



# **Dr Gopi Katragadda**

Interviewed by

**Jane Bird**

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By Zoom

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*Welcome to the Archives of Information Technology where we capture the past and inspire the future. It's Monday 20<sup>th</sup> November 2023 and we're talking on Zoom as has become customary since the coronavirus pandemic. I'm Jane Bird and I've reported on technology and the IT and telecoms industries for newspapers such as The Sunday Times and the Financial Times since the early 1980s. Our contributor today is Dr Gopichand Katragadda, who on October 1<sup>st</sup> this year, 2023, became President of the Institute of Engineering and Technology. Gopi is a thought leader in AI, he set up the Myelin Foundry, an AI company that aims to transform human experiences and industry outcomes. We're at a point in time for AI similar to what the early 1990s were to the internet, says Gopi. Everything around us will be reinvented and engineers can lead the way in delivering a resilient future by embracing innovation and technical advancement and dispelling myths about AI. Gopi is also an independent director of Bosch India and ICICI Securities and a member of the NASSCOM governing council for the Centre of Excellence for Data Science and AI. Gopi has more than 30 journal publications and five patents for his research work, and he has written a book on innovation, titled SMASH, currently in its second edition. Gopi, welcome. I'm very much looking forward to hearing more about your life and experience in the world of engineering and technology.*

My pleasure, Jane, and I look forward to discussing with you.

*So, if we could start at the beginning? You were born in Bangalore in 1968, I think.*

Right.

*So that was, how was your early life, did you have a happy time in India?*

Yeah, lovely, lovely time. 1968 in Bangalore was the time to be in Bangalore in many ways and there's a different way of looking at Bangalore today, and I enjoy being in Bangalore again. So in those years, 1968 through, I was in Bangalore all the way through undergrad education, so I left for my undergrad education in 1990. So all those years I was in Bangalore. I had a fun time of course as a kid, going to school, coming back, playing on the streets, learning what the school was teaching, but also learning beyond, making stuff, breaking stuff, you know, learning through

friends. So I was always a curious, creative, aspirant, if you will. So I painted and I liked to build stuff, so it was a great time.

*So did you have a big family, lots of brothers and sisters?*

So I had – so this is the story, right, Jane – that my dad and mum, they wanted to have one more after me, I was the older of the siblings, and they had twins, so we had three brothers, so the second attempt, my parents had twins, and yeah, so they're engineers too.

*And are they quite close in age? Did you grow up close to them and... or were you rivals or good friends, or were they like you?*

Yeah. So they were actually so self-contained and self-content within their own orbits between both of them, that they didn't really need the rest of the world. But we were close enough. In terms of age, they're four and a half years younger than me and so they followed many of the things that I did in terms of cricket or in terms of various other interests as well as maybe from an education standpoint. But they are fiercely independent and different from each other as well. Very creative brothers. And the question around the large family is, the family was large not just because of my brothers, but I have, counting first cousins as well as cousins of my age group that were not necessarily immediate first cousins, on my dad's side there are 14, all of whom are engineers. On my mum's side we are a smaller family, so including us we are about 11, is what I last counted, and on my mum's side the family is more creative. So they are into acting and writing and so on and so forth. So that's the nature of the family.

[00:05:05]

*And your father's side, sorry, did you say they had engineering backgrounds?*

That's correct. So all of them, all of my cousins are engineers. My dad was an engineer, his dad was an engineer and as a family my last name, Katragadda, one of the stories is that we were military engineers going back hundreds of years. And on

my mum's side of the family we were, going back hundreds of years, bookkeepers and writers.

*That's marvellous that you can trace your family back hundreds of years. I'm sure that must give you a strong sense of identity.*

No, absolutely. The last names in India again, so if you look at Katragadda, which is my last name, it means 'black soil'. And it's a family name, which means anybody with that name are related to you, it's not a community or profession name. So that's one aspect of the name. So actually my roots are from Andhra Pradesh, while I was born in Bangalore, my roots are from a state immediately north of where I grew up and so my relatives are all still there and when I go into that state, it gives me co-ordinates. As soon as I enter the state, if people hear my last name they know everything about me, my family and so on. My mother's side, the last name is Tripuraneni. Tripuraneni means that they were tax collectors for three towns. And again, that's a name that is, like I said, that's a family which is smaller but exclusive. There is a statue of my great-grandfather, a large statue, in one of the primary locations in Hyderabad, the capital city of the state, and my grandfather was an award-winning writer. So again, that family name has its own identity different from my father's side.

*And what about your education then? Were both your parents quite committed to you having an education and were you state educated?*

Yeah. So I was not state educated, just to get that out of the way. State schools in India are not where we want them to be and hence most parents would prefer their kids to go to private schools and colleges. So I did my schooling in what would be categorised as convent schools in India, so Stella Maris, St Joseph's, and that was my schooling, and then I went to undergraduate degree in RV College of Engineering, which is, again, private school but my entry into that school was through an entrance exam and my fees were subsidised in that sense. Yeah.

