CONNECT

WITH THE INDIAN INSTITUTE OF SCIENCE

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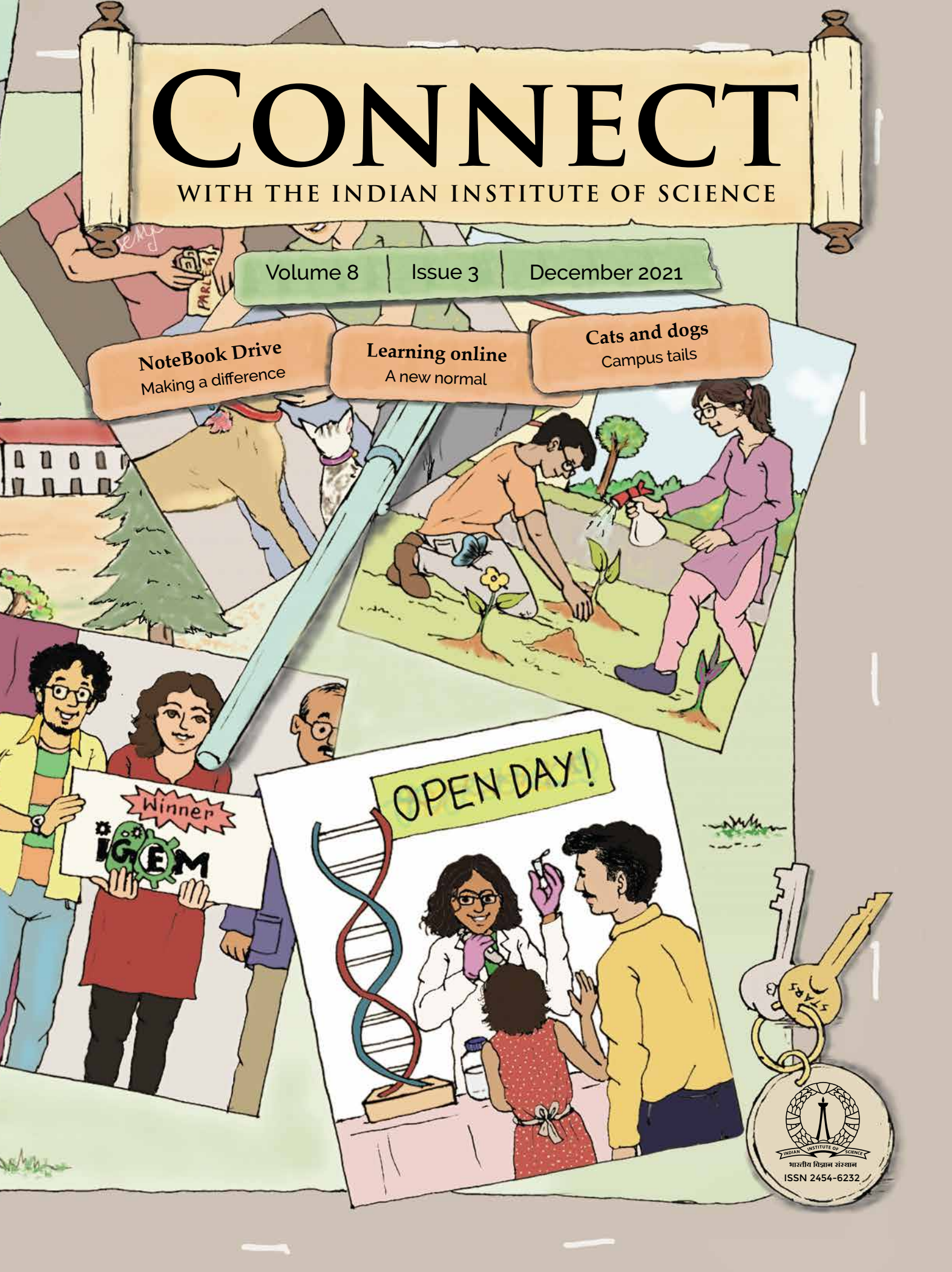
NoteBook Drive
Making a difference

Learning online
A new normal

Cats and dogs
Campus tails



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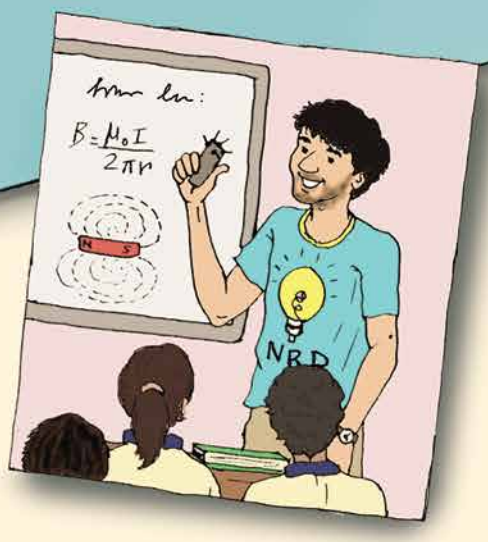
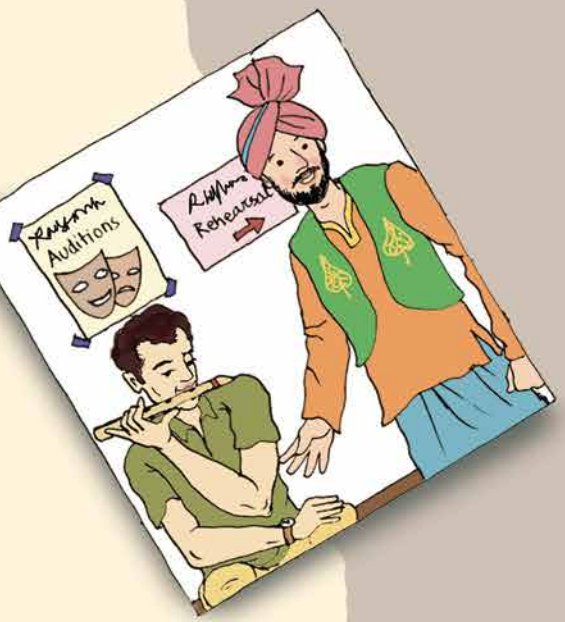


Editorial



The activities of the vibrant student community at IISc are not confined to just academics. This issue of *Connect* is dedicated to some of these pursuits, one of which is the NoteBook Drive, whose volunteers have been helping school students from less privileged backgrounds for nearly two decades now. Another set of student-driven initiatives is aimed at inculcating scientific temper in young minds. IISc students have also been shining bright at the annual International Genetically Engineered Machine (iGEM) competitions for several years now.

In this issue, meet the members of the Animal Welfare Group that works to promote peaceful coexistence of humans with the dogs and cats on campus. The IISc Gymkhana, inaugurated in 1925, is home to around 30 student clubs, including Rangmanch and Rhythmica. Read about how these spaces are providing students with a much needed break.

As the pandemic continues to interrupt our lives, faculty members and students discuss the pros and cons of online learning, and a campus resident describes how she re-discovered photography during COVID-19. A retired employee talks about work-life balance. We also revisit the Simputer, a handheld computer device that was incubated at IISc way back in the late 1990s.

Finally, colleagues and friends pen a tribute to an exceptional academic and mentor to many within and outside the science community.

Happy Reading!

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What happens when you give

A CHILD A NOTEBOOK

- Gouri Patil

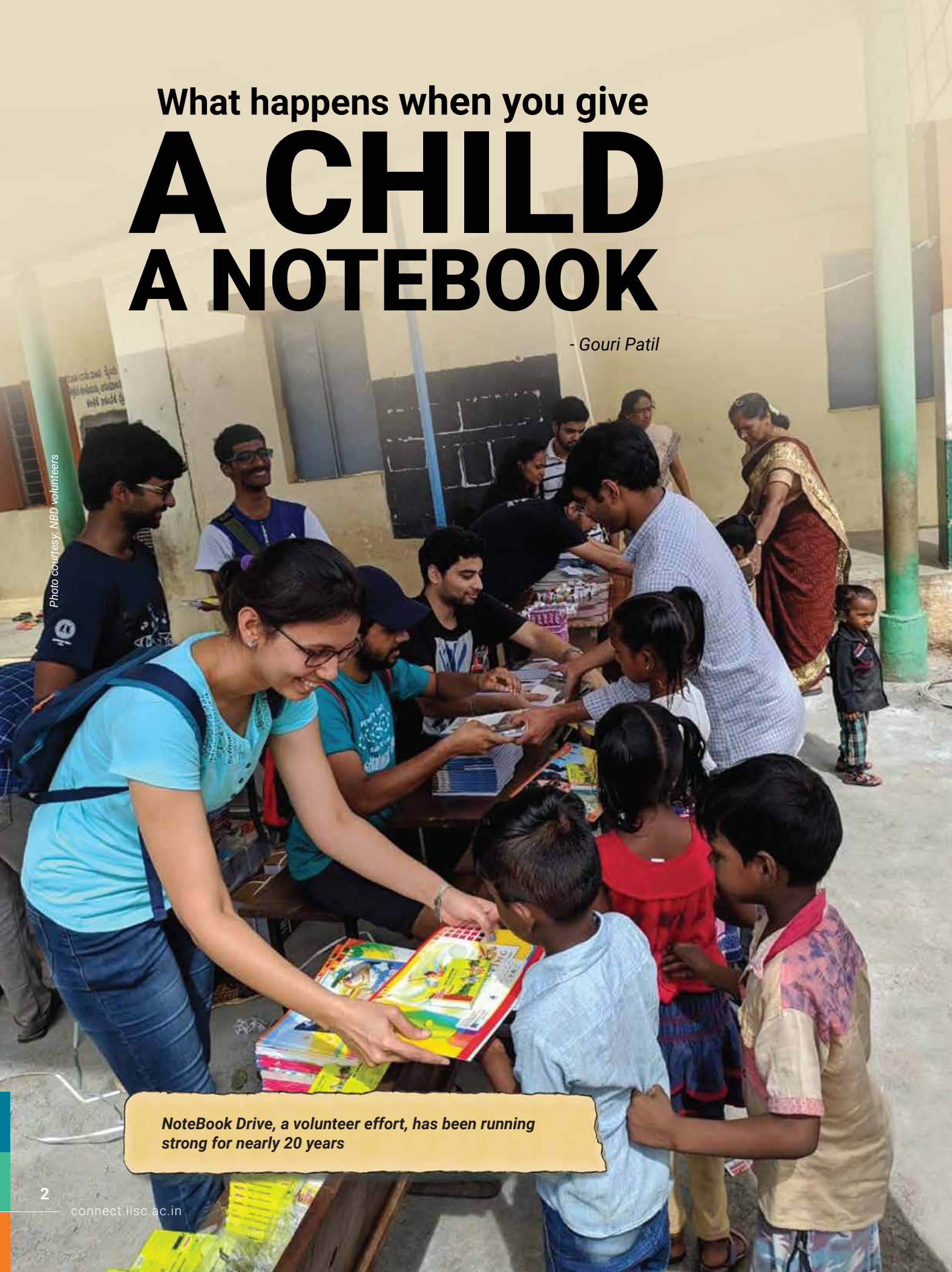


Photo courtesy: NBD volunteers

NoteBook Drive, a volunteer effort, has been running strong for nearly 20 years

In an otherwise silent campus, a typical Sunday sees a bustling crowd near the dining halls of IISc, with students unwinding after the week's hectic work schedule. But what caught my eyes during one such weekend of my first year was a flurry of activity in a small space tucked away near the student housing and dining halls – a blackboard, a few school kids brimming with enthusiasm and curiosity, and a couple of graduate students. My first thought was, "Why school on a Sunday?" But the kids seemed eager to attend these extra classes apart from regular school on weekdays. The sessions were part of a mentorship programme, just one of many initiatives under the vast umbrella called 'NoteBook Drive', popularly known as NBD.

Very few children have the privilege of access to education, let alone quality education

NoteBook Drive, an initiative run entirely by the student community at IISc, has been active for 19 years now, spreading its wings across more than 30 schools in and around Bangalore. In 2002, a few graduate students first started collecting donations and distributing notebooks in the government-run primary school on the IISc campus. This slowly grew into a massive network of volunteers coming together and building myriad initiatives under the banner of NBD. Their primary goal is to promote quality education in schools with students from lower socio-economic backgrounds, and give them an equal chance to dream big. Over a span of two decades, they have been able to touch the lives of more than 5,500 students in Bangalore and nearby rural areas.

India boasts of having the highest population of young people under the age of 29, and education is a constitutional right as well as an indispensable part of their development. Social rights activist Nelson Mandela once said, "Education is the most powerful weapon which you can use to change the world." It is the first step in empowering people to develop critical thinking and contribute to making the world a better place. However, due to glaring gaps in socio-economic conditions in India, very few children have the privilege of even access to education, let alone quality education.

Even though India has many government-run schools, most of them are in a pitiable condition, lacking funds for infrastructure and teachers. This puts the children from economically weaker backgrounds at a considerable disadvantage and can set them back for another generation.

Pankaj Jain, a former PhD student from the Molecular Biophysics Unit and one of the former volunteers who still participates in a few activities of NBD, recalls how his first visit to a government-run school brought him face-to-face with this stark reality. "I was back in the hostel room … and I remember crying for a while. Most of us don't come from those backgrounds, and this is like a reality check at the grassroots level. We generally blame kids for not being attentive in class, but we don't know the background. There is so much baggage owing to their social conditions: sickness, poverty, domestic abuse, alcoholism and many more."

Nurturing young minds

During the first few years of NBD, the volunteers mainly focused on distributing books and stationery to randomly chosen schools in Bangalore and nearby rural areas. Then, they started activities like scholarship initiatives, mentorship programmes, Children's Day celebrations, science fairs, robotics and computer training, classes on English communication, career guidance, museum visits, 'Art and Literary day' and many more.

Photo courtesy: NBD volunteers

NBD volunteer teaching arts and crafts to students on Children's Day

With activities spread throughout the year, the NBD team keeps soliciting students at IISc to volunteer with whatever help they can provide. The team raises funds every year, with the maximum share of money flowing in from the generous contributions of the student community. Additionally, they receive some monetary help from the IISc Alumni Association of North America (IISc AANA). The money raised goes towards funding the notebooks, stationery, sports kits and so on, for thousands of students.

Vikas Arora, a volunteer and a PhD student at the Department of Physics, says, "The government provides textbooks and uniforms, but not notebooks and stationery. We try to fill the gap. We conduct a survey among teachers and the administration about the resources they need in each school. Following this, we place the orders with our long-time vendors and physically go to more than 30 schools to distribute the things. All this involves a lot of coordination, planning, and effort." He pauses and smiles to add, "But it feels completely worth it when the child has a new notebook in hand and smiles ecstatically, flipping and sniffing through the fresh pages."

A significant chunk of the funds also goes into scholarship initiatives for students in the 11th and 12th standard

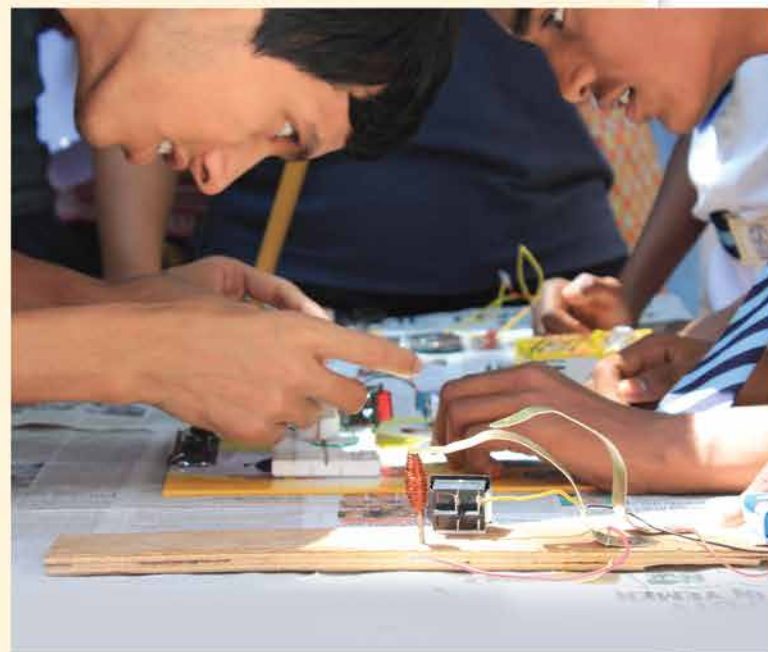
A significant chunk of the funds also goes into scholarship initiatives for students in the 11th and 12th standard. A group of volunteers conducts surveys across many schools in nearby villages and slums of Bangalore every year. They try to identify students in dire need of monetary help in finishing their higher secondary schooling. The surveys are carried out by visiting the students' homes and families and allocating funds to as many students as possible. Vikas recalls his experience with one such survey recently. "I went to a remote village nearby which lacked even proper roads. A girl student there could not pay the fees for her 12th standard year, with her father in deep debt due to job loss during the COVID-19 pandemic. They are in such dire need. How can they ever be on equal footing when competing in the national-level exams after secondary schooling?" He explains further how the student's gender exacerbates the issue, with parents trying to marry off the girl child as young as 15 years old because they have no way to fund her education.

"That is why scholarships help," adds Pankaj. "Scholarships have made a big difference where sometimes we were able to take the kids out of their homes and place them in hostels." Karim Saab was a brilliant student and the school topper. Still, his brother wasn't ready to let him continue his studies as he needed help with running his roadside eatery stall. The NBD team helped Karim move out of his home and placed him in a hostel in Tumkur. He finished a diploma in electronics and secured a job in a company. Karim says, "NBD not only helped me for studies (sic) but also took care of me when my health was poor. This is something I will never forget." Numerous such stories are a silver lining in an otherwise murky situation.

Apart from providing monetary help, the volunteers also spend time with students mentoring them in various subjects. Every weekend for six months, the volunteers teach science, mathematics and English to the students. They give them hands-on experience with science experiments and brainstorm creative and innovative ideas for small science projects. Afterwards, the students demonstrate their ideas in a science fair set up at IISc.

