



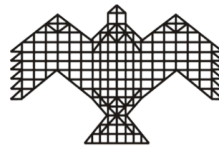
# BRICS Young Scientists Forum

Apply for the Annual conclave in Russia 2024

25-29 November 2024, Sochi, Russia

**LAST DATE FOR SUBMISSION: 24 October 2024**

**DEPARTMENT OF SCIENCE & TECHNOLOGY  
Government of India**



**National Institute of Advanced Studies,  
Indian Institute of Science (IISc) Campus, Bangalore, India**



**9<sup>th</sup> BRICS YOUNG SCIENTIST FORUM  
AND  
7<sup>th</sup> BRICS YOUNG INNOVATOR PRIZE**

**I. BACKGROUND INFORMATION**

In accordance with par. 9 of the Brasília Declaration, adopted at the 2nd STI Ministerial Meeting (Brasília, March 2015), the proposal on the creation of a BRICS Young Scientist Forum (BRICS YSF) was adopted. The participants of the BRICS Young Scientist Forum should come from the scientific community and must be under 40 years of age.

During the VII BRICS Summit in Ufa, Russia BRICS countries decided to hold the Forum annually starting from 2016. The BRICS Young Scientist Forum is to be hosted by the country currently presiding in BRICS.

The Young Scientist Forum is one of the most effective platforms for expanding the network of international contacts among young scientists, including through the exchange of experience and best practices in supporting scientific research with the participation of young scientists and postgraduate students from the BRICS countries. It helps to promote initiatives and to establish an integral system of international cooperation among the future representatives of the science and innovation systems of the BRICS countries. These activities ensure the sustainable development of the BRICS cooperation, promote the development of the leadership position of the BRICS countries in the area of science, technology and innovation.

The 9<sup>th</sup> Young Scientist Forum will also host the 7<sup>th</sup> BRICS Young Innovator Prize - a special recognition of young talented entrepreneurs and researchers, whose outstanding innovations (inventions, products, applications, and services) will make a profound impact on the socio-economic, environment and conditions of life in BRICS societies. The BRICS Young Innovator Prize is a platform for BRICS young scientists and entrepreneurs to share their best practices in innovation and venturing. This initiative was introduced in 2018 during South Africa's BRICS chairship. Since then the BRICS Young Innovator Prize has been held 6 times successfully and it has become a significant event for BRICS youths to display their innovation talents and strengthen exchanges and cooperation.

In 2024 Russia is organizing the 9<sup>th</sup> BRICS Young Scientist Forum and the 7<sup>th</sup> BRICS Young Innovator Prize on 25-29 November in Sochi, Russia.



## II. OBJECTIVE

**The BRICS Young Scientist Forum** aims at offering opportunities for young scientists to share home country experiences, incentives, constraints and opportunities for pursuing education, research and entrepreneurship in science, engineering and allied disciplines and to enumerate their career pathways and choices for advancement of skills and research competencies in view of STI emerging developments. The BRICS Young Scientist Forum is instrumental in cultivating a cohort of well-prepared, innovative thinkers who are poised to drive progress in their respective fields and contribute to the advancement of knowledge, science and society at large.

The main objectives of the Forum encompass:

- enhancing interaction among young people of BRICS countries to consolidate knowledge in addressing common social problems through research and innovation;
- promoting skills and research development of young scientists of the BRICS countries under the age of 40;
- strengthening the BRICS role in the international arena in the field of science and technology with the help of creative young people who have the potential and capacity to accelerate innovation;
- encouraging the development of transnational research networks and partnerships that can drive innovation and advance scientific knowledge;
- strengthening BRICS STI and youth policies, enhancing the skills of talented young people and developing entrepreneurial principles.

**The BRICS Young Innovator Prize Contest** will take place within the Forum's Programme. Young innovators from BRICS countries are invited to present their projects to the international BRICS jury members. Their works will be evaluated in terms of the applicability of an innovative technological solution to current social, economic and environmental problems in the BRICS countries, namely:

- availability of innovative technological solution (novelty, social impact);
- relevance in the short-term period (current demand);
- relevance in the long-term period (anticipated demand);
- technical feasibility (accessibility of implementation);
- market feasibility (business model of the project, applicability and advantage over competitors);
- quality of project presentation (clarity, consistency of information and methodology).



