

EUREKA | MOMENT

■ Gold medal, cash prize of ₹65 lakh awarded in fields like engineering, computer science

Innovators all, Infy Science Foundation honours 6 eminent researchers

DC CORRESPONDENT
BENGALURU, JAN. 7

The Infosys Science Foundation honoured the winners of the Infosys Prize 2016 at an award ceremony, celebrating their journeys and contributions to science and research. The award consists of a citation along with a 22-carat gold medalion and a cash prize of ₹65 lakh and is awarded across six fields, including engineering and computer science, humanities, life sciences, mathematical sciences, physical sciences and social sciences.

Nobel laureate Dr Venkatraman Ramakrishnan, who was the chief guest, felicitated the winners. He

said, "In a complex and technological world, it is increasingly important for all of us to understand the basis of science and technology, and to distinguish evidence-based facts from speculation and myth. Scientists work quietly to advance the state of our understanding in areas from pure mathematics and physics all the way to medicine and engineering. The Indian government under-invests in science. Unlike European countries, investment in R&D by the private sector in India is also abysmally low."

The winners were chosen from over 250 nominations. Prof V. Kumaran, from the Indian Institute of Science,



Narayan Murthy, Trustee and founder, Infosys Science Foundation, Infosys co-founder D. Shibulal, K. Dinesh, G. Gopalakrishnan, ex-Infy CFO T.V. Mohandas Pai and Srinath Batni along with this year's awardees

Bengaluru was awarded for his exceptional work in the field of micro-fluid devices under the engineering and

computer science category. Kumaran's work is important in developing innovative technologies for lab-on-

a-chip devices, especially in the field of cardiovascular health. Prof. Kaivan Munshi,

Professor of Economics, at the University of Cambridge, UK, who received the award in the Social Sciences category for his research on the role of informal community networks in economic development, said, "Generally, economies undertake a journey from a pre-market to a full-fledged economy. In a developing country, however, ethnic groups and communities have strong internal networks. They are well-organised. If you want to start something, who do you go to for labour and resources? Someone from the community. This is also why the caste system is still prevalent. In an

economical sense, people prefer to marry within their own caste because of the economic benefits, so making it illegal won't stop the system from existing. As the economy becomes developed, these issues will lose their importance."

Speaking on the importance of immigrants in an economy he said, "The free movement of immigrants is beneficial for any economy to grow. Restricting them would lead to political benefits in some cases but no one knows if it is actually a good thing or not yet. It is a long process of collecting data, analysing them and then reaching a conclusion."

Infosys Science Prize winners are an eclectic mix

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Infosys Prize 2016 winners along with the jury chairs and trustees of Infosys Science Foundation in Bengaluru on Saturday | Nagaraja Gadekal

BENGALURU: The Infosys Prize 2016 were presented to six scientists for their work in various fields in the city on Saturday.

Nobel laureate and recipient of Padma Vibhushan Dr Venkatraman Ramakrishnan was the chief guest while another Nobel laureate and Bharat Ratna recipient Prof Amartya Sen, was also present.

Former CEO of Infosys and trustee of Infosys Science Foundation S D Shibulal delivered the opening address. He said the awards were aimed to “restore the romance of research.”

The recipients of the award for 2016 are Prof V Kumaran, Prof Sunil Amrith, Prof Gagandeep Kang, Prof Akshay Venkatesh, Dr Anil Bhardwaj and Prof Kaivan Munshi. The works of each recipient was introduced to the audience by respective jury chairs. The award includes prize money of Rs 65 lakh, a gold medal and a citation.

After the awards were given away, former Infosys CEO and foundation trustee N R Narayana Murthy spoke about Dr ‘Venky’ Ramakrishnan and described him as someone “the whole world could look up to.”

Dr Ramakrishnan spoke about the importance of recognition for scientists, the phenomenon of basic science leading to ground-breaking inventions and discoveries and the importance of science to a country’s economy. He said a nation’s wealth was more a measure of its scientific prowess than the amount of natural resources it had, and exemplified Japan and Singapore in this regard.

He termed the Indian government’s aim to become among the top three nations in science by 2030 to be very ambitious, but said it could be done by showing a sustained commitment to science. He also questioned the lack of investment in science by private entities in the country, contrasting it with the scenario abroad where private investment is twice the investment by the government.