Another addition is computer and robotics training. Although a few schools have computer labs and robotics kits supplied by the government, the students lack mentors to guide them in using the resources, and this is where the NBD volunteers lend a helping hand. "Mentorship is fun. You get to relive your childhood," says Gokul Krishna, an undergraduate student. "We took everything our teachers said for granted and never questioned them, but now those questions are raised to you by these kids." He recalls an amusing incident while he was teaching science to primary school children. "When asked how a tree absorbs water, a student shot back confidently, 'When it rains, the water from the ground evaporates, and the leaves catch hold of it.'" Instead of correcting the students, Gokul prods them into thinking creatively and arriving at the answer. Most volunteers follow this way of teaching. Alongside the mentoring programmes, the NBD volunteers also conduct career guidance sessions for the students at the secondary school level. They help students recognise their interests and skills to match them with a possible career option.

Photo courtesy: NBD volunteers



Students demonstrating experiments at the science fair

While these serious activities form the crux of NBD activities, most volunteers agree unanimously that the Children's Day celebration is their favourite of all. They get around 200 volunteers from IISc to visit 25-30 schools and plan a 'fun day' for the kids. Various activities like sports, dance, origami, art, clay modelling, acting and singing are organised, and the kids love these sessions, pleading with the volunteers to come back again for another 'fun day'.

Inspiring and inspired

NBD is not just helping underprivileged kids realise their potential, the movement is also having a profound impact on its volunteers. Several graduate students, particularly in top institutes like IISc, suffer from 'imposter syndrome', a psychological pattern in which an individual doubts their skills, talents, or accomplishments. Rinkumoni Chaliha, another longtime volunteer and a PhD student at the Department of Inorganic and Physical Chemistry, explains, "Campus life isn't easy. Many students, including me, go through a difficult time navigating the rigorous research environment. Sometimes you're bogged down by dissatisfaction and worthlessness, and I feel being part of NBD helps. Those kids are looking forward to meeting us on the weekends, and we feel rejuvenated, bringing joy to their faces and helping them envision a future, and throughout this process, we start to feel worthy." She adds, "The large group of volunteers become your new friends, and you end up making meaningful connections for life. And I think that is the secret behind how this movement has sustained for over 19 years now."

Photo courtesy: NBD volunteers

Some of the many NBD volunteers

NBD is not just helping underprivileged kids realise their potential, the movement is also having a profound impact on its volunteers

Some volunteers credit NBD for reigniting their passion for teaching. After a postdoctoral stint at NCBS, Pankaj decided to co-found an educational start-up, Seed2Sapling Education. The company focuses on helping students and teachers in building a vibrant learning atmosphere in classrooms. He and five other co-founders are alumni of IISc and were inspired by their time as volunteers at NoteBook Drive.

Another unique aspect of NBD is that there is no central governing body. The group is composed only of volunteers, who are an ever-growing and ever-changing set of people – in that sense it is truly an organic initiative. It has fostered a culture of inclusivity, encouraging diverse ideas and people to take responsibility equally.

The past couple of years, with the ongoing pandemic, have been difficult for NBD and the school children. But they are slowly getting back to normal. NBD volunteers have restarted their activities and are trying to introduce the initiative to newcomers on the campus in order to attract more volunteers and funds. They are excited for the next year as it marks twenty years of their sustained movement. As Pankaj reflects on the past two decades, he adds, "We won't be able to bring a sea of change, but we can make a big difference in a small cohort of aspiring children, and more importantly the volunteers, who get a new perspective of looking at the education system and society at large."

Gouri Patil is an Integrated PhD student at the Department of Physics and a former science writing intern at the Office of Communications, IISc

Setting the stage

- Bitasta Das

Photo: Madhusudan Manna

Rangmanch and Rhythmica offer students space for creativity

Scene from the play Khudahafiz

IISc is famed for its science and engineering éclat. Students here are expected to be academically brilliant and consistently work hard to excel. In such an environment, Rangmanch and Rhythmica are two student-driven clubs that allow them to showcase their artistic ingenuity. In the absence of a full-fledged humanities department at the Institute, the activities of these two clubs provide students an outlet for cultural dialogue and expression.

Drama on campus

Rangmanch, the dramatics club of IISc, was formed in 2008-09. Recalling its inception, Amit Roy, a PhD scholar in the Department of Physics, says that the seed of the idea to start a dramatics club for IISc students was sown when the Centre for Film and Drama in Bangalore presented the play 'Copenhagen' at IISc. The audience comprised members of the Institute – mostly students – who were interested in theatre. Following the play, there was a meet-up of these theatre enthusiasts and this marked the beginning of Rangmanch. The first production of the club was a musical play called 'Life at IISc'. It was written and created entirely by the club members and performed on the occasion of the freshers' orientation programme organised by the Student's Council in August 2009. This play was a great success and subsequently encouraged many more students to join the club.

'Life at IISc', the first production of Rangmanch was a great success and subsequently encouraged many more students to join the club

Over the years, Rangmanch has represented IISc in numerous theatre festivals and national level competitions and has won many accolades. It inspired the formation of other cultural clubs at IISc; the Art and Literature Club is one example. Rangmanch was also instrumental in the creation of similar clubs in other Bangalore institutes like the National Centre for Biological Sciences. The club has been gradually growing, both in members and in number of events, and has been staging poignant performances. "After watching a few plays by Rangmanch, I feel it is larger and more brilliant than I initially thought. It will be great to learn from them," says Satwik Garikimukku, an undergraduate student who recently auditioned for the club.

The current conveners of the club are Dymphna Joyce John, a PhD student in the Department of Molecular Reproduction, Development and Genetics, Rohit Dutta, a PhD student in the Molecular Biophysics Unit and Akash Gulati, a PhD student in the Department of Physics. The various activities of the club, they say, attempt to creatively explore several areas of theatre including street plays, mime, musicals, and improvisation.

Photo: Yogeshwar Prasad

Scene from the play 'Incredible India'

The primary role of a convener is to act as an interface between the Institute administration and the club. They represent the club at the Gymkhana Student Affairs Council (GSAC) meetings, arrange periodic meetings of the club members to plan future activities, secure venues and organise different events. They also keep a record of the finances. Other than the conveners, there are directors, writers, and producers who guide the performers. Those who are interested in arts and crafts venture into set design, costume design and lighting among many other activities. The Institute provides them with space and resources for various events including the Rangmanch Showcase (the annual theatre event), Sangam (the fresher's event), Spectrum (the annual sports and cultural event of Gymkhana), Gandhi Jayanti, and Founder's Day. In addition to this support, the club conveners collectively feel that a certain amount of seed funding at the beginning of each session would be helpful, and that the long-pending infrastructural improvements of the Students Affairs Committee building should be completed.

Performing for a social cause

Rangmanch, besides being a source of pleasure and joy for its members and audiences, has also enabled self-discovery for some students. Amit says, "The club has been my constant source of energy and motivation to overcome failures, in research as well as in life. It has taught me teamwork and collaboration." Sri Vamsi Matta, a former UG student and founder of the Bangalore-based theatre group Chandrato Collective says that he learnt life skills by doing theatre with Rangmanch. "Like the real world, the theatre world is also casteist, sexist, elitist and highly gate-kept by cis-het, savarna men. It also involves a lot of red tape, bureaucracy and navigating ideologies. Rangmanch helped me understand theatre in totality," he explains. He believes that no other theatre school would have been able to teach him these on-the-ground lessons. He goes on to add that while he found his calling and his love for theatre through Rangmanch, having a background in science has also proved to be invaluable for him. He follows the same method for theatre production as he did for designing an experiment and writing a research paper, reading literature thoroughly and analysing materials and methods. "This rigour comes from my science education," he explains.

Rangmanch has also been a platform from which students give voice to local and global concerns. In 2015, Rangmanch members performed incisive street plays in the wake of the nationwide protests by research scholars demanding a stipend hike. These plays became very popular and appealed to researchers all around the country. Through performances of plays like Vijay Tendulkar's 'Silence, the Court is in Session', Aristophanes' 'Lysistrata' and Mahesh Dattani's '30 days in September', Rangmanch has explored the harsh realities that women have faced across time and space. Sanjna Banerjee, a PhD student in the Centre for Neuroscience says, "Rangmanch not only provides a platform to present women's issues but actually strives to foreground them." The club encourages original scripts and adaptations from intersectional feminist texts in different languages, and has an equal if not larger proportion of women spearheading direction, scriptwriting, acting and production design. Rangmanch's plays on women's issues have been performed across venues in Bangalore, including the Rangashankara Theatre festival.

Reverberating melodies

"Rhythmica plays for the crowd," is the tagline of the music club of IISc. In the 19 years of its existence, the club has not only enthralled its listeners, but has also honed the talent of numerous students, giving them a space to create, share and discuss music. It has brought to the campus an impressive repertoire of music ranging from Indian classical to Western; from Rock to Jazz and Blues; from western country music to Indian folk; Vedic tunes and home-brewed self-composed scores, and from the early 20th century classics to the current chartbusters.

Photo courtesy: Rhythmica convenors

Music behind the scenes

Reminiscing on his experiences, Appilineni Kushal, a former UG student, says that Rhythmica nurtured his love for music. Playing songs with the group helped him understand and appreciate the role of different instruments and the minute technical details of composing a song. It introduced him to like-minded people with whom he is still in touch and continues to seek feedback on his original works. He continues to compose music at the University of California at Davis, where he is pursuing a PhD in Applied Mathematics. Echoing similar thoughts, Sruthi Unnikrishnan, a former PhD student in the Centre for Ecological Sciences, says that Rhythmica was a huge stress-buster for her. It is only because of Rhythmica that she has made friends across disciplines and discusses work and music with them, she adds. "I think I have grown as a person due to my association with the group. I was a convener for the year 2011-2012. I was very active in Rhythmica and it has a special place in my heart."

Music continues to flow with Rhythmica

Rhythmica is highly coveted among the music lovers on campus. Kartikey Pratap Chauhan, a UG student who enjoys performing Indian semi-classical music, narrates that after entering IISc, he aspired to join this "prestigious" music club. He was not successful in his first attempt, but he trained harder, and to his joy, he qualified in the second attempt. This boosted his confidence as a singer. Rhythmica taught him to pay attention to technical aspects of singing, he says. Eventually, he got the chance to perform before an audience of more than 350 people, twice. He also feels confident about his organisational and interpersonal abilities now.

Rhythmica follows a democratic enrollment process and is not restricted to freshers. Monmita Bhar, a PhD student in the Centre for Neuroscience and a former convener, says that all students on campus are welcome to participate and the auditions offer an opportunity to gauge potential members' interest and musicality. The panelists try to assess these as objectively as possible.

The conveners, Umang Bhat, Meghal Sachdev, Nilay Agarwal – all UG students – explain they have been unable to conduct shows or auditions for the past two years due to the pandemic. In addition, many veteran members have graduated and left the Institute. Now that life on campus is slowly returning to normal, they are conducting auditions and hope to receive the IISc community's support once again. Besides performing at official IISc events like the Independence Day celebrations and representing the Institute in inter-collegiate events, Rhythmica also organises music classes for the IISc community at an affordable rate. They plan to resume these courses and workshops as well. The club conveners also say that they would like the Institute to provide improved access to the music room as the present one is located far away and is restricted at night.

Photo courtesy: Rhythmica convenors

Magic on stage

The lives of IISc students, like everyone else's, have been affected by the ongoing pandemic. Yet, the bleak situation has not completely dampened their spirits. Cultural Secretary Rydham Goyal, a UG student, explains that many students of IISc are still highly motivated to participate in cultural activities, which have increased substantially as campus opens up again. Students have been asking various clubs to organise training sessions for dance, drama and musical instruments, which gives them an opportunity to pay attention to arts and crafts, he adds.

Rangmanch and Rhythmica, as much as they are the bedrock of IISc students' creative expressions, have also effectively supported the mental and emotional well-being, not just of the students, but also their many spectators.

Redesigning the genome

- Sangeetha Devi Kumar

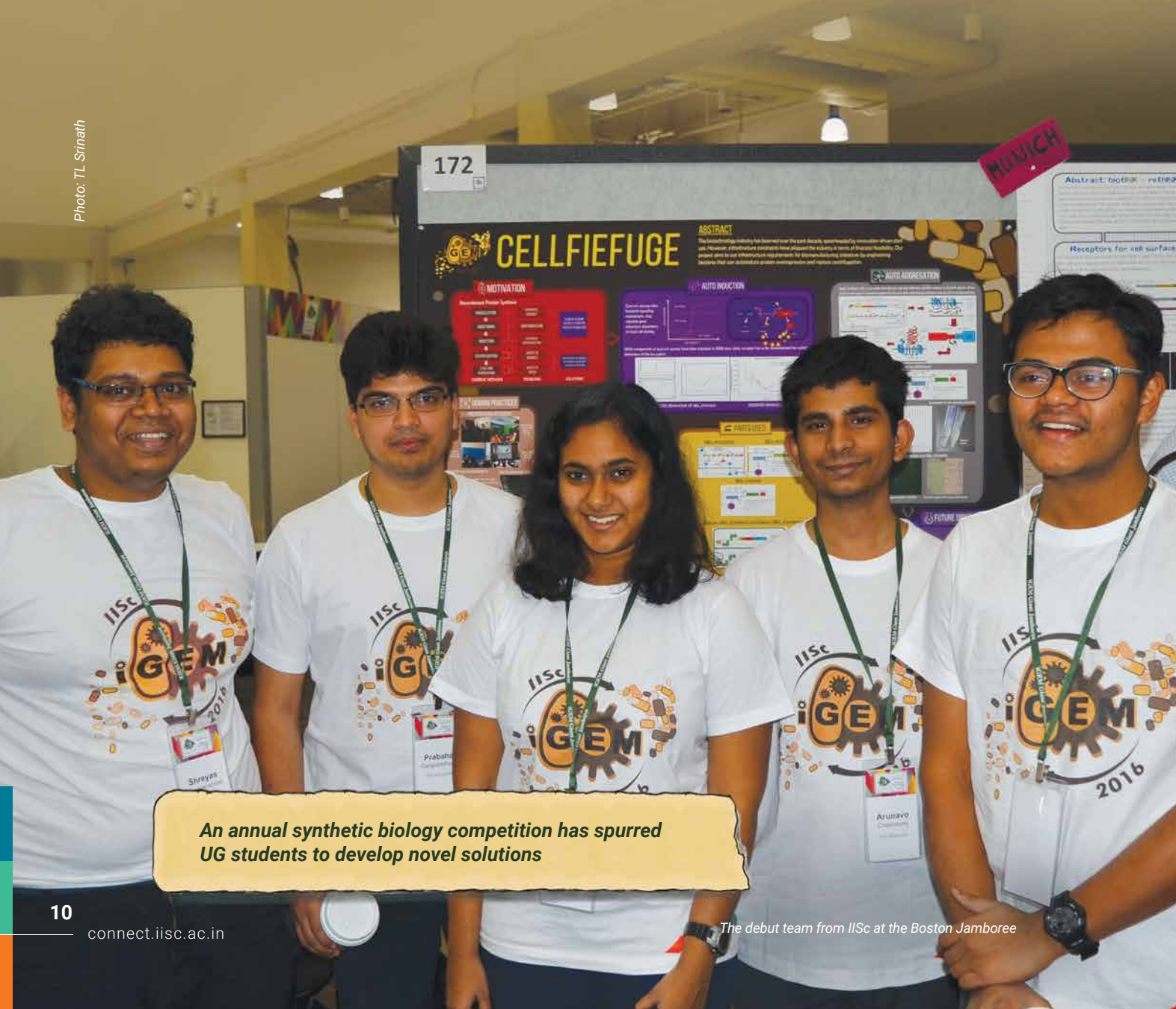


Photo: TL Srinath

An annual synthetic biology competition has spurred UG students to develop novel solutions

The debut team from IISc at the Boston Jamboree

In the early 1960s, French scientists Francois Jacob and Jacques Monod figured out how gene expression in bacterial cells is regulated. Since then, scientists began dreaming of manipulating these regulatory circuits in the bacterial genome (the entire set of its genetic material) to synthesise products of interest to humans. The boom in genomics and recombinant DNA technology in the 1990s allowed scientists to alter the hereditary material of an organism to manipulate its form and function. This field, known as "synthetic biology", has grown tremendously in the past two decades. Synthetic biology attempts to create modified organisms by editing their genome – adding genes for beneficial traits, removing or editing those causing diseases and so on. A well-known example is "golden rice", a genetically modified beta-carotene-producing variety of rice. Humans, after consuming it, can convert this beta-carotene to Vitamin A, which satisfies our dietary requirement.

Synthetic biology is now used in various areas ranging from agriculture to medicine, to make products such as biofuels or vaccines. While the field has nurtured many useful applications, there are also concerns about the potential for its misuse – in bioterrorism, for example.

One organisation keen on promoting the ethical advancement and beneficial role of this field is the International Genetically Engineered Machine (iGEM) foundation. It is independent, not-for-profit, and hosts an annual competition that invites students from across the globe to push the boundaries of synthetic biology for the betterment of human life. Students work together as a team to design, build, and test a biological system using synthetic biology tools and molecular biology techniques.

At the outset, iGEM might seem like a competition exclusive to biology and engineering disciplines, but often students from arts and design are roped in for a broader perspective. For almost six months, participants work on several facets pertaining to their project including fund-raising, increasing public awareness, and working on developing a unique solution or product in the lab. The competition culminates in a synthetic biology conference called the "Giant Jamboree". Here, each team presents their ideas and preliminary results. They showcase innovative hardware or new technologies developed to aid their projects. Vectors (carriers) containing the modified genome or plasmids developed by the teams are deposited as "BioBricks" (standardised DNA sequences that can be assembled to form bigger synthetic DNA circuits) in the Registry of Standard Biological Parts. All future iGEM teams have access to these.

IISc undergraduate (UG) students were introduced to iGEM in 2015, when Chaitra Prabhakar and Sachit Daniels, PhD students from the National Centre for Biological Sciences (NCBS), planted the idea of sending a team from IISc to the competition. Over the next few months, a handful of enthusiastic undergraduate students came together and brainstormed more than a hundred ideas, finally choosing what they felt was the most practical one. With support from Umesh Varshney, the then UG Dean and Deepak Saini, both professors in the Division of Biological Sciences, and relentless guidance from UG instructors Narmada Khare and TL Srinath, the team went head-on into the competition.

