

“The Max Planck Center Will Make Computer Science More Attractive”

For Naveen Garg, it is a calling: seeking solutions to what the computer science community describes as difficult problems. Spanning diverse areas of application, the solutions may one day help boost the computational prowess of computers, allow sales teams to plan more efficient routes, and improve the performance of complex systems – from computer networks to spacecraft. Garg, a professor of computer science at the Indian Institute of Technology, New Delhi, spent three years at the Max Planck Institute for Informatics, Saarbrücken, during the 1990s. He is now Co-Director of the Indo-German Max Planck Center for Computer Science (IMPECS), the Max Planck Society's first center in India, an initiative to promote education and research through a network of academic researchers in India and Germany.

You studied computer science at IIT New Delhi as an undergraduate. Many IIT students have a tradition of pursuing studies in the United States after their first degree. What prompted you to stay on for postgraduate education?

Naveen Garg: During my final undergraduate year here at IIT, I was involved in a project on designing algorithms for random number generation. I was guided at the time by Vijay Vazirani, a computer science professor who had moved from Cornell to IIT Delhi. I was fascinated by the topic and the collaboration with Dr. Vazirani. At the end of the year, it seemed to make sense for me to continue my postgraduate studies right here.

Could you tell us something about your area of research?

It's an area called algorithm design in which we try to devise smart techniques to solve complex problems. There are some computational problems that do not have easy or quick solutions. We've been trying to design efficient algorithms to get as close as possible to exact solutions. A classic example is the traveling salesman problem. A salesman has to cover a large number of locations – let's say 50 to 100 cities. What is the most efficient route? This is not a trivial problem – the

fastest algorithms and computers of today could take millions of years to figure out a solution. Such challenges provide the motivation for designing more efficient algorithms.

Are there other examples?

Take for instance the field of scheduling: Suppose you're a manager and have to assign a set of tasks to ten people. How should the manager distribute tasks? If you have one person to assign the job to, it's easy – the single person does the entire set of tasks in a sequential manner. But when you have multiple people, the problem is really hard. Solutions to this type of problem may find application in improving the performance of computers or in efficient distribution of tasks in complex systems such as aircraft or spacecraft.

What made you pick the Max Planck Institute for Informatics for postdoctoral work?

For my Ph.D., I worked on approximation algorithms and wanted to continue this during postdoctoral research. There was an option from a US university, but the offer from MPI came earlier. The MPI option also appeared more attractive than the position at the US university for two reasons: the MPI position was initially for two years, while the US position was for one year, and MPI also seemed to have a set of researchers whose interests appeared to coincide with mine.

What influenced your decision to return to IIT New Delhi?

I was familiar with IIT New Delhi, and I knew I would get good undergraduate students here. Also, the teaching and research environment in India provides a bit more academic freedom than in a typical US university, where you have significant academic pressures – pressures that are likely to drive academics to pursue fashion-driven research topics rather than what one really wants to do. And theoretical computer science involves a lot of mathematics – we don't have to worry about expensive laboratory infrastructure.



Naveen Garg

Could you tell us something about IMPECS?

I was on a sabbatical at the Max Planck Institute for Informatics in 2006 and 2007. Kurt Mehlhorn, who was my mentor and collaborator during my stay there from 1994 to 1997, was now the vice president, and we began discussing the idea of a center. It was inaugurated last year, and is intended to serve as a bridge for research and exchange of ideas between computer science communities in India and Germany. IMPECS is supported equally by the Max Planck Society and India's Ministry of Science and Technology. We expect ten academic groups to be part of this network in India. The initiative will facilitate exchange of students and faculty, as well as computer science workshops that broaden the participants' toolboxes. Lectures and travel to meetings may be other mechanisms for collaboration.

What sort of outcome from the IMPECS would make you most satisfied?

One thing I'd really like to see is an increase in the quantity and quality of research in India in the field of computer science – more computer science Ph.D.'s. The number of Ph.D.'s in computer science at present is small – there are perhaps 40 to 50 per year – while the number is many-fold higher in China. Some of us are hoping that, through its workshops and interactions, the Max Planck Center will make research in computer science more attractive.

Interview: Ganapati Mudur



At Home Everywhere in the World

The Max Planck Society has a global network of research partners – especially in India

Max Planck institutes operate within a worldwide network based on international cooperation and projects. International cooperation promotes scientific performance and productivity, creating scientific added value and, in many research fields, making it possible to actually achieve a critical mass.

India is an important and attractive partner for the Max Planck Society. The nation is developing into a global player of the 21st century, and one with major economic and scientific potential. Conversely, the interest of young, Indian junior scientists in Germany and in the Max Planck Society is also growing. Between 1998 and 2002, the share of these individuals among foreign doctoral students rose from 2.2 to 11 percent – one more reason for putting the collaboration with India on a new footing.