January 8, 2017



THE WINNERS: Infosys Science Foundation awards were presented to Kaivan Munshi, Akshay Venkatesh, Sunil Amrit, Anil Bharadwaj, Gagandeep Kang and V. Kumaran in Bengaluru on Saturday. - PHOTO: BHAGYA PRAKASH K.

NINTH EDITION OF INFOSYS PRIZE: THE ROLL OF HONOUR

SOCIAL SCIENCES

Kaivan Munshi, Frank Ramsey Professor of Economics, University of Cambridge, UK

Award for research into role of ethnic, caste communities in economic development. Work spans India, Mexico, Bangladesh, Kenya and the United States

MATHEMATICS

Akshay Venkatesh, Professor, Department of Mathematics, Stanford University, USA

Use of analytic number theory, Ergodic theory, homotopy theory to address problems in number theory

HUMANITIES

Sunil Amrith, Mehra Family Professor of South Asian Studies, Professor of History, History Department, Harvard University, US

Contribution to history of migration, environmental history, history of international public health, and in recognition of his field-changing research on the interrelated past of contemporary Asia

PHYSICAL SCIENCES

Anil Bhardwaj, Director, Space Physics Laboratory, Vikram Sarabhai Space Centre, Thiruvananthapuram

Contribution in planetary science and exploration. Experiments on Chandrayaan-1 and Mars Orbiter missions. Studied solar wind interaction with lunar surface, thermal escape of Martian atmosphere and planetary X-rays

LIFE SCIENCES

Gagandeep Kang, Executive Director of Translational Health Science and Technology Institute (THSTI), Faridabad

Research into the natural history of rotavirus and other infectious diseases. Aided in the development of vaccines and other public health measures to thwart these infections

ENGINEERING AND COMPUTER SCIENCE

V. Kumaran, Professor, Department of Chemical Engineering, Indian Institute of Science, Bengaluru

Study of complex fluids and complex flows that have led to innovations in cardio-vascular and pulmonary health, including point-of-care diagnostics

Winners of Infosys Prize 2016 include IISc, VSSC scientists

The winners of Infosys Prize 2016 include a star gazer, a child prodigy and a physician scientist who is also a tireless humanitarian



A screen grab of Infosys Science Foundation's website.

Bengaluru: "Research and development (R&D) forms an important pillar of competitiveness of any country, as it assumes criticality for innovation," says S.D. Shibulal, president of the board of trustees at the Infosys Science Foundation. And the annual awards given by the Foundation is all about celebrating and recognizing the best researchers and scientists of our time.

The eighth edition of the Infosys Prize, divided into a range of categories including engineering and computer science, humanities, life sciences, mathematical sciences, physical sciences and social sciences, continues to "celebrate success in scientific research and stand as a marker of excellence in research," says Shibulal, adding that he believes that the prize — comprising of Rs65 lakh, a citation certificate and a gold medallion — will help inspire bright, young minds to take up scientific research as a career option.

The winners, who were shortlisted from among 250 nominations by a jury of scientists and academicians including Amartya Sen, Inder

Verma and Kaushik basu, include a star gazer, a child prodigy and a physician scientist who is also a tireless humanitarian.

The award ceremony will be held on 7 January this year, *Mint* profiles the six recipients of the Infosys Prize 2016.

Engineering and Computer Science

V Kumaran

A professor at the department of chemical engineering, Indian Institute of Science, Bangalore, Kumaran has been awarded the prize for his seminal work in complex fluids and complex flows, especially in transition and turbulence in soft-walled tubes and channels. "Our theoretical and experimental work reveals that the transition from laminar to turbulent flows in soft tubes and channels is very different from that in rigid tubes and channels," he says, pointing out that both cardio-vascular and pulmonary flows take place in soft tubes and channels. "The research that we do helps get a better understanding of the flow dynamics, and could lead to better interventions for anomalous physiological conditions," Kumaran says.

Kumaran, who holds a B. Tech degree from the Indian Institute of Technology, Madras and a Ph.D from Cornell University, is a fellow of the Indian Academy of Sciences (1998), Indian National Science Academy (2001) and the Indian National Academy of Engineering (2006). He was also elected to the fellowship of the American Physical Society in 2015 and has won a number of prestigious awards including the Shanti Swarup Bhatnagar Prize, the Rustom Choksi Award and the TWAS Prize given by Italy-based The World Academy of Sciences.