Being the first IISc iGEM team came with unique hurdles. It wasn't easy to get many UG students excited about an untried project. "There was one brainstorming session where it was just me and nobody else," recalls Abhijeet Krishna, a former UG student from IISc who was part of the 2016 team. Mentoring UG students also had its challenges. "When they're young, they have a lot of restless energy. So, to make them sit still is an effort," says Deepak. "I remember that I took a bunch of them to the Biotechnology office, Government of Karnataka, so that they could explain their idea and request for funding. And they were so restless; they kept saying, 'why are we not being called in right away?'" he laughs.

While the science part was easy for them, most team members were not skilled at fund-raising. All iGEM teams receive starter kits with basic plasmids and BioBricks from the organisers at the beginning of the competition, but they have to procure everything else themselves with the help of their mentors. Acquiring funding and dealing with logistics were alien terrains for them. With a lot of perseverance, the 2016 team acquired funds from the Wellcome Trust, the Department of Biotechnology (DBT), Government of India, and the Karnataka State Government, among others.

Let's settle down, folks!

Over the years, IISc's iGEM teams have worked on diverse projects where microorganisms are made to do wonderous things. For this they use "Recombinant DNA (rDNA) Technology", a set of techniques now commonly used in the biotech industry where it has paved the way for the mass production of antibiotics, vaccines and so on. Although the benefits from these products outweigh the production cost in most cases, rDNA technology remains a costly affair, going up to millions of dollars.

Photo courtesy: IISc iGEM 2018 Webpage

A member of the 2018 iGEM team distributing pamphlets about their project 'PhageShift' as part of their public engagement at Visvesvaraya Industrial and Technological Museum, Bangalore

At the heart of this technology are monstrous machines called bioreactors. They constantly monitor the growth of the bacterial culture growing inside them, induce bacteria to synthesise a particular product at a specific stage, and finally, separate the bacteria from the newly made product. The last stage is the costliest. The 2016 iGEM team aimed to cut these costs by designing a bacterium that would "know" exactly when to start making the product and to settle down on its own after it is done, minimising the need for a bioreactor. They named this project "Cellfiefuge".

Bacteria have the fantastic ability to regulate gene expression in response to their population density. This is called 'quorum sensing'. The team designed a bacterial strain that responded to two separate densities. The cells would synthesise the product of interest when the first density level was reached and would then synthesise a "sticky" surface protein after the second density level was reached. The "sticky" protein molecules on the surfaces of bacterial cells would cause them to aggregate into large clumps and settle down. In October 2016, Arunavo Chakraborty (the team leader), Prabaha Gangopadhyay, Shreyas Gopalakrishnan, Abhijeet Krishna, and Aiswarya Prasad visited Boston, USA, to participate in the iGEM Giant Jamboree. The IISc Alumni Association of North America (IISc AANA) funded their travel and hosted them. The team won a bronze medal for their maiden attempt, encouraging the future batches to actively participate.

I feel bloated

Continuing with the theme of amazing bacteria, the 2017 team was inspired to use bacteria for bioremediation (using living organisms to clear out contaminants, toxins, and other pollutants). Oil spills caused during extraction or transportation of oils are harmful to aquatic ecosystems. The technologies used to clear these spills are wildly expensive and time-consuming. Another cause for harm to aquatic ecosystems are the fast-growing algal blooms. These algal cells cover the surfaces of water bodies, preventing adequate oxygen supply to the aquatic life growing below.

Like how two wrongs can make a right, the team conceived a possible solution for oil spills by imagining floating networks of oil-degrading bacteria inspired by algal blooms, in a project they called 'iFLOAT'. Algal cells stay afloat by producing gas vesicles. Getting bacteria to do the same in the lab was painstaking. The team was partially successful in engineering a bacterial strain that could not only make gas vesicles within their cells, but also release them into the growth media outside. The potential application of this project is the production of a mesh of vesicles coated with oil-degrading enzymes called lipases, and using them to efficiently clear oil spills.

The 2017 team also developed a new tool. Working with bacteria means long tedious hours in the lab, waiting for them to reach the sweet spot of optimal population density. The team found a way around this by engineering a novel gadget. Enter the Growth Curve and Optical Density Device, or GCODe! This instrument measures the bacterial density in real time and one can track it using a smartphone. This innovation won a consolation prize at the Giant Jamboree that year, and the team won a gold medal.

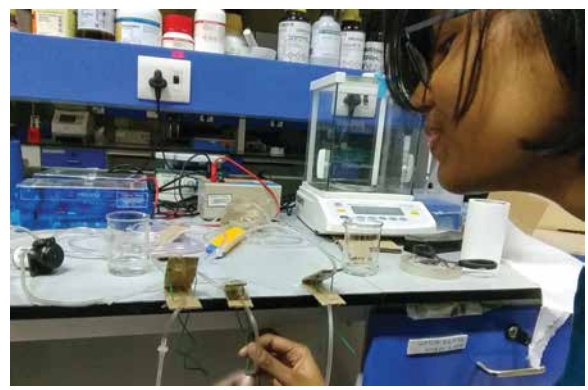


Photo courtesy: IISc iGEM 2017 Webpage

Pratyusha from the 2017 iGEM team working on a prototype of GECODe

Photo: Sukriyo Chakraborty

The 2021 iGEM team brainstorming during the pandemic

Pausing during the pandemic

As the world was reeling from the COVID-19 pandemic, IISc remained shut. The labs were closed. Participating in iGEM in 2020 was out of the question, but this didn't stop the UG students from planning for iGEM 2021. This year's project was also centered around bioremediation, but this time focusing on combating the harm caused by chemical pesticides.

Farmers in India continue to use chemicals of the 'organophosphate' family as pesticides, despite the fact that they have been banned elsewhere in the world. These are toxic compounds that can leach into groundwater and are harmful if consumed. The 2021 team synthesised a bacterial cellulose sheet to use as a filter. This filter was coated with organophosphate-degrading enzymes that can effectively rid the water of these toxins. The filter, called 'CellOPHane', can be custom-made to degrade other harmful compounds as well, by coating it with appropriate enzymes.

As part of public engagement, the 2021 team also made promotional videos in English, Hindi, Malayalam, Kannada, Tamil, Odia, and Bengali. They have also provided subtitles in Telugu and Marathi. This was probably the first attempt of its kind to reach a wider audience, the team says. "We have not come across any other team that has made a video in so many languages," says UG student and team leader Sukriyo Chakraborty, proudly. The team went on to win a gold medal at the Giant Jamboree meet-up that took place in Goa in November 2021.

After iGEM

The participants' association with iGEM does not end with the Giant Jamboree. Some iGEM projects have gone on to inspire start-up companies. Sea6 Energy, a company incubated in IIT Madras, was born out of their institute's iGEM project in 2009. 'After iGEM' is an initiative by iGEM for participants to remain associated with the organisation and participate in dialogue about synthetic biology. Aiswarya Prasad from the 2016 team participated in the United Nations Convention on Biological Diversity held in Sharm El-Sheik, Egypt in 2018. She explains that biotechnology is growing at a pace that no one imagined, and many of the laws and framework have fast become obsolete. "[Therefore] as scientists, there's a lot of scope to participate in these conversations, because there is just not enough of a voice coming from [them]," she says.

The iGEM journey that students embark upon is a long one. What takes the longest is zeroing in on a feasible project idea. The three months of summer vacation are spent working on this idea, but time is never enough. A synthetic biology project involves standardising protocols specific to the new genetically engineered organisms and monitoring their growth. The work often spills over into the academic year, and this becomes problematic, since the undergraduate coursework at IISc is pretty gruelling. Juggling this hectic coursework – which is meant to prepare them for higher studies – with iGEM can be challenging for the students, says Dipshikha Chakravortty, Professor in the Department of Microbiology and Cell Biology, who has mentored the iGEM teams for the past four years. "The students participating in iGEM need more time to complete their experiments," she says. To tackle this issue, the teams need to start working on their projects much earlier, at least two years in advance, suggests Sandeep Eswarappa, Associate Professor in the Department of Biochemistry and one of the mentors of the 2018 team.

By all accounts, iGEM has had a lasting effect on its participants. Former participants say that the experience has helped them acquire useful skills and make helpful connections. Over the course of the journey, they have all fought, made up, agreed, disagreed, worked together and ultimately remained friends.

Sangeetha Devi Kumar is an Integrated PhD student at the Department of Biochemistry, and a former science writing intern at the Office of Communications, IISc

Sharing a home

- Sritama Bose

Photo: Jyotirmoy Paul

Promoting peaceful human-animal coexistence on campus

Dheer Singh M, retired mess supervisor, with Teddy

On a clear sunny morning, beside a small pond and in the pleasant shade of large trees, Ipcy was treating herself to a nap in front of one of the vintage buildings of IISc. It was around 10 am, and everyone in the building was starting their day's work. Students were arriving, some on foot and some riding bicycles. Among them were some of Ipcy's friends. Whenever one of them passed her, she acknowledged their friendship by lazily opening her eyes and gently wagging her tail. She was happy to see them, but also knew that this was no time for play, and continued her mid-morning slumber.

Ipcy is one of the many stray dogs living inside IISc. She was named "IPCY" after the Department of Inorganic and Physical Chemistry (IPC), where she came one evening, to take shelter from heavy rain. "Unlike most other dogs who come to take shelter, [she] wanted to interact with humans," recalls Saheli Chakraborty, a former PhD student of the department. "Back then, I used to consider dogs as animals that would bite me, but she changed my perception. She used to look at me with persuasive puppy eyes, wag her tail, and try to communicate. One day, I tried my luck and patted her gently." Saheli fondly recalls this first interaction with the dog, which eventually developed into a beautiful friendship between the two.

Photo: Jyotirmoy Paul

IPC gang: Ipcy, Penny and Joker

There are many such stories. The Institute is more than just a place where people come to study or work – they live here too. It is also a place to meet new people, make friends, or find companions. For some, these interactions are not always restricted to fellow humans. Like Saheli, they make new furry friends as well.

But co-existing with animals, especially stray ones, is not always easy and many of the campus residents have had unpleasant encounters too. In IISc, the Animal Welfare Group (AWG) – a primarily student-run voluntary initiative – is trying to assist in the peaceful coexistence of humans and animals on campus.

Why AWG?

The group was formed in early 2018, when the Institute was actively trying to cope with the growing population of stray dogs and cats on campus. Complaints about the 'dog menace' – dogs chasing humans or walking inside classrooms – were increasing. V Rajarajan, who was the Registrar at that time, convened an open house to discuss ways to deal with these issues. Sudha Narayanan, founder trustee of Charlie's Animal Rescue Centre (CARE), and HD Lohith, a leading veterinary surgeon in Bangalore were invited to share their advice.

Human-animal conflict often evolves from being one between humans and animals, to one between two groups of humans – those who love being around animals and those who do not. Nitin Balajee, a PhD student who attended the open house, recalls a lot of heated arguments between the two groups. Rajarajan and the experts present in that meeting proposed the formation of the AWG. Nitin, who had worked with CARE earlier, along with a few others, volunteered to take this up.

Currently, the AWG has more than a hundred volunteers, most of whom are students. Along with taking care of the animals, the group has also become a point of contact for any animal-related issues that campus residents face. There is an AWG WhatsApp group where people share their concerns. The administration also consults the AWG in dealing with issues related to animals. The AWG website contains information on how to deal with animals in distress, and also educates people on how to minimise conflicts with dogs and what to do if chased or attacked.

Photo: Shubham Pradeep Farate

Hostel cats

Animal birth control

"[The] Indian constitution guarantees the right to life to stray animals as well. In the context of conflict with stray animals, one immediate suggestion many people give is to relocate the animal. Now, doing so is unconstitutional. Relocating a stray dog, for example, invites huge penalties from BBMP and the police," points out Nitin. "Considering all the laws concerning stray animals, we concluded that responsible animal birth control (ABC) was the only legal solution."

And so, the first round of the ABC programme was initiated by the Institute. A temporary animal shelter equipped with the required infrastructure was set up, and a team of vets from CARE conducted the vaccination and sterilisation of the strays. Meanwhile the AWG, which was coordinating the programme along with CARE, had new volunteers joining the group. "Almost all dogs on campus are vaccinated and sterilised, and the AWG volunteers ensure that the dogs receive the booster doses in time," says Jyotirmoy Paul, another PhD student and member of the group.

Veeranna Kammar, one of the Deputy Registrars, explained the challenges the administration faces in controlling the dog population on campus. "Firstly, because of both the vastness of our campus and the presence of a lot of forest areas, it is very difficult to catch the dogs – they easily escape into the forests." He also points out that there are increasing instances of people from outside secretly abandoning their dogs inside the campus. A general perception of the campus being animal-friendly might be encouraging such activities. Veeranna adds that stray dogs from outside often enter the campus on their own, and since there are people on campus who feed them, these dogs mostly stay back, contributing to further increase in their population. "Carrying out the ABC programme at regular intervals is the only humane and legal way to control the dog population," he emphasises.

Cats, unlike dogs, are not as visible on campus and are mostly found near the hostel areas. "[The] problem with cats is that they become sexually mature at a very young age, and they give birth to big litters," says Nitin. Jack D, an alumnus and another founder member of the AWG recalls how they took care of Ghost – a white female cat who roams the New Girls' Hostel at night – and her kittens. "The AWG had put in a plan to ensure that she is sterilised, and that all the kittens get adopted. We had to keep her in an enclosed place overnight to make sure that she did not run away or eat anything before the surgery. Many cats have been sterilised and the kittens given for adoption," says Jack.

From conflict to coexistence

Both Nitin and Jack emphasise that even those who identify themselves as animal lovers need to be educated about pursuing animal welfare in a responsible manner. "We always discourage random feeding of strays by students. Also, there should be separate feeding spots for different packs of dogs," says Nitin, while explaining how fights over food between two packs can often become nasty. Such unpleasant fights can generate or enhance fear

among people. “I do not hate dogs, but when I see dogs running and barking, I get scared,” says Rinshad VA, a PhD student who had a traumatic experience during his childhood. He was around six years old, and one day, while trying to escape a dog chasing him, he tripped and fainted. These situations can also lead to accidents and injuries. “One early December morning last year, I was going to my lab, and suddenly found myself surrounded by a pack of dogs. They gathered around me, and almost jumped over me. I fell down and scratched my legs. Luckily, another person was passing by who somehow managed to disperse the dogs,” recalls a PhD student who prefers to remain anonymous.

Even those who identify themselves as animal lovers need to be educated about pursuing animal welfare in a responsible manner

Understanding the inconveniences that many campus residents encounter due to the presence of stray animals is vital to ensure peaceful coexistence. So is being compassionate towards those who face these difficulties. Jyotirmoy points out that working with the AWG has helped him understand these issues better. “Human-animal conflict, especially with dogs, happens primarily because most of us are not aware of their [the dogs’] psychology,” he suggests. This lack of awareness also applies to people who are fond of animals. “A main motto of the group is to educate and assist people who love animals as well as those who are not as tolerant to having animals around them. We prefer to avoid the term ‘animal haters’ because it has a negative connotation to it,” explains Jack. “We did not want to identify ourselves as ‘animal lovers’ either. It creates a divide. Our goal is coexistence,” adds Nitin.

The AWG faced an unprecedented challenge during 2020, when the Institute was closed, and most students had to leave the campus prior to the nationwide lockdown due to COVID-19. Upasana Gupta, a visiting PhD student who is currently handling finances for the group, was also one of the very few students who stayed back at IISc then. “The dogs were following me in search of food. I felt very bad, and I started feeding a few of them,” she recalls. That was how her association with the AWG started. With support from the IISc administration, the group planned a feeding programme during that time which continued till people started returning to campus. “The AWG is mostly a donation-run group. One big round of donation was made during the pandemic – a lot of people who had to leave campus donated to the feeding programme at that time,” adds Upasana. Jack, who stays in Bangalore, obtained emergency permission from the authorities to visit IISc regularly and feed the animals once a day. “It was really nice that the administration considered our concern and helped us,” says Jack.

Some of the AWG members highlight the importance of companionship that animals often provide to students on campus. Upasana is the daughter of a veterinary doctor. Having been around animals since childhood, she points out that spending time with animals can be beneficial for the mental wellbeing of people. Pritha Ghosh, another PhD student and AWG member, remembers how the dogs near the hostel helped her when she was under tremendous stress while trying to meet her thesis submission deadline. “I would be awake the entire night, working, and extremely exhausted. But, on my way to breakfast, I would meet Pogo, a little puppy. My exhaustion would vanish. There were also Rubenstein, Battery, and Bhodor – I played with them. It calmed me down every day,” she adds. Nitin also says that before the AWG was formed, he volunteered with CARE, and that was his way of coping with the stress of doing a PhD.

Photo: Jyotirmoy Paul

Pogo and Battery at the New Girls Hostel

Within the large green campus of IISc, there possibly exist many small ecosystems, and the animals on campus are a vital part of those. Nitin spoke about a few interesting patterns they have observed. For example, hostels where residents are tolerant of the presence of dogs have fewer monkeys entering inside. Another hostel, where there were no cats, witnessed bandicoot problems. “So, what we found out was that having a controlled population of all types of animals is beneficial. I agree it does cause inconvenience to some people, but it keeps things stable in the long run.”

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Playing the field

- Debraj Manna

Photo: Anooj Sathyana

The Gymkhana is ground zero for students interested in sports and arts

A scene from the women's basketball tournament

At the southwestern end of the main campus of IISc, an overbridge across CV Raman Road connects it to the IISc Gymkhana ground on the other side of the road. The ground, with an area of over 12 acres, has a building that houses all indoor activities of the Gymkhana, as well as facilities for outdoor sports like cricket, football, hockey, basketball and tennis. Also occupying the ground are the Student Amenities Centre, a couple of hostels, the Jawahar Guest House, an amenities hall, and a government high school. Inside the two-storied Gymkhana building is a dance room, where clubs like the dance club and the aerobics club conduct their events. The building also has a well-equipped gymnasium that draws in fitness enthusiasts. The colossal cricket ground also sees many people exercising and playing other sports.

The Gymkhana at IISc was conceived exactly 100 years ago. In November 1921, an assistant professor at the University of Cambridge, William J Pope, headed a committee to examine the functioning of the Institute. In its report, the committee proposed the establishment of the Students' Gymkhana Club. The proposal was accepted, and in 1924, with a generous endowment from Dorabji Tata, the Institute students were able to get away from the monotony of their studies and research when the Gymkhana was informally set up. It was inaugurated by Charles William Edgerton Cotton, the Agent of the Madras State Agency. Krishnaraja Wadiyar IV, the Maharaja of Mysore, agreed to become the Patron of the club, while JK Catterson-Smith, Professor in the Department of Electrical Technology, was appointed as the first president of the club. Finally, on 16 March 1925, Dorabji Tata formally inaugurated the club, now known as the IISc Gymkhana.

