Introduction to Research
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Lecture - 48
Discussion with Research Scholars

Prof. Prathap Haridoss: Hello, we welcome you to this discussion on research. We have with us a collection of students they are all research scholars here at IIT Madras. There are about 30 of them, spread across about 16 department in the institute. So, we have a broad collection of research scholars, different backgrounds, different departments, different disciplines that they are studying and pursuing research in. And they have typically spent at least 2 years here in campus as research scholars. So, they have gone through all those critical steps that are there as part of research and some of them have been here longer. So, they have very recent experience in what it means to get started as a research scholar.

So I encourage you to look at the department module related to your department which is already put up on this course, as part of this course material, but I would also like you to watch this discussion to see how students, who are you know little bit more senior than you in this research setting and what their experiences have been, what they have learnt and what is it that they would like to share with you. So this is the general context in which will have this discussion. So, I would like to start by asking any of you to, tell me what was your view of research before you came and joined as a research scholar here and if over the time that you have been here if any of these views have changed and if so how they have changed. So, anyone who is willing to volunteer can get started.

Priyanka: Hello I am Priyanka, I am from Electrical Department. I am doing my MS here and I am from Nagpur. So, before coming here I was an under graduate student there in I barely knew what research was but from what idea I had about a researcher was that the someone who you know change the way things have being done and they you know challenge, they accept challenges and just bring about positive change in technology and in society as a whole. After coming here, what I felt was like, I actually realized that what I thought was actually correct and yes there is a lot of, I mean we are creating

impact in the way things were being done and in fact, what has changed in my perspective is that it's not just about you know doing something very exciting, but then at the same time it requires lot of patience, which I realized in the due course of time and I am enjoying this.

Prof. Prathap Haridoss: Okay Great, nice to hear. I think first of all I am very happy that your perspective turned out to be true and that you really do think that we are doing something very useful and I mean, I appreciate your point that there is a lot of patience involved which is I think some of the times, which people don't realize till they get in, that there is a lot of patience involved. May be we will talk of patience also a little bit. Anyone else, please.

Zeeshan: Sir my name is Zeeshan, I am from Department of Biotechnology. I have been a MS scholar here for the past 2 years. Previously I have actually worked outside, so I have some amount of industrial experience. My perspective of research was that it could be more structured; I thought there would be a certain way of doing things. Coming from industry, in industry everything as I said protocol there is SOP for everything, I thought research would be more on those lines something like that, but when I came here I realized that you have to bring the structure into the research it's not all inherent.

So, that part was initially of putting I mean it was strange. I thought it would be a directed approach to you know reach a goal, you would have a goal in mind and you would reach. My perspective has changed in that manner that I have seen that you don't actually start with the fixed goal. Even in research you don't actually start with the fixed goal, your goal actually shows up as you start working hence the process is also not straight forward, you kind of go everywhere and then reach there.

Prof. Prathap Haridoss: So, you tend to meander a bit here and there, move around and then, but let me ask you, in industry what sort of a position where you holding.

Zeeshan: I was a junior research fellow.

Prof. Prathap Haridoss: Okay so, you felt even a research in the industrial setting was

very structured.

Zeeshan: Yes Yes. There we had goals that we had to reach and do. I mean as in every position has it's own, you have your responsibilities, you are expected to fulfill your responsibilities. Lower down in the cadre you do not have big responsibilities so your results are fairly consistent. So, it feels the process is very structured. Generally your team mates tell you that there is this goal that we are trying to reach and we are working towards it. In research even your adviser doesn't tell you what is your goal you kind of have to figure it out as you go along so.

Prof. S. Sankaran: But research you were doing in the job itself right.

Reshan: Sorry.

Prof. S. Sankaran: In the in the previous job you were doing research only right.

Reshan: Yeah it was it was.

Prof. S. Sankaran: But then why did you come to an academic institution to do a research.

Reshan: Well for me it was actually a change of domain. In the industry I was in analytical development, I wanted to shift over to bio process engineering; it's a process engineering stream. So, I did not have the skills that requisite for bio processing engineering and in the industry you don't get to learn as much as do in academy, you have responsibilities you finish them you don't get to learn much.

Prof. Prathap Haridoss: Okay so there is not much flexibility in what you can do. There is a very fixed narrow path you have to walk down that the path. So, research is within that narrow path and you cannot you cannot, so meandering has some use I mean you can go this way and that way helps you learn and grow.

Zeeshan: No, it's just that because in the industry everything is driven economically right, everything you put in money you want some output yeah. So, that's why it is so directed you cannot actually go it's like you optimizing a process you stick with the process, you do not actually start with something entirely new. So, like that.

Prof. Prathap Haridoss: Good very nice to know.

Hemanth: Hello I am Hemanth, I am doing my Ph.D in Chemical Engineering Department. It's been like 4 years or 5 years I have been here, and so when you see when I was in under grade so I thought the research is something you invent a new product and that is the ultimate goal. So when, after coming here, so it's more it's included that you invent a new product on top of that you can develop more scientifically for the existing product also, you can improve the efficiency of the product, and all these basic studies you can do so that the existing product can also be improved, that's that's another prospective of research what I have seen. And when it comes to the way I see the subjects when I was in under grade and when I was a research scholar. So you understand the concepts at the end of the day it is basically you put in the mathematical form of this concepts develops some models for the systems what you have, and then try to understand the systems better with a little experimental activity and also little modeling activity where we tend to do it only experimentally when we are doing a research laboratory in, you don't have research laboratory as such we do in laboratories in under grad you just do a CRE experiment for example, say continuous tank reactor you just do to learn what are the theories that is already established, the same thing you do here for establishing a new theories. So, that's what the main difference we can see from the under grade labs and the labs which you are setup in the IIT's or whatever.

Prathap Haridoss: Okay Great !

Ram: Hi I am Ram; I am doing PhD in the Department of Civil Engineering. So, as an under grade I had bit similar views as others had like you invent a new product or something like kind of an iphone comes up and those are the really the products of our outcomes of the results that happens. But then once I joined here like researcher is a someone who actually works and contributes to the society as a whole. So, because even

I have some amount of industry research experience where it is more as it find out it is more economically like either there is a just to cut down the cost that is happens or how to increase your profits.

But in here we more work on kinds of document how internationally something has been done and for example, the mean things of we even work on something like who works on these stuff like, how do you effect duly managed the waste for example, that something is industry doesn't work at all because something which is there the society is incurring cost in how do you manage it and as a researcher we are actually looking at how do we, an effectively used the waste that the industry is generating. And once we theoretically develop morals which are economical as well and so that you would get something out of it and add value to the society, then the industry and other people start using it. So, we are someone who actually puts the foundation for others to actually arise up in their life, so that is one thing which I have.