Kumaran is the technical adviser to MicroX Labs, a social start-up working in his lab, that won the first prize in the Tata Social Enterprise Challenge in 2013-14. "Micro-X Labs is a start-up company incubated at the Indian Institute of Science, with directors Mr. Prakhar Jain, Mr. Usama Abbasi and Mr. Prabhat Kumar, who are trying to design a low-cost lab-on-a-chip device for blood cell counting in low resource rural environment," he says.

About the Infosys prize, he says that it is an honour that "will motivate me to strive harder."

Humanities

Sunil Amrith

Sunil Amrith believes that his formative years in Singapore fostered his interest in tracing Asia's interconnected past. "My interest in ports, in how peoples and cultures travel, in the visible and invisible ways that Asia is connected, owe something to my formative experiences in Singapore, which has been a commercial crossroads since the 19th century, and home to migrants from across Asia," says Amrith, who is being recognized for his contributions to chronicling the history of migration, environmental history, and the history of international public health.

Born in Nairobi to Tamil-speaking parents, he spent his vacations visiting relatives in Chennai and Thanjavur. "Indian history exerted a fascination on me that has never dulled," says Amrith, the Mehra Family Professor of South Asian Studies at Harvard University. "As a result of

my biography and my academic training, I approach India as both an insider and an outsider, combining familiarity with critical distance,” adds Amrith, who received his undergraduate and graduate degrees from the University of Cambridge, where he also pursued his doctoral research.

Amrith is the author of three books: Decolonizing International Health: South and South-East Asia, 1930-1965 (2006), a study of the early history of the World Health Organization; Migration and Diaspora in Modern Asia (2011), a survey of migration across Asia; and Crossing the Bay of Bengal: The Furies of Nature and the Fortunes of Migrants (2013), a narrative of the Indian Ocean that acted as a maritime highway between India and China.

About the prize, Amrith says, “It is especially meaningful to me to have my work recognized in India. The Prize will give me the freedom to devote more time to my current work on the history of water, climate, and environmental change in Asia.”

Mathematics

Akshay Venkatesh

Srinivas S.R. Vardhan, who formed part of the jury, says that mathematician Akshay Venkatesh’s work “weaves together in a surprising way, threads from many different fields, creating a wonderful fabric. It is really what mathematics is all about, unexpected beautiful connections between different areas,” he says.

Born in New Delhi in 1981, Venkatesh grew up in Perth, Australia after his family moved there soon after. “ I...moved to the US in 1998,” he says adding that he now lives near San Francisco with his wife and two young children—he currently teaches at Stanford.

A child prodigy of sorts, Venkatesh was winning medals in both mathematics and physics by the time he was 12. He entered the University of Western Australia at the age of 13 and graduated with honours at 16; he won the J. A. Woods Memorial Prize for best graduating student. “Although I was in classes with older students, I always felt accepted, and had plenty of friends,” says Venkatesh, who went on to receive a Ph.D at the age of 21.

The recipient of a number of honours including the Salem Prize (2007), Packard Fellowship (2007) and SASTRA Ramanujan Prize (2008), he has won the Infosys Prize 2016 for his , “exceptionally wide-ranging, foundational and creative contributions to number theory.”

Venkatesh, who enjoys reading and running in his spare time, says that “it’s a real honour and pleasure to have my work recognized by the Infosys Science Foundation.”

Physical Sciences

Anil Bharadwaj

Anil Bharadwaj is the only scientist in India whose payloads have been selected for every planetary mission so far. “Dr Bharadwaj is a brilliant example of an exceptional blend of scientific expertise and engineering competence,” says Shrinivas Kulkarni, who was part of the jury.

Bharadwaj, the current director of the space physics laboratory at the Vikram Sarabhai Space Centre, has done research including studies of surface, atmosphere and ionosphere of planetary bodies and their interactions with solar radiations and solar wind.

Born in the town of Mursan in Aligarh district of Uttar Pradesh, he was schooled in Lucknow at the Mahanagar Boys school and the Lucknow Christian College, before going on to received his B.Sc. (1985) and M.Sc. (1987) degrees from Lucknow University, and Ph. D. (1992) in planetary and space sciences from the Institute of Technology (now Indian Institute of Technology), Banaras Hindu University, Varanasi.