*Okay, so what was your schooling like and did it encourage you to be, did you have that engineering sort of technical interest, technology and so on from the beginning and did your school encourage it?*

Yeah. So, Jane, you might know, but in India in those days people were coming out of middle class and the only two professions which were encouraged, not just in schools, but in society, your parents, your uncles, aunts, were either engineering or medicine, right? So earlier to that, the professions which were popular were being a lawyer and so on, but like I said, my dad was an engineer, my mum had got her MA in sociology. But professionally, everybody would want their kids to go into either engineering or medicine and hence the entire- so there's no issue like the STEM issue in the UK, even now, so everybody wants to be science engineering graduate.

*That must give India the most extraordinary competitive advantage.*

In a way, but also just look at it like this, 1.5 million graduates in engineering every year and most of them will not find engineering jobs, number one, most of them are also not really qualified with an ability to take on engineering jobs. So we need to do better at producing a more thorough percentage of good engineers.

[00:09:55]

*Okay. But in your case then, how was it? Did you excel in your engineering skills from an early age?*

So, engineering is something I hope nobody wants to excel right from the beginning. It's a field where you want to learn and grow, you want to break things, you want to set things on fire and learn, I've done all of those. And so the, obviously at an early age you're not thinking engineering, you're thinking about making stuff, creating stuff, and then you have the curiosity, so that combination is what I had. I had no clue that engineering is the way to go. Of course, like I said, my dad was an instrumentation engineer and I would many times walk from school to his office to get a ride. And it was a long walk, but I would do it and I would see the engineering happen in their offices, which was in aeronautical development, and he was an

instrumentation engineer. So it's not at that early stage I was immediately wanting to be like my dad, but that's, the basics is that you're creative, you want to create and you can find different ways to explore. If not an engineer I would be an artist, I would paint, but that's not something which is as readily lucrative, you have to be one in the country, the top ten, to be able to make a profession out of it.

*Yeah. So you obviously had that support with your father, and what was the school like then? It was quite focussed on helping you develop those engineering technology skills, was it?*

Yeah, the school, K-12, if I think about that. So what we do is we have a broad-based learning system, so K-12, so you get the physics, chemistry, maths, but also you get the biology and you get English, history and so on, so forth. So from after you finish your twelfth grade, that's when you have to pick your field. Usually even after ten you start getting a flavour of where you want to head to, so you have to pick between sciences and arts, but then after 12 you have to pick engineering or medicine. So the schooling, which is, considering K-12, is broad-based and they prepare you in a broader way. And then you pick up [incomp].

*And what age, sorry, is that, the twelfth grade, what age do you have to focus on one or the other?*

Yeah, twelfth grade is usually 18 years, when you're 18 years.

*Right. Okay, so that's quite a long time that you learn a broad range of topics.*

Yeah.

*Longer certainly than in the UK, and I think typically in the European system. So you have a very broad base, do you think that is an advantage when you're doing engineering, that you're actually studying all these other subjects as well?*

Yeah, I think it is, especially now. So when you think about the workforce now as well as the corporate systems, what we find is that those who are broad-based, those

who can talk on multiple topics, and those who can think that way, are more effective in the current workforce. For example, if you want to bring in an individual who can do artificial intelligence, that person is also going to understand biology of the neurons, but also if that person can understand, let's say, health and wellness from a broad level, you don't have to be at the engineering level of detail, but know that there's organ and tissue health, there is cellular health, and there is health at the molecular level, then those folks can think about the future of health and wellness. Whereas if you're only able to produce one piece of equipment, in the best possible way, then you can be an engineer obviously, and do very well in that domain, but I think more and more it's about creating new ways of value, providing value.

[00:14:35]

*So, did you have at that time when you were at school perhaps, or afterwards at university, did you have mentors who had a great influence on you, apart from your family?*

Yeah, I always learn from people, so you know, in school, for example, there was a Hindi teacher, a biology teacher who was very good at their subjects, so my performance would naturally go up when you had good teachers. And I drew a lot of inspiration from them in terms of knowing a subject in depth, and that helps me now, it helped me in my Masters and PhD, and it helps me in any form of research which I do beyond my work as well, which I'll be happy to talk about also. So I've drawn inspiration from them. And then in my grad school, my professor, Dr William Lord, he is actually from the UK, and he was a major source of inspiration from a standpoint of how do you interact with people. He would inspire us to get work done, and he didn't have to say much, it's because we wanted to do it for him. And so his approach of, you know, doing good for his team so that they in turn returned that favour is what I use even today. And it goes on, I learnt operations excellence from my first work, the boss I had there, and I learnt global thinking from my boss in GE at that point of time, and from the Tata Group I learnt how to be humble. So there are many and each one of these is coming from an individual.