With about 30 clubs, the present-day Gymkhana has a broad representation of various sports, ranging from cricket to ultimate Frisbee, and cultural activities like dance, music, and theatre. Given the number of activities, the Gymkhana has a well-oiled organisational structure. Each club has a convener and a co-convener who manage the working of their club. An elected sports secretary and a cultural secretary oversee the matters of all the sports and cultural clubs. The students also elect a general secretary who manages all the clubs' activities through the two secretaries. The general secretary, sports secretary, and cultural secretary together form the student-run Gymkhana Student Affairs Committee (GSAC).

Photo: Anooj Sathyana

An athlete showcasing his long jump skills

The Gymkhana Improvement Committee (GIC), composed of faculty members, provides support to the Gymkhana. The head of this committee is called the Honorary President of the Gymkhana. The ex-officio Secretary of the GIC is the Deputy Registrar of IISc, who also serves as the officer-in-charge of the Gymkhana. The GSAC members first discuss any matters of concern, whether it is related to maintenance, improvement, or student activities, with the officer-in-charge. Their suggestions are then taken to the GIC for a final decision.

Photo: Chirantan Pramanik

A Friday afternoon poetry session organised by the Art and Literature Club

Where sports and culture meet

The Gymkhana hosts various sports clubs which organise both indoor and outdoor sports like archery, cricket, football, hockey, basketball, ultimate Frisbee, volleyball, badminton, athletics, carrom, billiards, chess, kabaddi, kho-kho, swimming, tennis, table tennis, handball, and so on. It also organises multiple competitive events every year in these sports.

Spectrum is the annual sports and cultural fest of the Gymkhana. As part of the event, several inter-departmental tournaments and competitions are held for the IISc fraternity. Some clubs like the cricket club, badminton club, music club, and the drama club organise their own events. A few clubs like the football club also organise inter-hostel tournaments. "For two to three weeks before and after a tournament, the footfall in the Gymkhana increases. Before the tournament, they come for practice and after the tournament, they are still interested in playing. So, conducting these tournaments always boosts interest in the students," says Abdulla Samin MV, the General Secretary of the Gymkhana.

Another annual event is the inter-IISER sports meet (IISM) in which the Indian Institutes of Science Education and Research (IISERs), National Institute of Science Education and Research (NISER), the Center for Excellence in Basic Sciences (CEBS), and IISc participate. One of these institutes organises and hosts the meet each year. In IISM 2018, conducted at and organised by NISER, Bhubaneshwar, IISc performed well and won its first IISM gold medal in the men's volleyball tournament.

After this achievement, volleyball club members like Parvinder Singh, a former PhD student in IISc, and others were determined to do better in IISM 2019. The women's volleyball event at IISM 2018 also inspired IISc's students to form a women's team. According to Parvinder, they practised hard and Gymkhana also arranged for an expert to coach the women. "Finally, in 2019," an excited Parvinder recalls, "for the first time, the IISc women's volleyball team participated in a tournament outside the Institute since its inception in 1909, and won gold." In the same meet, the men's volleyball team also won the top honours. Both the women's and men's volleyball teams are now among the best in higher education institutes in the country, he says.

The 2019 edition, organised at IISER Pune, was the last IISM to take place before the COVID-19 pandemic struck. IISc received about 192 nominations – the number of students who applied for participation – exceeding the cap of 150. Upon multiple requests, IISc finally cut down the number to 165, 155 of whom eventually participated in the meet. Although unhappy with the decision, students of the Institute did exceptionally well in the event. "Our students won 11 gold medals and two silver medals. The highest number of gold medals was won by IISc," recalls a delighted Veeranna Kammar, the Deputy Registrar and officer-in-charge of Gymkhana.

Photo: Ramachandra Bangari

Javelin throw

The cultural section of the Gymkhana hosts several clubs: dance, drama, music, quiz, art and literature, and aerobics clubs. The Ranade library is also part of the cultural section. The dance club has many smaller clubs to cater to those interested in specific dance forms.

Amritha A Raj, a PhD student and the cultural secretary of the Gymkhana, explains why these clubs matter. "We must involve as many people as possible because everyone should step out of their comfort zone and be active in doing things that are not related to research. These events will help people deal with the monotony and culturally just vibe in with the campus life," she says.

The cultural clubs participate in the inter-IISER cultural meet (IICM), which is similar to IISM but for cultural competitions. In the second IICM in 2019, organised by IISER Trivandrum, IISc won the championship trophy.

Photo: Rydham Goyal

IISc team winning the Champion's trophy at IICM, 2019

Making UG voices heard

In Indian higher education institutes like the Indian Institutes of Technology (IITs) and National Institutes of Technology (NITs), most students are undergraduates (UG). But in IISc, which is also a research institute, most are either Master's or PhD students. UG students are therefore underrepresented in public events at the Institute.

In early October, during a chai pe charcha meeting at the Sarvam complex, two UG students, Sree K Roop and Debarshi Ghosh brought up this pressing issue. The students, both active Gymkhana members who had previously helped organise sports events, reminded the other members that there had been no events for IISc's UG students in recent times. And that this had been made worse by the COVID-19 pandemic. In response, a committee to organise a sports event called *Eclipse 2021* exclusively for UG students was formed. Besides Sree and Debarshi, the committee also included Vibanshu Golla and Abdulla Samin MV.

Once the basic blueprint of the event was ready, the core committee approached the UG Dean, who readily supported the event. But the Dean also asked the organisers to ensure extensive participation among IISc's UG students. "We realised that the primary focus of this event is to increase participation. Then we felt the need to include events which are not high-skilled so that more people can participate. So we introduced events such as hand cricket, stone-paper-scissors, tambola, three-legged race, one-legged race, lemon-and-spoon race in addition to mainstream athletics," explains Debarshi. The organisers expected about 100-120 nominations; instead, they received 230. *Eclipse 2021*, initially slated to be a short event, eventually became a week-long affair.

Along with maintaining and providing support for the clubs it hosts, the Gymkhana encourages new activities and the formation of new clubs under its auspices, be it related to sports or culture. Recently, a handball club was formed. Bharath Sankar S, a PhD student in the Institute and the convener of the handball team, along with his friends, started this club in 2020 with a total of seven players. After contacting the administration, they were able to find a coach for their team. The number of members of the team has now increased to 20.

Other recent additions to the list of Gymkhana clubs are the poetry club and the quiz club (the latter has now merged with the Ranade club).

If the COVID-19 situation continues to improve, the Gymkhana is hoping to organise more events including *Spectrum* in 2022. It is also eager to host an IISM in the coming years. Most clubs of the Gymkhana are also beginning to come out of hibernation and organise their events.

Photo: Keerthana S Kumar

Table tennis is a popular sport at the Gymkhana

While the functioning of the Gymkhana has been largely smooth, it has also had to deal with many issues and concerns that crop up on a regular basis. For instance, students have frequently complained about the absence of grass-covered fields for cricket, football, and some other sports. Their night-time sports endeavours have also been halted because of the lack of floodlights. However, the students' voices seem to have been heard. In the coming days, the Gymkhana football and cricket grounds are set to become completely covered by grass, and the hockey ground will be upgraded to a turf court, according to Veeranna. Floodlights for the outdoor grounds of the Gymkhana will also be installed in the near future.

Debraj Manna is a PhD student at the Department of Biochemistry and a former science writing intern at the Office of Communications, IISc

Making learning FUN

- *Ranjini Raghunath*

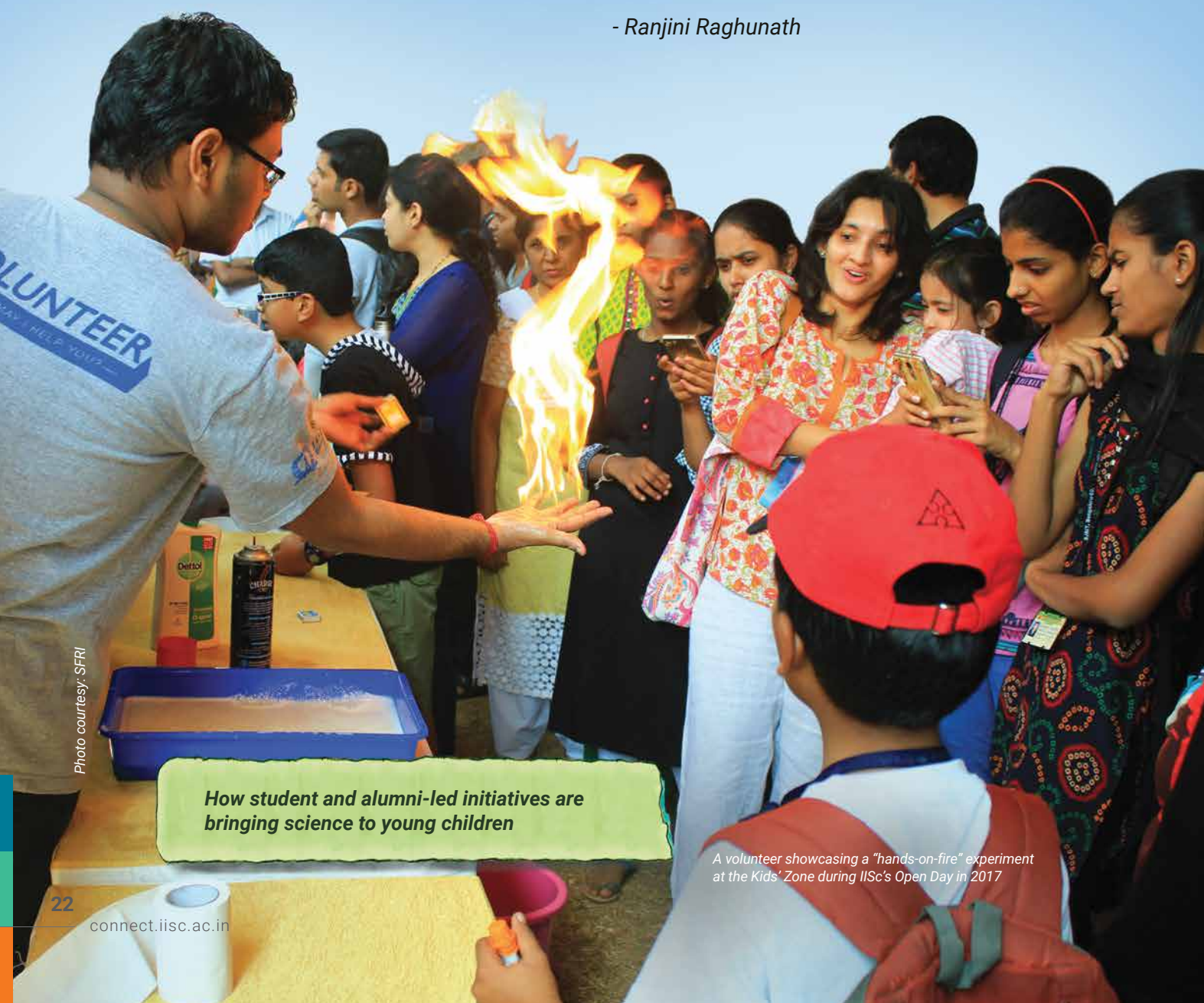


Photo courtesy: SFRI

How student and alumni-led initiatives are bringing science to young children

A volunteer showcasing a "hands-on-fire" experiment at the Kids' Zone during IISc's Open Day in 2017

In 2016, when Suyog Mahulkar, Ashok B, Nilesh Potghan and a handful of other students at IISc decided to start an outreach initiative to teach science and maths at rural schools, they were gung-ho but also a bit "naive", Suyog admits. Armed with presentation decks and simple experimental setups built in the lab, they set out to visit schools and orphanages in and around Bangalore, starting with Nisarga Grama, a children's shelter in Hesaraghatta.

What they witnessed at these places, however, was not just the poor quality of education but also crumbling infrastructure and dismal socio-economic conditions. At the Hesaraghatta orphanage, for example, students in the 9th and 10th standard could not do simple arithmetic. "In one of the girls' schools, sanitary pads were lying on the ground, and they did not have proper restrooms. It was very shocking to me," Suyog, a PhD student in the Department of Mechanical Engineering (ME), says. In other schools, experimental kits donated by NGOs were lying untouched because the teachers were scared of damaging them and having to bear the cost of fixing them.

Those visits were eye-opening but did not dampen the volunteers' enthusiasm. Calling themselves 'Science for Rural India (SFRI)', the group has been visiting many such schools and orphanages over the weekends – some nearly 150-200 km away from IISc – to teach the children. The Karnataka State Council for Science and Technology (KSCST), housed in the IISc campus, helps them identify students and schools in need and provides support for travel and logistics. Five years later, the group is still going strong, with about 60 volunteers from various departments at IISc.

"We take up topics from their science books, and explain the concepts with the help of some experiments," says Ashok, also a PhD student at ME. "For example, we built this electric generator using just household stuff: a magnet, a coil, an LED bulb and a rope." Initially, they let the children explore the kit on their own, and give them time to think and analyse what they see. "Then, we finally reveal the concepts behind it – what is a magnet, how is the coil working, what is electricity, and so on."

Over time, the volunteers have experimented with different formats and fine-tuned the way they teach these classes, sprinkling in cartoons and stories to make them enjoyable. "It is really hard to get their attention for more than half an hour. We try to make it as interesting as possible," says Suyog. The volunteers also take along with them at least one person fluent in Kannada or take the help of the school teachers for translations. For a short while, KSCST also brought batches of 40-50 students to campus and helped the group set up science 'magic shows' for them, but that was discontinued after logistical challenges, explains Ashok.

While SFRI has gained popularity in recent years – particularly for their involvement in organising the highly sought-after 'Kids' Zone' at IISc's annual Open Day – Suyog and Ashok are also worried about its future after they graduate from IISc. One of the ways they have tried to ensure its continuity is to rope in PhD students receiving the Prime Minister's Research Fellowship (PMRF), who are mandated to do outreach, each year. They also plan to set up networks with other institutes across India that organise similar activities.

Open Day might be the undisputed queen of outreach activities at IISc, but initiatives like SFRI, driven entirely by students and alumni of IISc, are also making a substantial impact on science education.

Photo courtesy: SFRI

SFRI volunteers explaining electromagnetism to school children using a simple experimental setup

Rethinking classroom education

The problem with primary school education, Pankaj Jain points out, is that the focus is more on "informing" students instead of letting them figure out how things work around us. "Science and maths are very beautiful processes," the former PhD student from the Molecular Biophysics Unit says. But hamstrung by a lack of resources, teachers themselves don't experience the "joy of learning", let alone their students. The classroom environment should also be "mistake-friendly and non-threatening," he adds. "A child should not be afraid of the teacher, and the teacher should not be afraid of the child and accept that they don't know [something]."

A few years ago, Pankaj and a couple of other students from IISc set out with an ambition to change how education is imparted in classrooms. Inspired by their days volunteering at NoteBook Drive, a student-led initiative that has been active at IISc for nearly 20 years, they founded a startup called Seed2Sapling Education. The company has worked with more than a dozen schools and hundreds of students to understand the gaps in teaching and organise different programmes to address them.

Photo courtesy: Seed2Sapling Education

Students at Vidya Mandir school in Malleswaram, Bangalore, testing the strength of their boat models

Under one of their initiatives called "Dialogue on Learning", for example, they spend an hour or so every fortnight with school teachers to first make them experience the processes behind the subjects. The discussion then goes on to how they can improve the way they introduce certain concepts and elicit responses from students in the classroom; these discussions continue for about two to three years. "Before we start, we ask the school to fill up a form and understand what their needs are, and customise the programme," explains Tarun Choubasia, a co-founder and alumnus of the Department of Electrical Communication Engineering (ECE) at IISc.

Seed2Sapling also organises programmes aimed at young children in primary and secondary schools, such as "Explore@Home", where the children are asked to develop simple experiments using household items. In one class, when they showed students a photo of ice cubes in a water glass and asked where the droplets on the outside of the glass were coming from, many students answered that the droplets were seeping out from inside the glass. Instead of correcting them, the team encouraged them to try and prove this theory by designing an experiment. For example, a child used coloured ice cubes to see if the droplets also turned out to be coloured.

"The idea is not to 'teach' students," explains Pankaj. "We are trying to make it more challenging actually … like a puzzle, but joyful. Let the students figure out the concepts by themselves."

When the pandemic hit, the team saw the chance to expand their scope beyond Bangalore and began organising online sessions for students and teachers. "We could engage a lot of students because of the inquiry and discovery process even in an online setup. But it's not easy," admits Tarun. "Sometimes they may turn their videos off. Then it becomes challenging."

Another problem is the glut of information the students are already exposed to, with some of them simply Googling answers to questions the team poses. One way to deal with this is to ask them why they think it is the right answer and use that as a conversation starter, explains Mrinal Shah, another team member and alumna of the National University of Singapore. "We also pick out some absurd articles and ask the students to identify what are the claims made, the evidence for the claims, and if there are any other explanations that they can think of." Mrinal is the only non-IISc graduate who's part of the Seed2Sapling team; the others including Pankaj and Tarun are all alumni of IISc.

Creating enthusiasm for ecology

Another IISc alumna, Devica Ranade, became interested in science communication when she took a break after finishing her PhD from Kavita Isvaran's lab at the Centre for Ecological Sciences. "During my PhD, I always felt that the exciting work that ecologists do doesn't reach the common person," she explains. In 2020, she started a website called 'Ecology Research Explained (EcoRE)' to break down interesting research in the field of ecology for a broad audience. "Initially, I thought that the best way to do this is through videos and animations. Then, I wrote some small articles and posted them on Facebook. That actually got a very good response." Slowly, she began recruiting more interns to help her write articles and make videos to share on Instagram and YouTube.

The goal, she says, is to reach students in lesser known colleges in India, and get them excited about pursuing a research career. "In ecology, there's a bubble," Devica explains. "At [places like] IISc, National Centre for Biological Sciences or IISERs, we get taught really well. Those students who are not in IISERs or IISc might not get as much guidance and exposure to the field as they should."

