

# Interview of Dr. Timothy A Gonsalves

Director, IIT Mandi

by *Perception* in collaboration with SCRI, IIT Mandi

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[00:32] Hello everyone, This is Rishabh Dharmani and today I have with me Dr. Timothy A. Gonsalves. Dr. Gonsalves is a computer scientist and professor. He is the founder of Nilgiri networks of TeNet group IIT Madras and was also the Head of Department of Computer Science and Engineering at IIT Madras before becoming the first and present Director of IIT Mandi. It's a pleasure to have you here with us. How have you been?

- I am fine. It's my pleasure to be here with you.

[00:59] Sir, firstly can you tell us something about your school and college life, like what was an interpretation of fun those days?

- Well, school and college were very different from what it is today. There was much less pressure, perhaps because there were very few opportunities at that time. So maybe that's ironic. We had 5½ days of school and 5½ days of college. Despite that I had lot of time to do other things. I used to take part in many sports and games. Living in the mountains, I loved going on long walks in the forests near my house. I also liked going on a lot of bike rides, I also like reading. So while I was in IIT I went on bike rides around South India as well as around the city.

We did a lot more outside classes, and I think there was more variety, perhaps because we were not so focused on the best job and whatever.

[02:09] My second question is how was Engineering in those day and how it is different from nowadays?

- Engineering was very different. In terms of jobs, there were relatively few jobs that were not very well paying in India. At that time India was a closed economy. So engineering in India was very different from engineering outside India. There was no Internet at that time. There were very few books. I remember in the Strength of Materials course there was only one book in the library, and the teacher had taken that out. So we had to go to class and be dependent on the notes that we took. So learning was quite different. At the same time, BTech was a 5-year degree, and although we had 5½ days of classes, we did spend a lot of time outside classes doing various things. For instance apart from bike rides, sports and other things, many of us built our own electronics music systems, and so on. We started a technical newsletter in the Institute, and there were many things like that we did outside studies.

[03:40] Sir, You are a Bachelor of Technology in electronics and Master of Science in electrical but by profession you are a data scientist and a professor of computer science. What is the reason behind this inclination?

- Actually, I thought I was more a Civil Engineer over here looking after construction, but anyway, now I know I am a data scientist!

At the time I started my BTech there was no computer science. In the third year of my BTech, IIT Madras acquired an IBM 370 mainframe computer, and at that time, it was the second most powerful computer in India. As soon as the computer came, Professor H.N. Mahabala started a series of lectures in the evenings for learning Fortran programming. I went for that, and I got hooked on programming, and after that, I spent quite a bit of time in the computer centre working on the computer.

My final year project, my MTP, was on digital communication in electrical engineering, and then I went for my Masters. I migrated slowly upwards in the communication stack towards local area networks. After I started working, I started looking at applications of networks and more into distributed software systems. And with the growth of Internet and growth of distributed system, it was a fairly natural migration towards big data and databases.

*[05:19] Can you elaborate more about your work at IIT Madras, more specifically at TeNet?*

- When I joined IIT Madras, at that time IITs were institutes in India primarily focused on the education of students, and the research that was being done was largely academic work published in international journals.

Three of us joined IIT Madras as faculty in the late 80's: Professor Ashok Jhunjhunwala, Bhaskar Ramamurthi and myself. We decided that we wanted to make difference in Indian society, not limit ourselves to academic work. So we decided to start working on product development, developing products that were tailored to the Indian conditions, and at the same time, were not inferior to anything developed anywhere else in the world. So this was the genesis of the TeNeT Group.

At that time, India had 900 million people, we had 7 million phones and there were no mobile phones they were only landlines. Typically there were waits of several years to get a telephone at home, and it was expensive and did not work very well. So we looked at how we could change that and say move towards 100 million telephones in India. And we figured that we needed to have a wireless system from the exchange to the subscriber - wireless and local loop. So we worked on developing such a system and encouraged some of our former students to start some companies to commercialise the technology. We came up with something CorDECT wireless loop system.

And then we moved on to looking at how do we provide Internet services? Again at that time, Internet was at the nascent stage in India. So the TeNeT Group grew into a group of about 20 faculty, 200 project staff and a dozen companies working on developing products in the telecommunication space for India.

