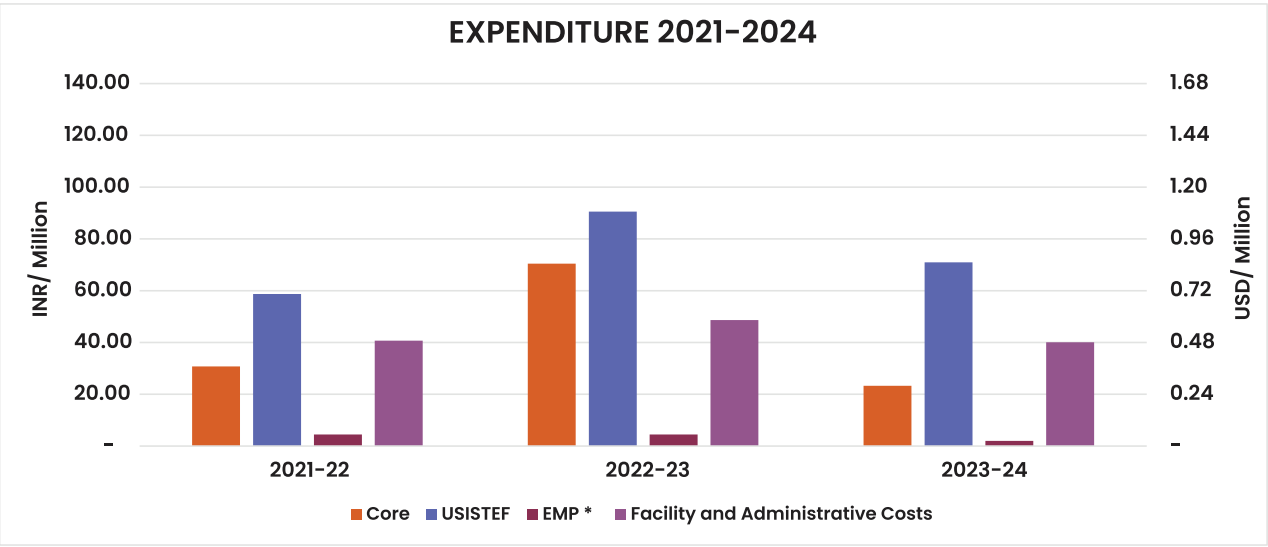
(B) Overall Expenditure (2021-2024)							
S. No	Head	2021-22		2022-23		2023-24	
		(INR/ Million)	(USD/ Million)	(INR/ Million)	(USD/ Million)	(INR/ Million)	(USD/ Million)
1.	Core	30.71	0.42	70.50	0.88	23.28	0.28
2.	USISTEF	58.74	0.79	90.56	1.13	70.92	0.85
3.	EMP *	4.48	0.06	4.44	0.06	1.97	0.02
4.	Facility and Administrative Costs	40.72	0.55	48.64	0.61	40.07	0.48
	TOTAL	**134.66**	**1.82**	**214.14**	**2.68**	**136.25**	**1.64**

All the figures are as per audited financial statements of the respective years and excludes grants given in advance to grantees

**EMP expenditure includes direct expenditure on management of targeted grants received from the funding agencies*

1 USD= 83 INR (2023-24); 80 INR (2022-23); 74 INR (2021-22)

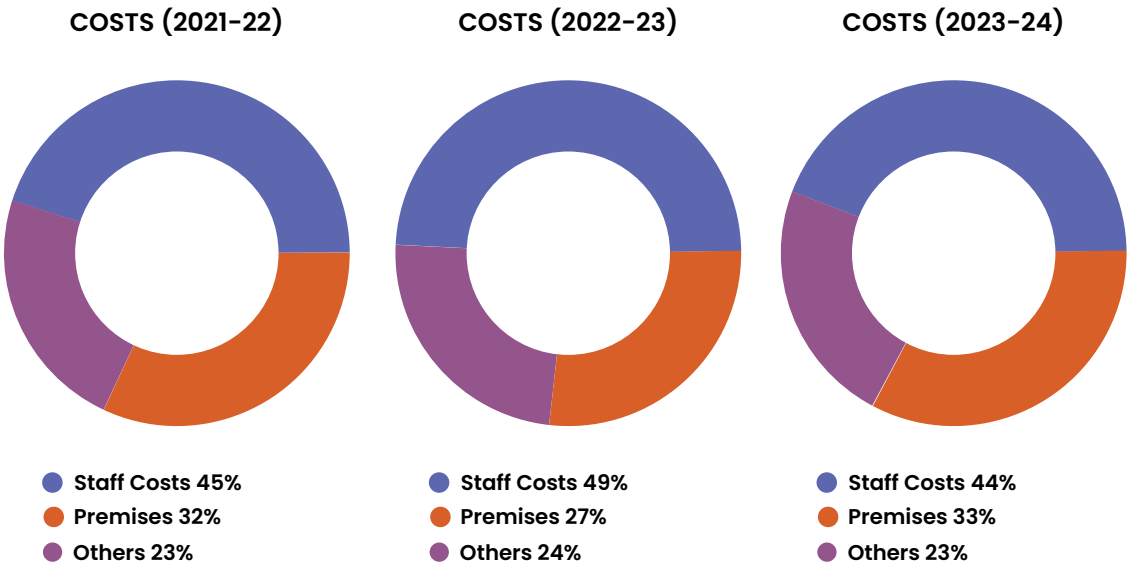


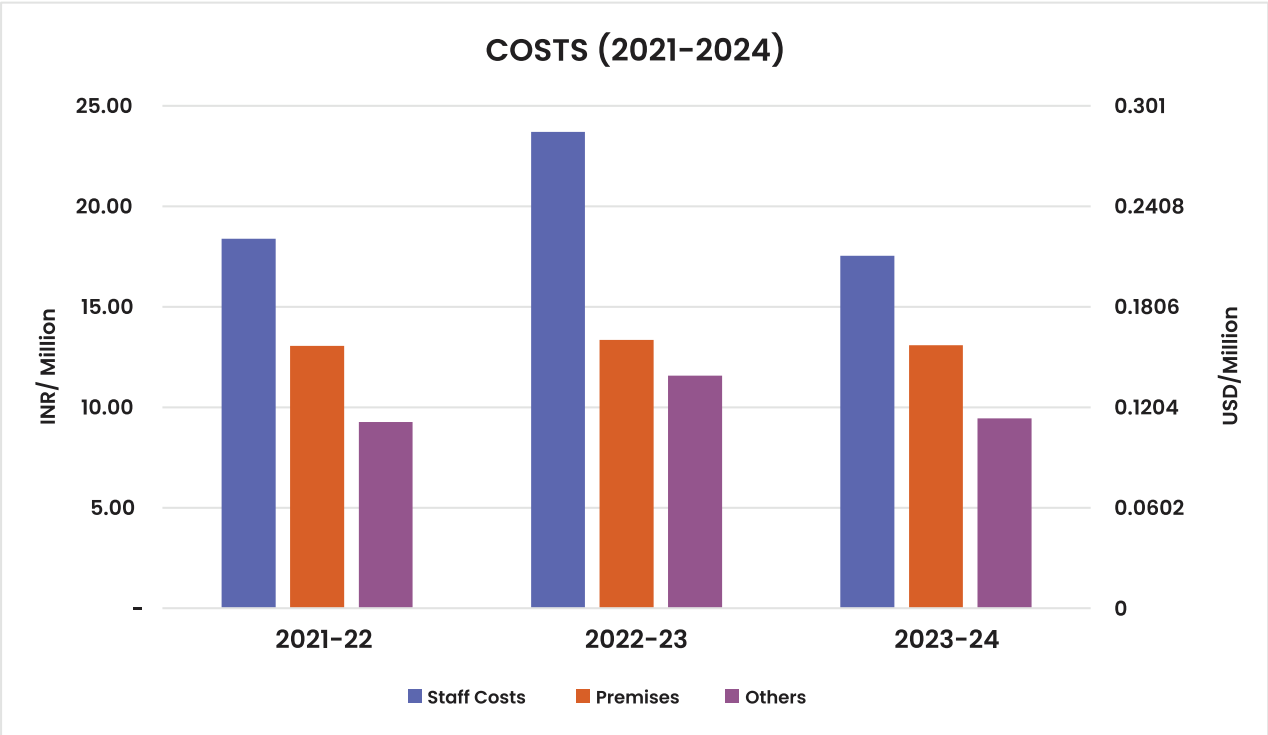


(C) Facility and Administrative Costs (2021-2024)							
S. No	Head	2021-22		2022-23		2023-24	
		(INR/ Million)	(USD/ Million)	(INR/ Million)	(USD/ Million)	(INR/ Million)	(USD/ Million)
1.	Staff Costs	18.39	0.25	23.71	0.30	17.54	0.21
2.	Premises	13.06	0.18	13.35	0.17	13.09	0.16
3.	Others	9.27	0.13	11.58	0.14	9.44	0.11
	TOTAL	**40.72**	**0.55**	**48.64**	**0.61**	**40.07**	**0.48**

