CASCADE

The oa Newsletter

Issue 2
April 2025

Makers of CSA

Here is a conversation featuring Vinod Ganapathy (VG) interviewing Prof. Y. Narahari (YN), celebrating his Distinguished Alumnus Award and delving into his long and influential career at IISc. Prof. Narahari recounts his serendipitous journey to IISc in the 1970s, the evolution of his research interests from manufacturing systems and operations research through supply chains to pioneering work in game theory and mechanism design fueled by collaborations with industry giants like GM, Intel, and Infosys. He also shares candid reflections on his experiences in significant administrative roles, including Chair of CSA and involvement in the IISc Centenary celebrations, discusses pivotal moments and challenges, and offers his perspective on the future trajectory of the CSA department, along with advice for its faculty and students

Vinod Ganapathy: Prof. Narahari, welcome. Today we would like to interview you about your long and distinguished career at IISc. Let us first congratulate you on winning the IISc Distinguished Alumnus Award. I would like to start by asking you to tell us how you came to be associated with IISc in the 1970s.

Y. Narahari: I must tell you that there is a story behind that. I was doing my BSc and physics, chemistry and mathematics from the National College, Gauribidanur, which happens to be a branch of the National Education Society, Basavanagudi here in Bangalore. In the final year of BSc Professor H Narsimhaiah, who was the President of the National Education Society (he would later go on to become the Vice Chancellor of Bangalore University), would visit National College Gauribidanur every Saturday and give us a four-hour lecture on modern physics, and those were very inspiring lectures. I had a liking for mathematics, physics and chemistry in that order. I wanted to do my MSc in mathematics in Central College (Bangalore University) because that was the college which was well-known to us. (all my three excellent lecturers in mathematics in National College did their MSc in mathematics from Central College). So then my dream was to do an MSc there and then come back to Gauribidanur as a lecturer of mathematics. That was my big dream.

And then fortuitously, in the marriage ceremony of my brother, I met his father-in-law (his name is Anantha Rao), whose son had studied his Bachelor's in IISc in electrical engineering. He asked me what are you going to do after BSc? I told him my big dream. He said you should know there are other options for you, do consider those too, because my own son has done his Bachelor's from IISc and is now doing very well at BHEL.

He told me about two options. One was IIT Madras, MSc Mathematics, because I was interested in MSc Mathematics. And then he also said you should apply to Indian Institute of Science. The height of my ignorance was that even though I was in final year BSc,I had

not known about IIT Madras or IISc. But once he told me about these options, I found that there was about three months left for applying to IISc and also IIT Madras. I applied to both the programmes and fortunately I got selected in both the programmes. So now came the issue of selecting between my MSc Mathematics at IIT Madras versus IISc. That was decided by the simple criterion that Bangalore is closer to Gauribidanur. So that is how actually I joined IISc.
I joined the ECE department here, where from 1979 to 1982, I did my B.E. in ECE. During the final year, all of us students would take as electives the courses which are offered to the ME students of the then School of Automation. So for example, Professor Preeti Shankar, she was a very popular instructor those days. Dr. Chakrapani used to teach software engineering and software systems and he was also extremely popular.

In 1982, tried to do a project in School of Automation with Dr. Chakrapani who already had about ten students so I was rejected. So then I ended up doing a B.Tech project in the Instrumentation department here with Dr. NV Sreenivasa Rao on implementing the Fast Fouriert Transform algorithm on the Intel 8086 processor which had just appeared in the market

I also applied for the ME programme here at the end of my B.E (ECE), but then had again to make a tough decision. I had got a job in Wipro and at Telco. At Wipro, my HR interview was taken by Azim Premji himself – they were a very small company at that time. I had been selected for Wipro and Telco on the one hand, and on the other hand, I also got selected for the ME programme at School of Automation.

Everybody advised me to join the ME programme and I was also very keen to do so. Those days the School of Automation was hugely popular as the number one department in IISc. It was in many ways, it was “The Blue-Eyed Department” for Professor Satish Dhawan, because he was responsible for starting the department and it had great Professors. And so it was a dream for me to do an ME here. It turns out that I had to write an entrance exam to get selected for the ME programme – our batch was the last batch which escaped having to write the GATE exam for entry to the ME program! I did my ME from 1982 and in 1984, I finished working on my M.Tech. project with Professor Viswanadam.

In 1984, again I had to make a decision on my future, because working at ISRO used to be my dream, I somehow wanted to join ISRO. And at the end of my ME I got an offer from ISRO to join their data processing and computer facility division. They even actually they gave me two salary increments. So that was a big option. The other option was to continue here for a PhD. Professor Viswanadham played a very important role here -- he said, you have done a very good project and if you can continue for PhD then you can finish your PhD pretty fast. So that’s how I joined for PhD.

V.G : We learned a lot about your various accomplishments during your illustrious research career during the recently concluded GAME-ARTS Symposium in July 2024. I was wondering if you can recount for the benefit of our alumni how you moved from working in manufacturing systems and operations research, to supply chain management during the early days of your career to game theory and mechanism design more recently. What were the various transitions in your research career?

Y.N : So during my PhD Professor Viswanadham had just come back from a sabbatical at MIT, where there was a lot of activity on flexible manufacturing systems (FMS). On his return, he wanted to do industrial engineering and operations research kind of work, essentially using mathematical modelling tools like queuing theory. Those days

Petri Nets used to be a very popular tool, so he wanted me to do a thesis on flexible manufacturing systems with models like queuing and also stochastic Petri Nets applied to FMS.

Professor Viswanadam had visited the locomotive plant of General Electric in Schenectady, New York, and he had access to a lot of data during those days. The data showed that the automated facilities there would often get deadlocked because of the protocols of interactions among them. We did a mapping of the deadlock prevention and deadlock avoidance problem in highly automated factories to the deadlock prevention and deadlock avoidance in operating systems, essentially using Banker's algorithm. And we wrote a paper on that topic that got excellent citations. That was one part of the thesis.

Receiving the Best PhD Thesis Award from Prof C.N.R. Rao

And the thesis also evolved into doing more quantitative performance modelling and also analysis of manufacturing systems. The paper that we wrote on modelling turned out to be the first paper in that area and it was very well appreciated by Professor Kathryn Stecke in University of Michigan, Ann Arbor. She was holding a conference on flexible manufacturing systems in Michigan, and this paper had been submitted there. It got accepted with good reviews. In fact, she went ahead and then invited me to do a PhD with her in this area. This happened during the transition between M.Tech and PhD, so that Professor Viswanadham said "why don't you go to Michigan?" I said no and decided to continue here. I had that head start in my M.Tech, and was able to finish the work for my PhD in three years. I submitted my PhD. thesis on July 31st, 1987 so which means it took exactly three years.