After about 10 years of this, I had seen that many of the people who worked in these projects and companies came from the rural part of India. They had to migrate to the city (Madras) in order to work on these. So I thought why not to go to a small town, my hometown Ooty, and set up a company where people can do the same type of advanced telecommunication development software staying in their hometown. So I took two years of leave from IIT Madras and setup Nilgiri Networks. For this purpose I hired some local people, some of them were physics graduates and not engineers, and learned programming on the job. And we developed some very interesting

products sold as a part of the TeNeT Group in different parts of India and the world. So, that in a nutshell is what the TeneT Group is about.

*[08:40] How does it feel to be the Head and a Professor in the same Institute where you were once a student at IIT Madras?*

- I graduated in 1976 from IIT Madras and returned there in 1989. So there was a gap of about 12-13 years. I left as a young bachelor and returned with a family of two children and a lot of experience. At the same time, IIT Madras had grown and changed substantially. It was not really strange. I didn't feel any particular difficulty because of the changes in myself and in IIT. At the same time, having being a student at IIT Madras, I knew all the tricks students could use to get around the administration and faculty and so on and which help me in dealing with new generations of students.

*[09:46] Sir, Now talking about IIT Mandi. How did you establish such an eminent institute from ground up?*

- I had experience with starting companies at IIT Madras, in the Nilgiris and so on. When starting something new you have to compete with what already exists, for which you have to have a USP. We set out to decide on a USP. Obviously, one USP is location in the Himalayas over here, but also, we needed an academic USP. So here we hit on two things. One is we decided to give our students a different kind of education and an education that will prepare them for a world of change and prepare them to contribute positively to society. So this is our project oriented BTech curriculum which you are all enjoying, I hope. So in this curriculum right from day one students are engaged in team projects. They take real world problems, design and build solutions to these problems and essentially learn how to learn and acquire the knowledge required to solve problems. This is a kind of learning that will stand the student in good stead for the 30-40 years after they graduate. So this is on the teaching side.

On the research side we started with a vision to make a direct impact on Indian society through our research and development, and we encourage faculty to work in interdisciplinary teams collaboratively across branches towards this end. For instance, we do not have departments here, unlike other institutions. We have schools. And if you see the seating arrangement of faculty it is a mix of all discipline. And the result is that our faculty have taken a number of important problems of society and worked collaboratively with each other and come up with good solutions for some of these problems.

So these are our two USPs. And these USPs overtime helped us to attract better students over here, helped to attract better faculty, and also have brought attention to IIT Mandi as institute that is going to make a difference to the Himalayan region and will make difference to India in the time to come. One example of one of the impacts that this is beginning to have: last year the Department of Biotechnology decided to setup a major project called FarmerZone™ to use AI and ML to help small and medium farmers to make crop management decisions. This will help them to cope with the rapid change brought about by climate change and globalization which are caus-

ing great distress in farming sector today. And it's remarkable that the Department of Biotechnology selected IIT Mandi to lead this national project which also has international partners. And that is an indicator that our USPs are bearing fruit. So that is one aspect of building a successful university.

The other is the people. I have been very fortunate to have an excellent team of students and faculty. There are many young faculty here who are exceptionally good in their field. They could get positions in bigger IITs and cities, but they have chosen to stay here and take up the challenge of building this Institute from scratch. They have put in a lot of hard work and at the same time have done their teaching and research and made the name for institute.

We are also fortunate to have a number of senior faculty, professors who come after retirement and have put heart and soul into building IIT. They have taken ownership of the unusual USPs that we have here which are very different from the academics that they had in their institutes earlier. And they strive to make an institute and make a name for it. There have also been a number of supporters from outside IIT Mandi who have helped us in various ways, some visiting here, some from afar. So it's been a team effort.

*[14:54] Sir an informal question from my side. How do you remember every little detail about things?*

- I have a good memory to start with, but I have augmented that by making systematic notes, by having a system of filing notes, documents, and so on and making soft copies as well hard copies. And I also have very good secretaries and office executives. That's why I urge students to have the habit of making notes, because, although you can often find something on the Internet nowadays, but when you need it you may not have access to the Internet so it's good to have your own system of keeping track.