On October 6, 2004, Max Planck President Peter Gruss and State Secretary V.S. Ramamurthy, in the presence of then Federal Chancellor Gerhard Schröder and the Indian Minister for Science and Technology M. Kapil Sibal, signed a Memorandum of Understanding in New Delhi on the future scientific cooperation between the two countries. The contract provides various tools for strengthening the scientific cooperation between the Max Planck Society and research institutes in India.

The newly established cooperation with India is turning into a success story: in 2009 alone, more than 600 junior and guest scientists from India visited Max Planck institutes – a rise of more than 80 percent in the past five years. In terms of the international exchange of young scientists, this has made India one of the two largest partner countries of the Max Planck Society. Every tenth foreign doctoral student at Max Planck institutes now comes from India. Many of them are involved in research as part of an International Max Planck Research School. In addition, there are almost 50 cooperative projects between Max Planck institutes and research facilities

in India, and offers such as Partner Groups and Max Planck India Fellowships are also developing successfully.

Since 2008, the Max Planck Society has had a representation at the German Embassy in New Delhi. On February 3, 2010, then Federal Chancellor Horst Köhler, together with the Indian research minister Prithviraj Chavan, opened an Indo-German Max Planck Center for Computer Science at the Indian Institute of Technology in Delhi. Participating in this venture on the German side are the Max Planck Institutes for Computer Science and for Software Systems in Saarbrücken and Kaiserslautern.

In general, the Max Planck Society has developed various instruments that are specifically tailored to advance international collaboration. Such instruments include the establishment of Max Planck Centers, Partner Groups and Fellowships.

MAX PLANCK CENTERS

Max Planck Centers are platforms for institutional cooperation between Max Planck institutes and outstanding international research facilities, giving both partners the opportunity to pool their knowledge, experience and expertise, creating scientific added value by combining complementary methods and knowledge. This is a way for Max Planck Centers to promote, in particular, the exchange of post docs, for example by holding joint workshops, providing education and advanced training facilities, working with scientists from other facilities as associated partners, promoting the common use of research infrastructure, setting up joint applications for outside funding for project cooperation, and providing reciprocal access to their research facilities and equipment. They also facilitate initial steps toward stronger institutionalized cooperation by setting up junior research and partner groups.

The Centers are financed by the institutional funding of each partner, or by funds provided by the relevant national project grants, which in some cases can also be transferred abroad. Max Planck Centers do not have any independent legal capacity. The basis for setting up a Center is simply an agreement on the research program, the measures to be undertaken and the financial, personnel and infrastructure resources available for the particular Center. Max Planck Centers are normally set up on a fixed-term basis of five years with a one-time option to extend this for a further five years.

Algorithms are the focus at the above-mentioned Indo-German Max Planck Center for Computer Science in Delhi. With their help, scientists can, for example, quickly and reliably identify large prime numbers. These play an important role in cryptography, which is also used to encode, for instance, online credit card transactions. There are currently two German-Indian research groups under the umbrella of this Center, which was officially opened in January 2010. Further research groups are planned for 2011.

To date, the establishment of five Max Planck Centers has been approved. These have already taken up their activities, or will do so in the next few months. Further Max Planck Centers are planned with partners in Japan, the US, France and Israel.

PARTNER GROUPS

There are currently 44 Partner Groups worldwide. These are useful instruments in the joint promotion of junior scientists with countries that are interested in strengthening their

research through international cooperation. Examples include India, China, Middle and Eastern European countries, Russia and Argentina.

Partner Groups can be set up with an institute abroad with the proviso that, following a research residency at a Max Planck institute, top junior scientists (post docs) return to a leading and appropriately equipped laboratory in their home country and carry out further research on a subject that is also of interest to their previous host Max Planck institute.

The work of the Partner Groups is evaluated after three years and, provided the evaluation is positive, can be extended to five years.

MAX PLANCK FELLOWSHIPS

Qualified and promising Indian post docs up to a maximum of 35 years of age who already have a recognizable scientific profile can apply for Max Planck India Fellowships (MPIFs). Time previously spent at a Max Planck institute is not a requirement.

Successful applicants for MPIFs receive an annual travel allowance of 3,000 euros for a period totaling four years. The Indian Department of Science & Technology also provides additional travel funds for MPIFs from the Biology & Medicine Section and the Chemistry, Physics & Technology Section. Indian scientists who receive this grant must spend at least one month a year at a Max Planck institute. The host Max Planck institute pays for the subsistence costs incurred. The selection procedures are the same as for the program for Partner Groups.