We already had many papers, and though I never went abroad, fortunately Professor Viswanadham was travelling quite a lot those days and he had advertised the work very well. In one of those conferences, I think it was in an ORSA/TIMS meeting, now it's called the INFORMS meeting, he met a representative of Prentice Hall, who was very proactive

and suggested that a book could be written on the topics related to factory modelling. So we started working on a book on performance modelling of manufacturing systems. It took about three years because we wanted to pull together all the literature.

Those days CSA used to have these inland letters that were printed with request for a reprint version of a published paper. It used to be a standard template, these inland letters I used to just ask the department for about a 100 such inland letters and then write to various authors for sending reprints of their papers. Those days, within about one or two months, we used to get back reprints of all those papers. Because of this process, the preparation of the book itself took about three years.

We knew that there were at least three other groups working on similar books at that time. One group was that of Professor Shanthikumar from the University of California, Berkeley and Professor Buzacott from the University of Toronto. They were collaborating on writing a book on stochastic modelling of manufacturing systems. Professor Stanley Gershwin from MIT also was writing a book on manufacturing systems and Professor Ronald Askin from University of Arizona also was writing a book. But our book was published first. So in 1992, when I went to the INFORMS meeting in San Francisco, Shanthikumar congratulated me because their book was still in the final stages of preparation. He said that he was very happy that two people from India have beaten us by writing this book on performance modelling manufacturing systems. We'd like to get a complimentary copy of the book and fortunately I had a copy of the book and gave it to them immediately at that point of time itself.

When the Indo-US Science and Technology Fellowship were announced, I was one of the recipients of it. It was also called the Prof.hi-Ronald Reagan Fellowship. Professor CNR Rao Chaired the selection committee for this fellowship. First it was offered to Prof Y.N. Srikant and then to me. In fact, he interviewed me twice, first time in 1987 for a lecturer position at CSA Immediately after my PhD and then within one and a half years of that there was an advertisement in 1988 for an Assistant Professor position in CSA, for which I applied. So he again interviewed me for that position. He was also instrumental in my being selected for this Fellowship.
When Professor Viswanadham mentioned my selection to this Fellowship to Professor Sanjoty Mitter and Prof Stan Gershwin at MIT, they agreed to host me at MIT. So I ended up going to MIT -- this was in 1992-1993. My son was had just been born and I went to MIT within ten days of his birth. Padmashree wanted me to come back early, so I ended up spending only eight months in MIT although I could have actually spent two years there.

The MIT experience was excellent because in addition to research, I ended up attending all kinds of classes there. I attended a class on dynamic programming by Bertsekas , a class on Intelligent Control by Sanjoy Mitter and Shakar Sastry, a course on ,
dynamic and stochastic scheduling by Bertsimas and Tsitsiklis, and then a course on queue theory by John Little (of the famous Little's law in queueing theory) (he passed away recently) . These were all wonderful courses.

I managed to write two papers there. I also had the chance to get acquainted with Professor Sanjoy Mitter during my visit He was the Chair of the LIDS department at MIT at that point of time with Professor Gallager I had a good amount of interaction with Sanjoy Mitter – although I never co-authored a paper with him, the technical discussions with him went a long way, and I got to know him very well. Whenever he came to India, he would make it a point to inform me. I would make it a point in inviting him to IISc and he has also given talks in CSA. So he was mentor of mine from those days.

I must recount something very funny that happened once with Prof. Sanjoy Mitter.
Because he was offering a course on intelligent control, which I used to attend myself and one more friend. And this class used to be from 2:00 to 3:30 in the afternoon, immediately

after lunch. Professor Mitter, you know, once he starts the class, the equations will simply flow. Unless you concentrate really hard, it will be very difficult to understand anything in the class. So one day my friend and I were going to the class. Little did we know that Professor Mitter was behind us. My friend was commenting that this class is going to be extremely boring class. It will be filled with hundreds of equations being flashed on transparencies. I fortunately did not say anything, but this friend went on and on about the class, saying that, we have to survive these classes for more two months and so on.

I think Prof. Sanjoy Mitter must have overheard all this. That day he was a completely transformed person in class. He gave a fantastic talk from 2:00 to 3:30 where he did not flash even a single equation, but kept on giving excellent intuition and insights in that lecture. Then when we all came out and the two of us were going away, he caught two of us, and he asked us – how was my lecture today? So in spite of what we did, he was so gracious. I am really fortunate to have had him as a mentor.

V.G : So how did you make the transition to game theory and mechanism design?

Y.N : So once I came back from MIT, I decided to start work on supply chains. This was logical because manufacturing systems are one building block of the supply chain ecosystem. And all researchers in manufacturing were basically moving towards supply chains, so it was natural. This was sometime in I would say 1994-1995. So during 1995 to about 2002, we've actually working on some very interesting design and optimization problems in supply chains. Those days General Motors had set up a research lab in Bangalore, and they knew about our work in manufacturing systems. They ended up funding a big projectson supply chains. We had a project with them called six Sigma supply chains and those projects produced some very good results and excellent publications.

We were sailing along doing supply chains research until 1999, when Intel they started this Laboratory for Internet Technologies and Electronic Commerce in the CSA department. I played an instrumental role in it and they actually gave us a Rs. 50,00,000 donation at that point of time in the form of state-of-the-art workstations. One of the persons who championed that from the Intel side was Vijay Kumari. She had known my work in supply chains and got in touch with a very interesting problem that they were facing: Intel had a big division which did what was called indirect materials procurement within Intel. For example, Intel employees will require laptops, printers, consumables and scanners, and the indirect materials procurement division was in charge of this, which procured these things from qualified suppliers. But they wanted to have a competitive way of engaging with all their internal suppliers. They were thinking of making a procurement marketplace where all the qualified suppliers come in and Intel would be able to negotiate good prices with them. They wanted to try out auctions. Vijay Kumari told me "you work in supply chains and I'm sure procurement is one of the key aspects of supply chains, would you mind helping us with design of auctions for our private procurement marketplace". So though I did not know much about auctions at that point of time, I decided to get into the area. This was around 1999.

Once they posed this problem to us, I had to start learning about auctions.
My students came in generations -- the first generation was L.M. Khan, Hemachandra and Ravi Kumar, who basically worked on manufacturing systems. The next batch of people they were looking at supply chains. So with one of the ME Project students (Praveen Kumar) and a Project Assistant (Ravi Shankar), I started working on auctions. We found that for procurement, combinatorial auctions work very well. The problem is very simple, so if you are procuring A, B and C, then instead of procuring them individually, if you procure A, B and C together, or A and B together ,or B and C together you can get

package discounts. So we thought package discounts will be a way to lower reducing the total cost of procurement. I thought this was very appealing and Intel also asked me to design an algorithm for combinatorial auctions for winner determination and also for payment determination, saying that they could make it part of their private procurement marketplace. The next six months was spent with the two students in developing a very nice efficient polynomial time approximation algorithm for determining winners in combinatorial auctions. We had got into a new area without knowing anything about game theory. The other, equally important part was Intel had an SAP system and this private marketplace had to be interfaced to the SAP system they had. So that is where we also got into some details of the SAP interfaces. And then finally, we were able to integrate whatever solution we had developed. We were able to plug in the whole thing into the SAP system and then they started using that private procurement marketplace, after making some changes themselves. So I think that was a breakthrough project for us and them.