The final evaluation of the Young Innovators' projects will be held in-person on 25-29 November, 2024 during the BRICS Young Scientist Forum. The presentation of each project is limited to a (ten) 10 minutes pitch. The top (three) 3 highest-scoring projects will be the award-winning projects with a total prize value of 50K USD (25K USD – 1<sup>st</sup> place, 15K USD – 2<sup>nd</sup> place and 10K USD- 3<sup>rd</sup> place).

This year the traditional 3 prize places will be supplemented by a special nomination "Palladium in future technologies'.

### III. PARTICIPANTS

Each BRICS country is invited to nominate:

- 12 young scientists under the age of 40 (3 representatives for each thematic area);
- 4 young innovators under the age of 40;
- 1 innovator for the special nomination;
- 1 jury member for the BRICS Young Innovator Prize;
- 1 head of the delegation (could be one of nominated young scientists/innovators/jury member).

### IV. SESSIONS AND THEMES

**The 9<sup>th</sup> BRICS Young Scientist Forum** will comprise 4 parallel sessions on thematic areas:

1. Nature-like and Convergent Technologies as drivers for sustainable future
2. Environmental and Climate Technologies
3. Digital Humanities
4. Artificial Intelligence

Detailed description of the thematic areas is provided in part VII.

**BRICS Young Innovator Prize** will be among the most important events of the 9<sup>th</sup> BRICS YSF. This contest is aimed at recognition and fosterage of the best results of scientific research and innovative projects, comprising technological innovations providing the opportunity to make a significant contribution to the development of scientific and technological branches of the BRICS countries.

The planned thematic areas of the contest are:

1. Green technologies for the chemical industry
2. Green technologies for food industry
3. Green technologies for agricultural industry
4. AI technologies



BRICS Young Innovator Prize **will also encompass one special nomination:** «Palladium in future technologies» (awarded separately).

All participants will have an opportunity to attend the plenary sessions on crosscutting thematic areas.

#### **V. LOGISTICS**

Host country will provide **local hospitalities for all delegates, which include accommodation, transfers between airport, hotel and venue of the Forum and meals, for the period between 25 and 29 November 2024.**

Air tickets to Sochi/Adler International Airport, medical and travel insurances and visa expenses of foreign delegates are borne by the BRICS participating countries.

Each country proceeds through its own national selection of nominations for the Forum and Innovators Prize.

#### **VI. TIMESCALE**

BRICS countries are to nominate their representatives for the 9th BRICS Young Scientist Forum and the 7th BRICS Young Innovator Prize.

#### **VII. DESCRIPTION OF THEMATIC AREAS OF THE BRICS YSF:**

##### **1. Nature-like and Convergent Technologies as drivers for sustainable future**

The intersection of nature-like and convergent technologies is poised to revolutionize the pursuit of a sustainable future. As the world grapples with the challenges of climate change, resource depletion, and environmental degradation, researchers are turning to nature-inspired solutions to inform the development of cutting-edge technologies. Nature-like technologies, which mimic the intricate patterns and processes found in nature, have already shown remarkable potential in addressing complex environmental issues.

Nature-like and convergent technologies promise unprecedented and previously unimaginable possibilities. The basis of convergent technology is connecting the capabilities of modern digital technologies, such as microelectronics, with the creations of nature. Advances in electronics, nanoscience, bioscience, information technology, cognitive science, social sciences and humanities, and their integration, will allow us to develop previously unachievable human-centred utilities and services to improve



our lives and leapfrog traditional impediments. These technologies are also referred to as frontier technologies since they are innovative, fast-growing, deeply interconnected and interdependent.

The areas of nature-like technologies are interdisciplinary and may include, but are not limited to:

- technological reproduction of living nature systems, including nature-like energy systems;
- developing materials, devices, and systems that mimic the properties and functions of biological systems, such as self-healing materials, adaptive structures and responsive surfaces;
- neuromorphic artificial intelligence systems;
- cyber-physical additive manufacturing complexes;
- medical systems, including those based on regenerative technologies;
- forming key elements of anthropomorphic and group biorobotics;

As these nature-like and convergent technologies continue to evolve and intersect, they will undoubtedly accelerate our ability to address the pressing challenges facing our planet, ultimately paving the way towards a more resilient and sustainable future.

## **2. Environmental and Climate Technologies**

It has been recognized that climate change is one of the most significant threats to the future of well-being and prosperity of our planet and all its inhabitants. Climate change affects ecosystems, society, food and water security, exacerbates disease outbreaks and increases natural disasters. It is imperative for science to focus its efforts on researching climate adaptation and mitigation technologies, such as:

- monitoring the state of the climate system based on Earth observation technologies and AI methods;
- enhancing ecosystem resilience and increasing sequestration potential of ecosystems;
- climate change mitigation technologies in information and communication technologies aiming to reduce their energy use and carbon footprint;
- reduction of greenhouse gas emissions related to energy generation, transportation and buildings, e.g. housing, house appliances or related end-user applications;
- climate change mitigation technologies related to wastewater treatment or waste management;
- capture, storage, sequestration or disposal of greenhouse gases.