Prathap Haridoss: Okay! Very Nice! Very Nice!!

Mahesh Balan: Good evening. So, my name is Mahesh Balan, I am from Management Studies Department. So, I am actually from Kanyakumari. So, my perspective on research was completely altogether different. So, the perspective that I now have on research and the perspective that I had before is completely opposites. So, before I did my engineering then I was working in corporate and they were literally giving me all the stress and all the work. So, my perspective even my dad suggested to go for research, I told - no I am not a geek, I am not a nerd, so I am not fit for research and all those things. So, because I basically had an idea that for doing research we must have that in born interest to do research, that need the hunger to learn more and I basically did not have that in many bachelors.

Then because of work pressure or whatever I opted to do research without having any interest, but now the two thing that I learnt is - one is you need not have that genius thing or intelligence to do good research only thing that we need is interest, patience and hard work, so that I realized that. And, one more thing is in industry you can put a lot of creativity into it and you get recognition for that and all those things, but if we put the

same hard work and creativity in research, but on seeing that being used by someone that small body of knowledge that you add which is new in the complete thing that little happiness that you get and you know the purpose that you are here I think that makes complete difference. So, these two things actually changed my complete view on research before and after that.

Prof. Prathap Haridoss: Very nice, very nice. May be will also, I just wanted to I mean as moving forward I also wanted to get a sense of coming in here and then settling down into a research as a research scholar. What did you feel was the most challenging experience for you that you somehow maybe didn't anticipate and then it took you some effort to get accustomed to and then move on forward as a research as form.

Prof. S. Sankaran: You can also add your anticipation, what was you are anticipation and then how it really shattered or you are happy with whatever.

Sandhya: Hello this is Sandhya, I am from the Department of Management Studies, I am from Hyderabad. I feel personally as research scholars, you get tend to get demotivated very easily because my fellow scholar was also mentioning earlier that it is very unstructured program. So, you would not, there is no hard and fast deadlines as such so, you have to structure you are own program, you need to have your own deadlines and secondly, the output of your research is not very immediate. So, you don't know what is happening, it's as the a process going on; so you tend to get demotivated very easily. So, you need to have that self motivation.

Prof. Prathap Haridoss: Okay self motivation. So, it took you some effort to.

Sandhya: Yes, yes to understand that I need.

Prof. Prathap Haridoss: To go from a point where other people were motivating you to motivate yourself.

Sandhya: Yeah exactly.

Prof. Prathap Haridoss: OK.

Sandhya: True.

Prof. Prathap Haridoss: Ok Fine.

Swathi: Hello my name is Swathi and I am from the Department of Humanities and Social Sciences. So, coming here was a was a big surprise for me, because precisely because I do my research in humanities and social sciences. So, coming to an IIT which is a science dominated place and doing my research here. I mean I did know that it's going to be different from the universities have been doing my BA and my MA, because they were like you know once that were totally dedicated to humanities in the study of human culture and all that. So, here I don't know the kind of talks that happens and the general culture in, I mean the culture in general is very different from or humanities culture or a culture that is inducive to humanities and social sciences research.

So, initially I did not really like it very much and I thought I might produce a mediocre research if I stay here. So, I thought maybe I should move out from here, but then after a semester or so I thought the kind of challenges this place gives you is to define your discipline, is to have a dialogue across disciplines to make the science people - I mean when I explain what my discipline is to a science person I have more clarity over what I am doing. So, that way you know I do know, I understand my discipline better it gives me better insights into my discipline and you know it's become very broad. Like for example, Terry Eagleton critics such that the idea of a university becomes complete only with humanities and social sciences being there, because humanities basically suppose to have a kind of counter intuitive thought, a critical speculative I mean speculative look back at life in general. So, I think if you can integrate this, if you can have a dialogue across disciplines I think we can produce better engineers and better research in humanities.

Prof. Prathap Haridoss: Okay Great. I think it's true actually that I mean even from our discussion with lot of faculty in the institute. So, one of the, I mean aspects about a campus which is multidisciplinary is that in fact, you do have access to lot of other

disciplines easily. So, you can look at for example, in fact, the humanities faculty we interviewed was specifically mentioning that. So, for example, lot of companies now look at the social impact of setting up their industry in a particular location which was not something that they very formally looked at earlier on, previously they just wanted to you know get the regulations, get pass the regulations to set up the industry in some location and they would just set it up and run.

But now they have become much more conscious of the fact that wherever they set up there is you know society near that area, which they have to work with, which they and that society has to actually feel happy with them, they would also you know work with that society get the work force from that society not pollute that location lot of aspects are there where there is a lot human angle in it, which is not not normally recognized or may not have been recognized as much in the past. So so, they are apparently looking at a lot of students with humanities background who would fit into such settings, and such students are probably in a better position to look at develop that aspect of their work when they interact with a lot more engineers who are doing those industrial settings. So Yes. So, that is I think a very nice perspective to have. So, anyone else; yes please.

Swethambul Das: My name is Swethambul Das and I am doing PhD in Physics and I am in my final year of work.

Prof. Prathap Haridoss: And you are from.

Swethambul Das: I am from Bihar, I am from Patna.

Swethambul Das: Okay So, the thing is I hope that I will bring a little different perspective to into the whole discussion because I am from theory side of physics and with the perspective which I share with people from maths department for example is that, the thing is theory theoretical works develop in a little different way than other areas. So, I did cook quite bit of under grade research also before coming here and the thing which I realized doing while doing PhD is that problems unfold itself at every stages. So, there is no set way of going about it and you have to be alert at every stage to tackle the problem in different ways.

So when we see a research paper it look's very nice you know from introduction to conclusion, but it's really messy you have to get your hands dirty to do the whole job. So, that is something I realized while doing you know PhD and also I understood that one has to develop this idea of finding a problem, as far as theories concerned I mean I can't comment on other fields which I have don't have experience in, so solving a problem is a skill and one has to be really smart in doing that, but may be you know a more challenging aspect is to find a particular problem which you can solve and people in theory most of the time do this. So, people who you know young students who wish to come to research and particularly in the theory side they should be dealing to you know get up to this challenge that they should be able to do things independently, should learn at least to do things independently as soon as they can. That's that's what I say.

Prof. Prathap Haridoss: Okay Independent working processes you have to develop and take's a while for a student to do.