Knowing about this project, General Motors also proposed to us another kind of a procurement marketplace for themselves, which was completely based on different kinds of principles. The General Motors Project was a big success and the persons who made it a success were Pankaj Dayama (now with IBM) , and Ravi Kumar. We started the General Motors internal procurement problem and came up with a suite of algorithms and this suite of algorithms actually were implemented. . And this effort actually got an innovation award within General Motors called the Charles McCuen Innovation Award.

Infosys also approached us wanting us to build a very futuristic marketplace on carbon trading. Carbon trading is actually a big thing nowadays. The problem was how do you design a carbon market so that people who have carbon credits will be able to monetize those credits. Infosys thought about this way back in early 2000s, and we did a project for Infosys also. Because of all these projects, I had to get into game theory because auctions are completely based on game theory and mechanism design. I used to offer a course on supply chain management, which actually was a big hit with the CSA students and also management students. That slowly evolved into an E-commerce course and

Fortunate meeting with Professor John Nash

subsequently became game theory.

V.G : For my next question I would like to transition to the various phases of your career. Of course, you have had a long career here as a faculty and a researcher, but also transitioned into administrative roles as the Chair of CSA, Dean of ECS and then the Director Chair of the Centre for Brain Research. So you would have had a perspective of IISc from each of these roles. Could you share your perspective of these roles? What were the high points and low points during these phases?

Y.N : I think my first administrative appointment. I would say, was as DCC Chair in CSA in the late 1990s and early 2000s. And then when Professor Balram became the Director, he called me and said, I want you to become the Chairman of the management studies department. Both Professor Balram and Professor Balakrishnan said, "you have done good work in supply chain management, you are an industrial engineering, operations research person and we know that you are in the computer science and automation department, but currently management studies is looking for a new Chair. Would you be able to take over as Chair of the management studies department?".

I had gathered all my courage and said no to that offer. And then immediately, I was requested to take up another assignment to scale up Technology Development Missions (TDM). Technology development missions was a visionary Pan-India project by the government of India, involving the five old IITs and IISc, working on five technology mission areas for India. Faculty members from IITs and IISc would collaborate on these projects, and the phase 1 of this project had just been completed. Phase 2 funding was supposed to be given, but it had gotten into some issues and a big push was required to get Phase 2 funding, and that was the task that was assigned to me as the coordinator from IISc's side.

That role was a big breakthrough for me because at a young age, I think I got to know some of the most senior people working in India in various areas. I was probably only 45 or 46 at that time, but the coordinators from IITs, they were all in their late 50s, early 60s and so on. Senior faculty from IITs also were involved.
The two youngest coordinators at that time were myself and P.P. Chakraborty from IIT Kharagpur, and that led us to become very good friends. The best part of the TDM was that it provided a fantastic networking opportunity. That was the time when I visited all the IITs, the Ministry of HRD and got to know of the faculty and the officials working on the projects. There were also about 40 to 50 faculty members in IISc who were involved and I also got to know them well and got to know the ecosystem both inside and outside the Institute. Of course, we never got the phase 2 funding of the TDM despite our best efforts.

This was around 2005-2006. At that time, IISc was making plans for a grand centenary celebration. Professor Balaram and Professor Balakrishnan formed a committee, which met over a six-month period to celebrate the IISc centenary. The dates for the Centenary conference were fixed almost a year and a half before the event. The organizing committee for this event required one secretary from engineering and one secretary from science. Again, Professor Balaram reached out to me, and also to Professor Nagaraja from Molecular and Cell Biology (he went on later to become the President of the Jawaharlal Nehru Centre for Advanced Scientific Research) to become the secretaries. We never thought that this would involve much work, and that we may have to coordinate only certain things. Little did we realize that over the next one and a half years we would spend almost 50% of the time organizing this conference. Each division had its own divisional conference, followed by the main conference of four days. On the first day of which there were 5,000 people. The President of India, Vice President of India and many

other VIPs came for the event. I ended up spending time with Nagaraja and nearly 50% of our entire time was spent only on organizing the centenary event. But this was another great networking opportunity because we got to invite and interact with several people worldwide, including Professor Eric Maskin. We actually tried to get Professor John Nash and Roger Myerson but we could not. The conference was held in December 2008 and was a grand success.

Around this time, Professor Narasimha Murty, who was CSA Chairman, had also completed his term, and expressed his interest to Professor Balaram to step down from the Chairmanship. Professor Balaram and Professor Anurag Kumar appointed me as Chair, CSA. From December 10th, 2009, I was Chair of the CSA department for four and a half years – till August 22nd 2014. In fact, I had taken over as the Divisional Chair of the Electrical Sciences division on August 1st, so for 22 days, I was both the Chair of CSA and the Divisional Chair, and my first task was the find the next Chair of CSA. During my tenure as divisional Chair, I ended up having to appoint the CSA Chair three times: Jayant Haritsa, Shalabh Bhatnagar, and then Chiranjib Bhattacharya.

During all this there have been high points and challenging points. A particular challenging point was during the Centenary Conference, because of what happened on November 26th, 2008 (the Taj Hotel attack that happened in Mumbai). The ministry contacted the Institute and said that we should not have the centenary conference due to security concerns. And so that November 26th to December 16th was a really challenging time because we were uncertain about whether the Centenary Conference would happen. But Professor Balaram and Professor Balakrishnan were firm and said that extremely tight security measures would be taken and the conference would proceed.

You know, the Institute was already in a state of high alert because of the terrorist attack that happened in December 2005. In fact, when the terrorist attack happened in December 2005, it happened in the JN Tata auditorium where a conference was going on – the Operations Research Society of India Annual Conference, and I was the programme Committee Chair for that conference. On the day the attack happened we were actually

CSA department in 2010

felicitating Professor M. Rammohan Rao, who was the Director of IIM Bangalore and then Dean at the Indian School of Business. After the felicitation of Professor Rao concluded at 5:30pm, we were supposed to go to the management studies department for a business meeting. Vijay Chandru, being a great friend of Rammohan Rao was also there and so also Professor Sadagopan of IIIT-Bangalore. Professor Vishwanadham took Rammohan Rao and they walked to management studies early.