Image: Devica Ranade

Screenshot of a video where Devica explains how researchers study owl diets

In her videos, Devica and her team use simple language and colourful animations to explain new research findings or fascinating phenomena in the natural world. Some of their early videos on YouTube, for example, touch upon the role of tusks in Asian elephants and why fan-throated lizards display three different colours on their throats. Their website and Instagram handle also have posts on interesting research findings such as how some snails practice cannibalism or how

pollution affects pollinators like honeybees. "We focus on studies based in India since they do not get as much attention," explains Devica. In summer 2020, they organised an online workshop on "Backyard Biology" for more than 100 school students through the Chhatrapati Shivaji Maharaj Vastu Sangrahalaya, a museum in Mumbai, which was quite popular, Devica says. "I really want to get kids excited about the natural world around us."

Image: Devica Ranade

An Instagram post on cannibalism in snails

Opening up the campus

Initiatives like EcoRE, SFRI and Seed2Sapling are not the only outreach activities by IISc's students and alumni. The biggest by far, however, is the Institute's annual Open Day. Organised around the 3rd of March each year – to commemorate both JN Tata's birth anniversary and the discovery of the Raman effect – it has become an unmissable event in the city's calendar. On this day, the usually quiet campus becomes abuzz with chattering children and their parents in tow, running to keep up with the kids as they flit from department to department. Cries of "ooh" and "aah" fill the crowds as they watch drones race each other at the airstrip, or a student displaying a fireball in their hand, or the lightning show in the High Voltage building.

The success of Open Day is largely due to the Institute's student community, who turn out in huge numbers to stand patiently on their feet all day, explaining and demonstrating the same concepts and exhibits over and over again, and fielding questions from visitors of all ages.

"It is an immensely satisfying experience," says Karthik PN, a PhD student in the Department of ECE. "We interact with so many people. They come and challenge our thought process. They question us as to why our work is relevant."

During last year's Open Day, Karthik and his friends organised an event called 'Game of Loans' based on his PhD thesis, which saw five teams competing with each other to make split-second choices and score high points. "We get a lot of answers about our own work and understand it a little deeper." They also organised a session on 'Gate to ECE', giving tips and suggestions to students seeking to write the GATE exam and pursue a career in research at places like IISc, which was also popular, he adds.

The concept of Open Day isn't new; the idea of having an "Annual Week", during which labs in the Institute were kept open for the general public, especially industry representatives, was mooted as early as 1957, according to the annual reports. But it is only in recent years that the popularity of Open Day – which is now held only on one day – has increased tremendously, thanks to the reach of social media and interest shown by electronic and print media, points out Veeranna Kammar, Deputy Registrar and Public Relations Officer (PRO) at IISc, whose office is in charge of organising the event. "In 2020, more than 50,000 people attended the event," he says.

A large part of that crowd typically flocks to the Kids' Zone tent run by the SFRI team. In 2017, when they first came up with the idea of setting it up, their ultimate goal was to assemble a bunch of child-friendly experiments and demos they could later take with them to the rural schools. "We initially had only about 5-6 experiments, but on the day before, we received 40-50 experiments from different departments," says Suyog. They were also completely blown away by the visitors' enthusiasm. "The queue was so long that traffic became congested. On that day, we decided we were never going to do it again because it was very hectic to handle the kids," says Suyog. But they continued organising Kids' Zone again during the 2018, 2019 and 2020 Open Days.

This year, adapting to the pandemic, they decided to move Kids' Zone online, creating a day-long event showcasing various experiments and demos, even organising competitions for children to come up with their own experiments at home. The online event also turned out to be unexpectedly popular, with more than 75,000 people joining the live stream. The team is also working on providing translated versions of the videos with voice-overs in several regional languages.

"As a government-funded organisation, we have a responsibility to the common people, to impart knowledge and help them understand science and technology. Open Day is a very good medium for this," explains Veeranna.

Veeranna recalls that in 2019, he met a 76-year-old man who had travelled from a village in Chitradurga district (about 200 km from Bangalore) to bring his young granddaughter to Open Day. They had apparently been planning the trip for 15 days. "He reached here early morning around 7-7.30 am with his granddaughter. He wanted to show [her] everything in the Institute. The granddaughter was very enthusiastic, she grabbed all our pamphlets and kept asking what departments she could visit … She didn't care to eat lunch either; her grandfather was carrying some food in his hand and running behind her saying, 'please, please eat,'" Veeranna says, smiling. "I am sure that she will definitely become a good science student or a scientist."

Towards an inclusive academic culture

- *Sambita Modak*

A former IISc student, now an educator, remembers her experience of navigating issues with mental wellness and lays down what she learned from it

She walks alongside her mentor,
enters the seminar hall and gets comfy in her seat.
She is sinking through the seat,
a black hole sucking her in,
her vision blurs, and she's falling
She's falling

The speaker's words are distant murmurs,
as if in a dream,
her own words unreachable,
masking a muffled scream.

Illustration by the author

Sometime in late September 2021, when I decided to write this piece on mental wellness on campus, I was immediately transported back to a mid-September 2012 afternoon – my second month in IISc – that was about to change the very trajectory of my academic career. It was my first and pretty dramatic glimpse into what a mental health struggle could look like. But more than that, it was the experience that followed that opened my eyes to the factors creating a dearth of mental wellness in academia.

Speak to any grad student, and they would have several stories to share about labs where supervisors expect students to prioritise experiments over meals, or work on weekends and holidays even when their projects don't demand it. I have known peers who expressed the need to hide their engagement in non-academic activities after work hours, friends who have worried about taking time off to visit family or friends. I remember that in my first year of the Integrated PhD programme, most of our course assessments were scheduled at odd hours on non-working days, leaving little room for recreational activity. It was not rare, even in those very early days of my doctoral years, to encounter peers judging their labmates on the hours they spent in lab, on whether they were "dedicated" and "passionate" enough to spend their weekends in the lab, indicating that this unhealthy and unprofessional work culture has been pervading generations of researchers.

However, the culture of poor to non-existent work-life balance is not limited to a PhD scholar's experience, or even academia. Superhuman expectations of "productivity" affect every member of an organisation or institution, where adjectives like "resilient", "high-functional despite", "productive despite" turn into sought-after labels that insidiously exclude the workplace accommodations required by those whose mental wellness conditions call for a long-term supportive and inclusive environment. It doesn't help that mentors and supervisors often shy away from opening up about their own struggles or the workplace accommodations they might have appreciated in this regard. Their reticence leaves little room for mentees and students to gain confidence or to feel safe about opening up in their workplace. The role models held up to us are always the ones who overcome struggles with little to no help from others, grinding their teeth and 'battling it through with sheer grit', 'always thinking about their research'. I think many of us invariably attempt to ape these qualities, and any failure or departure from these models triggers a crisis of self-esteem and self-doubt, eventually creating a vicious cycle that is difficult to break away from.

Furthermore, our tendency to promote only the professional success stories of those who overcame their struggles with mental health creates the misconception that it is a one-time hurdle needing a one-time resolution. I agree that success stories can be the bearers of hope to someone who's unable to see the light at the end of the tunnel, but at the same time, it can feel alienating to those for whom the struggle doesn't end with tackling that one-time hurdle. The nature of support these individuals need might look quite different from those for whom the concerns were limited to a specific time, place or environment.

What we need is room for open and transparent conversations about mental health amongst all stakeholders interacting in a system – students, faculty and staff. Of course, the choice of sharing lies with the individual – it is the fear that stops them from sharing that is worrisome. The stigma around mental health is strong enough that I have seen people admitting to having problems fearing that they will be perceived as "unreliable", "less productive" and "irresponsible". This creates a communication gap, not only for those seeking support at their workplace but even for those who want to help someone who might be struggling, but there is no frame of reference to turn to in either case.

What we need is room for open and transparent conversations about mental health amongst all stakeholders interacting in a system – students, faculty and staff

Empathetic language to ask a person what help they need would go a long way towards bridging this gap. Such empathetic and inclusive language might come naturally to some, while some of us may need to be trained in this skill (building empathy in a community is already being practiced in institutes across the world, particularly in schools, which can act as a source of inspiration for academia). Without it, we risk imposing improper remedies on others without consulting them. Even if well intentioned, these actions can aggravate a mental health problem that we may not have adequate insight on. For example, the preconceived notion that being with family would aid recovery can lead to students who are unwell being sent home against their wishes. This not only violates their autonomy as adults, but can be particularly traumatising for individuals hailing from dysfunctional families and whose mental health struggles are deeply rooted in their personal history.

The official conversations on mental health on campus have mostly focused on the concerns of individuals with mental health conditions like depression and anxiety, and prevention of suicide. But what about the overlooked section of people who are reeling from chronic stress, or cornered in a non-inclusive workspace, yet are not quite in a place where they can be diagnosed with any serious mental health condition? I remember being told by a health professional, "Everyone has mild to moderate depression, why should that necessitate time off from work or a change of work environment for recovery?" Does that imply there is no place for those lacking mental wellness unless it escalates to a mental illness?

I have come across numerous instances of mental health professionals dismissing my friends' concerns about their health, or worse, jumping to conclusions and diagnoses too soon, or prescribing medications a little too hastily – sometimes, inappropriately without proper diagnosis – which from my experience can sometimes worsen the mental health condition. Besides, for me and many of my peers, the task of finding a "compatible" mental health professional and getting a proper diagnosis through trial and error has been an excruciatingly long and exhausting task. This in no way suggests that all mental health professionals are judgemental or dismissive, nor does it imply that medication and therapy is futile. I have personally interacted with several who are particularly empathetic, have exceptionally inclusive perspectives and who are also aware of these loopholes in the field, and work relentlessly to improve the situation.

Is there no place for those lacking mental wellness unless it escalates to a mental illness?

While mental health professionals may rightly advocate for a healthy lifestyle, rarely is the feasibility of this healthy lifestyle examined from the perspective of a student living on a meagre stipend and trying to keep up with a work schedule that demands, lauds, and often rewards overwork. Poor work-life balance can adversely affect both physical and mental health, as is experienced in burnout. This makes me wonder whether an individual can actually be helped in the long term in such an environment solely by turning to a mental health professional.

Where the lack of mental wellness is being triggered or worsened on a systemic level, to place the onus of one's own mental health entirely on the individual can never be quite sustainable, if at all successful, when the environment plays such a key role in not only one's mental wellness but overall well-being. Does it mean one should never aim for great outputs, ambitious goals? Of course, one should! It is not the destination that needs switching always, but the road to the goals that needs to be better paved instead of expecting every following generation to wade through murky waters and wince through the dingy and bumpy alleys that we, the predecessors, have gotten so used to. Changing this might require an enormous amount of creativity and empathy, and organised effort, but unless a determined initiative is taken, the path will remain ridden with potholes for generations to come.

In some ways, the rise in mental unwellness with the pandemic, a multidimensional stressor, has revealed these gaping holes in our conversations around mental health and mental healthcare. And it has directed us to the changes that are required in our approach to address these issues. For instance, while everyone to some extent has suffered the brunt of this immense stressor, I did notice that those who recovered fairly quickly or easily from the blows were not simply resilient individuals, they were often the ones in a more resilient environment, cushioned with a reliable and inclusive support system, with easy access to proper and affordable healthcare, a steady income, and a relatively stable and healthy professional and personal life. The workplace might not be able to do much to change the personal past and present of an individual, but creating an inclusive environment that provides stability in at least one facet of one's life can sometimes be the anchor that one needs to sail through the changing tides of life. As simple a thing as timely disbursement of a stipend could mean one less major stressor in a researcher's already uncertain life, without the additional stress of losing out on the time and energy it takes to follow up with the relevant office.

Ensuring an environment that fosters mental wellness is key to keeping mental illness at bay. In the institute I currently work in as an educator, the institute counsellor, mentors, teachers and the institute authority often work hand in hand with the students, without breaching confidentiality, to understand each student's requirements, creating an inclusive environment that prioritises trust and safety. This eventually sets the students up for growth and long-term success, even if it were to mean a temporary setback in terms of deadlines.

Lastly, I think the answer to our collective burnout is probably not just sessions with a therapist, but as one of my friends recently suggested: "the answer lies in a life offering sustainable rewards". For me, sustainable rewards in life range from accessing the flow state of mind during art sessions with friends or on my own, or playing with data (for fun), to just taking a break to embrace the stillness and soak in nature, doing nothing conventionally "productive". It might be something entirely different for another person. It would be wonderful to have an environment where all members of the institute have access to these moments or sometimes, even periods to unwind, to create space for these rewards in an otherwise deadline-driven "always busy" work life. For in the end, I know that no number of therapy sessions could have replaced the amazing support system I was lucky enough to have landed during my PhD, despite all odds and despite all their shortcomings, in the form of an understanding mentor, life-long friends, the thrill of learning new skills, indulging in creative expression, and last but not the least, countless walks through the green campus of IISc.

Sambita Modak is a former PhD student at the Centre for Ecological Sciences, IISc, and was also a member of Empaths at IISc. She is currently working as an educator at Bombay International School and is interested in psychology, art, and the need for systemic change to foster a more inclusive and healthy workplace environment.

Mute/ Unmute

- Samira Agnihotri

Navigating the new normal of online learning

Photo: Bharath M

Selvam Raja from the I-KEN team testing the studio equipment

In early 2020, as the nation went into lockdown, educational institutions across the country were forced to move their classes online. This was not a smooth transition, with technical glitches, connectivity issues and many awkward situations. Attreyee Ghosh, Associate Professor at the Centre for Earth Sciences, recalls one such incident. In the beginning, she used to ask her students to switch on their video when they were speaking. “One day a student said, ‘Ma’am, I’m in my hostel room and I’ve got all my washed clothes hanging behind me. Do you really want me to turn on my video?’ I said, ‘No, no. It’s okay, forget it.’ After that, I kind of gave up. I don’t want to see things that I don’t want to see!”

This uncomfortable coming together of the personal and the professional has become the new normal. Several faculty members and students recount their experiences of how they have navigated this new medium of teaching, and the challenges they have faced over the past year. Some of them also describe the positive side of online teaching. The Institute, for its part, has introduced some initiatives in response to the current situation, including setting up studios where faculty members can record lectures and a fully online MTech degree programme. As faculty and students adapt to the evolving situation, academic institutions may also need to prepare for a future in which the best of both worlds – online and offline – coexist.

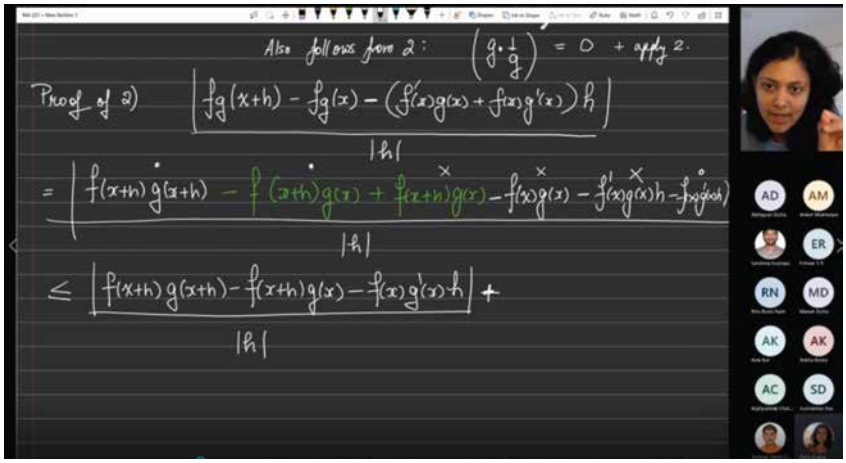
An unsatisfactory experience

Left with no choice but to teach online, faculty members at IISc have been making the best of the situation, but many of them admit that it has been an unsatisfactory experience, ridden with challenges. For one, the back-and-forth interactions that happen in class have dipped drastically, says Ramray Bhat, Associate Professor at the Department of Molecular Reproduction, Development and Genetics, and a recipient of the Prof Priti Shankar Teaching Award in 2020. “Teaching is much more than just being able to pass on words or even slides to students. There is a performance of sorts … one communicates through so many more dimensions when one teaches [in person]. Creating a dialogue with the students is very important, and this is very difficult to do online,” he says. Overall, many faculty members say that students don’t participate as much in online classes, and that faculty-student interactions are reduced to questions like, “Are you able to hear me?” and “Are my slides visible?”

Not being able to see the students' faces in class has also left faculty members unsure of whether what they are saying is getting through to the students. “When we are teaching in person, the expressions of the students tell you a lot,” says Attreyee. “It’s very gratifying when students grasp a concept you are teaching. In a physical class, you can see their eyes light up – that is a very satisfying feeling for an instructor.”

For some subjects like mathematics, the challenges are particularly stark. Purvi Gupta, Assistant Professor in the Department of Mathematics, explains that presenting long technical proofs has become especially difficult on a small screen. “The content is very, very restricted.”

Photo: Purvi Gupta



Screenshot of an online mathematics class

Adding to their woes is the extra preparation that online teaching requires. Ramsharan Rangarajan, Assistant Professor in the Department of Mechanical Engineering, who also received the Prof Priti Shankar Teaching Award last year, says that presenting learning material online in an effective manner is a big challenge. "My wife used to poke fun at me saying, 'Are you the one taking the class or the students?'"

Having to conduct practicals online has also been challenging for both students and faculty. Even though faculty members have been recording videos to demonstrate experiments, and conducting extensive discussions on troubleshooting afterwards, students confess that they gain experience only when they can actually perform these experiments themselves. "Even though I'm in my final year right now, I don't feel very confident when it comes to my lab skills," says Vibhanshu Golia, a fourth semester undergraduate (UG) student.

Faculty members also find it tough to design and evaluate exams online because it is much harder to prevent students from sharing answers among themselves, something that several students also admit has happened. "But at the same time, if you have an erratic Internet [connection] like I did at home, then the professor might think, 'Oh this girl went away, she might be cheating,'" says Bhoomika Bhat, another UG student.

Missing human touch

Connectivity issues have also left students in fear of missing out on important lessons and being unable to catch up. Aastha Munjal, an Integrated PhD student in the Department of Microbiology and Cell Biology, explains that at the beginning of the lockdowns, when everyone at home had to work and attend classes online, the bandwidth would get overloaded, and she would lose connection frequently. "I felt quite helpless. I actually remember feeling that everybody else is able to catch up and I'm not." It felt very alienating, she adds.