Prof. S. Sankaran: Did you come with a definite problem to solve it?

Swethambul Das: Well, such sort of I had a problem in my mind when I came, but my supervisor had a different problem.

Prof. S. Sankaran: OK.

Swethambul Das: So.

Prof. S. Sankaran: How finally, you settled down.

Swethambul Das: Yeah. So, I actually when I joined here one of the things which was asked in my interview is what do you like to do and I told them very specific subject area and problem and the second question was, do you know anyone who works in this field and I knew 3, 4 people but I didn't know whom of them where there in the interview board. So, I picked that random and I said proff V Balakrishan and everybody was happy and I got. But I am not working with him and I am working with somebody else, but

that's how it all happened.

Prof. Prathap Haridoss: OK.

Ranjith: Hi I am Ranjith, from the Department of Civil Engineering. I am basically from Kerala a place call Trishur. So I would like to share my experience while, some experiences which I faced while settling in to the field of research. So, I am an MS research scholar. So, before this I was doing my under grade. So, we were like a pack of students studying the same subjects writing the same exams from there, here I come to a field and which I am me and my guide and like a small set of people might be doing a similar problem, but the problem to me is specifically pointed out to me and I face difficulties.

So, the thing is we have to from a like a pack culture we are going in to an isolated state where we have to solve problems by ourselves and for that we need a little bit of and not a little bit a real motivation to go on further will face like difficulties our at every stage. So, that self motivation and ability to work independently you have to adapt to it when you get into research. Not just that in the previous studies you will be studying something that is already written, just like my fellow researchers told here will be just accepting that facts, facts and figures in the text books and the papers, but now that complete ideology have change to question everything that you see. So, they have done something in the papers which may be correct and which may have like loopholes also. So, our job is to find the loop holes that is a serious change in attitude that we have to adapt to while you come into the research which I think is really important especially when you are doing the research scientifically. So, something I want to share it with all.

Prof. Prathap Haridoss: Very nice, so getting used to; so Independent working is also a little bit of isolated working is the point you are making so that some takes some while to get used to.

Ranjith: Yes.

Prof. Prathap Haridoss: And also moving away from just accepting whatever you are

shown, to questioning whatever you are shown.

Ranjith: Yes.

Prof. Prathap Haridoss: And making a habit out of it. So, that is nice point.

Bhakti Patel: Hello, I am Bhakti Patel and I am from, my home town is Mumbai. So, while I was doing my under grade I was.

Prof. Prathap Haridoss: Which department?

Bhakti Patel: Which department, Applied Mechanic.

Prof. Prathap Haridoss: OK.

Bhakti Patel: Yeah. So, while I was doing my under grade, I had this idea of research it's like you will be given a problem and then you have to work on it and you have to just go towards that goal, that's all. But while when I joined over here as a research scholar as a PhD scholar, so then it was with my guide that I understood that it's not just like you have to be go in one direction, he gave me a complete freedom as you can do whatever you feel like you have all the facilities which are available over here and you can just manage your own research and be as free as you want and what whenever you face some difficulty you can come over here and then take help from me.

So, that this part it was not, which was something new to me that OK, in my under grade days I was like ok research means just to produce papers and that's all, but over here when I came to became a research scholar, then it was like no we have to get some quality work also done, it's not just the race of getting paper and all. You just have to hang on for some time have some patience and determination and then, just you will spend some time and then you will automatically get some ideas by yourself and then the quality also of your research and all will be increasing gratuity. So, you just have some patience that's all.

Prof. Prathap Haridoss: So, basically you are saying freedom takes a while to get used to.

Bhakti Patel: Yes, yes, yes initially you will be lost completely as in you will be frustrated with yourself and you will be very irritated.

Prof. Prathap Haridoss: So, you wish somebody actually told you no, no don't do.

Bhakti patel: Yeah yeah.

Prof. Prathap Haridoss: I understand.

Prof. S. Sankaran: Finally, it was a happy settling out.

Bhakti patel: No, right still I am struggling.

Prof. S. Sankaran: That is exactly I want to know.

Bakthi patel: Yeah.

Prof. Prathap Haridoss: So, along similar lines may be will go to the opposite end of this spectrum. So, what did you really feel happy about or what was a pleasant surprise for you when you joined which you had not may be as much anticipated.

Vijay Bharadwaj: Hello my name is Vijay Bharadwaj, I hail from Mysore Karnataka. I am a MS research scholar in from Metallurgy and Materials Department. Research is very free in my opinion and particularly in from past one and half year or so, I have found lot of opportunities to develop inter personal skills, soft skills and a very healthy and joyful life style and that was a very present surprise. I did not expect that to happen before I coming here I thought research was all work and no play, but well that is has complete changed out, out of style now. So, that's it.

Rajnath: Hello my name is Rajnath. I am from Applied Mechanics Department, I am

from Hyderabad. Before coming here, during an under grade it was like morely like we study most of them before exams only; like in rest of the time we just pass the time just like that.

Prof. Prathap Haridoss: OK.

Rajnath: Study is not like a major part of the day, but here when we came here everyone this picture like, haan you are from IIT you should be a geek, nerd something like that, but when we came here especially the professors. They are really ground to the earth and very enthusiastic, I have taken some courses they were like really they tend to be like very enthusiastic and you feel more enthusiastic. The way they look at the problem, it's totally different you cannot find that in the text books. What I use to, I am actually in the second semester only. So, whenever we had discussion with some professor I used to search in internet I forgot that one, but I never get anything in internet then I told to that professor sir what is this I am not getting then he said forget everything, you use your brain like that, it's very interesting actually.

Prof. Prathap Haridoss: OK, very nice.

Ashwin: My name is Ashwin, I am from Department of Engineering Design. It's been it's been 3 years from now I have joined IIT and the pleasant surprise is that I got admission in IIT first.

Prof. Prathap Haridoss: We are also very happy to have you here.

Ashwin: Thank you. So, because in my masters I was the you know the last guy who won't study and sitting in last bench and you know say I don't know anything and I am the very you know the 7.5 to 8 CGPA things like that and you know on top of me like everyone will have CGPA of 9 and even my whole family and even my collage mates are very surprised that you got into IIT. So, that is the pleasant surprise.

Prof. Prathap Haridoss: So, you exceeded every bodies expectations including your own.

Okay

Ashwin: I did not expect anything.

Prof. Prathap Haridoss: Yes, please.