I think myself, Vijay Chandru, Sadagopan and a few others came out of the auditorium and our plan was to start walking towards management studies. Professor Sadagopan actually called me back and asked to talk to me, so I went back into the auditorium to talk to him, and that is when the attack happened outside the auditorium. Vijay Chandru was grievously injured and Professor M.C. Puri unfortunately succumbed to the bullet shots. I am grateful to Professor Sadagopan – if he had not called me back, I would have actually walked along with Vijay Chandru and Professor M.C. Puri to management studies.

V.G : So coming closer to home, where do you think CSA should be headed over the next decade?

Y.N : Yes, so that is a very important question. This is one question on which you know all of us, always keep thinking about. CSA clearly has a great future. However, there are many constraints under which CSA has to operate. It could be faculty recruitment, it could be student recruitment, it could be alignment with expectations from the institute, government, alumni, and industry.

I think CSA chose a certain trajectory for itself over the last 15 years, this particular trajectory it has chosen has helped CSA. . That trajectory has been to do high quality research and publish the best papers in the best venues worldwide. And also try to inculcate the research culture even in the Master's program. I think this helped CSA to a great extent. And the very fact that CSA, in spite of not including other Computer Science related faculty in IISc continues to be the top among all the Indian institutions, is a testament to the success of that trajectory. This single-minded devotion towards publishing in the top venues has paid off to an extent.

Having said that, I think there are certain things that CSA will have to work on in the coming years, and there are challenges in all that. The first challenge will be on scale. How can CSA scale? For example, when I was the Chair, in 2010, CSA had 35 research students and a large number of M.Sc. students. So I think CSA started sort of scaling up in terms of the number of PhD students. That happened because it also started scaling up in terms of the faculty numbers, due mainly to fantastic support from Professor Balaram, Professor Balakrishnan, and Professor Anurag Kumar. We made 10 faculty appointments in four years. All these were brilliant scholars. The last two who were recruited during my Chairmanship were Arpita Patra and Bhavana Kanukurthi, who were recruited on the same day. So student scaling happened because faculty scaling happened.

Now, faculty recruitment is not easy, is increasingly becoming more and more difficult. And the student recruitment has also become a challenge because students see other avenues, other opportunities. One of the reasons why we could scale up the PhD program, during 2010 to 2014, in hindsight is because the opportunities for prospective PhD students were limited at that point of time. So IISc was a very attractive option. Many of the IITs were not very aggressive in recruiting PhD students, and would only

recruit one or two students. TIFR, CMI , and IMSc also would hire only a small number of PhD students.

So in the next decade, CSA now will have to think of how to scale under the changing circumstances for us to really compete with the best universities in the world. To be competitive at the global level, CSA should have at least 50 faculty members. and at least 200 graduate students, then I feel everything will fall in place. We will have to also think of the overheads of running a large M.Tech. programme and also manage the B.Tech. programme on Maths and Computing.

CSA should brainstorm and have a very clearly defined trajectory: A short-term trajectory and then long-term trajectory. What should we do in the short-term? Some creative short-term measures will have to be thought of to help CSA to overcome the current challenges. I firmly believe that, once in three or four years it will be good to take stock of what happened in the last three/four years and plan ahead for the next three/four years or even the next decade. I remember we organized a one-day retreat to take stock of the department, where all the faculty members of CSA were there from morning till night and we discussed various matters, and even prepared a vision document. We also had a follow-up meeting at the department level. This was followed by an EECS divisional retreat and an international review, followed by another internal EECS retreat.

I think it would be very nice if a great plan can be put in place. Maybe have a two day trip to the IISc Chellekere campus and also go for a tour of the Chitradurga Fort! At worst, this will have no outcomes other than simply bringing us all together. And the best case scenario is that a clear plan can be developed, and a few signature projects will emerge. These should be projects that everybody in India, or the world talks about, as being synonymous with CSA. Making such a project work at the department level may be very difficult, but perhaps it can be done on the different cluster level, like theory, AI and systems projects.

I do think that CSA has faculty who are world beaters, but they may have to plan ahead to have a department-level plan, with individually optimal policies aligning perfectly with department-optimal policies. This vision of what they must do should be worked out in a bottom-up fashion. The faculty should realize that the government does have some expectations about the department and that CSA also has a corporate academic responsibility of being like a mentor to all the computer science departments if not necessarily in all of India, at least in Karnataka.

V.G : I'm glad you mentioned this, because my next question was, what is your advice to CSA faculty?

Y.N : I feel that our faculty are aiming to become very well known in their individual subjects and gain recognition for their work. At the same time, it's also important for a group of faculty members to come together and do a signature project that they are passionate about. Funding should not be an issue, because there is a certain respect for IISc and the IITs in the government system. So if a group of faculty from IISc come together and then propose a project, funding agencies will welcome it. If a group of faculty come together and then start thinking about a big problem, then at the end of one year, the worst-case scenario is nothing will come up. But then a lot of discussion would have taken place and individual faculty might pick up something from there. The best-case scenario is that they will come up with an excellent proposal which will bind that group together.

V.G : And finally, your advice for our students.

Y.N : CSA students, my advice would be that there is no shortcut for success. If they go for shortcuts, something will get compromised somewhere. So that's the first thing I would say.
The second thing is that the world is full of opportunities. They don't have to take up only a particular job in a high-paying multinational company. I think there are opportunities waiting for them in so many different ways. They can also go for startups. And the startups could be of a variety of flavours. That's one possibility. Another possibility is that you know they could go for higher education, which was, which always used to be the number one priority for M.tech students of this department. Or, you know, they can get into a totally different kind of profession with the kind of opportunities that modern AI is offering.

I think each student should realize that there is a certain talent that is hidden in her or in him, and that they should leverage that and not be, you know, sort of fascinated only by these branded jobs. They should know that the world is also changing quite a lot. The world is also becoming highly interdisciplinary. As far as the course work in CSA is concerned, CSA offers some of the best courses. Students should do their project work with due diligence, that is going to help them in the future to become leaders. CSA has very definite and very high expectations from the students.

Finally, I wish to thank all the Chairs and faculty members of CSA, past and present, for their excellent support at all times. My grateful thanks go out to all the office staff, past and present. CSA office is a well-oiled machine which supports the faculty and students in a splendid way. I must thank all my students, without whom, I would not be here today. I have survived in IISc because of my students. Special thanks to Professor Viswanadham for his rock-solid support at all times.