Bhoomika echoes this feeling, saying that if she missed out on a few minutes and could not follow what was going on, she felt like quitting the class. Initially, a lot of professors did not record their classes, and if students lost connectivity, that content would be gone forever, the students say. Eventually things stabilised, and almost all faculty members now record their classes on Teams or upload them on private channels on YouTube.

Technical issues aside, perhaps the biggest drawback of online learning is the lack of social interactions. "I definitely enjoy talking to students, given that our jobs are quite solitary. In mathematics, we don't work in a lab environment and a typical day for me is just being by myself solving problems. The most social aspect of my job is teaching," says Purvi. Having joined the Institute just before the pandemic hit, she also says that she is eagerly waiting to get back to the times where faculty are talking among themselves about how their classes are going and exchanging notes over lunch.

Most students are also waiting to get back to the physical classroom. Nikhita Kirthivasan, a UG student says, "In online classes, we still do get an opportunity to learn, but the interaction of the class is constrained by the fact that there's a lot of nonverbal cues that you're missing out on, both from your colleagues and from the professors." Aastha adds, "Even the most introverted friends of mine were ultimately very fatigued by the online platform."

This phenomenon of "zoom fatigue" has been particularly hard on students who have to sit in front of their laptop for hours together. Bhoomika says, "We all have lower attention spans now – nobody can sit through an entire class. In a physical class, at least when you zone out, there is someone around who's paying attention and you're motivated to listen." Staring at a screen for long hours is even harder for people like Arkadip Basu, an associate of Walmart and currently a student of IISc's new MTech online sponsored degree programme. "Being working professionals, all of our development activities are online, hence we spend a significant amount of time in front of our laptops. Now with classes to attend as well, that screen time has increased a lot," he adds. "The new programme is very useful as continuing education for people like me. But if I were on campus, I'd visit the library quite often."

The bright side

Fortunately, there is a silver lining to this situation. Several students and faculty members see some benefits to having classes online. "I really like the idea

of having recorded lectures at your disposal. I could watch those before the exams to prepare," says Vibhanshu. Some people are good at multitasking, and for them especially, online classes allow them to be more productive. Bhoomika recounts how a lab mate of hers logs into class on his mobile phone while working in the lab, and still manages to ask the right questions.

"In some ways, [online teaching] has made things easier; you can sit in the comfort of your home or office and teach," explains Attreyee. "If you forget something, you can have your notes before you and take a look. Earlier, if I was travelling for a meeting outside Bangalore, I would have had to cancel my classes, but now we have the option of conducting the classes online."

Purvi adds that another advantage is that for some students, there is a certain anonymity that the online classroom offers that might encourage them to speak up – at least in the chat – which they would otherwise hesitate to do in a physical class.

The future of the classroom

Some faculty members like Ramsharan are not entirely convinced about the benefits of teaching online, but even he admits that we can no longer depend entirely on "pen and paper or chalk and blackboard". He says that it would be prudent to prepare for the future when something like this may happen again, and to run some courses in hybrid mode.

The Institute has already taken steps to prepare for that future. "IISc had previously recognised the disruptive role of educational technologies in 21st century learning. These can not only enhance a regular student's learning experience but also bridge the space-time-opportunity gap by making the content accessible to a broader audience. A learner can learn from anywhere, at any time, and any pace. The early days of the pandemic brought into sharp focus the need to use these technologies to engage with the learners in the online mode," explains Rajesh Sundaresan, Dean, Division of Electrical, Electronics and Computer Sciences. He and several faculty members including KVS Hari and GL Sivakumar Babu coordinate IISc's Knowledge E-Learning Network (I-KEN), housed in the Centre for Continuing Education.

I-KEN provides high-end infrastructure to help faculty members record and create online courses and interactive videos, and provide a more immersive learning experience. I-KEN also assists faculty in the new MTech (Online) degree programme.

"For both the regular and the MTech (Online) courses, we have a Moodle platform, a learning management system that hosts courses and stores recordings of the classes," explains Nicy Scaria, a Project Scientist at I-KEN. "We enhance the quality of those videos by editing and adding new content or by embedding interactive plugins. We also create a table of contents so that students can directly go to a particular timestamp in the video," she says. Krishna Chaythanya, a PhD student from the Department of Electrical Communication Engineering (ECE) and a Teaching Assistant for a regular Data Analytics course, agrees. "I think Moodle is definitely a very useful platform to have. It is easier to search for content, and there are discussion forums. Even tests are now conducted through Moodle."

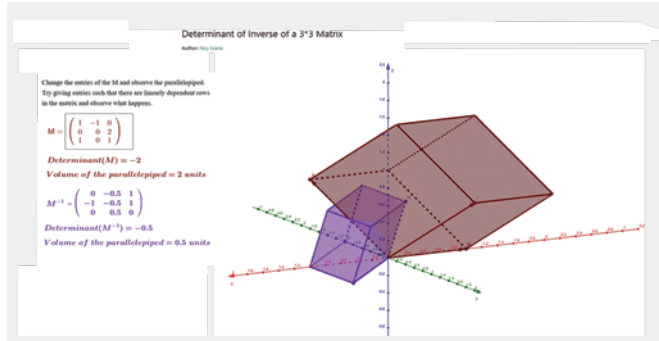


Photo: Nicy Scaria

An interactive simulation created for the MTech Online Course

The I-KEN team constantly strives to make the online classroom experience better, Nicy adds. In July 2021, six faculty members shared their online teaching experiences in an I-KEN workshop. Nicy says that the response was overwhelming and that the tips and feedback shared by the speakers helped many others. "There are still some issues with student engagement and assessment when everything is online, but everybody is learning."

Nicy also explains that the online mode is only gaining momentum. "Even if the pandemic is over and offline classes will start, the feedback from professors is that they can create resources useful for the coming semesters as we shift to a hybrid or in-person mode of teaching."

Complaints about online teaching aside, Ramray points out that it is ultimately a matter of privilege to have this alternative and access to it. In rural India, a lot of children and young people who have the right to education have been deprived of it. A large section of society cannot afford devices such as smartphones, let alone laptops. Many cannot even afford to buy a data pack for their mobile phones. Krishna points out that in two of his courses, there were students from Jammu and Kashmir who were unable to attend classes that were live streamed due to the Internet shutdown. They would have to wait for the class to end and then try to get to an area with mobile connectivity, and download the recording.

"A large part of our world is deprived of these choices and privileges," emphasises Ramray. "It is incumbent on us to realise that and to make the best use of what we have, and be thankful for it."

‘If I say I am Sudha Sudarshan’s husband, people understand who I am’

- Kavitha Harish

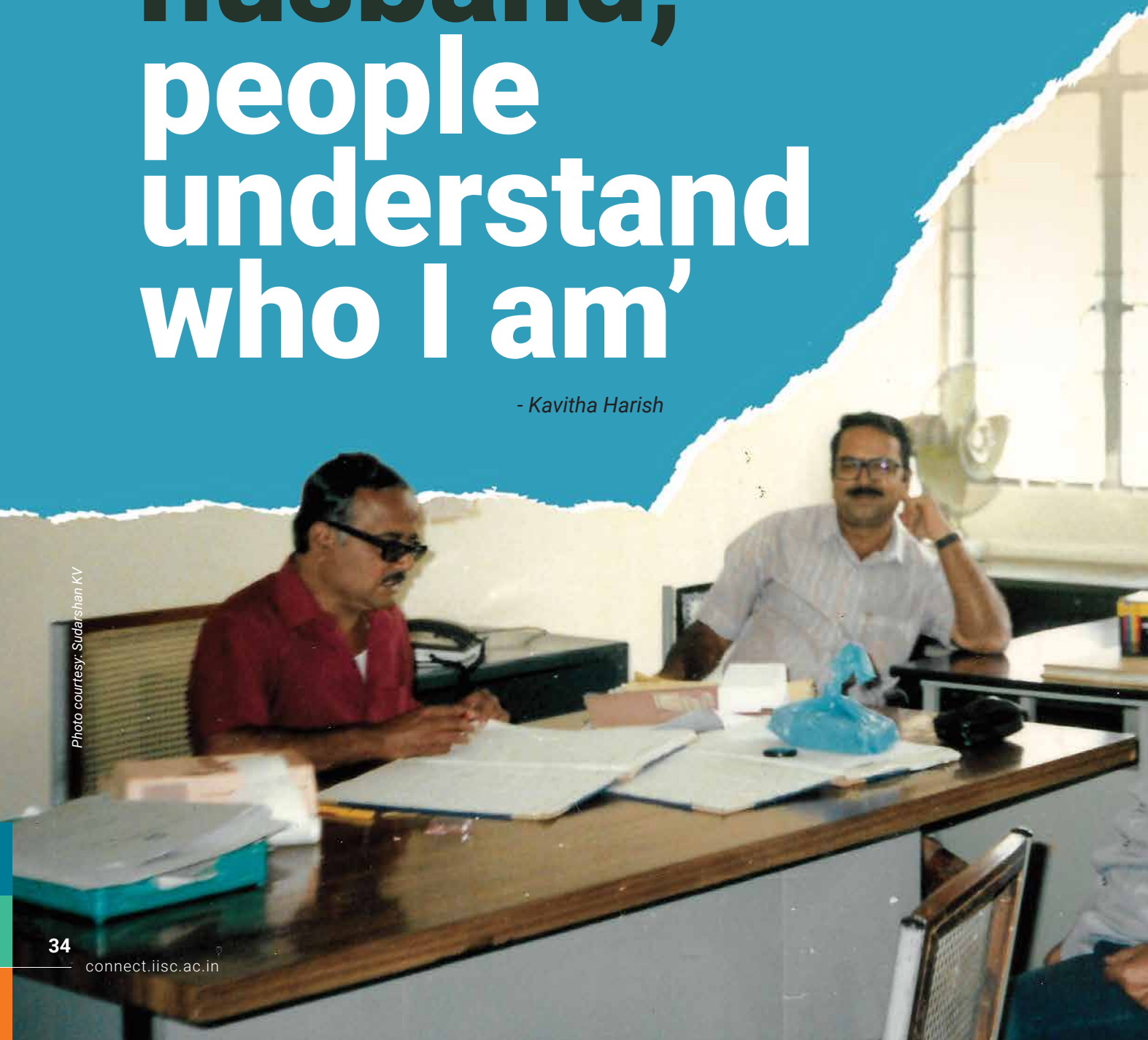


Photo courtesy: Sudarshan KV

Sudarshan KV joined IISc in 1966. He worked in the Budget Section before serving as Office Supervisor in the Centre for Sponsored Schemes and Projects. After opting for Voluntary Retirement Scheme (VRS) in the year 1998, he served in the Pensioners' Association at the Institute for over 10 years. Having been born on campus, his association with the Institute has been a long and happy one. In this interview, he recounts how salaries were once given out in cash, how medicines were prepared on campus by compounders like his father mixing brightly coloured liquids, picnics and outings with colleagues and friends, and how having a famous spouse has meant close proximity to the who's who of the Kannada film industry.

What was your life like before joining the Institute?

I feel very glad to be able to say that I was born on IISc's campus. We were nine children in total: I have two elder brothers, two elder sisters, two younger brothers, and two younger sisters. I was the only one of them to have been born on campus, and I was called 'Madhyama Pandava' at home.

My father, Shri Venkat Rao, was an employee at the Institute working in the Health Centre's dispensary, giving out medicines under Dr TB Subba Rao. He was a compounder and served for over 35 years here. He would manage the medicines, which were coloured liquids kept in containers. Whenever the doctors prescribed medicine, he would prepare it by mixing one or two colours and giving it to the patients, who would come with their own bottle. Many a time, for cold, cough or other small ailments, patients would request my father to give them medicine without approaching the doctor for a prescription. My father would ask, "What happened? Okay, drink this and go home, take rest." My father was in service from 1935 to 1975. My mother, Sarojamma, was a housewife. Our quarters were where the Tata Memorial Science Club [now known as the Tata Memorial Club] is currently located, which was near the old government school next to SBI.

My schooling began at the Institute government school. It was a small school, and a very old one. Middle school was in Yeshwantpur, and high school was in Malleswaram, and I pursued a BCom at MES College, Malleswaram. My wife is from Srirampuram, and we also own a house in Mathikere – everything being so close to the Institute has made my life revolve around the campus. Before the pandemic, we were regular visitors to the campus for a walk.

What motivated you to join IISc?

After my BCom, I was planning to work for a bank and was looking for opportunities. My father suggested that I try for a job at the Institute and introduced me to Mr SS Prabhu, who was the Registrar at the time, and requested him to provide me with an opportunity, if any.

Sudarshan KV (extreme left) in the Schemes section (now CSSP) with colleagues MR Narayan, PR Prabhu and B Subbaiah

Mr Venkata Ramaiah was the Assistant Registrar for the Establishment Section, which handled recruitment. Those days, there was no employment exchange or recruitment process, we only had an oral test. I got through, joined the Institute, and after that we had to appear for a 'code examination' every six months. This particular test is all about the Institute, and we were given a booklet to read beforehand. Those who passed were made permanent employees at the Institute. I was first appointed in the Accounts Section.

Photo courtesy: Sudarshan KV

Sudarshan and Sudha at his retirement function at Choksi Hall. At extreme left is Mohan Das, former Deputy Registrar, Centre for Sponsored Schemes and Projects (CSSP), and on the extreme right is HS Mukunda, former Chair of CSSP

What was the nature of work in the Accounts Section?

I first worked in the Budget Section which was in the Main Building. At that time, all the Central Offices – Establishment, Council, Finance, and so on – were functioning from the first floor and ground floor of the Main Building, except for Purchase and Stores.

We had a very pleasant working atmosphere in the Section, especially with our colleagues and officers. Our busiest days were those during the budget period when all the accounts were to be submitted. We would go to the office at 9 am and sometimes work until 9 pm. We had no computers, and there was no OT (Over Time payment) to employees working after office hours. Officers would provide snacks in the evening. Our work involved checking the one-year accounts, receipts, payments and so on, and the final work was to prepare the stencils, which had to be checked very carefully. The stencil was a master print on a special sheet that we would use to print many copies using a stencil machine.

In those days, we didn't pay staff by transferring the amount to their bank accounts – we would give employees cash in an envelope! Two employees from the Accounts Section were deputed every month to each department to personally hand over salaries to employees. When it was our turn, we were given a vehicle accompanied by a security guard, and we would take the cash box to each department with a notebook.

I had the privilege of going to the dispensary and handing my father his salary when I was deputed to Cash Counter 2 (we had eight counters to pay salaries on campus). My father was so happy to see me paying salaries to all in the dispensary, and to receive his salary from me in an envelope.

From the Accounts Section, I moved to the Schemes Unit which is now the Centre for Sponsored Schemes and Projects (CSSP). After taking VRS in 1998, I worked in the Pensioners' Association up to 2012. I left the Institute after that to undergo a heart operation, after which I worked in the Association again until 2016.

What is the function of the Pensioners' Association?

Retired employees are given the option of joining the Pensioners' Association at the Institute for a membership fee. This association, which has more than 300 active members, has a Benevolent Fund to support pensioners. This fund is generated by contributions from members, grants from the University Grants Commission and the Ministry of Education. The interest earned from this fund is used to support pensioners' medical bills, a death relief fund, their children's education and marriage.

Were there any memorable events from your time at work?

There were several memorable events.

After all the budget work for more than a month of working day and night, instead of OT, to encourage the staff, our officers would take us out to movies and lunch. I remember seeing *Sholay* with colleagues and enjoying lunch in the Majestic area. We had been to this movie with Mr Anantharam, the Financial Controller, and Mr Nanjunda Rao, the Registrar. They booked tickets for all the staff in our section and got lunch and snacks from Ramakrishna Lunch Home. We

were also taken to the Exhibitions opposite the Majestic Bus Stand once in a while. Mr Anantharam would spend on all these outings, getting us snacks, gifts, and so on.

I also remember being told that on the day of my father's retirement, during his send-off, Mr SS Prabhu, the Registrar at the time, said to my father, "Hello, Venkat Rao, you are leaving the Institute, but you are leaving an asset to this Institute, I say." My father was in tears hearing those words about his son. After coming home, he called my wife, gave her the garland he received at his send-off, and told her to put it on me. He was so happy about me. This is one of the most unforgettable and happiest moments of my life.

Do you have good memories of your time outside work as well?

There are many, we need more time to talk about that, but let me tell you that my wife Sudha Sudarshan and I organised many picnics to places in and around Bangalore every year for colleagues and friends. It started from our section initially, then many other staff members eventually joined us.

We would start from the Institute at 7 am sharp and return by 7.30 pm. We would arrange to take a cook along with us, and have freshly cooked breakfast and lunch. We conducted many competitions and games, and had a lot of fun giving out prizes and gifts. On returning, everyone would get packed food before they left for home so that they wouldn't have to cook after reaching home. Staff and family members would wait eagerly for the next picnic. We were happy to sponsor these picnics, and we really had good times.

I also remember that we used to have a nice canteen for students and staff, who could bring their families as well for unlimited food at subsidised rates. We remember eating the masala dosa every time, and there was no need for us to eat breakfast at home. It was a very good mess, with good food, and staff coming to make those special breakfasts, which were quite popular in those days. We would take house guests there for lunch on Sundays.

Did you happen to meet any dignitaries during your service at the Institute?

I have seen Nikita Khrushchev when he visited IISc, though I don't know the exact date. I have also seen Pandit Jawaharlal Nehru during his visit to IISc. I think this was before I joined the Institute. [Editor's note: Khrushchev visited in 1955, while Nehru visited in 1948 and 1951.]

During the 75th year celebrations of the Institute, I have seen some dignitaries. The Institute gave us one silver coin each.

Photo courtesy: Sudarshan KV

Sudarshan and his wife Sudha with Kannada actor Dr Rajkumar

We understand that your wife was a popular figure because of her work in All India Radio (AIR). Can you tell us about her?

My wife Sudha Sudarshan was quite popular as an announcer in AIR-Vividha Bharathi. Because her work involved interviewing many celebrities, I had the opportunity to meet and interact very closely with almost all Kannada film actors and actresses. In fact, people would frequently identify me as the husband of Sudha Sudarshan. Especially on the phone, when I say I am Mr Sudarshan, they don't remember me, but if I say I am Sudha Sudarshan's husband, people understand who I am. Many of my colleagues on campus were fans of Sudha, and when they found out I was married to her, they wanted to meet her.