Asha Kranthi: I am Asha Kranthi, I am a PhD student in Biotechnology Department and I am basically from Andra Pradesh. So, one thing that I found surprising okay I came here for a degree I wanted to get a PhD and it was all about research. But right from the third semester onwards I was part of some council or some student body in the institute that challenged me and my own level of confidence, it went down and I picked myself up at a personal level it has been a journey that I think would not have been possible in any of the places that have been till now, so that's the pleasant surprise here.

Prof. Prathap Haridoss: So personal growth is what you experience and growth in personal level, yes.

Revathi: Hi I am Revathi, I am from the Department of Computer Science. I am doing my PhD here. So, the pleasant surprise is that you don't have to be brilliant to do a research. So, the thing is that you can be a mediocre, you just need to have a lot of creativity and imagination and the passion that drives you, you have to feel that okay you are good at this, you can do this. So, that kind of self motivation is what is exactly that is required for a researcher. So, people can wonder I mean when I joined here itself and I started doing my research I used to wonder okay like whether I am going in the right path, whether this is the right thing to do and there is nobody to tell you that okay you are going in the right path or whatever you are threading through is the correct way to approach it.

But the thing is that ultimately whatever especially what my peer group says to me. So it's like you have to explore you have to understand what is happening and whether you are going right or wrong it doesn't matter. It's like, it is continues learning process and whatever you are doing it will be right in one way or another. So, that was the surprise for me because I thought that it was always about doing the right things, but what I

understood what is that it is also OK, to do the wrong things and understand and it's a continues learning process to understand it in a right sense so.

Prof. Prathap Haridoss: Okay Great, and where are you from?

Revathi: I am from Trivandrum, Kerala.

Prof. Prathap Haridoss: OK.

Shruthi: My name is Shruthi, I am from the Department of Metallurgical and Materials Engineering doing my PhD. So, one of the most pleasurable thing was the course work, where in so many concepts were made very clear we have plethora of information from the internet videos now a days, but the way things are explained here by our faculty is so absorbing that I don't think that we would forget it for life, any concept. So, that was a most pleasurable thing. Many times I felt oh that's all, this concept is all about. So, it was a great experience.

Bobu: Good evening everyone my name is Bobu I am doing my PhD in Metallurgy Department, I am from Kochi, Kerala. The pleasant surprise for me was about the amount of freedom that we get in the institute right from the selection of guide to the topic and the amount of time you should take to finish the work. So, that was a pleasant surprise for me which I never had in my under grade or grad school.

Ram: When I started doing my research like before when I was an under grade, seriously when whenever I talked in the family like, there will always be discussion in the family members like what we can do like something like income how do you manage it and all. So, they really don't care what you say at all. So, when you started doing research they think you are a scientist. So, suddenly you become the council for the whole relatives and your friends. So, they everybody will keep calling you what can we do whether my son should study computer science or statistics. Okay so, suddenly you feel a lot of more, you have gained lot of respect and that is it.

Prof. Prathap Haridoss: You suddenly become respectable, to your own pleasant surprise. Okay so, maybe I also wanted to one of the things that we all do as research students and even as you know professional researches is to go for conferences. So that's something that you don't do normally as an under graduate student wherever you are, but it's a inherent aspect of research scholar life. So, I just wanted to wanted you to share with us if you have been to a conference and what was your experience what did you really you know feel about the whole process and how you think it has you know contributed to you as a research.

Madhuri: Hi I am Madhuri, I am a MS scholar in Computer Science Department, I am from Bangalore. So, I attended my first conference after one year after joining MS and I just attended it I did not present any paper. One thing I realized there was, it's not just a show case of the new discoveries that people have made or I working theoretical computer science. So, there are these new theorem people have proved new approaches they have discovered to proof things.

But it is also sort of there is a community feeling that happens in the conference where people are working in different universities across the globe different countries, but they are all come together as a community there is a lot of sharing that happens and it's a very unselfish thing where people discuss come together, do collaborations and conference sort of place a ground for that also to encourage future collaborations and to inspire people to do more. Like teach them on different areas that can be applied, some interdisciplinary things that can be done. So, conferences are really good ground for collaborations and for inspirations.

Prof. Prathap Haridoss: Great, good to know. So, how often have you been going to conferences?

Prof. S. Sankaran: I mean she is too young now.

Prof. Prathap Haridoss: Too young, OK, fine.

Ranjith: Hi my experience with the conference is that basically you get to see the state of work that is happening all over the world like we see in the papers, but the papers will be

at least 6 months to 1 year old at least because it takes a lot of time for it to get published. But then there is lot of work that is going on currently which is fair more advanced than what you see, which is clearly exhibited in that conference. Another thing that I felt in conference was like when you are presenting a paper basically I went in and I made my research. So, I really wanted so much of feedback and we are getting that usually in the institution will get it from lot of I mean peers, our professors, our fellow research scholars etcetera, but we are getting a research from a wider audience and the feedback who is really excellent, on top of that your research visibility increases.

Once I go to a research, I present my work and later I submit a paper, when professor if we are lucky he listened to your presentation or read your proceedings or something like that; he reads or the he knows your work and he reads it he will get a better clarity of your work and give you better reviews. Also when we are applying for post doc or a PhD position, he just known your at least your name or when we writing an email we can say I met you at so and so conference and it is we get a better response from them than the general lot who just send it as a dear sir and something like that.

Prof. Prathap Haridoss: OK.

Ranjith: Visibility is a really good point I see from the conference.

Prof. Prathap Haridoss: Visibility a good level of personal contact.

Ranjith: Yes.

Prof. Prathap Haridoss: Interpersonal activities.

Ranjith: Yeah, it helps in the further collaboration also. We don't know who will be collaborating in our current research itself, we might not have all the facilities, but we can always collaborate with another university we can get the contacts. So, that is a great plus point of a conference.

Prof. Prathap Haridoss: Okay Great, you had something.

Pragyan: Good evening I am Pragyan, I am a MS scholar from department of engineering design. I am doing a Masters here and I am from Orissa particular Bhubaneswar. I have been to two conferences as IIT provides a international and a national conference. So, my first conference was in Bangalore in which I met a lot of DRDO people and my work is related to somewhat defense. So, I saw like they are still like struggling with something which I have the results and they are still struggling with the old techniques. So in that platform I had something to offer to them and also I learnt a lot of things which I didn't know, I taught that it is always all working for me, but they set up some scenario in which my thing was not working. So, in this way we had a lot of collaboration which BEL DRDO and I offered them like you can come to our lab and if you allow we also come and in this way we can help in development of the country rather than spreading across and doing small parts as in why work together and work for development of the country.