Department Activities

Walmart Global Tech (WGT) has partnered with the Indian Institute of Science (IISc) to launch the Walmart Center for Tech Excellence – designed to strengthen the research ecosystem in India. The center will focus on driving research excellence in the field of Computer Science and empowering talent with opportunities for future growth. In February 2024, Walmart launched a Center for Tech Excellence at IIT Madras. Walmart's partnerships with academia reinforce its commitment towards serving communities and helping them live better.

https://iisc.ac.in/events/walmart-launches-center-for-tech-excellence-at-indian-institute-of-science-iisc/

SPARKS 2025: Research Opportunities at CSA, IISc

The Scholars Pursuing Advanced Research in Computer Science (SPARKS) 2025 program, launched by the Department of Computer Science and Automation (CSA), IISc, offers research opportunities for students in CS, ECE, EE, and Mathematics. Scholars will work under CSA faculty for a minimum of four months in areas like machine learning, programme analysis, and blockchain

https://www.csa.iisc.ac.in/sparks-programme/

The GAME-ARTS Symposium

organized by the members and alumni of the Game Theory Lab at the Department of Computer Science and Automation, Indian Institute of Science, Bengaluru. The collective efforts of Professor Y. Narahari, the principal investigator at the Lab and his advisees, supported by the unique research ecosystem at CSA and IISc, have resulted in contributions to interesting problems in diverse domains at the interface of computation and economics.

A three-day event that revolved around contemporary themes in game theory, mechanism design, and artificial intelligence. The event featured talks by eminent researchers, tutorials delivered by the GTL team, an engaging panel session, and an enchanting cultural programme

https://gtl.csa.iisc.ac.in/gamearts


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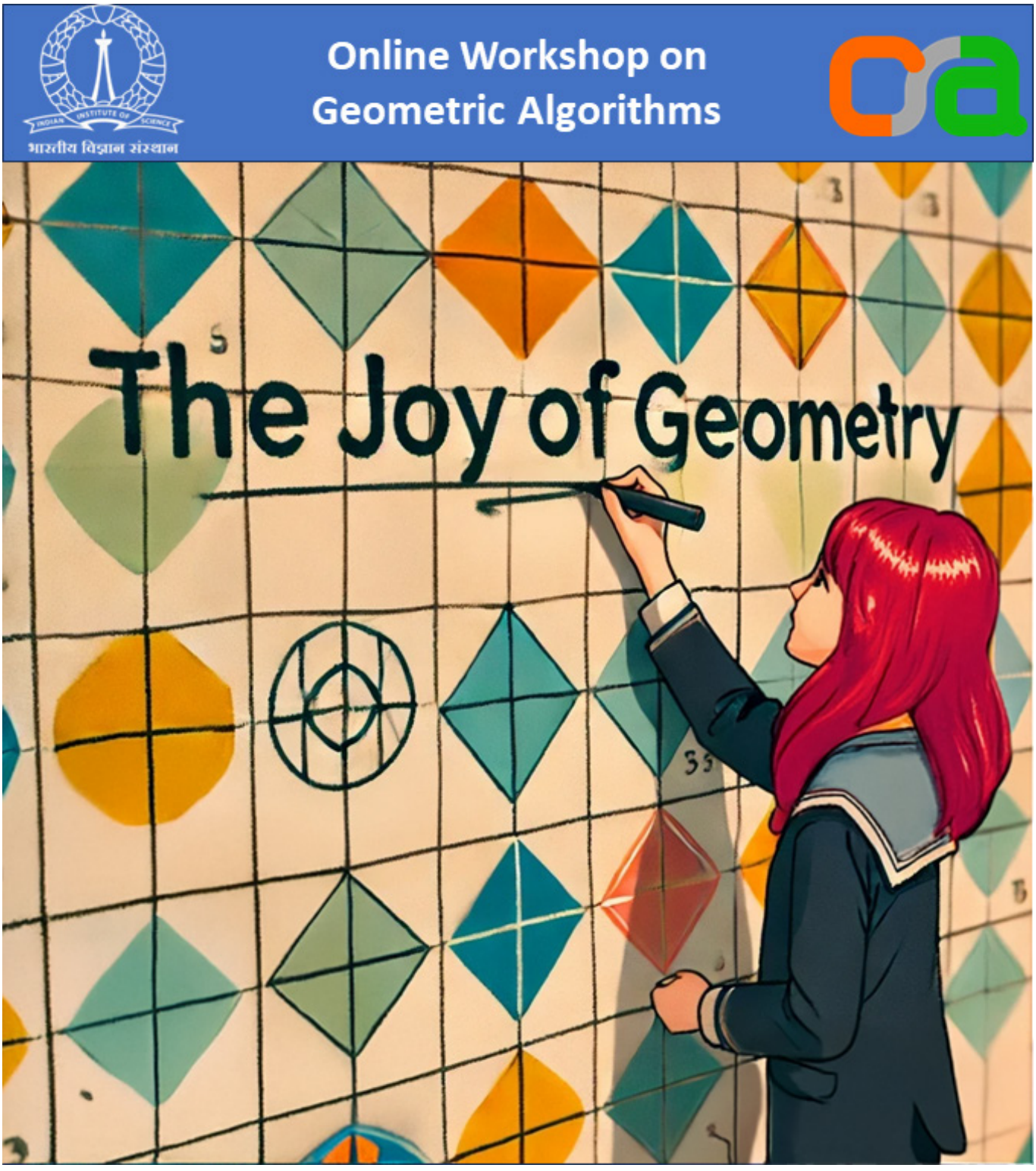
EXIT



The Joy of Geometry

The Department of Computer Science and Automation (CSA), IISc, successfully organized a five-day online workshop on designing algorithms for geometric problems. Led by Prof. Sathish Govindarajan, faculty-in-charge of the Discrete and Computational Geometry (DCG) Lab, the workshop introduced participants to the fascinating field of Geometric Algorithms. The event received an overwhelming response from students and researchers across India, thanks to the efforts of many who helped spread the word.

https://sites.google.com/view/joyofgeometry/home

WELCOME TO THE JUNGLE 2024 PG INTAKE

Inauguration of the CSA Auditorium

A heartfelt thank-you to our generous donors: Ittiam Systems and their CEO, Srini Rajam, for a CSR grant; Integra Micro Systems and their CEO, Mahesh Jain, and Directors, Ravi Palagummi and Dr. Gopalakrishna Vadlamani, for a CSR grant; Nirmala Setlur, Anand Setlur, Arvind Setlur, and Amod Setlur for their family's contribution in memory of Prof. S.V. Rangaswamy; and EECS Division, IISc.