All the figures are as per audited financial statements of the respective years

1 USD= 83 INR (2023-24); 80 INR (2022-23); 74 INR (2021-22)



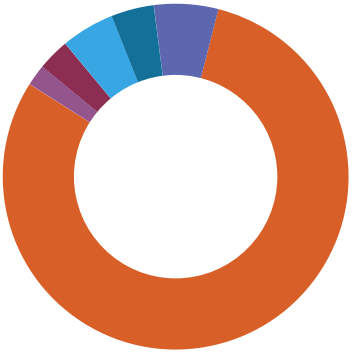


(D) Expenditures - IUSSTF Core Programs (2021-2024)							
S. No	Head	2021-22		2022-23		2023-24	
		(INR/ Million)	(USD/ Million)	(INR/ Million)	(USD/ Million)	(INR/ Million)	(USD/ Million)
1.	Bilateral Workshops	2.01	0.03	-	-	-	-
2.	Virtual Networked Centres	24.45	0.33	59.16	0.74	16.64	0.20
3.	Visitations	0.75	0.01	4.24	0.05	4.56	0.05
4.	U.S. India Artificial Intelligence Initiative	0.86	0.01	3.17	0.04	0.21	0.00
5.	Solar Decathalon	1.54	0.02	3.36	0.04	0.10	0.00
6.	Direct Admin Expenses	1.10	0.01	0.56	0.01	1.76	0.02
	TOTAL	**30.71**	**0.42**	**70.50**	**0.88**	**23.28**	**0.28**

All the figures are as per audited financial statements of the respective years and excludes grants given in advance to grantees

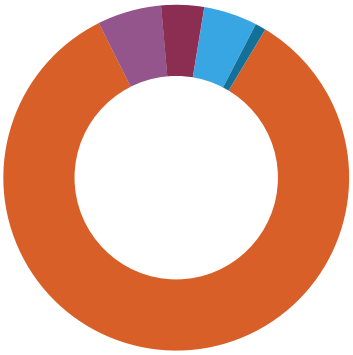
1 USD= 83 INR (2023-24); 80 INR (2022-23); 74 INR (2021-22)

EXPENDITURES (2021-22)



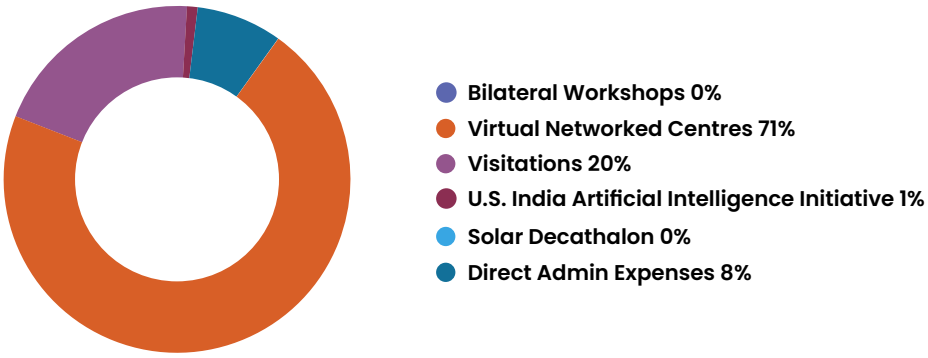
- **Bilateral Workshops -6%**
- **Virtual Networked Centres 80%**
- **Visitations 2%**
- **U.S. India Artificial Intelligence Initiative 3%**
- **Solar Decathalon 5%**
- **Direct Admin Expenses 4%**

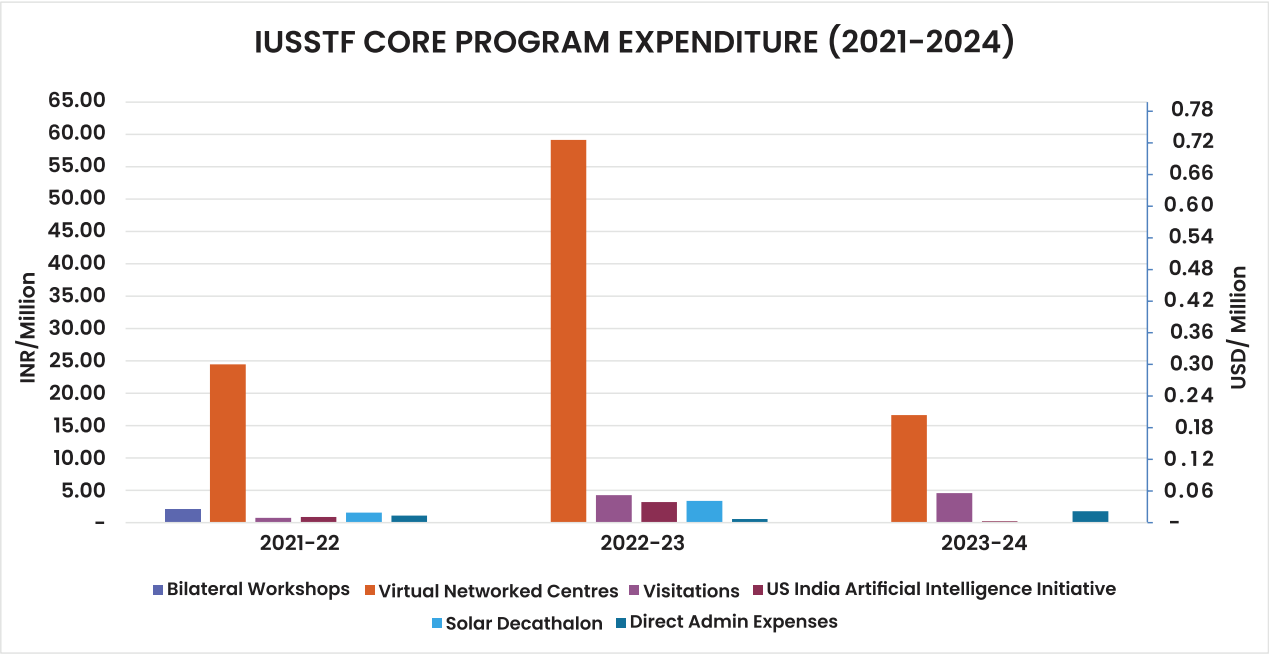
EXPENDITURES (2022-23)



- **Bilateral Workshops 0%**
- **Virtual Networked Centres 84%**
- **Visitations 6%**
- **U.S. India Artificial Intelligence Initiative 4%**
- **Solar Decathalon 5%**
- **Direct Admin Expenses 1%**

EXPENDITURES (2023-24)