*Yeah. Well, let's just, okay, so to finish off on your education then, could you just talk through what – you did two degrees then? Did you do a Masters as well? And you mentioned the army college, what was your university education?*

So, not an army college, it was just two characters – RV. R as the letter 'R', and 'V' for Victor. So 'R', Robert, 'V' for Victor. So that stands for Rashtreeya Vidyalaya, which means the national college of engineering. Right, so that was my undergrad degree, that was my Bachelors of Engineering in Electronics and Communication. And then I did my Masters, again in electrical engineering, in the US electronics and communications comes under electrical engineering, so I did my Masters in electrical engineering being funded by NASA and I worked on the space shuttle main engine heat exchanger tubing and built electro-magnetic sensors for inspection of those tubing, and used AI to classify the signals coming out of those sensors. And my PhD was funded by Gas Research Institute, and Gas Research Institute, among the many things they did, was also interested in looking at automating the inspection of the hundreds and thousands of gas pipelines by putting what are known as PIGs, Pipeline Inspection Gauges, into the pipelines, and collecting data which will tell them where there are cracks and so on, so forth. So various sensors, electro-magnetic sensors using magnetic flux leakage, but all the way to ultrasound. So that was my PhD, so that was my education, I went straight through, yeah.

*And in America, you did that, your Masters?*

That's correct, yes.

*So where were you based in America?*

Yeah, so this was a small town called Ames, in Iowa, bang in the middle of the US. Ames had the university called Iowa State University. I was fortunate also to very recently receive an award from the university from the department I graduated from.

*So, was it a big change for you then to go from India to America? Must have been quite a big adventure?*



Yeah, actually it was an adventure, but it was in some ways opposite of what you might expect. I was in a big town, Bangalore is a reasonably big town in India, and of course I later lived in Mumbai for five years and realised that Bangalore is not such a big town after all. But then Ames, Iowa is a village and so it was like going from a city to a village. But, it was such an enjoyable experience, because we had students, 25,000 of them, the total town population was 50,000. I was part of the Student Union board, I led the Indian Student Association, I met my wife, future wife, at Iowa State University, and, you know, a lot happened in those five and a half years.

[00:20:03]

*And to be involved with NASA, that would have been a very prestigious, presumably, and exciting thing to participate in?*

Yeah, yeah. So one of the happiest moments in my life was when Dr William Lord said that he would give me that assistantship. I'd gone to the US without a source of funding other than my parents, so from day zero I was able to get funding, which was NASA funding, and those days NASA was really prestigious – again, we're back with NASA being in the limelight, in between there was a bit of a downturn, I would say, for NASA – but really, those days being part of NASA, a research scholarship, was really awesome.

*So, from NASA then, how did you, what was your sort of first job? I mean I've got some information about what you did, but I think it would be quite helpful if you could just talk through your various roles.*

Yeah. So the, NASA was a graduate assistantship and then my PhD was funded by Gas Research Institute, like I mentioned. So my first job was with a company called Carter Technologies. So again, just to give you a background, I had two offers at that time. One was from the banking industry, credit card industry, to be more specific, to use AI and engineering techniques to look at fraud. And the other offer was from this start-up which spun off from Southwest Research Institute, and they were using electro-magnetic sensors for inspecting critical equipment, which was my field. So even though longer term it was thought that it is more lucrative in the banking

industry, I stuck to my roots and picked up the job with the start-up in San Antonio, Texas. And this was a spin-off, like I said, from Southwest Research Institute. It had the fabric of research, governance, compliance coming from Southwest. But nevertheless, we were a start-up and I was the employee number 40 when I joined. I joined as a senior research engineer. But like would happen throughout my career, I always focussed on the job at hand, but the opportunities showed up very quickly for something larger. So within a year the vice president of the organisation left to start his own company, so they asked me to do the role, not with the title, but still did the role, with the title first of manager, then director, and then VP in three years, of R&D in that firm. And we grew also in the meantime from 40 to 400. Another three years in that role is what I did in the US, in San Antonio, Texas.

*Okay. And then what was your next move?*

So, Jane, I actually had gone to the US thinking that I'll return within two years, that is immediately after my Masters. And by then, by after my Carter stint, it was already 12 years. So, having done my PhD, the jobs which you would get in India at that point of time were not going to leverage my PhD, let's put it like that. But then in 2000, GE started the John F. Welch Technology Centre in Bangalore. It was the largest centre for GE outside of the US at that point of time. Actually now it is the largest centre across the globe. But when I went back to India for a wedding I saw an advertisement in a local paper in US which had Indian flavour, advertising for jobs at John F. Welch Technology Centre, so I went and talked to them. And so that was my next move, I went back to India. So, Jane, the way I always now think about how I made my career moves was that it is the intersection of technology, people and in some manner, India. So that intersection is the sweet spot for me. But what I realise now is that it is also broadly, since now I've spent my career in India, much broader, so it's the intersection of technology, people and culture. So that culture wherever I am is something I look forward to learning. For example, yesterday I was in the Roman Bath, a lecture at Bath and I loved going round and seeing, you know, that period in UK's history. I've been to Stonehenge. So I have that interest in culture. So now I think I'm able to look at my sweet spot, again to repeat, as technology, people and culture.