INTEL AI PC Experience Development Center

Intel has launched an AI PC Experience Development Center at IISc, Bengaluru (alongside IIT Hyderabad). This initiative provides students and researchers with cutting-edge Intel Core Ultra processor-powered PCs, software resources, and direct mentorship from Intel technologists. The center aims to empower interdisciplinary innovation across campus, enabling the development of impactful AI solutions for real-world challenges in India.

https://www.firstpost.com/tech/intel-launches-ai-pc-experience-development-centres-at-iisc-iit-h-for-students-to-learn-how-to-work-with-ai-13834004.html

PRESENT AND FUTURE COMPUTING SYSTEMS

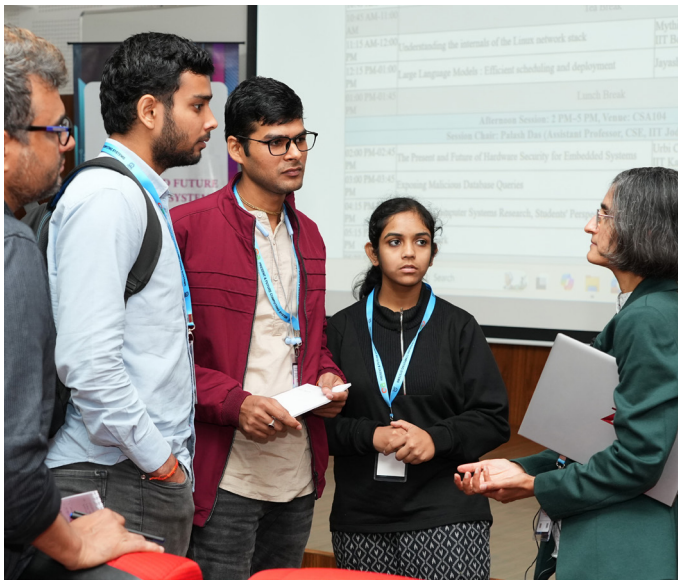
A workshop on Computing Systems, focusing on the evolving landscape of modern computing. With computing devices such as mobile phones, desktops, and laptops becoming integral to our daily lives, the event delved into the need for cost-effective, high-performance, energy-efficient, and secure computing solutions.

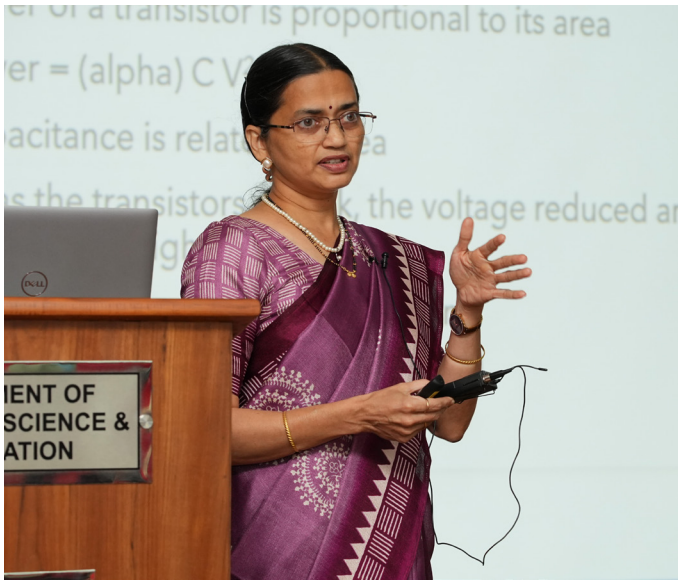
The workshop featured distinguished scholars with extensive research experience who shared their insights on the current state of computing systems and their future trajectory. A key highlight was the discussion on the growing demand for efficient and secure systems, particularly in light of the rise of machine learning applications such as deep neural networks and ChatGPT.

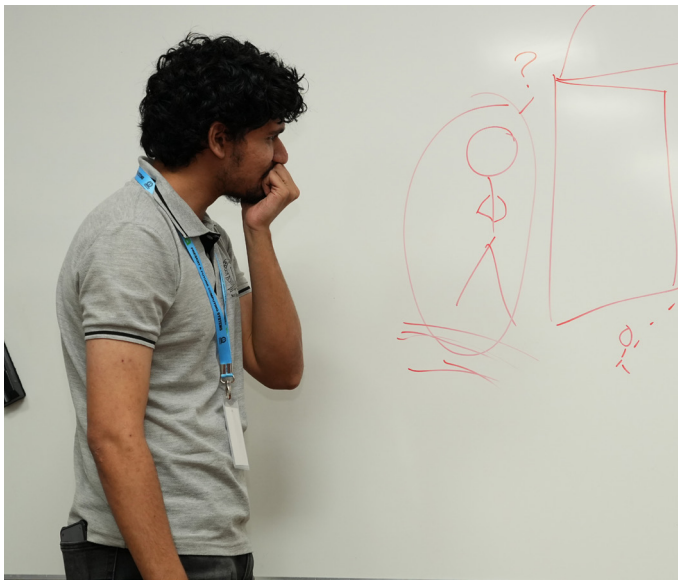
Attendees had a unique opportunity to engage with professionals from leading industries and academia, gaining valuable perspectives on emerging trends and challenges. Additionally, a team from Intel conducted a hands-on demonstration of their recently developed AIPC, offering participants practical exposure to cutting-edge innovations in the field.