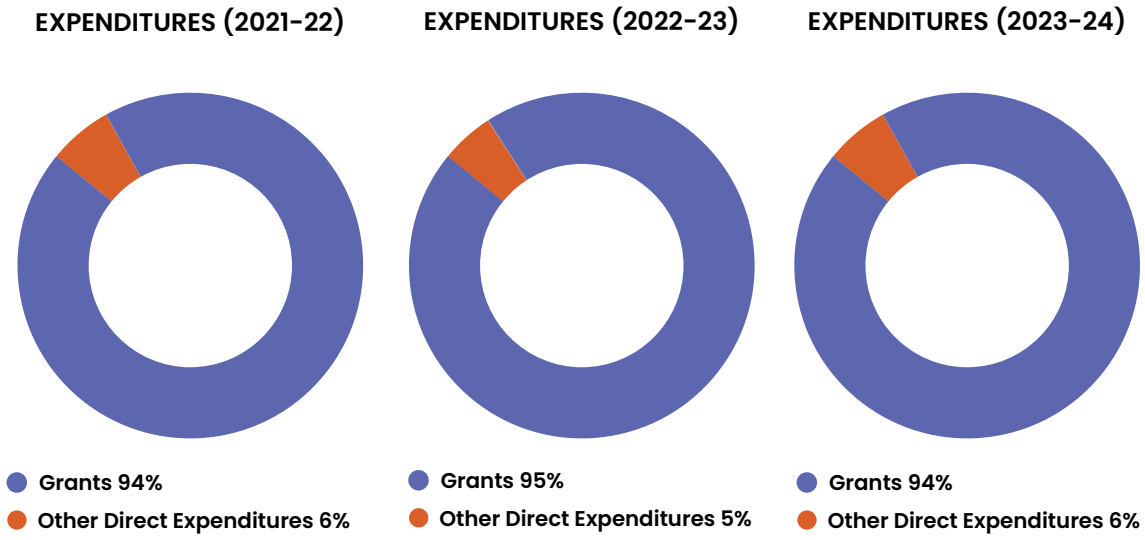


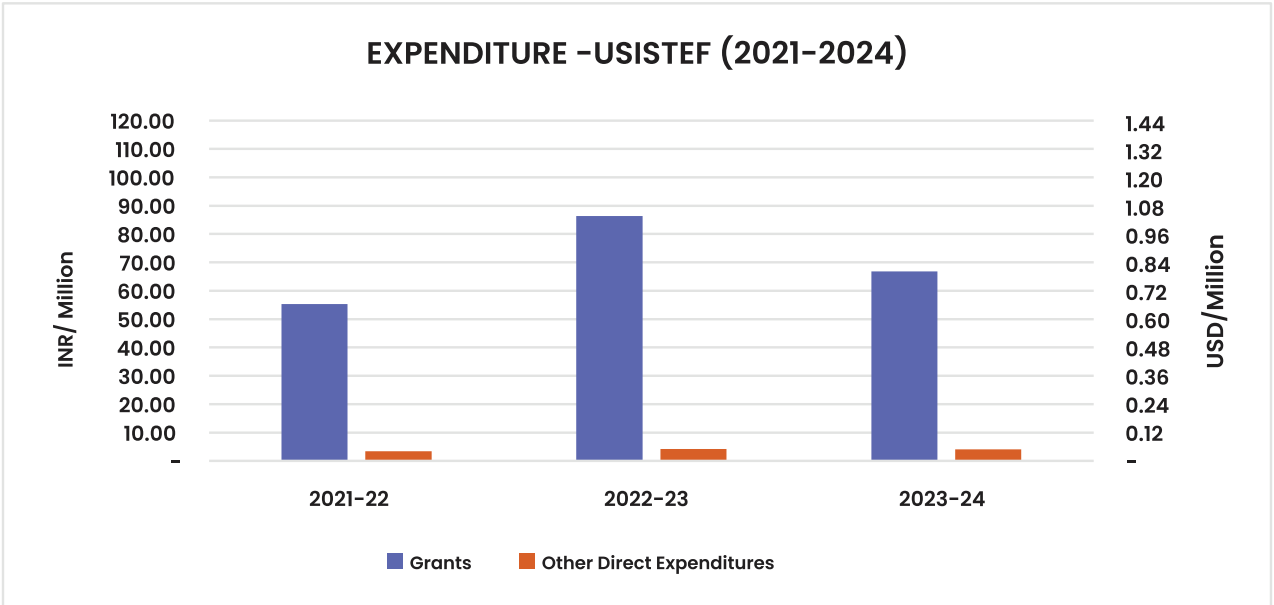


(E) Expenditures - USISTEF (2021-2024)							
S. No	Head	2021-22		2022-23		2023-24	
		(INR/ Million)	(USD/ Million)	(INR/ Million)	(USD/ Million)	(INR/ Million)	(USD/ Million)
1.	Grants	55.34	0.75	86.40	1.08	66.87	0.81
2.	Other Direct Expenditures	3.41	0.05	4.17	0.05	4.05	0.05
	TOTAL	**58.74**	**0.79**	**90.56**	**1.13**	**70.92**	**0.85**

All the figures are as per audited financial statements of the respective years and excludes grants given in advance to grantees

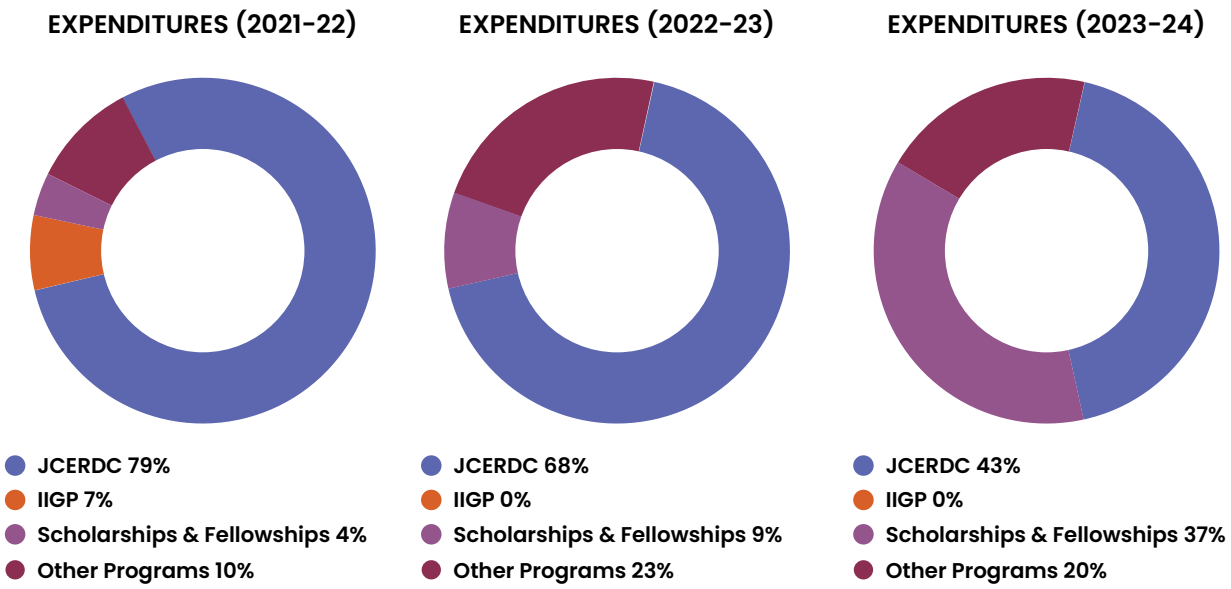
1 USD= 83 INR (2023-24); 80 INR (2022-23); 74 INR (2021-22)

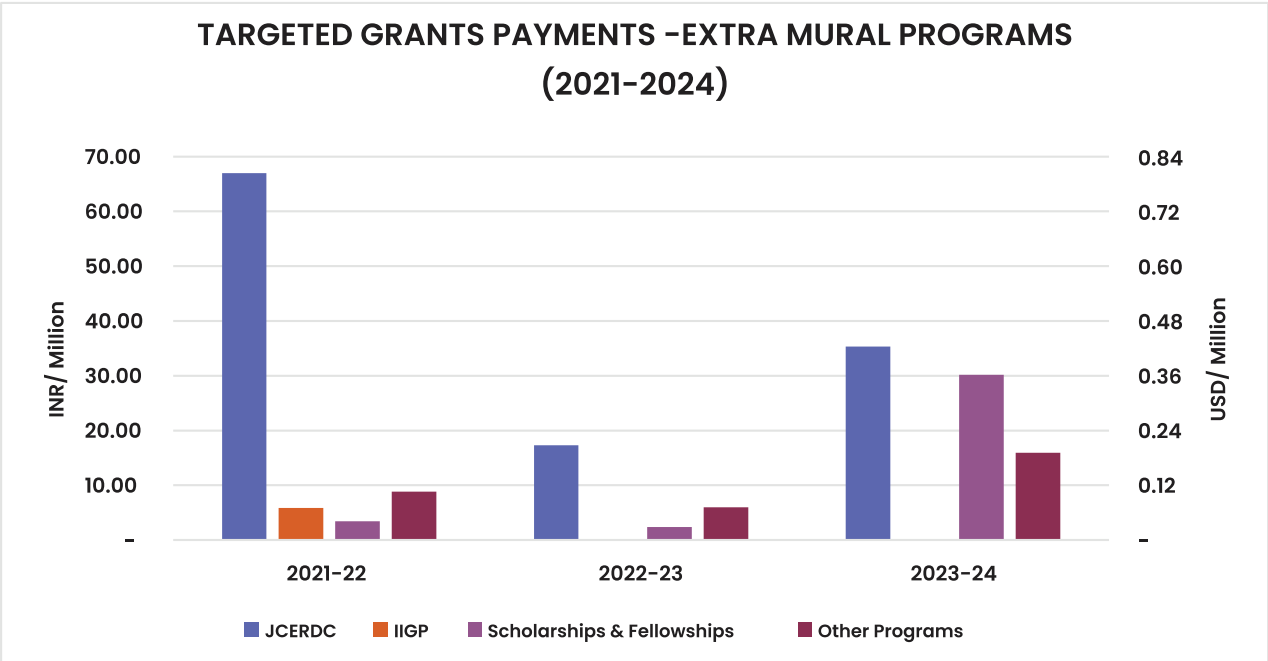




(F) Targeted Grants Payments - Extra Mural Programs (2021-24)							
S. No	Head	2021-22		2022-23		2023-24	
		(INR/ Million)	(USD/ Million)	(INR/ Million)	(USD/ Million)	(INR/ Million)	(USD/ Million)
1.	JCERDC	67.02	1.91	17.27	0.22	35.33	0.43
2.	IIGP	5.87	0.08	0.00	0.00	-	0.00
3.	Scholarships & Fellowships	3.41	0.05	2.35	0.03	30.15	0.36
4.	Other Programs	8.81	0.12	5.97	0.07	15.94	0.19
	TOTAL	**85.10**	**1.15**	**25.60**	**0.32**	**81.41**	**0.98**