[00:25:36]

*Okay yeah, that's fascinating because of course many technologists are much more focussed on the technology itself and then forget to realise that this has to be implemented by people for people and it won't work if people don't find it helpful. But maybe we could... so that was your, when you joined GE in India. And how long did you stay with GE then?*

Twenty years. So, GE, like a lot of my large company governance etiquette and ability to lead large teams, I built at GE. In fact, this visit to the UK, my first stop other than work was to a colleague from GE. So we have a large family of professionals, so GE is a big part of my career.

*Okay, but you're not with GE, you're obviously not with GE now. After GE you went to Tata, is that right?*

That's right. So I was at that point of time leading the John F. Welch Technology Centre, which I mentioned. But I was leading it only for two years at that point and in my book, that role, anybody should be there only for three years because it's the leadership of the centre and it's quite a significant ambassadorial piece attached to it, and two years into the role there was a call from a place which is a recruitment organisation. And I said, look, if it's a job, I'm not interested, but the request was to meet Cyrus Mistry, who was the chairman of the Tata Group at that point of time. And the suggestion was that look, there is nothing particular in mind, and for me, the opportunity to meet with Cyrus was something that needed to be attended to, because he was leading a 110-billion-dollar organisation in India. And so I met him and he ended the conversation asking if I would join him. I took six months before accepting.

*And the goal that you were joining as – sorry – the role, what was your role to be?*

It was the Chief Technology Officer for the Tata Group, across the group. It was a new role created by the new chairman, who was interested in ensuring that the group had a more significant technical outlook and flavour. Yeah.

*So that's an enormous role and responsibility to take on, I guess. And so that's what you did. So when did you take that role on?*

This was in 2014, Jane. So, to stick to my earlier comment, the intersection of technology, people and India was still playing a role and for me Tata Group represented a much larger canvas to be able to do that.

*So a really kind of global role, presumably? Or...*

It was, it was, because the Tata Group had a presence in UK, for example, with the Jaguar Land Rover and Tata Steel in UK and Europe. And a presence in the US and so on, so forth in various different companies, so Tata Chemicals, Indian Hospitality, and so on, so forth. Yeah, it was a global role.

*So during that role then, from I think you were there till 2019, was that right?*

That's correct, yeah.

[00:29:356]

*So what were your sort of greatest achievements, would you say?*

Yeah, so we were looking at creating something at the group level, which was never done before, to give a technology heft to the group. So a few things that we did, the way I structured it, Jane, was to say that there are things which we will actually have to demonstrate by doing things and delivering things from the group. So this is very tough a sell because at the Tata Sons level – Tata Sons is a holding company – so it's a tough sell because a holding company doing technology research is not heard of typically, but that's what I negotiated with Cyrus before taking on that role. So that six months was to say that this is what it'll take, this is the kind of investment which will be needed, this is the kind of team which we'll need to set up. So that was one part of it, which is what we delivered at the group level, across different companies. Second part of it was what do we do to facilitate university collaborations, again at a

group level. So how do we help university, how do we help our group companies think ahead, five years, seven years down the road. And what were the global best universities – and I'll come back to each one of these areas. So that was the second area. Third was when people like, large companies like Airbus was looking for collaboration, they were finding it difficult to talk to so many Tata Group companies. Third was to provide a uniform, unified technical face to the organisation. So, let me just go over each one of those in terms of accomplishments. So in terms of technology, what we did was delivering from the group at the group level. We created a model where we said half the team will be from my team – we created a new team – half the team would come from different group companies and we would target areas where we need to excel at, but no one company can do that. So the area that we picked, for example, was creating a new material called graphene, and creating a factory that would make that material. So we have a running factory now which produces graphene as a material and as you will know, by weight graphene has significantly higher properties from a strength and from a connectivity and other electric and thermal properties. So that we produced from a low-cost approach. So we were using something called shellac, which is resin from a tree, which we have ample access to in India and we were able to create this material, graphene, and create a factory out of it. Of course it was not something that was accomplished by me, it was accomplished by the team. But the ability to pull together all the right stakeholders, get it funded and get enough, not only the investment from a money standpoint, from a leadership attention standpoint, and bringing my team to also contribute was what we were able to do there. So that's one of the materials. Then we also created an India specific fuel cell. So the ability to do hydrogen fuel cells in the heat and dust of India is what we targeted. And again, in addition to the heat and dust we were to keep in mind that there is a cost sensitivity in India, so we brought that in as well. So [incomp] versus anything more fancy, for example, would be what is preferred in India. So that's something again we built, and a significant amount of that work also helped Tata Motors in their efforts to produce a fuel cell public transportation vehicle. Then in agricultural space we looked at aerial delivery of fertiliser and pesticide. So these were early days of drones to be able to do that, but we were able to do that, so there are many challenges which are not technical – I'll talk about that just because it might interest the readers. So in agricultural sector in India we were able to show significant improvement in efficiency by looking at where