Once I had the opportunity to pick up and drop the actress Pandari Bai home after her radio interview. It also so happened that my wife had to interview the actress Lakshmi after the movie *Tony*. I took my scooter to pick up my wife. That day, somehow, Lakshmi's car was not available. She requested me to drop her home on my scooter. I got really scared; how could I take her on my scooter on the road? Immediately, the actor Ambarish intervened and arranged to take her home in his car. I also remember Dr Rajkumar saying over snacks with us, "Drinking tea with masala vada, that's the real maja (fun)." I recall several such incidents interacting very closely with many Kannada film stars who are like my family friends even now.

Sudha served at AIR for 25 years and applied for VRS along with me to take care of health issues.

Kavitha Harish is Personal Assistant to the Assistant Registrar (HR, Council) at IISc

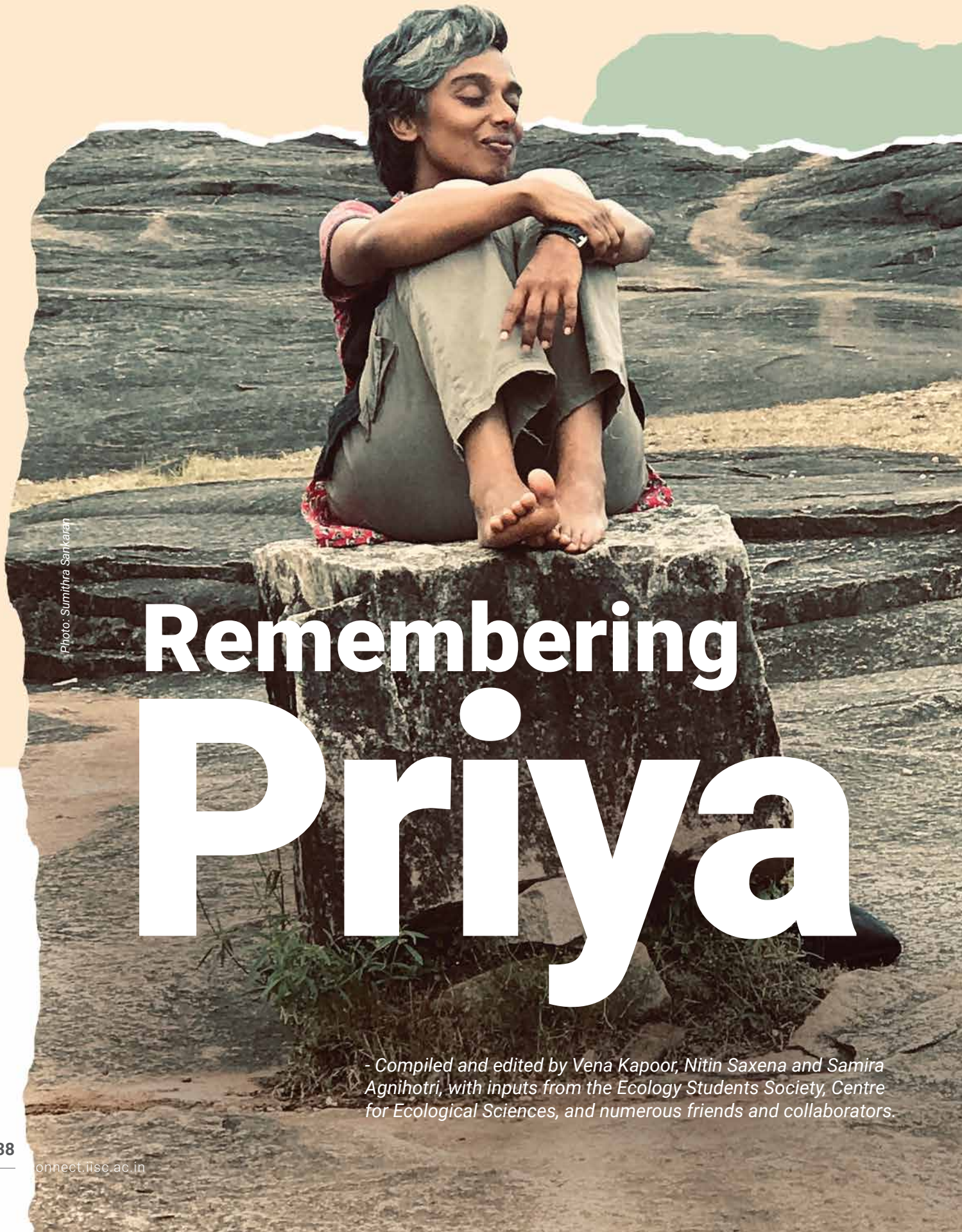


Photo: Sumithra Sankaran

Remembering Priya

- Compiled and edited by Vena Kapoor, Nitin Saxena and Samira Agnihotri, with inputs from the Ecology Students Society, Centre for Ecological Sciences, and numerous friends and collaborators.

The Indian science ecosystem lost Priya Iyer, a bright young scholar, earlier this year. In this tribute, Priya's friends, colleagues and collaborators remember the difference she made in their lives and to the science of looking at the natural world.

Priya Iyer grew up on the campus of the Indian Institute of Science (IISc) in Bangalore and went to the nearby Kendriya Vidyalaya for schooling. At IISc, she fell in love with the natural world. Later, she joined IIT Kanpur for an Integrated MSc in Mathematics and in 2009, she earned her PhD from Stanford University, where she started to address important questions in evolutionary biology.

After her PhD, she joined IISER Pune as a postdoctoral research fellow while also teaching and mentoring undergraduate students. She moved to Spiti in Himachal Pradesh in 2014, to study blue sheep and ibex. In 2017, she joined the Theoretical Ecology and Evolution (TEE) Lab at the Centre for Ecological Sciences in IISc to continue her research on mathematical theory and modelling in evolutionary biology. In some of her last projects, she was exploring the diversity of mating systems found in nature and the evolution of sex roles in parental care. Influenced by her PhD advisor Joan Roughgarden's path-breaking research, she investigated how cooperation, rather than competition, could be responsible for the diversity of behaviours seen in the natural world.

Priya, however, is no longer with us.

We could have written pages on her amazing contributions to scientific research spanning many years, and her numerous peer-reviewed publications, but those can be found online. We want this tribute to showcase her vast influence and the lasting impact she had on the people she met on her journey.

The Priya Iyer we knew would have disliked any clichéd paeans about her. The Priya we knew would have wanted us to move on and try our best in our own ways to correct all the wrongs in this world, because that was what she was doing, little by little. There was a beautiful reflective simplicity in her approach to life, her choice of words, and her lifestyle. As those who were close to her, we want to strive to keep alive her ideas, her vast empathy for others, and her deep passion for science and education in India.

It took us some time to settle down to write this tribute. Were we ready to talk about Priya through our shared memories, conversations and laughter? Would we be able to do justice to this amazing human being, who left us bereft, and too soon?

With gratitude to TheLifeofScience.com, who waited patiently while we compiled our thoughts and reflections of her, we reached out to those who also knew her and asked them to share a few lines (or more) about how they would like the world to remember Priya. We like to believe that she would have approved of this.

As we went through the notes, a few recurring themes stood out. Priya played several roles in each of our lives. She was a brilliant academician, and her teaching skills and zeal to promote a positive culture of doing science were incomparable. Vishwesha Guttal, who heads the TEE Lab at IISc, describes Priya's intellectual calibre: "I loved the way she did her science – slow, steady, reading in-depth all the papers she cited (how many of us do that, really!). She was sharp and had deep insights. She had an amazing ability to thoughtfully create models that nicely connected with data – an art that many theoreticians must envy! On various occasions, when I am in doubt as to whether what I am doing is right, or can I do better, I ask myself, "What would Priya have done in a similar situation? I find that I can't match how she went out of her way to help others."

Priya was a superb mentor, and a source of strength and support to many, both within and outside the science community. She had an exceptional ability to reach out to people and help them feel better and more accepting of themselves. Be it a collaborator, a student, a colleague, or someone she met only once at a conference, she had a very personal and positive impact on everyone she interacted with. Priya's love and compassion were unbiased. Whether it was a spider across her window, a helper in her house, or a victim in jail, she would always go to great lengths to help every living being who came into contact with her. If you knew her, you would know she always had you in mind.

Priya was a superb mentor, and a source of strength and support to many, both within and outside the science community

"She was never dismissive of anyone who wanted to speak to her about anything. I always left our conversations feeling better about myself. That was the kind of gift she was to the people who knew her," says Sanaa Khan, a Master's student whom Priya mentored for a project. "I've met many people before and since, but none gave me a sense that they truly cared about the people they interacted with, in the way she did. She was someone special and I'm glad to have known her. Because I knew her, I know what kind of person and scientist I want to be. I know I want to be patient with people, to remain open to new ideas (in science or elsewhere) and I know I want to be the kind of person who truly cares about the well-being of other people without a vested interest. That was who she was and though she is gone, her absence is a presence in my mind. She will always remain an inspiration to me."

Vivek Jadhav, another student Priya had mentored, adds: "If you're lucky, you work with a teacher whose influence helps you transform into a better person, and Priya was that teacher to me." Abhilesh Dhawanjewar, a collaborator and friend, recounts, "Priya was a warm and compassionate human being who always put others' interests before her own, especially when it came to her students. She was a very nurturing and encouraging mentor who inspired me to seek answers to my curiosities and turn them into actionable projects. Her calm, collected and caring nature magically dispelled any worries, uncertainties or chaotic elements of any project. I am who I am today, in part because of the significant role she played in my life. She is dearly missed."

As someone who was deeply concerned with issues of social justice, equality and fairness, Priya was a resolute source of strength and support to innumerable people. Arun M, a friend and colleague from the TEE lab where she worked, recalls how she would take others' problems as her own, and wouldn't rest until she found a solution. Nandini Cholaraju, a close friend of Priya since her time in Spiti, adds, "I would say she was a scientist outside her lab too. She was constantly attempting to find solutions to all the problems in the world in her mind-lab."

At Spiti, apart from her research, she also spent a lot of time with the local children, working to hone their curiosity into scientific temper. "She earned the love and respect of the locals," says Nandini.

Karpagam Chelliah, who joined Priya's team when was studying the courtship behaviour of the blue sheep in Spiti, brings up an incident from 2013 when Priya had literally saved her life. "We were headed from Shimla up towards Spiti, while everyone else we met on the way was sensibly travelling down the mountain. Our base camp was at an altitude of maybe 13,500 feet. It was inexplicably beautiful, mysterious and desolate. It was also extremely cold and cruelly windy – the wind felt like a searing knife in my chest when I inhaled. I was struggling to do fieldwork – could barely walk, could barely use my fingers to operate the camera or the binoculars or scribble data. I was totally useless. Priya was half my size and seemed to eat less than a sparrow, but was totally at home, running up and down the slopes with a backpack as big as her! Of course, my morale was down and I, who had dreamed of going to the Himalayas ever since I can remember, was actually longing for the tropical green mango and coconut trees and the scorching heat of Madurai, my hometown. Priya was very patient and she tried to teach me how one can overcome physical suffering with the strength of the mind. She certainly was doing it! Unfortunately, my will was not as strong as hers and on the third day, I developed altitude sickness. So while Priya did fieldwork alone, I lay down in the field station all day and all night struggling to breathe. Priya would return from fieldwork and take care of me. She would also keep the fire going, cook, clean and then organise the data collected and plan the logistics of fieldwork for the next day.

"She was constantly attempting to find solutions to all the problems in the world in her mind-lab"

"One morning, I started coughing blood and so we decided that I must see a doctor. My blood pressure was also worryingly high. We headed down to another little village, which had a Primary Health Care centre. The doctor told me that I must go down to an altitude of 8,000 feet within 24 hours otherwise I could die of altitude sickness. I told her, 'Ok we will go up to our field station to get my bags and then try to find transport back to Shimla.' She (the doctor) exclaimed 'Up?! – NO UP..' So I stayed put while Priya went back UP alone and returned with my belongings. Now for the next challenge. It is not easy to find transport whenever you want. This place is remote, rugged and it was winter. The local people told us that sometimes you may have to wait more than a day for some vehicle to arrive there and you have to be an early bird to book a seat to head back down. Fortunately, there was a vehicle and Priya somehow managed to procure a seat for me in this jam-packed vehicle. I was barely conscious when she bundled me into the seat and the jeep headed down the treacherous and long road to Shimla. Priya continued the fieldwork in extreme field conditions – imagine being out in the cold, high up in the Himalayas in December and January, walking up and down collecting data! She was utterly amazing! I was convinced that she was splitting atoms for energy.

"Had I been alone doing fieldwork alone in such conditions, I don't think I would be alive today to reminisce about this. She saved my life and spared my family and friends the grief of the loss of a loved one. I know that she saved many others in many different ways but no less significant. She was one of the most compassionate and beautiful human beings I had ever met and I miss her very much."

Priya worked on something, not for the impact factor, the fancy new buzzwords, or the fame, but just for her love for the innumerable fascinating questions in science

Priya wasn't the kind of scientist to give the impression of 'Look how great I am, put me on a pedestal.' She worked on something, not for the impact factor, the fancy new buzzwords, or the fame, but just for her love for the innumerable fascinating questions in science. She had a child-like curiosity for the world, and therefore everything around her used to excite or impact her greatly. This quality always had a cascading effect on the people she interacted with. "Her short stature belied the warm and deep timbre of her voice. The relatively high-pitched 'Hai na?' (Isn't it?) and accompanying grins when we discussed anything of great interest to both of us, are forever imprinted in my mind," says Samira Agnihotri, who co-conducted a workshop with her on conserving animal cultures at the Student's Conference on Conservation Science, Bangalore in 2019.

Vena Kapoor, one of the people Priya had invited to collaborate on a project exploring the links between hunting strategies adopted by spiders and the sexual dimorphism they exhibit, says, "She had this rare quality of being a genuine collaborator across disciplines. When she was fascinated by a topic, she would first find out who was working on it. Scientists of Priya's stature often only reach out to other scientists to collaborate. Priya just broke this mould.

"She would take the effort to find and meet anyone who could contribute to a subject, talk to them, and then get everyone together in the same room and somehow magically make them all feel equally heard and special. She would remember your interests, and made earnest efforts to introduce you to other people who shared these interests too."

"In physics, during school days, we were taught about photons — compact packets of energy which together form the illuminating and life-giving light that surrounds us all. I guess there is no better way to describe Priya other than that. I want to remember her as and be inspired by, the wholesome person that she was," says Nitin Saxena, a friend and collaborator at IISc. "She was like a gentle flower in the air that spread its fragrance to everyone who crossed its path until it vanished into the sky," adds Nandini.

We need more people like Priya in the sciences. For the time that Priya was with us, the depth and expanse of her interdisciplinary research were equivalent to the work of numerous scientists. We hope we can all do a little of the same in our own lifetimes. This tribute was difficult to write, but we want the world to remember her kindness and her dream of science to be a more inclusive and fair space. The Priya we knew had a naive curiosity and fascination for the sciences and would love for us all to retain that.

An empathetic companion and conscientious individual, she will be profoundly missed by those whose lives she touched so gently yet impactfully. We hope you are at peace and comfort, wherever you are, Priya. We promise to strive as much as possible to take your work and dreams forward. We echo Nandini's sentiment when she says: "I can never stop loving her because she is dead because she was unlike anyone alive. She is irreplaceable."

This is an edited version of an article that was first published by TheLifeofScience at https://thelifeofscience.com/2021/11/05/remembering-priya-iyer-a-keen-observer-of-the-natural-world/

Photography in the time of COVID

- Karthik Ramaswamy

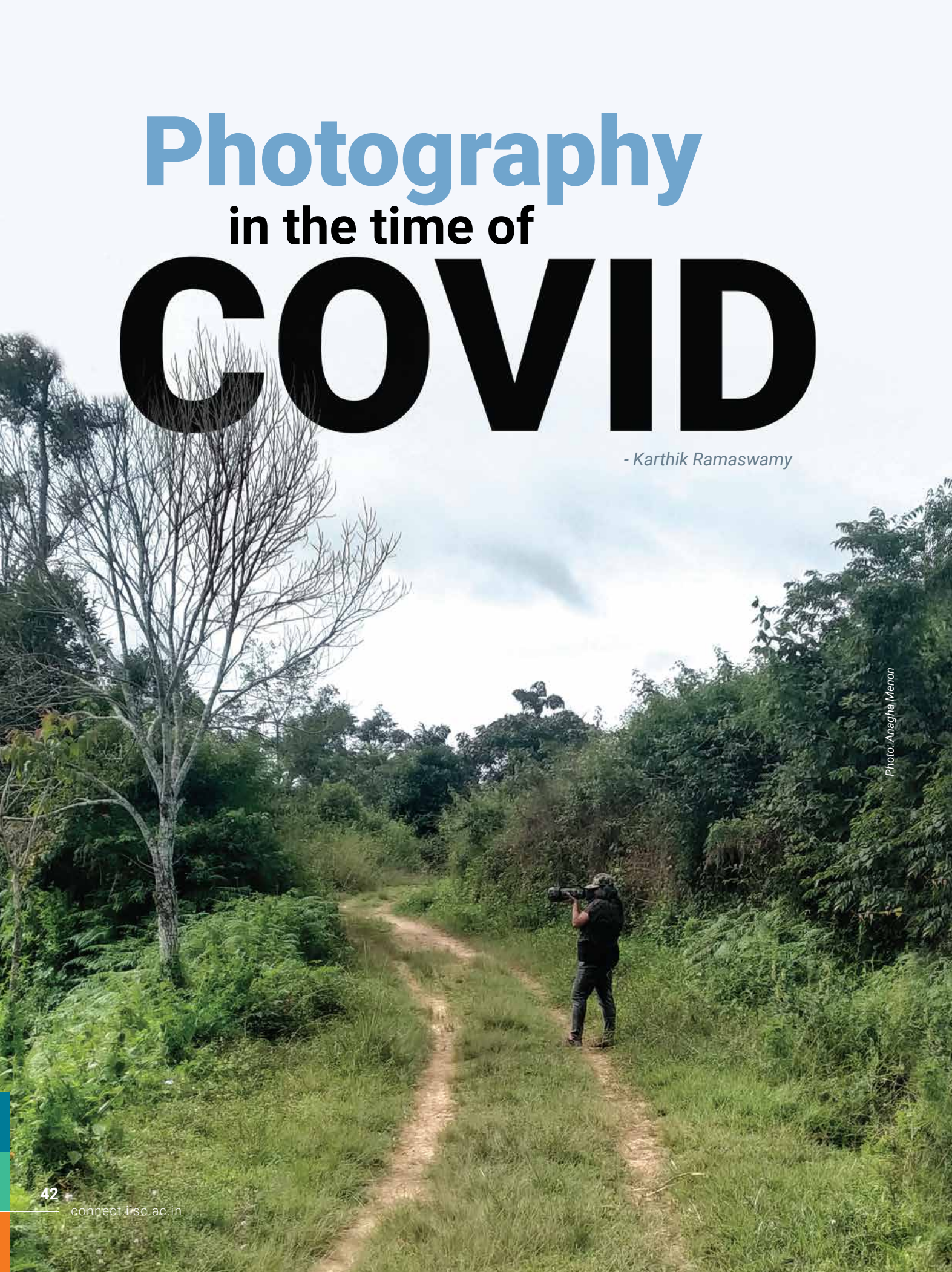
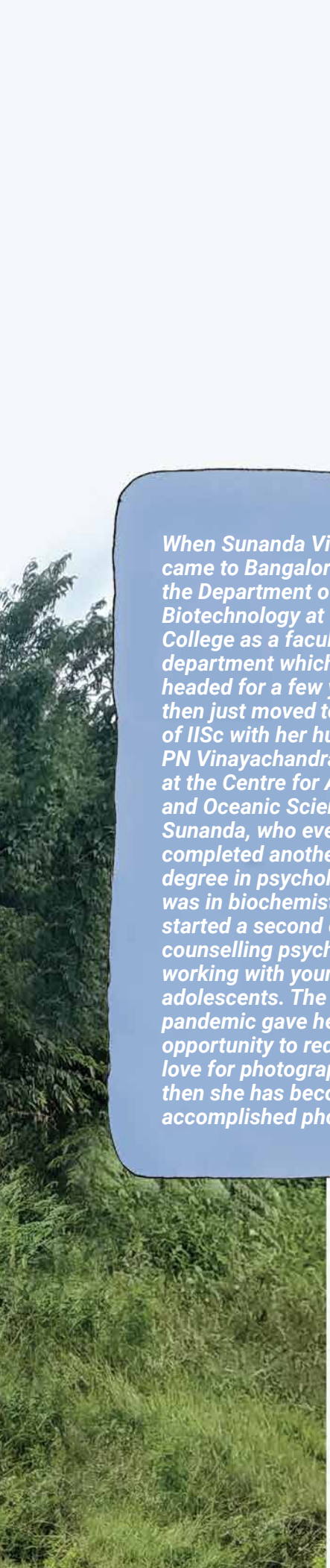