1 USD= 83 INR (2023-24); 80 INR (2022-23); 74 INR (2021-22)

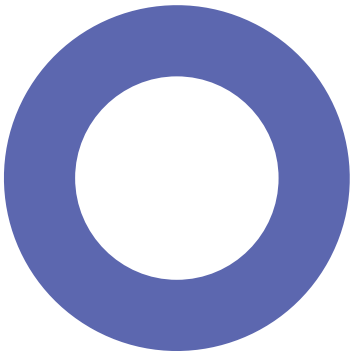




(G) Targeted Grants Receipts - Extra Mural Programs (2021-24)							
S. No	Head	2021-22		2022-23		2023-24	
		(INR/ Million)	(USD/ Million)	(INR/ Million)	(USD/ Million)	(INR/ Million)	(USD/ Million)
1.	JCERDC	90.69	1.23	94.94	1.19	42.06	0.51
2.	IIGP	-	0.00	-	0.00	-	0.00
3.	Scholarships & Fellowships	-	0.00	38.97	0.49	31.83	0.38
4.	Other Programs	-	0.00	3.23	0.04	0.16	0.00
	TOTAL	**90.69**	**1.23**	**137.13**	**1.71**	**74.04**	**0.89**

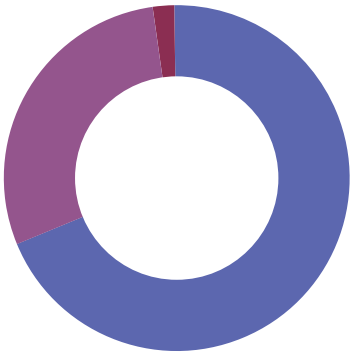
1 USD= 83 INR (2023-24); 80 INR (2022-23); 74 INR (2021-22)

RECEIPTS (2021-22)



- JCERDC 100%
- IIGP 0%
- Scholarships & Fellowships 0%
- Other Programs 0%

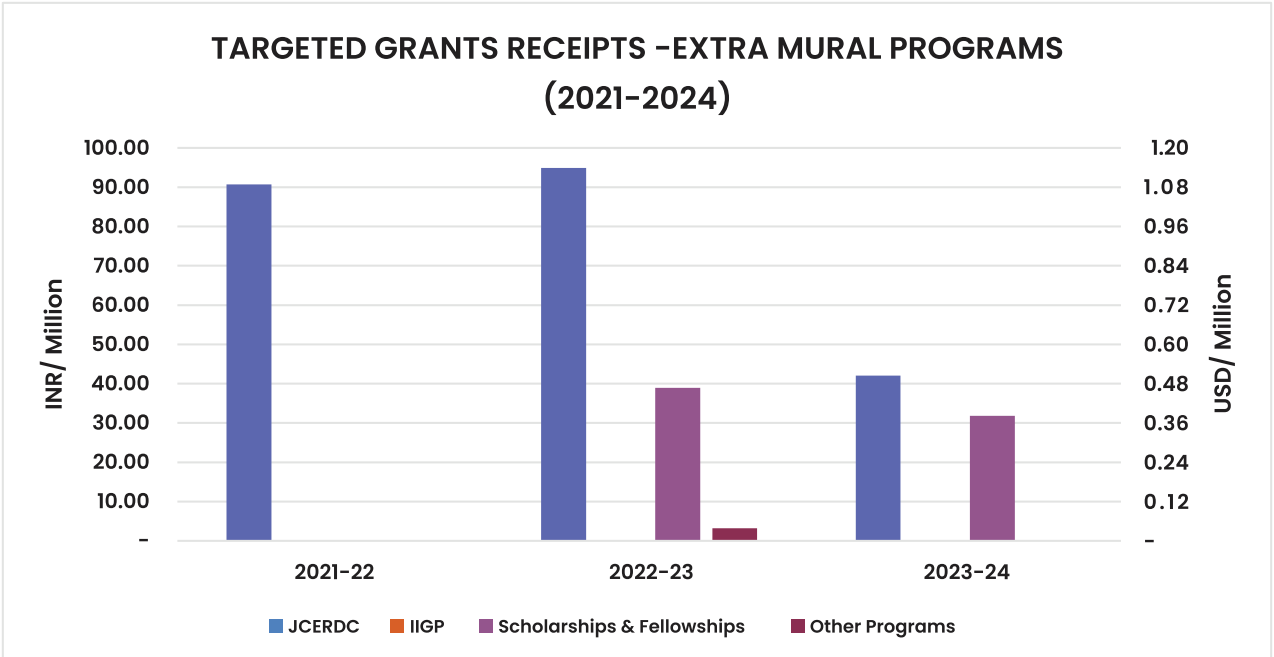
RECEIPTS (2022-23)

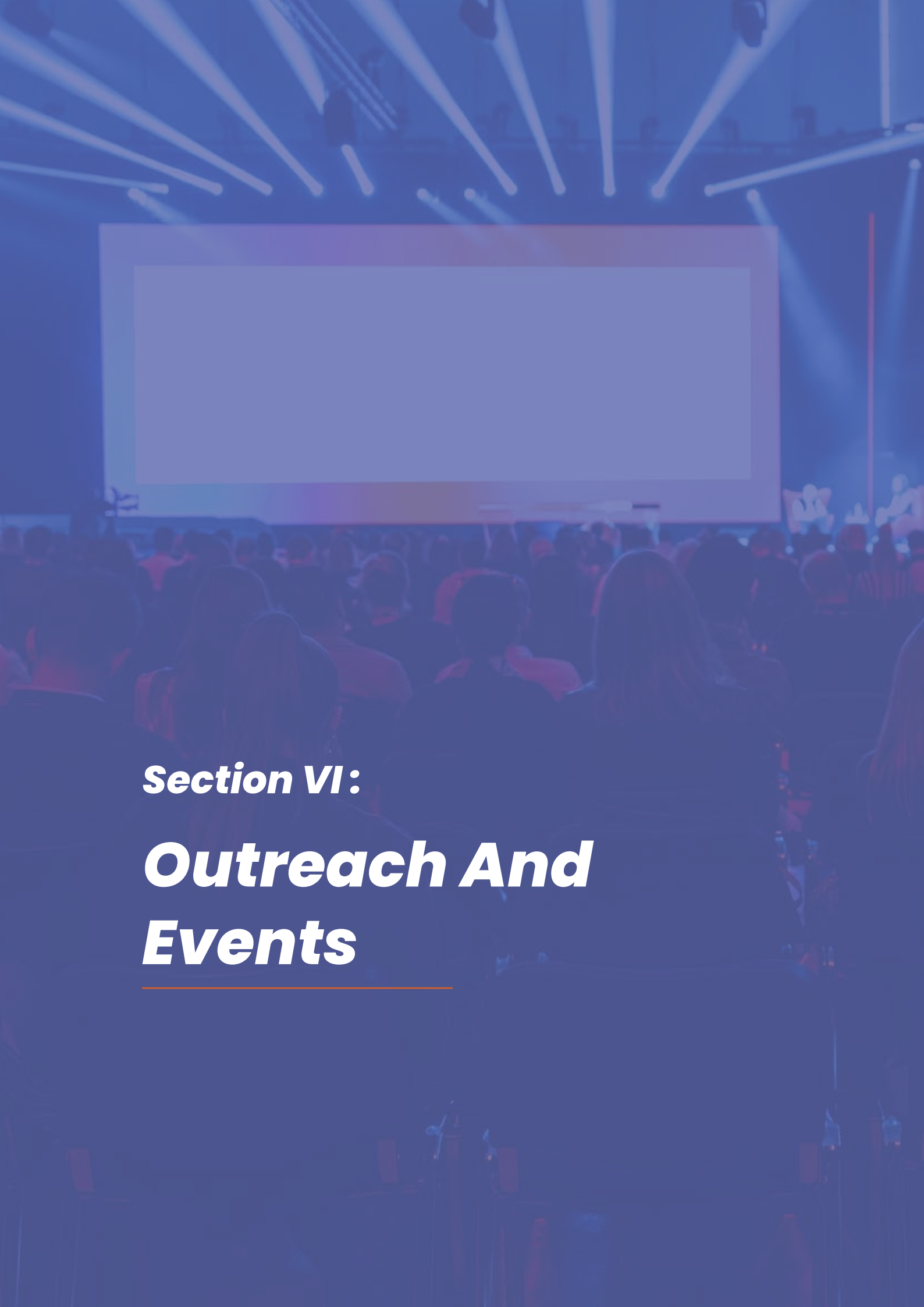


- JCERDC 69%
- IIGP 0%
- Scholarships & Fellowships 29%
- Other Programs 2%

RECEIPTS (2023-24)

- JCERDC 57%
- IIGP 0%
- Scholarships & Fellowships 43%
- Other Programs 0%





Section VI :

Outreach And Events

IUSSTF WELCOMES THE NEW LEADERSHIP

Dr. Nisha Mendiratta assumed the role of Executive Director of the Indo-U.S. Science and Technology Forum (IUSSTF) on November 17, 2023. Prior to this appointment, she served as an Advisor/Scientist G at the Department of Science and Technology (DST), Ministry of Science and Technology, Government of India, where she spearheaded crucial initiatives such as Women in Science and Engineering (WISE-KIRAN) and the Climate Change Program (CCP).