we need to spray, how much we need to spray using AI, and using aerial delivery of the spray also, as an example, pesticide. But the question that we were asked by the farmers is what do we do with extra produce, will you be able to buy it. And we were saying that no, we don't buy the agricultural produce. So the challenge there was very different, they were happy with what they were producing, even though India has one of the lowest per hectare productivity in agriculture, the farmers didn't have the supply chain mechanisms to do much more with what they produced. So the challenges in India are much more complex than just saying okay, I can improve your productivity on the agricultural side.

[00:35:10]

Another area of delivery was IOT, Industrial IOT, so we're talking again early days of Industrial IOT. But we took a route which was very light touch. So I'd come from GE where we had spent a heavy amount of investment in building a very large platform. So knowing the issues there we went with a very light touch approach to creating the IOT platform, the Internet of Things platform. And that is something that even today everybody does, right? And we also made a factory safety wearable. So wearables even today are being made for all the consumers, but how would the factory floor worker lower cost wearable which will look at the factory workers' vitals, make sure that they are in the right wellness state to go into hot regions of steel plant, because you do have fatalities and you want to save lives. And even if it is not a fatality, to be able to save a limb or to be preventing an accident of any kind is big. So we actually delivered a factory safety wearable which today is being marketed by Tata Communications. And so a few more...

*You delivered factory safety what?*

Wearable. It's something that you wear.

*Wearables. Oh, wearables. So what sort of devices? You mean monitors that check people's blood pressure and pulse rate and that kind of thing?*

Exactly. Not blood pressure in those days, very tough to get blood pressure, but yeah, heart rate and we were looking at skin temperature and a few other things, including geofencing, right? So if your employee that you train to be in a location, you train to be operating that piece of equipment, they are your training labs. So we could bring all of that to bear. That gives you a flavour what we did there. And from a university standpoint, right from Harvard and Yale to Imperial and Tel Aviv University and in India, IIT Kharagpur, IIT Kanpur, we set up for the first time collaborations which run even today. And these were multi-million dollar, multi-year collaborations. And we provided many opportunities for the group to collaborate with large companies and create partnerships with a single face.

*Wow, that certainly sounds quite impressive. So all that between 2014 and 2019.*

Yeah, I'll tell you something. My dear boss and also a friend, Cyrus Mistry knew I was coming from GE, and he said, Gopi, I know you're coming from GE, but you have 25 years to deliver, so go slow. I've never had any boss telling me to go slow. I did not go slow. And there is a reason for that, in technology things go at that pace and you have to match that pace. But also, I never took a guarantee for the future, and unfortunately, you might have seen the story, there was a boardroom matter and Cyrus was removed from his role and that was two years into my being there. I spent another two and a half years with the Tata Group, and the vision which Cyrus had and the vision which the incoming chairman had did not necessarily match and in terms of me being there, it required in my opinion, I'm a hands-on guy, we needed to deliver technology at the group level, and that need not match every chairman's vision. So we were making it work, but I felt that it would be a good opportunity to do a start-up and play a role in the start-up we called System of India. So while I'm today running a start-up, I'm also the chair of the CII start-up council, Confederation of Indian Industry start-up council in the southern region, and I'm a part of the overall national start-up council and contribute in that manner where I believe that India could do very well. So that's the reason for that change, even before you ask me.

[00:39:47]

*Okay, good. So is that what you decided to focus on in 2019 then, in the start-up world?*

In the start-up world, what we said we'll do is we will work on global first products which come out of the region we're in, and in order to, since we had the luxury we said that what is happening, and we took a call on AI very early in a manner, that we will be an AI company. But we also took an even earlier call on being a company which delivers AI on devices, so on your mobile phone, on your TV, and executing the AI on the device and not having to go to the cloud. And there are many advantages: latency, privacy and, you know, the ability to do safety in a timely fashion. So there are many advantages to the Edge, which is the device. But also we excel on the cloud. We differentiate on Edge, but we excel on the cloud.

*On the cloud, okay. So this is the Myelin Foundry you're talking about now, is it?*

That's right.

*You set that up in 2019.*

Correct.