Secondly, I went to conference in Poland in which I met lot of people from Russia, Japan, China and US in which I met students I met faculties in which I presented my work I even I told what problem I faced and I invited them to attend my lecture and they also suggested how would I improve my work and what else I should look into which is total unaware of. In this way there is a lot of collaboration and as my friend has already suggested, if you really want to do a PhD abroad, it is better to go and then meet them in person and then ask them to come and see what work you have exactly done. In this way they see you in person and it's a very good way to get a PhD abroad and as I am sending mails across from here. So, IIT provides this good opportunity of going and collaborating and at least interacting with people from national or from international background.

Prof. Prathap Haridoss: Great. So, basically you are saying both you were able to you know give ideas to people and take ideas from them in a collaborative.

Pragyan: Yes, and because everything is not in the internet or because if you see DRDO things is not available anywhere defense.

Prof. Prathap Haridoss: You are actually able to meet people; you would otherwise not able to access.

Pragyan: Yeah then you see them, what is they are seeing and exactly you can contribute to development the country, because at the end that matters is how a developed to a country is.

Prof. Prathap Haridoss: Great. Yeah, yeah.

Ganesh Govindarajan: Good evening everyone. My name is Ganesh Govindarajan, I am from Motion Engineering Department, PhD scholar from Chennai. Initially I thought that my research is not that much good, my results are not that much good. After that I applied those results to the conference, I presented those results through the conference then I met that the most eminent person in my research area from MIT. He appreciated me, your way of approach is very good you keep on working me, that makes me something like I am going in a good path like that, but everyone something like that is not good like that, but after he is make something feel proudly like that.

Prof. Prathap Haridoss: Okay so, you got a very good feedback on you know and you feel you feel confident about that feedback; lot of people will give you.

Ganesh Govindarajan: The feedback and it is nice to meet with the most eminent persons in from MIT like that, it's nice to get interaction those peoples can.

Prathap Haridoss: Very Nice. Very Nice!

Prof. S. Sankaran: That is one of the primary aim of conducting an international conference to bring all the experts in one place otherwise you don't have an opportunity to meet them. So, we actually in organization of conference that the primary requirement is this, how big people we can bring in one platform and then make available to rest of the audience. So, that is one of the aim for any conference they do, yeah good.

Hemanth: So, I agree with this networking development is the major thing which we get from the conferences. So the suggestion what I would like to give for the new research scholars who are watching this course is plan ahead for your conferences when you are going see the list of invited professors are, list of eminent faculty which are who are coming. Let's say you are in the second year of MS and you are aspiring a PhD position somewhere in the US or Australia whatever. See people who are working in your area and working in the areas which you are interested to pursue your research on PhD, get the emails of those persons and mail them saying I am so and so from Indian Institute of Technology, I saw you or, I came to know, I get to know that you are coming to the conference I am also coming to the conference, please attend my talk and give your feedback and that might help the first thing you need to plan.

So, the other if you are in PhD the same thing applies for a post doctoral fellowship before you go pursue post doctoral fellowship. That way you can get better you know feedback from the professor what who you need to meet and you will get to know them easily than, just going there and dropping say, hi! some professors might not find to talk to at the conference there itself, before giving them information would help you to interact with them in a much more descent manner, just say go for a dinner then talk about your PhD admission or post doctoral fellowship.

Prof. Prathap Haridoss: It is very good for carrier growth, you are able to interact with them and I think that your suggestion is very nice that I think people can plan it out a little better it's almost like an interview for free. So, you go there and you know there.

Hemanth: Yeah they should plan it for a better plan. So, that they can go and meet them and get little more much time then what they get when they meet, on the go.

Prof. Prathap Haridoss: Yeah yeah, Ok.

Swethambul Das: I was in Berlin last week and attended a big international conference. So, first of all it's nice to know that our institute and our society in general feels that, the kind of research that we do can be funded to this extent that we get a lot of money, but in such conferences anywhere in the world. And then first thing I noticed this time, I have

attended other international conferences also within India and elsewhere that we do very good research it's not that India is no longer in the research map any more. We do fantastic research and people from other country come up to us and ask things and discuss things. So, it was a pleasant surprise to learn this fact that we are second to none now, I mean yeah, it takes time to go to the certain extent, but the thing is we are in a in a good hands like professors like you and others in the country and we are doing a good work also that's what I learnt.

Prof. Prathap Haridoss: OK, lovely.

Prasanna: Hello sir, my name is Prasanna, I am from Karnataka. I am third year PhD scholar from Mechanical Department. When I first went to conference in Trivandrum organized by ISRO, VSSC. So, it was very surprise for me because first time I attended the conference, I am able to meet peers in my research areas and also a big big scientist and big big research scholars along with many professors. So, there what I learnt is that in the same group of people when we are going to presenting a paper, so different people are explaining in different perspective based on their application the way their theory they develop in their own mind.

So, this was really give value addition for us to progress in our own field and as well as when people are presenting, the different people presentation skill is very different even though we are working on the same area. So these kind of things will give some kind of value addition to our work and also it will be helpful for us to look for new problem in future and the way we are interacting with them is also very nice for us to further career growth.

Sujith: Hi, this is Sujith. I am doing my PhD; I am in my 4th year I am from Electrical Department.

Prof. Prathap Haridoss: And where are you from?

Sujith: I am from Hyderabad. So, this beginning of this year I went to a conference in my area that is supposed to be the best conference. So, it happens in California as you know

it is surrounded by all the companies that my area of interest. So, one thing I noticed was as people already said you get to meet lot of people, like minded people that are working in your area. But one good thing, one good inspiration also for me was I was asked very frequently when you are completing your PhD.

Prof. Prathap Haridoss: Very nice.

Sujith: By the company people. So, and it became one of the motivations for me to go that conference again, I mean in our area if you have one paper in that conference it is a big thing.

Prof. Prathap Haridoss: Ok.

Sujith: So, it's a very good motivation.

Prof. Prathap Haridoss: Okay very nice. So, may be now we have seen a lot different aspects of your research activities here, were we will look at something more. I was just curious, I mean do you see I mean at least as a undergrad you had lot of other options you could have done gone into management, gone into job, may be some of you have tried some different options before you came here and so on, now you are research student here, research scholar here. Going forward do you see yourself in future continuing to stay in research and in that context may be say 5 or 10 years from now where do you think you see yourself being, I mean what is your expectation or your anticipation that this is what I think I will be doing say 5 10 years from now.