Meet and Greet Event

To celebrate Dr. Mendiratta's appointment, IUSSTF hosted a Meet & Greet event attended by distinguished guests from federal agencies, industry, and academia.

Professor Abhay Karandikar, Secretary of DST and Indian Co-Chair of the IUSSTF Governing Board, extended a warm welcome to the fifth Executive Director of IUSSTF. He emphasized the pivotal role of IUSSTF in fostering scientific and technological collaboration between India and the United States. Highlighting the unprecedented growth in Indo-U.S. partnerships across sectors such as AI, quantum, semiconductors, clean energy, and healthcare, Karandikar underscored the increasing expectations on IUSSTF to adapt, innovate, and expand its impact by exploring new collaborations and partnerships.

Mr. Drew Schufletowski, Minister-Counselor for Economic Affairs, Environment, Science, and Technology at the U.S. Embassy India and USISTEF Co-Chair, along with **Dr. Akhilesh Gupta,** Secretary of the Science and Engineering Research Board (SERB) and Senior Advisor at DST, and **Dr. Arabinda Mitra,** Hon. Distinguished Fellow and former Scientific Secretary at the Office of the Principal Scientific Adviser to the Government of India (former IUSSTF ED), also congratulated Dr. Mendiratta on her appointment and expressed their best wishes for a successful tenure.

In her acceptance speech, Dr. Mendiratta expressed gratitude to all the dignitaries, guests, stakeholders, and colleagues for their warm welcome. She reaffirmed her commitment to fostering stronger Indo-U.S. scientific collaborations and thanked India's DST, the U.S. Department of State, and the U.S. Embassy India for their continued support.

The event also marked a significant moment with the unveiling of the "Connect - January 2024" edition by our esteemed dignitaries, further highlighting the collaborative spirit of the occasion.

PANEL DISCUSSION AND FELICITATION CEREMONY : "UNLOCKING POTENTIAL: INTEGRATING ARTIFICIAL INTELLIGENCE IN UAV APPLICATIONS."

The Indo-U.S. strategic technology partnership, further strengthened by the Initiative on Critical and Emerging Technology (iCET) launched in May 2022, continues to drive innovation. As part of this collaboration, the Indo-U.S. Science and Technology Forum (IUSSTF), in partnership with Lockheed Martin, organized a panel discussion and felicitation ceremony titled "Unlocking Potential: Integrating Artificial Intelligence in UAV Applications" on February 20, 2024, at Bharat Mandapam, New Delhi.

Recognizing Innovation: Honoring Drone Olympics Winners

Unmanned Aerial Vehicles (UAVs) made a spectacular entry at Aero India 2019 with the first-ever 'Drone Olympics' competition, conducted by the Ministry of Defence. To encourage and support startups and small businesses in developing UAV/ drone technologies for both Indian and global markets, Lockheed Martin agreed to sponsor three Autonomous Drone Racing Kits for the three winners of the competition. This initiative was an extension of the India Innovation Growth Program (IIGP) 2.0, which was administered by IUSSTF. However, due to regulatory challenges concerning the procurement of the drone racing kits, the planned sponsorship could not proceed as initially intended. Hence, IUSSTF, in collaboration with Lockheed Martin, recognized the winners of the Drone Olympics from Aero India 2019 and awarded prize money to them during the event:

- Drovengers Quad, Bengaluru
- Thanos Technologies Pvt. Ltd., Hyderabad
- UAS, Delhi Technological University, Delhi

This timely recognition and financial support underscore the commitment to fostering innovation in the drone technology sector.

The event served as a pivotal platform for industry leaders, academic experts, government officials, and startups to discuss the latest advancements and future potential of AI-integrated UAVs.

Mr. Mahaveer Singhvi, Joint Secretary (New Emerging and Strategic Technologies Division), Ministry of External Affairs, Government of India; Mr. Drew Schufletowski, Minister Counselor, Economic Affairs Environment, Science and Technology, U.S. Embassy; Dr. Praveen Somasundaram, Head International Division, Department of Science and Technology, GOI and Mr. Randall Howard, Vice President – Global Pursuits, Strategy and Business Development, Lockheed Martin Aeronautics, AVM Michael Fernandez (Retd.), India Country Head, Lockheed Martin, and Dr. Nisha Mendiratta, Executive Director, IUSSTF addressed the gathering during the inaugural session. Our eminent guests shed light on how the iCET provides a framework for joint research, development, and commercialization efforts between the two countries, with AI-integrated UAVs representing a rapidly evolving technology with immense potential for various applications. Collaborations on AI Integrated UAVs can lead to faster advancements and unlock a wide range of applications that benefit both India and the U.S., addressing societal challenges and leading to groundbreaking solutions.

Panel Discussion: Exploring the Future of AI-Powered UAVs

Moderated by Mr. Anshuman Tripathi, the panel discussion brought together a diverse group of experts from India and the U.S., including representatives from academia, industry giants, innovative startups, and government agencies. Moderated by Mr. Anshuman Tripathi, Member of India's National Security Advisory Board, the discussion explored the vast potential of Unmanned Aerial Vehicles (UAVs) and how integrating Artificial Intelligence (AI) can unlock even greater possibilities across various sectors.

- **Agriculture:** Optimizing water usage, reducing pesticide application, and improving crop monitoring.
- **Healthcare:** Efficient delivery of essential medical supplies and vaccines to remote areas.
- **Defense and Security:** Enhancing surveillance, reconnaissance, and other critical military operations.
- **Infrastructure Inspection:** Inspecting power lines, bridges, and other infrastructure assets.

By fostering collaboration and knowledge sharing, this event has further strengthened the Indo-U.S. partnership in advancing AI-powered UAV technology and its applications.


LOCKHEED MARTIN
Indo-U.S. Science and Technology Forum and Lockheed Martin India
Welcome all to the
Panel Discussion and Felicitation Ceremony
Unlocking Potential:
Integrating Artificial Intelligence in UAV Applications


IUSSTF
LOCKHEED MARTIN
Indo-U.S. Science and Technology Forum and Lockheed Martin India
Welcome all to the
Panel Discussion and Felicitation Ceremony
Unlocking Potential:
Integrating Artificial Intelligence in UAV Applications

USISTEF ROUNDTABLE: GROUNDBREAKING U.S.-INDIA S&T PROJECTS AND FUTURE DIRECTIONS

On April 25, 2023, the U.S. Embassy in India and the Indo-U.S. Science and Technology Forum (IUSSTF) convened a roundtable discussion to explore opportunities for collaboration between the U.S. and India in Science and Technology (S&T). The event brought together USISTEF Board Members, Joint Expert Panel (JEP) Experts, Mentors, and select awardees.

The roundtable provided a platform for awardees to showcase their innovative projects, which included:

- Smartphone-based AI for Cervical Cancer Diagnosis
- Secure Wireless Communication using Millimeter Wave Transceiver
- Multi-analyte Biosensor Strips
- Affordable & Transportable Pediatric Wheelchair
- Clinical-grade Robotic Video Electroencephalography (VEEG)
- 27 Conditions, Affordable Mechanical Ventilator
- Next-Gen Lightweight MRI Scanners
- Motion-Free Optical Tracking to Reduce the Cost of Electricity by 25%
- COVID-19 Monitoring Wearable Sensor
- Monoclonal Antibody Therapeutics for COVID-19

These projects, supported by the U.S.-India Science and Technology Endowment Fund (USISTEF), have the potential to address critical societal challenges and drive economic growth.

Experts emphasized the importance of showcasing USISTEF's success stories to attract startups, angel investors, and venture capitalists. They also discussed the need to establish a forum connecting key stakeholders from both countries to facilitate collaboration in emerging technologies.

The roundtable participants discussed probable key areas for future USISTEF calls, including:

- Artificial Intelligence
- Semiconductors
- Molecular Diagnostics
- Sustainable Technologies

These areas align with the growing importance of technological innovation and the need for global cooperation.

The roundtable reinforced the commitment of both countries to enhance their cooperation in science and technology. The insights and recommendations from the participants will be instrumental in shaping the future of USISTEF and driving innovation for the benefit of society.