https://events.csa.iisc.ac.in/futurecomputing/public_html/index.html

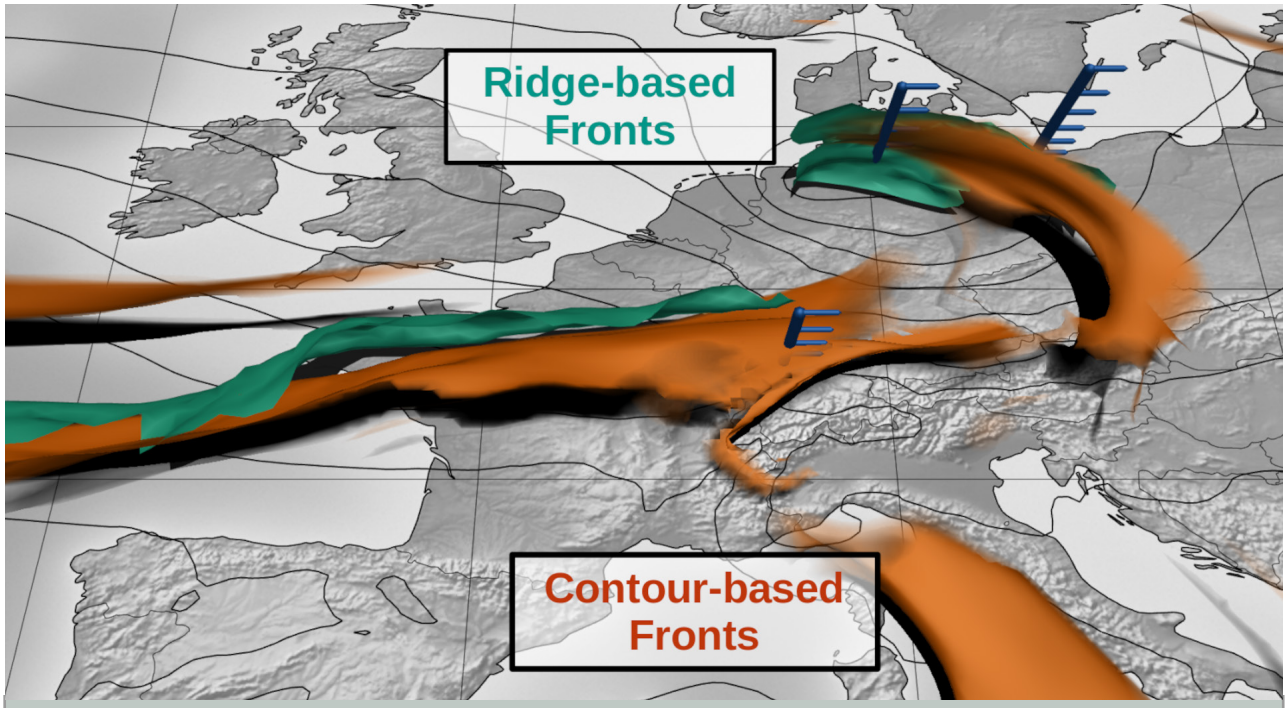

DEPARTMENT OF
COMPUTER SCIENCE &
AUTOMATION







Research Accomplishments & Awards



Paper:

A Ridge-based Approach for Extraction and Visualization of 3D Atmospheric Fronts

Authors:

Anne Gossing, Andreas Beckert, Christoph Fischer, Nicolas Klenert, Vijay Natarajan, George Pacey, Thorwin Vogt, Marc Rautenhaus, and Daniel Baum

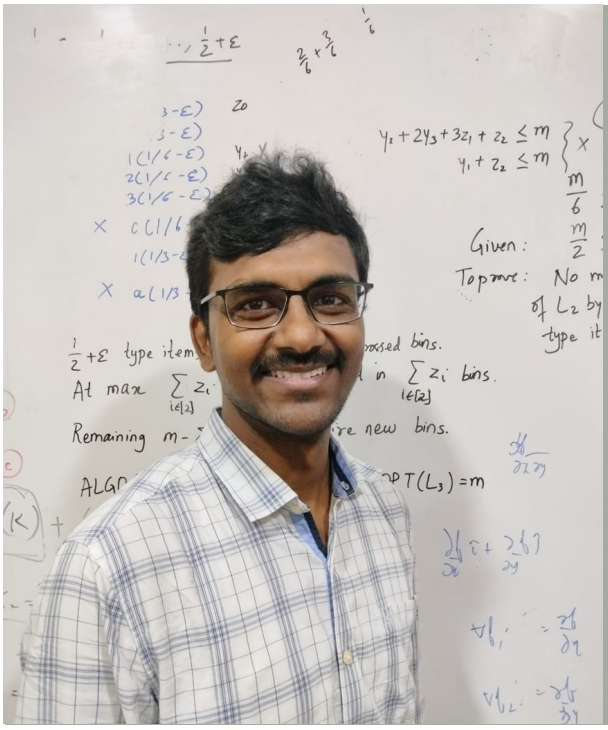
Received the Best Short Paper Honorable Mention Award at IEEE VIS 2024

[https://ieeevis.org/year/2024/program/awards/awards.html]

Protik Paul

Successfully defended his Doctoral thesis titled

Ankora: Notions of Multi-party Computation and Zero-knowledge Beyond Conventional Models



Karnati Venkata Naga Sreenivasulu

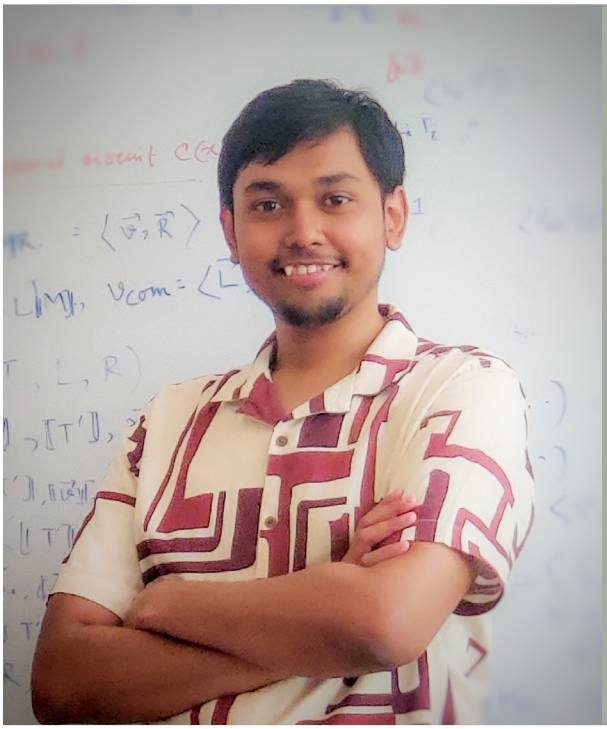
Advised by Arindam Khan, has been awarded the Dr. M.N.S. Swamy Medal for Best MTech (Research) Thesis for the year 2022-23.

Approximation Schemes for Geometric Knapsack for Packing Spheres and Fat Objects

ICALP 2024: 8:1-8:20

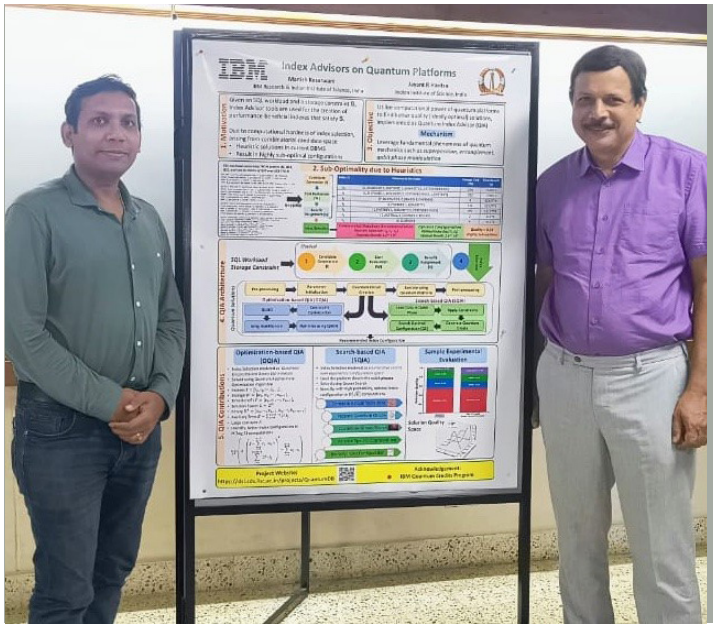
Authors:

Pritam Acharya, Sujoy Bhore, Aaryan Gupta, Arindam Khan, Bratin Mondal, Andreas Wiese



Soumya Kanti Saha

PhD student under the supervision of Dr. Chaya Ganesh in the Department of Computer Science and Automation (CSA) at IISc, has been awarded the TCS Research Scholar Programme (RSP) Scholarship for Cycle 18.