Arjun: I am Arjun, I am doing PhD in Ocean Engineering and I am from Kerala. And I am working in the field of Ship Structures, structural analysis. So, in my field I feel that not much R&Ds happening in India. So, I see that it's a big challenge. So, most of the guys in my field are going for a teaching job.

Prof. Prathap Haridoss: OK.

Arjun: Others, for if I am I opt to go for a research, but I don't know, but I have like to work in industrial research.

Prof. Prathap Haridoss: OK.

Arjun: But not much opportunities are there in India.

Prof. Prathap Haridoss: OK.

Arjun: If I want to work there I want to go abroad or something. So, most probably I would be working as a professor also.

Prof. Prathap Haridoss: So you would either, you will have to do either academic research here or if you want to do an industrial research you feel you have to go abroad somewhere to carry it out.

Unnikrishanan: I am Unnikrishanan, I am doing my MS in Machine Design Section, Mechanical Engineering. I come from Trivandrum. So, in 5 years I see myself working in R&D section in some industry. So, I was part of the placement team last time and I could see that the placement for the research scholars, at least for the MS scholars it was not that good in the industrial perspective, but it has significantly increased over the last 2 years.

So, in the case IIT Madras it has increased from 50 percentage to 71 percentage in the last 2 years. So, now, we can see that the industries are also focusing on research scholars and they are also having close collaboration with lot of research activities that's happening in the campus. So, I feel that there is high scope for research scholars out there in the industry and we should explore it that. So, I would like to work in one industry and see how the things work out there and if I get a good perspective on that then I may stay back over there. Or if I feel that the domain is too vague then I may come back to PhD or I may pursue for some higher education.

Pragyan: I am doing my research in Micro and Electromagnetic Engineering, and I always complain about this there is no company in RF or Microwave in India. So, my professor one day said - stop complaining and make your own company. So, that you at least do something good for the country. Then I realized that see I took a independent problem in which no one worked, in India hardly two groups work on that and I successfully completed it. So, that gives me a confidence you don't need a degree to start a company or something, if you have if you know the subject properly, when you are confident enough that you can carry on then I think in 10 years at least I think I will have my own company in which at least people in my lab won't ever complain you don't have a company in R&D working in microwave. So, that's my that what I see in like after 5 to 10 years

Prof. Prathap Haridoss: Very nice very nice to hear, but you don't have to drop out though, you can finish it.

Ashraf: The first thing when I took a PhD was like I decided my under grade that I wanted to contribute to my field of study. So, that was the reason I took a PhD. So, 5 years from now I want to join the academia and I would like contribute to my field of study.

And one more thing is as I see in our country the research, the academic research and the industry there is a lot of gap in between that. So, I mean if I become a faculty down the line what I would be planning to do is to bridge this gap between the academic research and industry. So, that is one of the aim I have because as you see in the western universities most of the funding comes from the industrial research, industrial sponsored research even the stipends for the scholars, but I mean that has its own disadvantages that our research will become more dependent on the industrial problem statements, but as a country we have to evolve in the closing this gap between the academy and industry. So, that is what I would like to do.

Prof. Prathap Haridoss: Great.

Mukesh: Myself Mukesh, I am from village of Chhattisgarh. I am in Mechanical

Department, I am doing my MS. After 5 year, I want to see myself as a working as a professor, because I wanted to support some research, I mean to say only IITs are doing research basically not all engineering colleges. So, if I go to some normal low level engineering college I want to support like UG levels to go for research also not only get place and go for job. When I came here I thought I will do my MS and I will go for research sorry I will go for placement, but being touch with research I thought we should encourage people for research also that is what I wanted to do.

Prof. Prathap Haridoss: Okay great, we would like to get the next generation of researchers. Yeah, after him.

Ashwin: 5 years before I didn't know that am going to be a researcher first. So, after 5 years may be I wanted to do post doc may be another 5 to 10 years down the line, so that I can explore a different way of doing research in different field for a different applications. So, now I am actually focusing on say nanotechnology. So, how it actually used for a different fields in same in the biotechnology or how to electronics and. So, I would like to go for different labs and to explore different things. So, that I can get a different experience, that's all.

Prof Prathap Haridoss : Okay Great !

Priyanka: My current research topic deals with electric vehicles, now that we see that I mean our world itself is facing a lot of environmental challenges. So, I believe that vehicular technology I mean this electric vehicles itself, electrification and the vehicular technology will revolutionize the way vehicles I mean we see these days. So, 5 years down the line, I would like to see the kind of research I am taking up here those thing a practically being implemented. The commercial viability of those things a lot of research is going on throughout the world and how we can bring those things to India, like in abroad those things are being implemented like we I have heard of Tesla motors and stuff. So, those things are there in US, in Europe, so those parts of the world. So, I would like to bring those things to India and may be you know you just revolutionize the way technology works.

Prof. Prathap Haridoss: Very nice, very nice.

Asha Kranthi: I completed my B Tech in 2000, Electronics and communication engineering and 13 years after my B. Tech I joined my PhD. I am currently in the biotechnology department I always wanted to work on cognitive disabilities, some in the computation neuroscience lab. In the last 4 years I am here, okay in the last 13 years after my B. Tech I worked as a teacher, I worked in the industry doing software programming and hardware integration. So, I have a lot of different skill sets and after coming here in the last 4 years at IITM, I had a broad idea of what are the different areas in which if you take neuroscience, there are people the range of fields or the range of domains in which work is happening with respect neuroscience is very varied. So, I just got an idea of all of those.

When I came here I wanted to complete PhD and go a back as a faculty, but my views have changed over the years. So, 5 years from now I am not really sure exactly this is what I would be doing, but I see that I would be able to figure out something where I can put together my knowledge in electronics as well as my research work here to work out something like one of the colleagues said why don't you set up something.

Prof. Shankaran: Start up.

Asha Kranthi: Why don't you start up something?

Prof. Prathap Haridoss: Okay you want to fully utilize your experience and education.

Asha Kranthi: That is something I have been visualizing that I would be able to put together.

Prof. Prathap Haridoss: Very nice.

Asha Kranthi: Now, and as 13 years ago, I wasn't sure I would be able to work in the neuroscience field given my background of Electronics and Communication. So, today I

feel confident I can figure out a way in that direction.

Prof. Prathap Haridoss: OK, Great.

Hemanth: So, 5 years down the line. So, it is decided when I was joining for PhD I want to become a faculty. So, I still go stick with that, and I will go for an academic profile either in IITs or NITs that's what my hope so. But I would like work for a something that can be done for the rural India, where there is lot of technology and it is not being implemented. So, that I would like to work on projects which uplift the parts of India which are yet to be technolized with this, that is all.