STRATEGIC DISCUSSIONS

Dr. Nisha Mendiratta, Executive Director, Indo-U.S. Science and Technology Forum (IUSSTF), interacted with the following organizations and individuals discussing international scientific cooperation, IUSSTF's role in catalysing S&T and possible collaborative opportunities:

1. **University of Massachusetts (UMass):** IUSSTF was honored to host a distinguished delegation from the University of Massachusetts. The meeting, led by Dr. Nisha Mendiratta, ED, IUSSTF, and team, fostered insightful discussions on potential collaborations in key areas such as sustainability, agriculture, women in STEM, climate change, Healthcare Innovation, and food and nutrition. The presence of esteemed delegates, including Mr. Marty Meehan, President, University of Massachusetts; Dr. Kalpen Trivedi, Vice Provost for Global Affairs/ Director, International Program Office; Mr. John Feudo, Vice Chancellor, University of Massachusetts Lowell; and Prof. Ramaswamy (Ram) Nagarajan, Distinguished University Professor/ Strategic Defense Research Projects Senior Director, highlighted the strong commitment to advancing science, technology, and innovation between the two nations. The discussions built upon the success of previous collaborations supported by IUSSTF, which have led to the establishment of virtual joint centers and the organization of numerous workshops. The meeting was held during their visit to India on 22nd January 2024 at the IUSSTF office campus in New Delhi.

The IUSSTF team with the Delegation from University of Massachusetts

2. **Ministry of Earth Sciences (MoES):** ED, IUSSTF interacted with Dr. M. Ravichandran, Secretary, Ministry of Earth Sciences (MoES), GOI. The discussion included suggestions for potential collaboration in areas such as the Blue Economy, Deep Ocean survey, modeling climate change, etc. Recognizing the significance of capacity building and organizing brainstorming workshops in these priority sectors, different platforms to work together could be mechanized.

3. **ICAR- Indian Council of Agricultural Research:** ED, IUSSTF met Dr Himanshu Pathak, Secretary, Department of Agricultural Research and Education (DARE) & Director General (ICAR- Indian Council of Agricultural Research, New Delhi), Assistant Director General (International Relations), ICAR on 12th January 2024. The meeting focused on exploring collaboration to strengthen ties within India's R&D landscape and pave the way for transformative advancements in sustainable agricultural practices, specifically leveraging the U.S. linkages established by IARI.

4. **University of Chicago:** ED, IUSSTF met with Dr. Katie Hrinyak, VP of Global Strategy at the University of Chicago in person. Prof. Supratik Guha, Faculty Director, and Dr Leni Chaudhuri, Executive Director at UChicago Center in Delhi, also participated in the meeting, which was held on 16 February 2024 at the IUSSTF office campus in New Delhi.

IUSSTF Team with the delegation from University of Chicago

5. **Association of American Universities (AAU):** ED interacted with the Association of American Universities (AAU) delegation led by President Barbara R. Snyder during their visit to India in 19th February 2024; discussions covered areas of mutual interest and ideas for future collaboration.

ED, IUSSTF meeting the Association of American Universities' Delegation during their meeting in Delhi

6. **MITRE Labs:** ED engaged in fruitful discussions on potential collaborations around Critical & Emerging Technologies with MITRE Labs at the IUSSTF campus at New Delhi on 28th February 2024. The U.S. delegation led by Dr. T. Charles Clancy, Sr VP and GM, MITRE labs, and the Science and Technology officials from the U.S. Embassy participated in the interaction meeting. The discussions primarily centered on exploring synergies in Critical and Emerging Technologies (CET), with a particular focus on Telecom, 5G/6G.
7. **Mehta Family Foundation:** ED interacted with the founder Mr. Rahul Mehta of Mehta Family Foundation to discuss future scope and collaborative opportunities on 29th January 2024.
8. Dr. Nisha Mendiratta, Executive Director, IUSSTF, connected with colleagues at IU India Gateway to explore and share ideas to strengthen U.S.-India educational ties. She was joined by Dr. Chaitali Bhattacharya, Principal Science Officer at IUSSTF.

The MITRE Labs team and U.S. Embassy Officials at the IUSSTF Office

At the Indiana University's Gateway Office in New Delhi

9. ED, IUSSTF participated in the 'Net Zero India: Building the momentum with Solar Decathlon India' panel discussion at the Forum for Energy Efficiency and Decarbonisation (FEED 2024), organized by AEEE India from 28-29 February 2024. Discussions at FEED 2024 focused on policies and trends shaping building decarbonization by 2030, with Solar Decathlon India (SDI) highlighted as a key transformative initiative.

10. During the India Smart Utility Week (ISUW) 2024 held from 12-16 March 2024, a key international forum for energy and utility leaders, ED, IUSSTF shared insights at the "Emerging Technologies for Utilities" session. This session, convened by the Department of Science and Technology (DST), Government of India, gathered industry experts to discuss shaping a sustainable future. The ED highlighted IUSSTF's initiatives for advancing clean energy, underscoring the synergy between current and prospective efforts.

Through these engagements, IUSSTF continues to play a vital role in fostering scientific collaboration between India and the U.S., contributing to advancements in various fields and addressing global challenges.

Section VII :

Annexures

ANNEXURE I

The projects awarded under the call for Technology -based Energy Solutions for Net Zero

1. Development of a cyanobacterial chemical production technology for aviation fuels from carbon dioxide

Partners

Syed Shams Yazdani
International Centre for Genetic Engineering and Biotechnology, New Delhi

Shota Atsumi
University of California, Davis

Najeeb Bin Haneef Zaara
Biotech, Cochin

With the aviation sector contributing 2.1% of global CO_2 emissions, sustainable alternatives to aviation fuels will play a critical role in achieving net-zero. This project proposes a synthetic-biology-based approach to engineer marine cyanobacteria to produce aviation fuels. Due to their faster growth rate compared to other photosynthetic organisms, their ability to fix CO_2 as well as their genetic tractability, cyanobacteria serve as an extremely effective platform for the production of bio-based chemicals and fuels. The aim is to engineer cyanobacteria to produce branched-chain alkanes within the aviation fuel range.

2. Design and Development of Highly Efficient Electrolyser System for Green Hydrogen Generation

Partners

Rohit Srivastava
Pandit Deendayal Energy University, Gandhinagar

Arunachala Mada Kannan
Arizona State University, Mesa

Snehangshu Patra
Eliteck Industries Pvt. Ltd., Kolkata

Most commercially available electrolysers employ expensive, noble metal based electrodes that function only in distilled or demineralized water due to stability issues. Consequently, the overall operational cost of running the electrolysers is high, which in turn makes green hydrogen generation expensive. Therefore, it is critical to develop a functional electrolyser consisting of highly active, electrically conductive, energy efficient, and easy to synthesize electrocatalysts, which are also industrially scalable. The team is proposing a functional electrolyser using bi-functional catalysts based on high entropy material to generate green hydrogen. The electrolyser will be designed to operate with regular tap water.

3. Hydrogen Separation from Coal-derived Syngas: A Near Term Opportunity for Commercialization using New Membrane Compositions

Partners

M.S. Santosh
CSIR - Central Institute of Mining and Fuel Research, Dhanbad

Prabhakar Singh
University of Connecticut, Storrs

M. Viswanathan
Rensol Power Pvt Ltd, Chennai

Hydrogen has emerged as a promising carbon-free energy carrier in the effort to control emissions. With large coal reserves in India and well-known gasification technologies, hydrogen production from coal is a promising near-term opportunity. The team proposes to develop new cost-effective membrane compositions and durability for gas separation applications. The main objectives are to evaluate the optimum hydrogen flux and fouling process of bimetallic biopolymeric composite membranes through advanced membrane tests and thermochemical analysis and to conduct techno-economic analysis and long-term performance evaluation of the membranes in a pilot-scale gasification facility.

4. Integrated Solution to convert Two GHGs CO_2 And CH_4 to H_2 rich syn Gas (ISTAG)

Partners

Sumana Chenna
CSIR - Indian Institute of Chemical Technology, Hyderabad

Vemuri Balakotaiah
University of Houston, Houston

Kishan Gurram
Sravathi Advance Process Technologies Pvt Ltd, Bengaluru

While Dry Reforming of methane (DRM) is widely used to convert CH_4 and CO_2 to synthesis gas, high endothermicity, coking, and high reaction temperatures remain major challenges. DRM is also not capable of producing syngas ratio greater than or equivalent to two. The team proposes the development of an efficient catalytic bi-reforming of methane (BRM) process that combines dry and steam reforming for syngas production. The novel integrated approach leverages quantum mechanics (QM) simulations and AI/ML models to first search the catalyst space and identify potential candidates, followed by experimental studies to design, synthesize, and validate heterogenous catalyst systems for BRM.