*[16:02] Thank you for the tip. Sir, as we all know, you are also heading a committee for providing 20% reserved seats to girl students in IITs. What encouraged you to come up with this idea?*

- I think the inspiration was originally from my mother. For much of her life, she was a housewife and looked after us and raised us. Once we were in school and getting more independent, she decided to go into teaching herself and fairly soon she set up her own school, particularly trying to help the poor children in Ooty get a good education. So, I think this showed me that women have a lot to contribute to the society not just in the house but in the society by working.

Over time, I also came across some exceptionally good women in my professional life. For instance Prof. Hema Murthy in computer science at IIT Madras, and Prof. Enakshi Bhattacharya in electrical engineering. They were very talented and have a lot of accomplishments in their professional lives. A number of students who worked with me, both IIT students as well as some technical staff in some of the companies I've been involved with, all of them showed me that women had a lot to contribute.

When I was doing BTech in IIT Madras, it was pretty much a male bastion, I think both at the faculty level and at the student level, and our curriculum was almost en-

tirely technology and science. When I went to the US for my Master's, to Rice University and then for Ph.D to Stanford, both of these are general universities with liberal arts degrees. They had a substantial number of women students and faculty. So again there I saw, not only the important role that women could play, but also the important role that the humanities and social sciences play in the life of an engineer.

So, when we started IIT Mandi, these were two things that we wanted to bring in over here. So as you know you have a significant component of humanities and social sciences in the curriculum. And then I started figuring out how could we get more women students over here. So, for a long time, when I talked to people in various fora, everyone said there's nothing we can do about it. This is a problem of Indian society. Girls are not allowed to go for engineering etc. etc. So, I then started looking at some data and fairly soon I realised that it was not a problem of Indian society. It was a problem of IITs and our entrance. And in fact, what I realised is that there are quite a large number of girls who are interested in engineering, there are girls who do very well in JEE, who should be getting into IITs but for various reasons they didn't get into IITs. So then backed by this data, I was able to convince people that this was something that we IITs could change.

Here I'd just like to correct one thing, you talked about reserving seats for women, we don't reserve seats for women. This is not reservation. What we do is that we provide extra seats for girls who are already qualified to get into IITs and for various reasons they don't actually take a seat. So, it's very different from reservation.

Now, interestingly, once I had sufficient data it was quite compelling. Then the JAB (Joint Admission Board) set up subcommittee which I chaired and there were number of women faculty on that. Several of them initially were quite opposed the idea of doing anything like have supernumary seats and so on but, by the end of one year or so of our deliberations, when we presented all the data, all of them unanimously supported this scheme. So the data is really compelling and this data is available on my faculty website. The report is available there for anyone who wants to see it. So, I think this was the genesis of this. And the way it was successfully implemented was, I think, primarily by taking a rational data-driven approach to the problem and convincing people that it was a problem of the IIT admission system and that this was the way to solve it.

*[21:18] What are your plans after retiring from IIT Mandi and can we get to know who might be your successor as the Director here?*

- For the last ten years I've been working on setting up an institution to teach the most highly privileged segment of Indian society, the one percent who get in over here. Of course, some may come from less privileged backgrounds, but by the time you finish from IIT, you're all at top of the Indian hierarchy. So, what I'd like to do now is to spend some time improving the education of the big mass of Indians who aspire to get an engineering education but go to colleges where the quality of education is not very good. So I plan to work on something like that.

I also plan to spend some time travelling with my wife and spend some more time with family. Over the last 30 years, in building up TeNeT Group, various companies, IIT Mandi, I've had to neglect my family and I'll spend a bit more time with them.

As far as the next Director goes, I think the goal of IIT Mandi is to be the best in the world in something, and I believe that in the last 10 years we have laid the foundations for a strong Institution which is on the road to becoming the best. It is not yet the best in anything. I expect that the next Director will be someone who's much better than I am and who will lead and inspire the exceptional faculty we have to make IIT Mandi the best in some area 'X' in next 5-10 years.