Prof. Prathap Haridoss: Ok. I think we spoke a lot about I just have a couple questions before and we will wind up that. We spoke a lot about the professional aspect of it and how you know may be various aspects of research have been, you became familiar with them you utilize them and so on. I am just curious do you see any change in your personality as a as a person, over the years that you have become been doing the research, are you a different person now then you were in some sense, then you were.

Prof. S. Sankaran: Definitely definitely every one of you.

Prof. Prathap Haridoss: Then you were 2 3 of, 2-3 years ago with before you join here I know that things were much more directed as many of you are saying and now you are suddenly very free, but what what do you think has daily changed in you.

Prof. S. Sankaran: This question is because, not just because you are in IIT or something like that because you tend to meet a different set of people across the country which you might not have had an opportunity before, and also the kind of lifestyle, the kind of curriculum style, everything is you know quite slightly different from the rest of the world. Definitely that will have a some influence I hope mostly is positive influence, but yes, but we would like to hear that what is that influence.

Prof. Prathap Haridoss: What do you feel has changed?

Ashraf : I think you get a sense of self responsiblity that is the first thing, where you take research because you have to work hard and you have to be patient enough, so that is one think and one more thing is you start questioning things and theories which you have been.

Prof. Prathap Haridoss: Taking for granted.

Ashraf: Yeah Taking for the granted in your under graduate.

Ashwin: One thing is I can start my own lab now. So, when I joined the IIT. So, my professor's lab he his actually, he is very new to the IITM. So, he just joined just before 2 years back. So, when I entered his lab nothing was there, it is like room is empty. So, and he is a like you need to start developing this lab, so now, I have a confidence that I can develop my own lab in future where ever if is go and join there.

Vijay Bharadwaj: I would like to quote one of one from PhD comics, when I joined for PhD it was like – Oh yeah I will change the world now. Well, now it's not like that, I have grown to be little more realistic and every lab comes with it is own constraints. So, if you choose a problem you learn how to solve it based on the given resources and how much more you can implement it and how much more you can give a change to the lab. That's what you learn, to work under constraints and you are also learned to delete lot of frustration.

Prof. Prathap Haridoss: OK.

Vijay Bharadwaj: It will make you more patient.

Prof. Prathap Haridoss: OK.

Ashraf : Yeah, that was the point I missed. Practicality practicality of any given problem that's what you start assessing.

Prof. Prathap Haridoss: Yeah, very nice yes.

Mahesh Balan: One question I used to ask my professor often is sir why is it a doctor in philosophy and not doctor in management studies or electrical engineering. So, he always says the body of knowledge that you learn in the field is lesser than what you learn about yourself. So, it actually changed myself completely previously when I used to lose my patience often. So, these days I used to go to a restaurant and I don't get my order okay take your own time no problem. So, every aspect of mine is changed. So, since I am from management studies previously like we used to go shopping are discount and go, buy it everything and come and now lot of economic theories come into my mind okay I understand. So, my view and perspective is completely changed and also I would add like as a researcher we also get some humility and simplicity. So, we always have a notion that we are the greatest in the world what we do is awesome, but we understand realities that we just play a small role and there are many good things happening in this (Refer Time: 53:57), so all these things.

Prof. Prathap Haridoss: Very nice, very nice.

Asha Kranthi: I would like to answer this from the perspective of a women, within my family. In the earlier generation there was only lady who is working as a teacher. So, when you aim for PhD the first thing that comes up is why PhD, settle down.

Prof. Prathap Haridoss: Yeah.

Asha Kranthi: So, challenging the notion of settling down working for money and the traditional setup did not come easy. But here, when you see people all around you and when you hear a women faculties share her own experiences of how she pushed through managing both family and a research you get inspired. So, I think you have an environment here that challenges you beyond the traditional setup that is outside. So, that is one thing I would say is what I saw here what helped me a lot.

Prof. Prathap Haridoss: Yeah, very nice.

Swathi: I would like to add to that, now as I said I am doing my research in humanities in social sciences. But IIT is a big targets compared to other humanities universities, you know were real good research happens because I do know the common crowd is more biased with science I guess. But coming to an IIT, I understand that this is a best way to fight patriarchy as in seriously, as in you ever notion that women cannot do science or women cannot reach somewhere, but then the attitude there is a I mean there is so much of an attitude change when you go back to your hometown or any place.

Like previously I was in English and foreign languages, university and university of Hyderabad, but real good research happens there, but the kind of respect that especially men give to such universities is, I don't know it's very different because humanities is supposed to be a very I don't know feminine subject and sciences is supposed to be masculine and more intelligent. So, when you share that space you get a different respect. So

Prof. Prathap Haridoss: More than your personality other peoples personality changes that's what you say.

Swathi: Yeah that changes, you don't have to fight back many a times, and it comes you know.

Prof. Prathap Haridoss: Sure.

Ranjith: Coming into research, we have some of my fellow researchers has told about the freedom that we are getting and with freedom that it comes a lot of responsibility too. So, during this 3 years at IIT Madras, I found that my responsibility as a student, as a may be as an individual improved a lot because I had to handle so much of things which nobody else was like controlling. So, you are completely free to do whatever, but still you have that responsibility this is one thing.

Second thing is like I mean like I am an MS research scholar so this people who have joined with me for M Tech, they might be graduated by now. But you will be still here, I may like we are doing a, in a research kind of stuff it is good like we done a good stuff,

but then going back to my home place there will like okay you just did Masters right, it's more than 2 years are you did you fail or something. They might not know the thing, but now I feel like I am mature enough to understand it's not my problem, but it's their lack of like knowledge in this area.

Prof. Prathap Haridoss: Knowledge in this area.

Ranjith: That is causing and that maturity that is developed during this years at IIT madras.

Prof. Prathap Haridoss: Very nice.

Mukesh: After joining as a research scholar, what I felt myself as a change is like a when previously I went to my home place and small small things I used to argue with my friends. Now after being a research scholar I stopped arguing with them I started observing them what they are saying, I did feel like that. So, the change is like from argument I changed to observation.

Prof. Prathap Haridoss: Yeah, go ahead, go ahead.

Rajnath: Yeah as I joined here I came to meet so many different people like with different mentalities and the way they look at the same situation differently. Earlier we used to be like, yeah what I said should be right, it is right, actually it is right, it should right. But now we start to accept different ideas and different thoughts. In that sense IITM like and also you become more and more enthusiastic everyday and you try to know about everything what is going on, what's actually happening like you be like a very lively person in fact.