*So, AI is such a vast concept, you're focussing on one particular part of that. Can you talk a little bit more about the world of AI? As you know, at the moment there's quite a lot of feeling that it should be perhaps put on hold, amongst experts who feel that the technology is developing too quickly, others who feel that we've got to keep up otherwise bad forces could get ahead on the technology and that might be even worse. What's your take on those issues?*

Yes, so I have strong opinions, obviously, and I'll be happy to share. Those who have asked for putting AI development on hold, actually if you've seen the developments, like Elon Musk, for example, they have continued their own development and they have released AI work along the way. So I think that everybody understands that this



train has left the station and the question is, if you want regulations, if you want good actors to play a more significant role, they have to be on this train and they have to be looking at, you know, what is happening, which are the stations which are just ahead and how do we make sure that we are using the technology for the better of human health and comfort, but also with the planet in mind. Will there be bad actors? Of course there will be, and the equivalent of the dark web. Dark web exists today and there are bad actors who use the dark web for carry on transactions which you and I can't even imagine. But, there are laws in place, they're criminals and we can use the laws to bring them to book. The question is, is there sufficiently more positivity which has come out. And I think the answer will be yes. The economy has grown, it has provided more access to remote parts of the world, more jobs to remote parts of the world, more people have access to healthcare, more people have access to knowledge. Similarly with AI, we will be able to deliver value for the benefit of society and for the benefit of the planet, and it will happen, there is no question about it. And what will also happen is that there will be deep fakes, there will be people who can, you know, use the technology to maybe hack into environments which were previously not hackable, and so on, so forth. But we can deal with it. And I again will reiterate that I don't think we have that ability to say we'll put a pause on something. It has never been done before, you can only pause what the good people are doing. Who is going to pause, you know, people who don't care about your regulations are doing. And hence, I think that it is important for us to leverage it. And also, no technology is bad, it is the human behaviour that we need to look at and no amount of technology neither can compensate for bad human behaviour, nor any new technology be dangerous in itself, right? So anything can be dangerous, so we just need to ensure that we are thinking about this correctly. If you give me a minute I'll share why I think that we shouldn't be worried about AI.

*Yeah.*

[00:45:00]

Is that okay?

*That's fine.*

Yeah. So AI, what does it do? It draws lines [incomp], in multi-dimensional spaces. So what does it mean? It can separate out cats and dogs or, you know, people of different kinds, or it can look at a box of chocolates versus a box of something else. So that can be done by virtue of what you're using for [incomp] if it is two-dimensional. If it is three-dimensional it'll draw a surface and still be able to separate, or it can morph one surface to another. So it can morph your face to my face, right? Most of the recent developments, while you said that you are focussed on one thing, we are focussed on that one thing, which is why that segment around the eyes, which is deep neural networks, convolutional neural networks and transformer networks, they're a series of developments from an algorithm standpoint, which is the only reason why we're talking about AI. Many people will classify a lot of things as AI, and they're right, but there is no excitement about using three-based logic for AI today, right? But there is a lot of excitement about using a stable diffusion model or a transformer model to be able to do large language models and in turn be able to produce a proposal based on [incomp] inputs that you give, or produce a tome of writing based on, again, your style of writing from the past which are fed into the material, or produce an image which doesn't exist before. So this is where the excitement is. And so where I see this going is that it'll impact knowledge workers, it'll – by that I mean it'll aid them – so if you're a doctor you'll have information at your fingertips of new, very new research, if you're a lawyer you will have information on case laws which are, you know, much more than you can digest on a regular basis. But, what AI will not be able to do is give a professional judgement on whether you should have a surgery or whether you should take medicine. These are calls based on seeing so many patients in the last, let's say, couple of years, based on medicines which have been working in the last couple of years. So, where there is a lot of data AI can help the individuals, where there is less data and judgement calls have to be taken, and where there is sometimes emotion involved, humans are the only folks who are – right now – who can do that, because you cannot program emotion by definition. If you can program it, it's no longer emotion.

*That's a good quote. Okay, that's great. So, just to finish off on your career then, is there anything else we should mention before going on to you becoming the President of the IET?*

So from a career standpoint, Jane, I think people should know that there is an opportunity to do your career, and alongside volunteer. In a way I've been a volunteer with IT since 2012, but I've also been a volunteer in student bodies from my undergraduate days, right? So if you're volunteering or giving back to society, it doesn't happen after your retirement, number one. Number two is, the skills that you develop along the way, and you will be repeating that development based on your roles, would include expertise which you build in your grad school and later, it will include imagination and creativity, but also it will include clear thinking, it'll include being able to work inclusively, and it'll include having an external focus as you grow into managerial roles of different levels of magnitude, so I just wanted to point that out.

[00:49:17]

*Yeah, indeed. So you were volunteering for the IET since, did you say since 2012?*

That's correct.

*So now that you are at the head, leading it, what are your hopes and aspirations, what do you want to achieve?*

First, Jane, I think the role of the president is part of a continuum, it is 150-year-old organisation so presidents come every year. So the way I believe a president should look at his role is to provide a leadership and a focus for that year, and at the same time provide continuity from the past year, and provide a continuity into the next year, right? So, for example, Bob Cryan was focussed on mentoring and looking at engineering careers of youngsters. I think that is something that should continue. My focus is on AI and creating AI jobs in the right places. And being able to think about AI ethics and data ethics.