*[23:11] It would be hard to find a person much better than you. You are the Director of a prestigious technical institute and your daughter is a social documentary photographer. In a world where every parent wants their child to be a Doctor or an Engineer, how did you motivate your daughter to pursue what she wants?*

- Again I think this was partly the example of my parents who encouraged me to do what I wanted to do. As a boy I went through various dreams: I had a passion to become a pilot, to become a priest, to become a doctor, to become all sorts of things. And finally I realised that engineering was the thing for me, and they supported me in that. So, it was natural for me to support my daughters to do what they wanted. By the way I have two daughters and neither of them is in engineering. My wife also, I think, the credit largely goes to her and her parents in supporting and encouraging them. For instance, I remember when they went for a visit to the US, when my second daughter was probably about 12 or so, to visit my in-laws. There my wife and her mother bought a digital camera for my daughter and also a film camera to get her started in photography. So, a lot of the credit goes to my wife, also.

*[24:46] What would be one inspiring incident of your life that you would like to share with all your students to inspire them?*

- Well it's difficult to pick an incident that has inspired ... there have been a number of them. For instance, I've attended seminars by really outstanding scientists, engineers and others from which I've drawn inspiration.

So, what I'd like to share more is some incidents that have changed my life. When I joined IIT Madras in 1989, we were staying in a flat in IIT Madras. We had come back from the US. And there, of course, electricity and so on works 24/7. So, we didn't think of the fact that you had to have candles and so on because of power failure in India. Since I'd been away for some years, I'd forgotten about such things.

One night the power failed, and then I went to knock at my neighbour's door to borrow a candle. And while he was getting the candle, he started, he just asked me what I was doing and who I was and all that. And it turned out he was Ashok Jhunjhunwala who was working in electrical engineering and I was in computer science. And then he said let's get together and chat about things. And fairly soon after that, the TeNeT Group got started.

So, I think this, the lesson I draw from this is that hardships like failures of power and so on are not something that necessarily are bad. In this case, if we had had a reli-

able power supply, I might never have met Ashok Jhunjhunwala, and perhaps the TeNeT Group may not have started, I would not have been a part of it. And I probably would not be sitting here as Director of IIT Mandi, all because the power failed in the evening, and I needed to borrow a candle.

So, I think my message to students would be: whatever comes your way, take it and see what you can learn, how you can profit from it rather than complaining about it or worrying about it. I'm reading a book called the "*Book of Joy*". It's about conversations between the Dalai Lama and Bishop Desmond Tutu of South Africa. I strongly recommend this to everyone to read. It's available in Book Nook. In that the Dalai Lama says that when something very difficult or troublesome happens, there are two things you can do: One is that you may have a solution to the problem in which case don't worry about the fact that something bad has happened, and on the other hand it may be that you don't have a solution to the problem in which case you can't do anything about it so don't worry!

*[27:41] I for one will surely give this book a read. Sir, what is the secret behind your fitness?*

- I think, one I was born in mountains. My home town is at 7,300 ft. and so my body is used to dealing with less oxygen and steep ups and downs which gives me a head-start over people from the plains. Right from when I was a boy, I loved walking, bicycling. I remember I'd walk to school rather than go by vehicle, and I also liked to play a variety of sports and games. I still did that in college and even now I continue to do that. Perhaps part of the secret behind my fitness is our dog Rusty. He insists on at least two walks everyday. And in the evening when I go home, however late it is, however tired I am, Rusty is at the door, and he insists that I take him for a walk around the campus. So, all this contributes to fitness. And also I think in terms of food, moderation helps. I like sweets, I like good food which means rich food. But in moderation, it's fine. I don't over indulge.

*[29:11] According to you what is the thing people should be more focussed on?*

- I think especially for engineers, and even for others, figure out in what way you can change the world and make it a better place and then work doggedly on that and don't worry about rewards like will I get a better salary? Will I get this perk or that perk? If you make a difference to the world where you improve the lives of many people, rewards will come. And even if monetary rewards don't come, still the satisfaction you get will be greater than any material rewards that you get. So, that is my advice to people. Decide on your passion, how you want to change the world and go ahead and change it.

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