As the technology continues to evolve, we can expect to see even more innovative applications, one of them being digital twin technologies. The digital twin is an emerging technology that builds on the convergence of computer science, mathematics, engineering, and the life sciences. Digital twins have the potential to revolutionize climate sciences in particular, as they could be used, for example, to create global-scale interactive models of Earth to predict future climate conditions over longer timescales.

Earth system digital twins require exceptional digital technologies to address the opportunities and challenges associated with extreme scale computing and big data. Higher-resolution simulations of the Earth system are based on models that are more realistic than those in the past; better ways to combine observed and simulated information from the Earth system; and interactive and configurable access to data, models, and workflows.

More realistic simulations at the global scale could translate to information at the regional scale that better supports decision-making for climate adaptation and mitigation through tight integration and interaction with impact sector models.

### **3. Digital Humanities**

Contemporary social science and humanities investigate human beings as complex subjects of social relationships, encompassing biological, psychological, political, and socio-economic aspects. They also examine the evolution of complex social and cultural systems, various types of social interactions and the means by which they are realized: linguistic, cultural, political, and economic mechanisms.

The last 20 years saw the revolution in modern social science and humanities associated with the use of big data analysis methods and new digital tools for mathematical modeling. Digitalization has introduced new highly efficient analysis methods not only for statistical data, but also for narrative sources, expanding the research toolbox and bringing the studies to a new level. Moreover, mathematical methods have enhanced linguistic research and created powerful technologies for machine translation and text processing.

The use of electronic computer systems featuring elements of artificial intelligence for analyzing and modeling long-term development dynamics represents another area of studying. By analyzing long statistical series, one can build verifiable dynamic models, which opens up unique opportunities for the forecasting based on the combination of mathematical models and expert assessments of socio-economic development.

### **4. Artificial Intelligence**

Artificial Intelligence is a field of research in computer science that deals with the development of programs and systems capable of performing tasks



that require human-like intellectual abilities. These systems can perceive their environment, learn, make decisions, and tackle challenges that previously only humans could handle. Artificial intelligence finds applications across various domains such as medicine, finance, manufacturing, transportation, and more. Over the past few decades, the field of artificial intelligence has witnessed significant advancements, revolutionizing how we approach complex problems and tasks. With the advent of big data analysis methods and cutting-edge digital tools, artificial intelligence has enabled researchers to understand human behavior, societal structures, and cultural dynamics. By harnessing the power of machine learning algorithms, neural networks, and natural language processing, artificial intelligence has empowered machines to comprehend language, translate text, and process information at unprecedented speeds and accuracy. Moreover, the integration of artificial intelligence into computer systems has paved the way for studying long-term development dynamics through advanced analytical tools. By leveraging artificial intelligence capabilities to analyze extensive statistical data sets, researchers can construct dynamic models that offer insights into socio-economic trends and facilitate forecasting based on a combination of mathematical models and expert assessments. New steps in the field of Artificial Intelligence are related to the use of advanced computational tools, such as photonic and quantum co-processors.

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### **SELECTION PROCESS**

The selection of Indian participants for participating in the BRICS-YSF Conclave 2024 shall be made by an Expert Selection Committee to be constituted by DST.

The selection shall be based on the assessment of information provided by the applicant in the application form and the reference letter(s).

### **Submission process:**

- Send the application as a single PDF file (named with your full name. Ex: BRICS-2024-Application-FullName), that includes the main application, resume, endorsement, reference letter, and copy of the passport (in the same order).
- Endorsement has to be issued by the head of the Institution. Reference letter can be provided by the Head of the Department/Institution, or the Supervisor.
- Attach the application form and email to Prof D Suba Chandran at [bricsysf@nias.res.in](mailto:bricsysf@nias.res.in), with a cc to [subachandran@nias.res.in](mailto:subachandran@nias.res.in), and





[a.bhattacharyya@nic.in](mailto:a.bhattacharyya@nic.in).

- Applications should reach on or before 24 October 2024.

No other form and/or channel of submission of the application shall be entertained. Hardcopies are not required to be submitted.

For more information about the program, please contact:

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