Photo: Anagha Menon



When Sunanda Vinayachandran came to Bangalore, she joined the Department of Biotechnology at St Joseph's College as a faculty member, a department which she also headed for a few years. She had then just moved to the campus of IISc with her husband, PN Vinayachandran, Professor at the Centre for Atmospheric and Oceanic Sciences. Sunanda, who eventually completed another Master's degree in psychology (her first was in biochemistry), then started a second career as a counselling psychologist working with young adults and adolescents. The COVID-19 pandemic gave her an opportunity to rediscover her love for photography and since then she has become an accomplished photographer.

How did you become interested in photography?

My father was an army officer and we lived in many places like Pathankot and Jabalpur, and he clicked a lot, especially when he was posted in exotic places like Sikkim. When we went together, I used to carry his camera and also click some pictures. In those days, photography was expensive and we were very careful about the pictures we were taking. During my student days, I didn't have a camera, but after I got married, I've always had one. I used to click photos of family members and events. Then, children and job happened.

When the pandemic started, I suddenly had more time on my hands, especially in the mornings. So I picked up my camera again and started clicking randomly – landscapes, flowers, leaves. Slowly, I narrowed it down to things which are alive and moving.

I then realised that I had a passion for [photographing] birds. Because it was the time of the pandemic, not many people were around. Of course, it took a lot of learning – you have to think about what you should wear, where you should stand, and the need to be absolutely still for birds to come closer in a natural habitat. I mostly do solo photography, but during my visits to Wildlife Sanctuaries, I realised that most people were interested in clicking big cats while I was looking at the trees for birds.

What is it about photography that excites you?

The first bird that I clicked was a flowerpecker that used to come to our terrace. It was completely unafraid of us – it was just about five feet away. And when I saw that it had a dotted ring around its eye and other details, it was unbelievable. Bringing out the details really excited me. I try to click from as many angles as possible to get a better idea about how the feathers are aligned, and their colours. And the more challenging it is to get these details, the more excitement there is.

When the pandemic started, I suddenly had more time on my hands, especially in the mornings. So, I picked up my camera again

I'm also very interested in their behaviour. Sometimes we can even make out if they are scared, if they are comfortable, or looking for a partner. With people, if you want to know something, we can just ask them. Animals display their emotions in other ways. When it comes to birds, they interact a lot with each other, even with birds of other species. Paying attention to that is like entering their world. Being a psychologist, understanding behaviour was exciting. That's what made me take up photography seriously.

How is photographing animals, especially birds, different from photographing humans or landscapes or inanimate objects?

When it comes to clicking people or landscapes, I can be more flexible. I can move around, sit in a place that's convenient. We can't do that with birds and other animals. We need to go to their world rather than bring them to us. And we also have to understand their world. I remember when I first clicked the forest wagtail, I knew that if I moved even an inch, it would detect my presence. I stood on one leg so as not to move, just so that it would come closer to me. This is very different from shooting landscapes or humans. We also need to worry about the time when we should go to photograph them. Our clothing is different, how we breathe is different, what we carry with us is also different. I like to shoot birds in their habitats and see how they behave. I don't like to see birds in bird hides, where they come because we feed them. You need a lot of patience if you want to get something in their habitat.

Bird photography is different, even from photography of other animals, because if I set up my exposure for a particular sky level and if the bird flies down to a place that is not bright, then I have to quickly change my exposure. You need to know your camera very well to adjust the exposure, focus, and so on very fast.

Photo: Sunanda Vinayachandran

A brahminy kite

Do you take pictures of animals to get that perfect shot or are you trying to understand animals through your photography? Which is the means and which is the end?

Just the other day someone told me, "Ma'am, go look for one species of bird and click that." But what I do is go to a particular place and document everything that's there. I also submit what I document to eBird [a citizen-science project]. I try to gather information about all the species that are there, where they are found, and the time of the day. I don't think about what photographs will come out. I try to understand birds first – their habitats, why they are where they are and not elsewhere. And as I said I have a need to see the birds in more detail. There are very small differences between some species and subspecies of birds. And in order to look at them in detail, I need to have their photographs. So, photography is incidental.

Photo: Sunanda Vinayachandran

A purple-rumped sunbird

You do most of your photography on IISc's campus. What makes this such an attractive place for photographers?

We have a great variety of plant life here. We have been able to protect some patches in IISc for years, which are somewhat untouched, where we have the undergrowth, a very essential part of the ecosystem. Unless you have undergrowth, you won't have insects, and if you don't have insects, you won't have birds. That is what makes IISc so rich. Imagine a place like this in the midst of a bustling city. You have Yeshwantpur on one side, Sadashivnagar on the other, and then Mathikere and New BEL Road. You can't imagine that such a place exists until you enter it. And the more such patches of greenery remain untouched, the richer they will be. So that's what makes IISc so attractive to photographers – there's so much to click: birds, landscapes, buildings. IISc has so much to offer. And many student photographers are getting more and more creative. Even with their mobile cameras.

Now of course that seems to be changing – we're putting lawns and 25 bushes of the same kind of an ornamental plant. Monoculture does not support much animal life. You won't see many insects or birds there. So, every time I post something on the Nature Club's Facebook page, I say, "From our beautiful campus." Let's keep it that way and make nature a part of our lives.

Photo: Sunanda Vinayachandran

A shikra

Given that the campus is changing and will continue to change – more buildings are coming up as IISc looks to grow – what suggestions do you have for preserving its greenery?

I would suggest that we should use as little concreting as possible. Of course, this is a research institution. We need labs and other research facilities. But I would very strongly ask the administrators to use as little space as possible for constructing these facilities. The second thing I'd like to say is this: don't surround any green patches completely with tall buildings. Somebody once told me, "We've only occupied this much space and left about 40 acres of greenery." But birds are foragers. You can't have one small patch with a few trees here and one small patch with a few trees there, and expect birds to thrive. They cannot do that. So, when you're making buildings, make sure that these patches are well connected by trees and are not completely cut off from each other.

If a bird living behind the erstwhile Nisarga restaurant felt threatened at any moment, it could escape to the patch of forest behind the Registrar's house and then to the middle forest in front of the Main Building. The undergrowth near the Main Building was so beautifully thick that you could not see the other side until a few years ago. We had birds like pipits and larks there, which we don't anymore. Even though birds can fly, they cannot move large distances in the open if there is no connectivity. They are very shy and wary of predators, especially the smaller birds. There have been occasions when a raptor like a shikra would be sitting next to me, and I won't know that it's there until the squirrels start screaming. So, the smaller birds have to be careful all the time and they need the help of trees. I would tell the planners to therefore ensure connectivity of trees and also leave the undergrowth alone. Not everything needs to be manicured. Manicured lands don't support much life.

And to others who are part of the IISc community, I would like to tell them not to feed animals. Don't interfere with them. Dispose your garbage responsibly and use as little plastic as possible.

Have you documented anything rare on campus with your camera?

Snakes are not easy to find. Just today, I posted a picture of a pair of male rat snakes in combat. Last year was lovely, with all people at home, and fauna thrived on campus. When I went to Jubilee Garden once, I was wondering, from a distance, why some kingfishers were behaving so differently. Then, I saw a whole bunch of chestnut-headed bee-eaters, which we hadn't seen on campus in a long time.

Photo: Sunanda Vinayachandran

Yellow-billed babblers

You are a psychologist. What role do you see for hobbies like photography for students who are dealing with the pressures that come from being in academics?

There's an old saying, "All work and no play makes Jack a dull boy," and it's very true for people of all ages. I feel people need to have some activities in life that they 'want to do', besides the ones they 'have to do'. In order to identify the activity that we can become passionate about, we need to explore. Failures will come our way. It's important to remember that it's not about being the best but about enjoying doing it. Exploration has to do with living in a real world, where we use all our senses and identify our needs and abilities, and see authenticity around us. Nature is very authentic and true, there are no lies, nothing is fake, and therefore is trustworthy and reliable. The closer we are with nature, and in sync with it, the more reassured we feel about life. This is my experience.

Before the iPhone, there was the Simputer

- Debayan Dasgupta

Image courtesy: PicoPeta

The Amida Simputer manufactured by BEL and sold as a BEL-PicoPeta product

The first example of academic entrepreneurship from IISc was an attempt to revolutionise personal computing in India

Birth of an idea

The year 1998 was the calm before the storm. India had just declared to the world that it had successfully tested weaponised nuclear warheads. The then Prime Minister, Atal Bihari Vajpayee, congratulated the scientists and engineers involved in the mission for their success. The Kargil War, which would sorely test India's military and technological might, was still a year away and the country had not yet registered the birth of its billionth citizen.

Over 180 million students were in school and only a lucky handful had just become familiar with computers. The digital divide was growing. In this backdrop, during the IT.Com event of October 1998 – touted as the first large-scale IT expo in the country – the Bangalore Declaration on Information Technology for Developing Countries was released. One of the goals of this declaration was to make a Simple Inexpensive Mobile comPUTER (SIMPUTER) to provide access to information technology for every citizen, regardless of their social or economic status. This spurred four faculty members in the Department of Computer Science and Automation (CSA) at IISc – Vijay Chandru, Swami Manohar, Ramesh Hariharan and V Vinay – to imagine and develop a low-cost handheld computer, one that could be accessible for everyone. Simputer was not the only innovation that came out from the partnership between the four. While Swami Manohar and V Vinay were setting up a company called PicoPeta to market the Simputer, Ramesh Hariharan and Vijay Chandru were also building a genomic company for personalised medicine called Strand Life Sciences.

In terms of technological innovation, Simputer had an impressive list of firsts. It was the first Linux-operated handheld device with writing capabilities, the first handheld device to have a USB master port and the first to have an accelerometer.

But the Simputer did not become a commercial success. Its development reflects the growing pains that the Indian entrepreneurship ecosystem faced during the early 21st century. In some ways, it also kickstarted the concept of faculty entrepreneurship at IISc.

Ahead of its time

"The most significant innovation in computer technology in 2001 was not Apple's gleaming titanium PowerBook G4 or Microsoft's Windows XP. It was the Simputer," journalist Bruce Sterling wrote in the *New York Times* on 9 December 2001.

When it first came out, the Simputer was truly ahead of its time. It had capabilities such as intuitive touch and allowed users to write using a stylus – a feature that was only widely commercialised 15 years later by Samsung in their Galaxy Note smartphones. Simputer had a simple handwriting recognition software and text-to-speech software built into the device.

A crucial feature of the device was the accelerometer, which is necessary for resolving orientation and responding to a user's gestures. This feature, which was introduced by Apple in their iPhones only in 2007, was already present in the Simputer. A German article that described the patent war between Apple and Samsung about the use of the accelerometer quotes the Simputer as prior art. *"Diese Idee wurde nicht 2007 erstmals von Apple implementiert – sondern 2004 von einem indischen Konsortium im 'Simputer' [translated] This idea was not implemented by Apple for the first time in 2007 – but in 2004 by an Indian consortium in 'Simputer'."* There were great expectations that the "Sub-10K Simputer" would disrupt the domestic market and become the device of choice for millions of Indians.

When it first came out, the Simputer was truly ahead of its time

Yet, the Simputer was not a commercial success in the same sense as the iPhone or the Samsung Galaxy smartphones, which went on to become household names. "There is no way the Simputer could have succeeded," says Vinay. "After running a business for 20 years, today, there is no way I would have started anything like the Simputer."

The main challenge for Simputer's founders, Vinay explains, was that anybody with deep pockets could subsidise it. Large companies like Microsoft or Hewlett-Packard could afford to build something similar and distribute it free of cost.

The other challenge was that venture capitalists did not find it as "exotic" as something like Strand Life Sciences at that time, points out CS Murali, who is currently the Chair of the Entrepreneurship Cell, Society for Innovation and Development (SID) at IISc. Murali was involved with the Simputer as a partner in a venture capital firm called Connect Capital, which also invested in Strand Life Sciences.

Murali attributes the lack of Simputer's commercial success to two factors. "For any product to succeed, you need an ecosystem. For hardware, you need people who would build software for it. For Simputer, there was no meaningful ecosystem or developers who would develop applications around it." Today, a lot of products are given away for free in the hope of generating an ecosystem and the revenue comes from usage; some examples are open-source projects like Arduino and Blender. While such moves would have been easy for bigger and more established companies to make, it was not feasible for a startup like PicoPeta.

The other reason that it did not take off, Murali feels, was its aesthetics. The first devices were "clunky and didn't look good," he says. "A product can have many useful features, but it can create a negative impression based on its looks."

The silver lining in Simputer's journey is that it generated a lot of buzz and became widely known in the world of technology.

Vinay points out that PicoPeta, Simputer's parent company, was the place to be for anyone who was interested in computers and information technology. "Every investor came to visit the PicoPeta office. It was the only piece of technology to be showcased in Bangalore at that time." When Bill Gates visited Bangalore in 2005, he was asked about Simputer's potential. Senior design engineers of the iPhone had also looked at the Simputer for ideas, according to Vinay. "Everybody took notice of it. It was an idea that everybody was aware of."

Running a business

Photo courtesy: N Dayasindhu

PicoPeta founders (from left to right): V Vinay, Ramesh Hariharan, Swami Manohar, and Vijay Chandru

The Simputer and the people involved in its development changed things at IISc too. This venture by four faculty members was the first such attempt at entrepreneurship from the Institute. Murali explains that the company was not incubated in the true sense as the concept of IISc-incubated startups did not exist at that time. In the early 2000s, the concept of faculty entrepreneurship, where a faculty member uses their expertise to create marketable products, was in its nascent stage and considered a very bold move. Simputer's founding generated great interest even within the IISc community. The faculty members' decision to take such a risk led the Institute to outline a well-defined policy for such ventures and take steps to figure out how entrepreneurship would fit into the Institute's charter of research, according to Murali. Their endeavours, therefore, paved the way for future faculty entrepreneurs.

Vinay credits Goverdhan Mehta, the former Director of IISc and HP Khincha, the former head of SID, for their help in encouraging academic entrepreneurship. As there was no precedent and the administration was also new to entrepreneurship, they imposed some amusing rules, Vinay remarks. "We were not allowed to take salary from the company to save our souls from corruption." They set up an office for PicoPeta in Sanjay Nagar, close to the campus, in the same location where Strand Life Sciences was also established.

The faculty members' decision to take such a risk led the Institute to outline a well-defined policy for such ventures

During the heady early days, the founders also managed to raise an impressive capital of about Rs 4 crore. This money was to be used to develop the device, pay salaries to the engineers and for rent. "What we did with the 4 crore is astonishing," Vinay says. "We survived for five years and we did not default on a single payment, either rent or salary. We were burning 25-30 lakhs a month – essentially, I had 2 months' worth of salary at any time. And I did not lose sleep at any point." Excitement about developing a new technology kept them going ahead at full steam. "Today, I would not do it," he admits.

In 2002, Bharat Electronics Limited (BEL) announced an alliance with PicoPeta to market the devices as BEL-PicoPeta Simputers. The price of one unit was set to be Rs 13,000. Eventually, PicoPeta was acquired by a Mumbai-based internet product company. Changes in BEL's management also brought the production of the devices to a stop. Vinay adds, however, that there are probably a few devices still around. "Several individuals do have the devices. I suspect the battery would have died out on most of them. I know that Manohar had a device that worked as recently as two years back (just before the pandemic)."

Although its production was stopped, there is no doubt that the device has left its mark. Vinay brings up the examples of Barbara Liskov and Alan Kay, computer scientists who conceptualised Object Oriented Programming. The languages they developed, CLU and Smalltalk, did not have the same impact that C++ and Java had later in the 1990s. "You can ask, 'Did they make a difference at all or not?'" says Vinay. "Early ideas do make a difference. We have inspired people and that's the only thing that matters in the end."

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ABSTRACTS

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