Talent from the Knowledge Superpower

The booming country on its way to becoming the superpower of the knowledge economy: India is a land of superlatives. The world's seventh-largest country, its population of 1.17 billion comprises an enormous pool of talent, including research scientists. These scientists form the basis of a strategic partnership with the Max Planck Society (MPS) in which internationalization is seen as a prerequisite for successful science, and one that opens up different cultural perspectives on research. Felix Kahle has been the Max Planck Society's on-site representative since 2008, and occupies an office in the German Embassy in New Delhi.

"India is developing into a global player of the 21st century, with great economic and scientific potential," says Felix Kahle. Even though India remains a land of stark contrasts, it is also

a place where nothing is impossible. According to Kahle, the optimism in the Indian science community is tangible. The government is investing massively, and recently announced the Decade of Innovation. Now they plan to extend the higher education system and its research capacity. The first results can be seen in the successful establishment of five new non-university Indian Institutes of Science Education and Research (IISER), where the Max Planck Society is already expanding its scientific collaboration. In order to train and educate the 14 million students already in the system, young scientists must be attracted back from their training placements abroad. "Many of them have or have had contacts with Germany and, of course, with our Max Planck institutes," affirms Kahle, adding that this makes

them attractive for further collaboration with the Max Planck Society.

Outside Europe, India is second only to China as the most important international partner of the MPS. The new generation of young Indian scientists has shown a growing interest in Germany and the MPS since the late 1990s – one more reason to set the collaboration on a new footing in 2004: After a Max Planck delegation with members from all three sections had examined the opportunities for research collaboration, Max Planck President Peter Gruss signed a contract on scientific cooperation in the presence of then Federal Chancellor Gerhard Schröder and Indian Minister of Science Kapil Sibal. "It turned into a great success story," stresses Felix Kahle. Last year alone, 616 junior scientists and guest scientists from India came to Max Planck institutes, representing an

increase of more than 80 percent during the last six years. Approximately one in ten of the non-German doctoral students at Max Planck institutes now comes from India. Many of them are conducting research within the framework of an International Max Planck Research School (IMPRS), and Kahle ensures that training placements at these schools are announced on the website of the German Embassy in New Delhi.

In addition, there are almost 50 collaborative projects between Max Planck institutes and Indian research institutions, and the number of Partner Groups has increased impressively. These groups provide career prospects for Indian postdoctoral researchers who have already spent extended research periods at Max Planck institutes and then return to recognized institutions in their own country to continue their research into topics that are also of interest to the MPS. In the last ten years alone, 24 such groups have been established, 19 of which still exist today. A prestigious meeting was held in February to forge bonds between Partner Group Leaders, forming a network characterized by the Max Planck spirit, and to share information about their research activities. Former Partner Group Leaders and Directors of the respective Max Planck host institutes traveled to New Delhi for the occasion. "It is wonderful to see how these scientists perceive the corporate identity of the Max Planck Society and how enthusiastic they are about Germany," says Felix Kahle, full of praise for the good atmosphere among the participants. He also visited the first Indian exhibition by



Networking in the spirit of the Max Planck Society: In February, all Indian Partner Group Leaders met to share information about their research activities, among other things.

Anish Kapoor, the world-renowned India-born sculptor who has been living in London for a number of decades now. Kapoor is considered an outstanding example of "brain circulation," as it is described in academic circles.

Cross-cultural collaboration between different ways of thinking is also the order of the day at the Indo-German Max Planck Center for Computer Science, opened by German Federal President Horst Köhler at New Delhi's Indian Institute of Technology in early 2010. The Center represents a newly established style of close cooperation, initiated here with the Max Planck Institutes for Informatics and for Software Systems and now extended to another four MPS centers in other countries.

The fact that the first Max Planck Center was established in India tells its own story, says Kahle, who is also Science Consultant at the German Embassy, and is a good example of the synergies that arise from the physical proximity of the Max Planck Society representation with the German Embassy. "It was new territory for both

parties, but the collegial exchange and cooperation is excellent." The Embassy sees the activities of the Max Planck Society as an important building block in the context of scientific cooperation between the two countries. "And the fact that we provide sustainable support for the Indian Ministry of Science's objective to encourage successful Indian researchers abroad to come home is completely in line with the Embassy's mission to highlight science as a fundamental pillar of Indo-German relations," says Kahle.

Kahle's activities have been well received by Max Planck Directors in Germany, too, as exemplified by an international conference in New Delhi organized recently by the German Embassy, the Max Planck Society, the Konrad Adenauer Foundation (KAS) and the German Society for International Cooperation (GIZ), and attended by lawyers working in the area of intellectual property. Once again, Kahle was able to breathe life into the maxim "Minerva meets Saraswati" – the latter being the Indian goddess of learning.



Our man in India: Felix Kahle has been the Max Planck Society's on-site representative since 2008, and occupies an office in the German Embassy in New Delhi.