*Okay. Yes, so the ethics touching on the kind of emotion side of things that you were talking on. Okay, so how... and how will you try to achieve that? Have you an implementation plan?*

So, it will be a long journey, Jane, in terms of being able to look at what is the best way to optimise the good impact AI has, while not letting go of certain fundamentals on how we do it. So it starts with data, so let's think about that. And there is a good amount of work already which has gone into data privacy, that's a great start already. A lot of the existing laws will also protect individuals in various ways. So the, so what else has to be done on data? So if you look at data creation, data annotation, there are places in the world where you will be generating data where you could get it for free. You give a wearable like I've mentioned earlier to a factory floor worker and say we'll let you wear it and the data which comes out of it is ours, but you just wear it. And it may be fair if you have collaborated with the company that you are working with, I mean the individual is working with. However, if I go to an individual in a village in India and say, put on my wearable and all your health data will be mine and you get the wearable for free, right? So there you're taking advantage, there you're not paying for something which is valuable, because the other individual doesn't know its value, alright? So being fair on data monetisation I think is one aspect of AI that we need to look specifically. Why I spend so much time on that is, that most of the aspects of what is required to be looked at will be already done in one way or the other in some regulation or the other, so we have to look at what is coming out new. Similarly, the impact of AI being used in the right places for the right impact. If it is being used for differentiating one ethnicity from another to look at targeting a particular ethnicity, obviously it's the wrong impact. Can AI do it? It absolutely can do it. So as engineers, I think we need to take a lead saying that certain impact – and I'll tell you this – that AI is easy to use, but from a standpoint of being able to train it to do certain things, as engineers we can make sure that it doesn't perform that way, right? So while it can do it, we can make it such that it doesn't perform certain negative tasks. So I think we need to, as engineers, or starting with engineers, sign up that we will ensure that there is typical data being used for AI and there is a typical user of AI from an end use standpoint. So we need to pick two or three areas for data and two or three areas for AI impact, and that's it, because the rest of it is going to be covered by existing laws and regulation.

*Okay. So looking back then, what would you say that your proudest achievements have been over your career?*

It's been the individuals that have gone on from working with me to be great leaders globally in multiple places. So that's been, I think, I take great pride. I told you that it's technology, people and culture now, but the biggest aspect of that is people and I feel rewarded whenever I meet my colleagues doing really great jobs, heading large companies, starting small companies, and when I meet them and the warmth that we share with each other shows that we had a great time and I had a piecemeal role of, you know, influencing their direction.

[00:55:10]

*And what do you see as being the biggest opportunities in the next sort of five to ten years in your crystal ball?*

Yeah, I think the ability – you look at a company like OpenAI and the things which are happening around its leadership, notwithstanding right now, they have done something miraculous. They have, what they have been able to do is channel a significant amount of funding into creating something of great value, right? So just one company, Microsoft, put in ten billion dollars into that company, OpenAI. So the opportunity, I think going into the future, is everywhere at the same time. By that I mean every field that you can think of will get impacted by what has been developed. But let's take a step back from the company and look at what has happened, is that there was a foundational paper called 'Attention is All that you Need' and that foundational paper was released a few years ago, and that is where – so this was 2017 it was released – and that's where all the present excitement about AI started. So with that paper and the building based on that paper of new AI algorithms, and that paper was written by the folks from Google, [incomp], and that paper was written by, if you look at the authors, people from all around the world, right? So I don't think any particular country should take complete ownership of the now opportunities which AI will have. I think the opportunities are everywhere, starting with healthcare, the ability to go from diagnose and cure to predict and prevent, in energy to identify the right mix to minimise the impact to the planet, in transportation to ensure that we are leveraging public transportation in the most effective way, and thinking about the networks and what is the best design, using AI. And agriculture, to be able to look at

how to get the optimal outcome using the least bit of interventions like fertilisers and pesticides, because those are damaging the soil below. So there is significant amount of opportunity. For us, for my company, for me, I think the opportunity is to excel on the devices. So in an automotive it is not advisable to go back to the cloud and warn you about an impending accident. So to be able to run AI on video is very tough and we have already excelled at that. So that's where we will excel, but we will be one brick in the wall and the wall is going to be beautiful.

*Okay. Why is it called Myelin Foundry, by the way? Because myelin is connected with nerve fibres, isn't it?*

Yes. And so also is AI. The artificial intelligence model today is called, is based on something called deep neural networks. So the neural networks we have used from my 1990s Masters, I have used neural networks, there's not much difference between that and what we are using today, other than the fact that we are using significantly more computational level capability. And like I mentioned, slight variations to that, one of them's to bring attention, which again is possible only because we have the computation that we have, right? So myelin is the protective cover on the neuron which allows signals to travel faster and is responsible for the success that the human being is. And so we took on that, we wanted a name that associates with the neuron and that was available, so we took that.