Index Advisors on Quantum Platforms

Manish Kesarwani and Jayant Haritsa's work on Quantum Computing for Database Engines

Only paper from India accepted to this year's VLDB (Very Large Data Base) conference.

https://iisc.ac.in/quantum-computing-based-approach-to-turbo-charge-data-retrieval-efficiency/

Paper:

On Approximation Schemes for Stabbing Rectilinear Polygons

Authors: Arindam Khan, Aditya Subramanian, Tobias Widmann, Andreas Wiese
Accepted at FSTTCS 2024 (44th IARCS Annual Conference on Foundations of Software Technology and Theoretical Computer Science)

Arpita Patra

Presented
Perfect Asynchronous MPC with Linear Communication Overhead

Venues

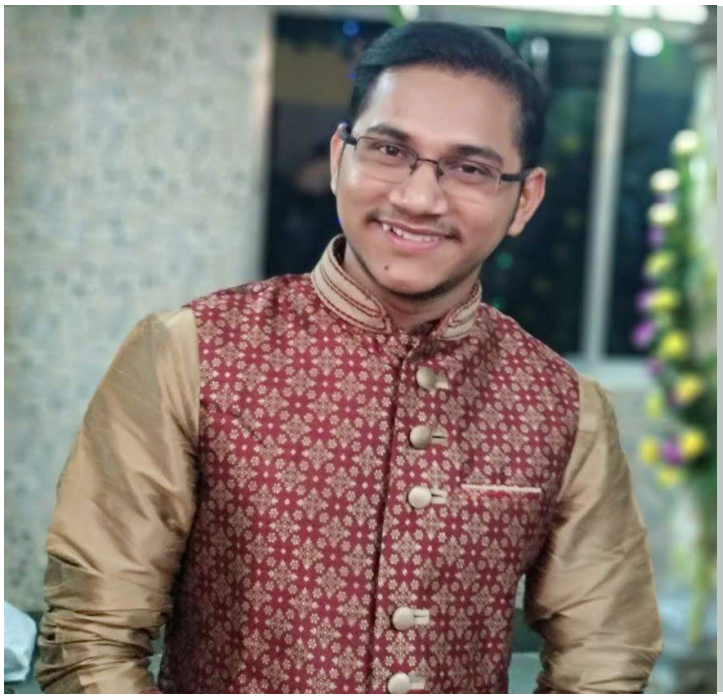
- TPMPC 2024 during 3 - 6 June, 2024. TU Darmstadt, Darmstadt, Germany
- Eurocrypt 2024 during 26 - 30 May, 2024. Zurich, Switzerland

Debajyoti Kar

Presented: ***Random-Order Online Independent Set of Intervals and Hyperrectangles***

Authors: Debojyoti Kar, Mohit Garg, Arindam Khan

Venue: European Symposium on Algorithms (ESA) 2024.



Protik Paul

Presented

Asterisk: Super-fast MPC with a Friend

Venues

- TPMPC 2024 during 3-6 June, 2024. TU Darmstadt, Germany
- IEEE S&P 2024 during 20 - 23 May, 2024. San Francisco, CA

Paper:
Graphiti : Secure Graph Analysis Made More Scalable

Authors: Nishat Koti, Varsha Bhat Kukkala, Arpita Patra and Bhavish Raj Gopal
Accepted at ACM CCS 2024.

Paper:
How to Make Rational Arguments Practical and Extractable

Authors:
Matteo Campanelli, Chaya Ganesh, Rosario Gennaro

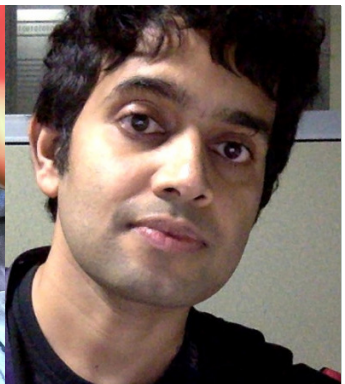
Venue:
IACR Communications in Cryptology 2024, Issue 1

Girisha B Shankar

Presented: ***Secure Vickrey Auctions with Rational Parties***

Venue: ACM CCS'24, Salt Lake City, USA

authors: Chaya Ganesh, Bhavana Kanukurthi, Shreyas Gupta



Paper: ***Compute, but Verify: Efficient Multiparty Computation over Authenticated Inputs***

Authors: Moumita Dutta, Chaya Ganesh, Sikhar Patranabis, Nitin Singh

Venue: Asiacrypt 2024

Presenter: Moumita Dutta



Paper:

Succinct Verification of Compressed Sigma Protocols in the Updatable SRS setting

Authors: Moumita Dutta, Chaya Ganesh, Neha Jawalkar.

Venue: PKC 2024

Presenter: Moumita Dutta

Paper:

Dual Polynomial Commitment Schemes and Applications to Commit-and-Prove SNARKs

Authors:

Chaya Ganesh, Vineet Nair, Ashish Sharma

Venue: ACM CCS 2024

Paper:

Batching-Efficient RAM using Updatable Lookup Arguments

Authors: Moumita Dutta, Chaya Ganesh, Sikhar Patranabis, Shubh Prakash, Nitin Singh

Venue: ACM CCS 2024

Presenter: Moumita Dutta

Arpita Patra

- Presented ***"From Theory to Practice: the Marvellous Journey of Mighty MPC"*** at Women in Data Science (WiDS) Worldwide 2024 at Bangalore Intuit.
- Presented ***"The Round Complexity Landscape of Perfectly secure MPC"*** at IEEE EASIT 2024 during 30 July - 2 August, 2024 at Shonan, Japan
- Presented ***"From theory to practice: the Marvellous journey of Mighty MPC"*** at IIT Guwahati on 17th September, 2024.

Bhavish Raj Gopal

Presented:

"Graphiti: Secure Graph Analysis Made More Scalable"

Venues:

- ACM CCS 2024 during 14 - 18 October 2024 at Salt Lake City, Utah, USA.
- At NIST Workshop on Privacy Enhancing Cryptography 2024.

Presented his doctoral dissertation description ***"Privacy-Preserving Graph Analysis"***

Venue : ACM CCS Doctoral Symposium 2024.

Contact

We would love to hear from you!
Write to us by emailing the Chairperson at

Chair.csa@iisc.ac.in

Find us on

Thank you

Credits

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