5. Ion Exchange Driven Direct Carbon Capture and Sequestration System (IXDCCS)

Partners

Sudipta Sarkar
Indian Institute of Technology Roorkee

Arup K. Sengupta
Lehigh University, Bethlehem

Dipanwita Sarkar
(Wastearn Private Limited Kolkata)

Current mitigation strategies based on carbon capture and storage (CCS) technologies aim to prevent the release of carbon dioxide from large point-sources such as coal-fired power plants, steel mills, cement kilns, and other chemical industries. The team is proposing the development of a solar-power driven, ion-exchange assisted direct CO_2 capture system that is capable of capturing CO_2 from ambient air and producing 10 kg of CO_2 per day at ambient temperature. The captured carbon dioxide can then be converted into short chain volatile fatty acids (VFAs) for further conversion to commercially useful organic chemicals and raw materials for bioplastics. The proposed technology does not require external addition of chemicals, operates at ambient temperature, and can be scaled up rapidly and cost-effectively.

6. Carbon dioxide sequestration by industrial wastes and its conversion to artificial soil

Partners

Raghavendra Ragipani Indian
Institute of Technology Kanpur

Bu Wang
University of Wisconsin-Madison

Shashi Bhushan
Tree Green Solutions Pvt Ltd, Hubballi

Iron and steel industries contribute 11% to global CO_2 emissions and produce large amounts of solid residues which often end up in landfills. Carbon dioxide capture and sequestration using industrial waste such as steel slag can simultaneously address the twin challenges of CO_2 removal and solid waste utilization. The team is proposing a new technology that can simultaneously sequester carbon dioxide and convert solid industrial residues (ash/ slag) into artificial soil. The innovation lies in the low-cost carbonation technology that is capable of direct CO_2 capture and produces a residue that is conducive to plant growth. The team plans to produce 2000 kg of carbonated steel slag which will then be converted to artificial soil.

7. Indigenous Battery Materials from Recycled Grapzhite and Biomass

Partners

Smruti Prakash Barik
Attero Recycling Pvt. Ltd., Noida

Vinod Nair
Farad Power Inc., Sunnyvale

There is great interest on the part of the Government of India in developing a domestic lithium-ion batteries manufacturing ecosystem. Production of the lithium-ion battery will depend heavily on an expanding supply of critical materials for which significant manufacturing infrastructure does not exist, especially from domestic sources of downstream raw materials. Efforts to develop high-performing anode materials using Carbon-Silicon composites have become an attractive alternative to graphite. The team aims to develop a commercially viable process for producing high-performance Lithium-ion battery anode materials. The process involves the conversion of furfural extracted from agricultural waste, silicon from rice husk, and recycled graphite from used Li-ion batteries to develop a C-Si composite.

8. Commercializing ZincGel Battery for Renewable microgrids

Partners

Manoj Gupta
TP Renewable Microgrid Ltd., Noida

Tejas Kusurkar
Offgrid Energy Labs Inc., San Fransisco

Kanwar Singh Nalwa
Indian Institute of Technology, Kanpur

Lead-acid batteries comprise 60% of the rechargeable batteries market despite being an inefficient and toxic technology. Over the next decade, lithium-ion batteries are expected to capture the market as they become cost-efficient with growing volumes. The team has recently developed the ZincGel® battery technology that uses temperature-stable, nonflammable electrolytes and sustainable, non-toxic materials. This proposal aims to develop a functional pilot of a ZincGel-powered 30KWh capacity renewable microgrid (RM) and demonstrate the performance of these batteries over traditional lead-acid batteries. The innovation is the customizable technology wherein electrolyte, cathode material and design can be modified to make variants targeting different applications.

9. Motion Free Optical Tracking to reduce cost of electricity by 25%

Partners

Lakshmi Santhanam
Renkube Private Ltd.,
Yeshwanthpur

Rajesh Manapat,
Arka.Energy, Union City

Existing solar roofing solutions suffer from poor energy yield due to misalignment and incorrect orientation of the roof when compared to south-facing, ground-mounted installations with mechanical trackers. The project aims to demonstrate the increased efficiency of an integrated roofing solution that uses motion-free optical tracking technology embedded in solar tiles. The proposed solution is expected to provide 40% more energy yield. The 3D prism design - an innovative light harvesting glass that tracks sunlight and bends it towards the solar cells thereby increasing the energy yield of the solar panel.

10. Rechargeable Sodium Battery for Sustainable Energy Storage

Partners

Vilas Shelke
Rechargion Energy Pvt. Ltd.,
Pune

Pulickel Ajayan
Rice University, Houston

While Li-ion batteries are considered the most viable energy storage system in the market today, the scarcity of raw materials, safety, environmental concerns, and costs are major issues. Thermal runaway arising from mechanical, electrical, or thermal disturbances warrants alternate strategies for mobility or stationary energy storage. This project aims to develop rechargeable Sodium batteries that exhibit high energy and power density, and cyclability comparable to that of Li-ion batteries. The main deliverable will be a customizable pouch cell that will serve as the basic building block for small and large battery packs. This low-cost and safe technology can disrupt the electric mobility (2/3-wheeler) and stationary storage segments in India.

ANNEXURE II

The following 13 students undertook their internships at Viterbi School of Engineering, University of Southern California in 2023

S. No	Name of the student	Indian Parent Institute	Title of Project	Name of the U.S. Host
1.	Abjijit Shaji	Indian Institute of Technology (IIT), Tirupati	Federated Learning For Multimodal Inputs	Jose-Luis Ambite
2.	Abhiram Rao Gorle	Indian Institute of Technology (IIT), Chennai	Graph Neural Networks for Memory Access Prediction	Viktor Prasanna
3.	Aditya Chaudhary	Indian Institute of Information Technology (IIIT), Sonepat	Data Science for Health	Ajitesh Srivastava
4.	Aditya Nand Kishore Khandavally	Indian Institute of Technology (IIT), Chennai	Optimizing Decision Variables in Multi-modal systems	Satish Kumar Thittamaranahalli
5.	Aneesh Sreekanth	National Institute of Technology (NIT), Tiruchirapalli	Design of a Concurrent Dual-Frequency Oscillator for Bio-Assays	Constantine Sideris
6.	Anik Mandal	Indian Institute of Technology (IIT), Kharagpur	Effect of Covid-19 on U.S. Financial Consumer Complaint Data	Mayank Kejriwal
7.	Apurba Prasad Padhy	Indian Institute of Technology (IIT), Roorkee	FPGA-Based Hardware Acceleration of Spiking Neural Networks	Peter Beerel
8.	Aryaman Gupta	Indian Institute of Technology (IIT), Banaras Hindu University	Improving Visual Navigation Policy using Failure Case Analysis	Somil Bansal
9.	Nikhil S	Indian Institute of Technology (IIT), Chennai	Robotics	Quan T. Nguyen
10.	Sanjana Adapala	Birla Institute of Technology and Science (BITS), Hyderabad	SAGA – Scheduling Algorithms Gathered	Bhaskar Krishnamachari
11.	Saumya Panda	International Institute of Information Technology (IIIT), Bhubaneswar	Transfer of Models from High Resource Coding Languages to Lower Resource Coding Languages (Natural Language Processing)	Xiang Ren

S. No	Name of the student	Indian Parent Institute	Title of Project	Name of the U.S. Host
12.	Shivam Patel	Indian Institute of Technology (IIT), Mumbai	Scalable Fair and Robust Optimization	Meisam Razaviyayn
13.	Sohini Gupta	Indian Institute of Technology (IIT), Kharagpur	Learning Deformable Prototypes with Convolutional Networks	Richard M Leahy and Anand A Joshi

ANNEXURE III

The list of students selected under the IUSSTF- Viterbi Program for 2024 are given below:

S. No	Name	Institution	Mentor at USC
1.	Abhishek Bhardwaj	University of Delhi	Cyrus Shahabi
2.	Adityaya Dhande	Indian Institute of Information Technology (IIT), Mumbai	Somil Bansal
3.	Aishwaryakopika R U	VIT University, Chennai	Viktor Prasanna
4.	Arnav Goel	Indraprastha Institute of Information Technology (IIIT), Delhi	Xiang Ren
5.	Asmit Ganguly	National Institute of Technology (IIT), Patna	Danny J Wang
6.	Chirayata Bhattacharya	Indian Institute of Science (IISc), Bangalore	Peter Beerel
7.	Gayathri Rajesh	National Institute of Technology (NIT), Tiruchirapalli	Daniel Seita
8.	Mihir Agarwal	Indian Institute of Technology (IIT), Gandhi Nagar	Andrei Irimia
9.	Mukulita Som	Indian Institute of Technology (IIT), Kharagpur	Hossein Hashemi
10.	Pradyut Ganesh	Birla Institute of Technology and Science, Hyderabad	Viktor Prasanna
11.	Poornash Anandan Sangeetha	Indian Institute of Technology (IIT), Patna	Meisam Razaviyan
12.	Shreya S Ramanujam	Indian Institute of Technology (IIT), Chennai	Erdem Biyik
13.	Swarandip Saha	Indian Institute of Science (IISc), Bangalore	Feifei Qian
14.	Vamsi Krishna Chilakamarri	Indian Institute of Technology (IIT), Chennai	Somil Bansal
15.	Vedika Agrawal	Plaksha University	Kallirroi Georgila

ANNEXURE IV

The list of scholars who availed their internships under the Khorana Program in the summer of 2023.