[00:59:28]

*Okay. So that's your crystal ball. What about your advice to young people who might be thinking about becoming engineers? Would you recommend it and how should they go about it, do you think?*

I think the youngsters should take on whatever... they should be the best version of themselves and for those who are creative, I would strongly recommend engineering, for those who have curiosity I would strongly recommend engineering, those who want to work with their hands or are interested in creating a future, I would strongly recommend engineering. That's a lot of people out there, I guess. But why I mention that, if somebody is an artist wanting to paint and is good, they shouldn't let go of

that, but there is enough of us who want to be creative, build a future, so engineering is a great place to make that happen. Everything which is out there needs to be rebuilt, so we can use as many engineers as we can. Why does everything out there need to be rebuilt? Today we are heading down a path where climate change is not going to allow the future to be as pleasant as it is today or as pleasant as it was yesterday, right? So we need to rethink everything which is out there with a new lens. So engineers are the most capable of doing that. Today where we are is based on something which happened in Glasgow where James Watt invented the more efficient steam engine and set in motion the industrial age. But his view was of making human health and comfort much better and not creating climate change, but that happened. Not that he was responsible for it, but collectively we're all responsible for it. So there is significant opportunity for engineers. The new engineer is an engineer who is not happy with just what they've learnt, but are constantly learning into the future, they are creative, they are hands-on, they have the planet in their hearts and minds and are willing to make a large impact.

*And what about where you're going to be? You mentioned that you caught a cold in London, I mean do you spend much of your time in London at the moment? Will that, presumably you'll need to in your IET role?*

No, I will end there. Actually, Jane, I've not caught a cold, it's just that the throat is getting used to the dryness or whatever. But yeah, so I have spent a good amount of time in London in the past and I'll continue doing this role and even more. So I look forward to it, London is a great place, the places that we are in, including I was in Glasgow, Birmingham is another place that we're in. Stevenage is where the staff sits. I definitely look forward to meeting the people, again going back to the fact that I love people. But also the culture of these places are so different and I'm really happy to be here and learning from the people and from the history of this place.

*And is there anything we haven't mentioned that you might like to cover, Gopi, before we finish?*

Yeah, there is one thing that I think would be of interest, Jane. One of the areas that I have looked at as part of my larger interests and curiosity is there is an undeciphered

script which is from the Indus Valley, it's called the Indus Script, and this is an area that I have spent a good 30 years trying to decipher it. I have a paper which has been published just yesterday I got the message that it was published, because accepted for publishing quite some back, but it took some time for them to get it out. But yeah, I would strongly and creatively want to, you know, look at their interests and not wait for some future time in their lives to take it up and, you know, be it volunteering, giving back to society, or be it an interest area, I think we have time for all of it, especially with AI.

[01:04:14]

*So yes, it's an ancient Indus script, did you say, on what, on tablets of stone?*

Yeah, this script was, what survives today is on seal-like tablets, so basically these are clay tablets and very few stone tablets remain, but most of them are seals, so they were used as seals either for monetary transactions or for royal transactions.

*And what period of history are we talking about then, how old are these seals?*

These seals go back to 3400 BC to 1400 BC.

*And this is an area that you're interested in as well as being interested in the 21<sup>st</sup> century and the technology of tomorrow, you're also deciphering these messages from three and a half thousand years BC?*

Absolutely, yeah.

*So your range of interests is truly remarkable, I would say.*

Yeah, I mean sometimes it seems a lot, but I think the brain has multiple tracks and it can process and then you do it over 30 years, you have all the time you want.

*So are you applying AI techniques to understanding this ancient text then?*



So, you won't believe, early on I did try. I'm talking about 1992 timeframe, I did try using AI techniques, but AI, the way you think about it is you need input and output when you're training. And so it doesn't lend itself very well for a script which has not been deciphered. But if you have a hypothesis and you have partial, have it partially working, then to fill in the blanks, it could be used. So that's something that is into the future, but right now my work which is being published looks at the seals, looks at the limited context which is available, applies a specific context and a knowledge of the language. So very hands-on rather than AI. So I think in any field you have to be a domain person first, only then you will be able to apply AI.

*You have to be a domain person, did you say?*

Yeah. So if you're applying AI in energy, you'd better understand how plants work. If you blindly apply AI you will get answers, but when there is something wrong you will not be able to distinguish the right from wrong.

*Okay, well that's probably a good point on which to end it. Gopi, thanks very much for your time, it's been absolutely fascinating hearing about your life in the worlds of technology and engineering and I wish you every success in the future. Thank you very much.*

Thank you Jane, and lovely speaking to you.

[01:07:21 recording ends]