He has played an active part in all of India’s planetary and space exploration programmes, starting with the Chandrayaan-1 mission and Mars Orbiter Mission. His findings on solar wind interactions with the moon and the nature of the Martian atmosphere have been acknowledged internationally. Currently he is involved in developing approved payloads for the upcoming Chandrayaan-2 mission and the Indian solar mission, Aditya. “Since each planet is unique in our solar system, having different physical and chemical characteristics, but also some similarities, studying them helps understand the processes and phenomena happening on the Earth,” Bharadwaj says adding that studies of this sort offer insights into the earth’s past and future. “For the possible future human settlement on Moon and Mars, it is imperative for us to understand the conditions on these objects that may be detrimental to humans,” he says.

He has received many honours including the Shanti Swarup Bhatnagar Prize (2007) and distinguished alumnus award of IIT, Banaras Hindu University (2015). He is also a fellow of the Indian Geophysical Union (2008), the Indian Academy of Sciences (2009), Indian National Science Academy (2010), and the National Academy of Sciences of India (2014). Additionally, Bharadwaj is an elected member of the International Astronomical Union (2009) and the International Academy of Astronautics (2014).

“The Infosys Prize is great compliment for the research work done by me and my co-workers, “ he says, “ It’s...an appreciation for the planetary science and exploration programme of the country.”

Life Sciences

Gagandeep Kang

Two out of five diarrhea-related cases of hospitalization among children under age five are caused by the rotavirus, says Gagandeep Kang, executive director of the Translational Health Science and Technology Institute (THSTI), Faridabad. She points out that the miniscule virus kills about 200,000 children in countries around the world, some 50,000 in India. "Because children have a large surface area relative to their size, they can get rapidly dehydrated, and could die without access to rehydration," she says.

Kang has been awarded the Infosys Prize in life sciences for her pioneering contributions to understanding the natural history of rotavirus and other infectious diseases that are important both globally and in India.

In addition to her basic research, Kang has extended her work to important practical areas. She has established a clinical laboratory for rotavirus vaccine evaluation that has provided critical reagents and training to rotavirus vaccine manufacturers not only in India but also in China and Brazil. "I played a small role in the development of indigenous rotavirus vaccine—we conducted the phase 3 clinical trial in Vellore, along with sites in Pune and Delhi," she says, adding that right now she is working on assessing the Rotavac vaccine. "This is an effort that I am very proud to be working with the ICMR (Indian Council of Medical Research) and the government of India on—it is the first time that the impact of a newly introduced vaccine is being assessed after introduction," she says of the virus that was first discovered in Australia in 1973 by Ruth Bishop, who saw it in the biopsies of children with acute watery diarrhea.

She underwent medical training at the Christian Medical College (CMC), Vellore where she held the post of professor of microbiology and head of the division of gastrointestinal sciences and the Wellcome Trust Research Laboratory at CMC. She is the recipient of a series of awards including Woman Bioscientist of the Year from the Government of India (2006); election to fellowship of the American Academy of Microbiology (2010), the Indian Academy of Sciences (2011), and National Academy of Sciences (2013).

About the prize, she says that it is "recognition of what you can achieve when you are willing to work with teams and across disciplines to seriously address problems in what I call public health biology."

Social Sciences**Kaivan Munshi**

Kaivan Munshi, who has received the Infosys Prize 2016 for social sciences (economics), is Frank Ramsey professor of economics at the University of Cambridge, England and has been so since 2013. Before this, he held teaching positions at Boston University, the University of Pennsylvania, and Brown University and holds a Master's degree from University of California, Berkeley and a Ph.D in economics from the Massachusetts Institute of Technology (MIT)

According to a statement, Munshi has contributed to the understanding of the role of communities and social networks in the process of economic development. In papers co-authored with Mark Rosenzweig, Munshi has delved into the impact of caste-based networks in a number of aspects of life including marriage, education, informal insurance, and spatial and occupational mobility.

Economist Kaushik Basu, who was part of the Infosys jury, believes that Munshi's work has "enhanced our understanding of the role of community networks in promoting and, in other ways, also hindering economic development." He adds: "It is his outstanding talent for combining attention to historical and institutional detail with rigorous statistical analysis that makes his research so durable and influential."