S. No	Name of the Scholar	Indian Institute	U.S. Host University
1.	U.S. Host University	Indian Institute of Technology (IIT), Delhi	Johns Hopkins University
2.	Aditi Ashwin	St. Joseph's University, Bengaluru	Washington University, St. Louis
3.	Advita Sharma	National Institute of Science Education and Research (NISER), Bhubaneswar	University of Illinois-Chicago
4.	Ameya Kirankumar Kothekar	Birla Institute of Technology and Science (BITS), Pilani	University of California San Francisco
5.	Anahita Chakravarthi Jayaram	Shiv Nadar University, Greater Noida	Shiv Nadar University, Greater Noida
6.	Antara Banerjee	Indian Institute of Technology (IIT)-Banaras Hindu University, Varanasi	Massachusetts Institute of Technology
7.	Anwesha Banerjee	Indian Institute of Science (IISc), Bengaluru	St. Jude Children's Research Hospital
8.	Aprajita Jha	Kamrah Institute of Information and Technology (KIIT), Bhubaneswar	Kansas State University
9.	Archisman Maitra	Indian Institute of Technology (IIT), Mumbai	St. Jude Children's Research Hospital
10.	Arnab Saha	UM-DAE Centre for Excellence in Basic Sciences, Mumbai	University of Nebraska Medical Center
11.	Arshita Sharma	Punjab Agricultural University, Ludhiana	University of Tennessee
12.	Ashley Suraj Hermon	Indian Institute of Science Education and Research (IISER), Bhopal	Harvard Medical School
13.	Ashwin A	Indian Institute of Technology (IIT), Mumbai	Texas A&M University
14.	Ashwini Singh	Indian Institute of Technology (IIT), Kharagpur	St. Jude Children's Research Hospital
15.	Avanteeka Ganguly	Plaksha University	Brigham and Women's Hospital ("BWH")
16.	Ayush Parag	National Institute of Science Education and Research (NISER), Bhubaneswar	University of Cincinnati
17.	Bhargavi R Budihal	BGS Global Institute of Medical Sciences, Bengaluru	University of Pennsylvania

18.	Bhavik Bansal	All India Institute of Medical Sciences (AIIMS), New Delhi	Yale School of Medicine
19.	Deep Bansal	Guru Gobind Singh Indraprastha University, Delhi	Wyss Institute for Biologically Inspired Engineering at Harvard University
20.	Dwaraka Vinodh Kumar	Tamil Nadu Agricultural University, Coimbatore	University of Arkansas
21.	Fatima Mohammad Amin	Vellore Institute of Technology (VIT) University, Vellore	St. Jude Children's Research Hospital
22.	Garima Pilania	Indian Institute of Technology (IIT), Mumbai	Arizona State University
23.	Gokulnath Ganesan	Indian Institute of Technology (IIT), Chennai	Rutgers, The State University of New Jersey
24.	Hamsini Harikumar	Centre for Human Genetics, Bengaluru	University of Wisconsin-Madison
25.	Harshini S	Indian Institute of Science Education and Research (IISER), Thiruvananthapuram	Seattle Children's Research Institute
26.	Ira Zibbu	Indian Institute of Science Education and Research (IISER), Thiruvananthapuram	University of Texas at Austin
27.	Irene Biju	Indian Institute of Science Education and Research (IISER), Pune	University of North Carolina, Chapel Hill
28.	Ishan Gupta	All India Institute of Medical Sciences (AIIMS), New Delhi	Mayo Clinic, Rochester
29.	Jitul Bora	Assam Agricultural University, Jorhat	University of Nebraska-Lincoln
30.	Kangna Verma	Ashoka University, Sonipat	Zuckerman Institute of Mind and Behavior, Columbia University
31.	Kavya Illath Kandy	Pondicherry University, Puducherry	Wisconsin Institute for Discovery at University of Wisconsin-Madison
32.	Kokil Singh	Birla Institute of Technology and Science (BITS), Hyderabad	St. Jude Children's Research Hospital
33.	Lalitha Shree Subramanian	Dr. B.R. Ambedkar National Institute of Technology, Jalandhar	State University of New York College of Environmental Science and Forestry

34.	Megha Gupta	National Institute of Technology (NIT), Surathkal	St. Jude Children's Research Hospital
35.	Mriganka Parasar	Indian Institute of Science Education and Research (IISER), Bhopal	Massachusetts Institute of Technology
36.	Naziya Faizy	Indian Institute of Technology (IIT), Mandi	Texas A&M University
37.	Neeharika Raguram	Indian Institute of Science Education and Research (IISER), Berhampur	Yale University
38.	Omm Prakash Sahoo	Indian Institute of Technology (IIT)-Banaras Hindu University, Varanasi	University of California
39.	Pauras Pritam Mhatre	Seth G.S. Medical College and K.E.M. Hospital, Mumbai	Johns Hopkins University
40.	Pontiana Ritika C	Anna University, Chennai	University of Rochester
41.	Pratyush Mishra	Indian Institute of Science Education and Research (IISER), Berhampur	Wisconsin Institute for Discovery, University of Wisconsin-Madison
42.	Priyansha Verma	Indian Institute of Science Education and Research (IISER), Mohali	University of California
43.	Rahul Kumar	Indian Institute of Science Education and Research (IISER), Mohali	University of Virginia Medical School
44.	University of Virginia Medical School	Indian Institute of Technology (IIT), Chennai	Yale School of Medicine
45.	Ritika Sachdeva	Rajiv Gandhi Centre for Biotechnology (RGCB), Trivandrum	University of Alabama at Birmingham
46.	Sabika Ali	Indian Institute of Technology (IIT), Roorkee	Purdue University
47.	Safya Nasir	Indian Institute of Technology (IIT), Gandhinagar	Massachusetts Institute of Technology
48.	Sampratikshya Das	National Institute of Technology (NIT), Rourkela	Koch Institute for Integrative Cancer Research at Massachusetts Institute of Technology
49.	Satyam Srivastava	Birla Institute of Technology and Science (BITS), Pilani	University of California, San Diego
50.	Sautam Bhattacharya	Institute of Post Graduate Medical Education and Research (SSKM Hospital), Kolkata	The University of Texas Health Science Center
51.	Sehasree Mohanta	Indian Association for the Cultivation of Science (IACS), Kolkata	Cincinnati Children's Hospital

52.	Sharon Kartika	Indian Institute of Science Education and Research (IISER), Kolkata	Moffitt Cancer Center at University of South Florida
53.	Shreyash Sinha	Indian Institute of Technology (IIT), Roorkee	Oden Institute at University of Texas, Austin
54.	Shubham Sanjay Agrawal	Indian Institute of Technology (IIT), Guwahati	University of California, San Diego
55.	Soumya Puri	Indian Institute of Science Education and Research (IISER), Mohali	University of Illinois - Chicago
56.	Srishti Goswami	Indian Institute of Technology (IIT), Mumbai	Indian Institute of Technology (IIT), Mumbai
57.	Steve Mathew Daniel Alex	Vellore Institute of Technology (VIT) University, Vellore	St. Jude Children's Research Hospital
58.	Sunil V	Indian Institute of Technology (IIT), Tirupati	Purdue University
59.	Swapnil Sengupta	Indian Institute of Science Education and Research (IISER), Kolkata	Oklahoma State University
60.	Swetha Rathinaraj	Indian Institute of Technology (IIT), Mandi	Indian Institute of Technology (IIT), Mandi
61.	Tejas Sabu	Indian Institute of Science Education and Research (IISER), Thiruvananthapuram	Dana-Farber Cancer Institute at Harvard Medical School
62.	Urmil Kiran Shah	Rajiv Gandhi Medical College and Chhatrapati Shivaji Maharaj Hospital, Mumbai	Icahn School of Medicine at Mount Sinai Hospital
63	Vaishali Sinha	National Institute of Pharmaceutical Education and Research (NIPER), Hyderabad	St. John's University
64.	Vishal Kaushik Pillalamarri	Tata Institute of Fundamental Research, Mumbai	St. Jude Children's Research Hospital
65.	Yash Vinaykumar Mundewadi	Indian Institute of Technology (IIT), Kharagpur	Harvard Medical School
66.	Yogheshwer Raja G	Indian Institute of Technology (IIT), Chennai	Indian Institute of Technology (IIT), Chennai

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Fulbright House, 12 Hailey Road, New Delhi 110001, India

Website: www.iusstf.org