Prof. Prathap Haridoss: Very nice.

Zeeshan: My perspective is slightly different; I had the opportunity to go aboard for a semester. So, I was abroad in Germany for 7 months. So, that allowed me to change in

many ways I mean the perspective that you gain going to a foreign land, trying to understand their language, seeing how they do things, it changes you. Here no matter how much time you have spent, the kind of thinking, the way we approach science, the way we approach any problem is very different and how somebody from outside approaches. So, going basically my change came from going aboard from seeing different people's perspective and now the way I think is far more expansive.

Prof. Prathap Haridoss: So, different more cultural influence from different places that make a big difference.

Zeeshan: Changes your perspective in usual time.

Srikanth: Well I think I am last one to introduce myself I am Srikanth, PHD scholar from Electrical Department. I joined MS program here and then I upgraded to PhD.

Prof. Prathap Haridoss: And you are from?

Srikanth: From Warangal, Telangana, so to be frank I joined here as a kid and I think now I have grown up little bit.

Prof. Prathap Haridoss: Very nice, a very nice thing.

Srikanth: And the motto of joining IITM was to get a job. I got an MS program. So, let it be IIT. So, let it be it's an IIT. So, I thought I would get a job after 2 years, but after spending 2 years I thought I am working in a cutting edge some interesting technology like I work in Renewable energy. So, there is a lot of scope. Then I was interested to do PhD. So, then I joined it. Now after while doing my PhD I am thinking like why cannot I commercialize this technology which I am working on. So, the basically I started for a job and then to do a PhD and then it's moving towards starting my own. So, there is a lot of professional change in my carrier. So, such as

Prof. Prathap Haridoss: So you are going from a view where you wanted a job, to

location where may be you will give jobs, so that's good, nice nice to know.

Sujith: My friend said he joined as kid and but he is grown up, but but I mean people have already said that they are getting more freedom, but little bit of maturity. So, I am feeling right now as I am in school again, but with little bit more maturity.

Prof. Prathap Haridoss: Ok.

Sujith: Because we are doing the things that we like, but from the school till B. Tech we have been learning something which we are not aware of, but I mean those things are very alien things to us, but now we are aware of the things and we are doing the things which we like and we have lot of freedom. That's the same thing that we used to do when we are kids right. So, I am feeling like that.

Prof. Prathap Haridoss: Okay very nice, you are having revisiting childhood in a professional way.

Sujith: Exactly.

Prof. Prathap Haridoss: May be I think we will we had lot of nice discussion on various topics I would like to just one last point; if you can comment on. So what are your words of advice or you know any anything that you would like share with a person who is probably watching us and is considering you know taking up research position in and as a MS student or a PhD scholar. Do you have any kind of you know words of wisdom or advice that you would like to share with me?

Sujith: I have a I have only one advice. So, if one person wants to go for research and he has to start as early has like just after the B. Tech, because it's going to take time and you have to think of your family also so.

Prof.Shankaran: Yeah, valid point.

Sujith: Yeah. So, there will be like 21, 22 and 5 years, I mean I mean if they want to do the research I think I would advise them to do soon.

Prof. Prathap Haridoss: Sooner the better.

Sujith: Yeah do a direct PhD and it would like 27 by the end.

Prof. Prathap Haridoss: Very nice sure.

Arun: Hello, I am Arun.from Chemical Engineering Department I am into my second year, I mean third year of MS.

Prof. Prathap Haridoss: And where you from?

Arun: I am from Chennai. I would like to tell people that you know actually perseverance is the most important trait I guess, because like in your under grade and all you just learn from books and everything is just thrown at you, but in research I think you mostly learn by figuring out what doesn't work. Most of the time the experiment don't work so I think, and then again one a good thing is it's not structured. So, it is not like a 9 to 5 job which kinds of 24 x 7, so that is really good.

Prasanna: If anybody wants to perceive in his in the field of research, if he come with proper goal is good. See if most of the research scholar we come here as we got PhD position in IIT Madras. So, if better if we come with proper goal.

Prof. Prathap Haridoss: He may more be focused.

Prasanna: About his carrier growth and future development everything, so later onwards he should not frustrate that while doing PhD. After finishing PhD if he not get job with desired field or whatever it may be according to me.

Prof. Prathap Haridoss: OK, you should think it through a bit and then

Prasanna: Yeah.

Prof. Prathap Haridoss: We have some idea and based on that you should.

Prasanna: You should come yes.

Prof. Prathap Haridoss: Ok.

Madhuri: So, this is a tip for the MS people who are aspiring to join for MS course. You don't have to really know the exact problem you will be working on. So, this is something we can figure out on the ways. So, that was something when I got in and I was worried that I did not really know what problem I wanted to solve, but as we did the courses you can talk to your adviser and figure out what you want to do. So, you do get time to settle in and figure out what to work on and you don't have to jump into it right away.

Prof. Prathap Haridoss: OK. Great Yes.

Vijay Bharadwaj: My piece of advice is mainly intended for undergrad students in their final year. So, I would like to tell that if you are not sure as to whether PhD for me or not, I would like to you push ahead and take the risk of doing masters first. In the masters, in the first year you will undergo lot of different course work at whether MS or M Tech and based on that you will be in a better position to tell okay PhD is for me. No, if not M Tech you are better at a subject and you will be paid more by companies. So, you for undergrads you better take up master before deciding for a PhD.

Ashwin: One thing is we should adapt failures. So, that is the only concern I feel.

Prof. Prathap Haridoss: They should accept.

Ashwin: They should accept failures and they should adapt to the failures.

Prof. Prathap Haridoss: Adapt to the failures. So so, they should become comfortable with the idea. So, so that's something that they should keep in mind as they.

Ashwin: They should not go down even if there are lot of difficulties; get ready for the.

Prof. Prathap Haridoss: Better to prepare to fail. That you can get up stronger get up stronger.

Prof. S. Sankaran: Get up stronger.

Asha Kranthi: I want to add one point to that, learn to recognize success after so many failures instead of thinking this is also a failure.

Prof. Prathap Haridoss: Okay Great, you forget what success is.

Asha Kranthi: Learn to recognize success in the middle of tons of failures.

Prof. Prathap Haridoss: Great.

Shabri Lal: Hello I am Shabrilal, I am doing third year MS in Aerospace, I am from Kerala. Basically the most and foremost thing a research scholar should need is patience, even though he had intelligence and all, it won't work because he should know how to work in a group. If he have enough intelligence and all, if he is a not willing to work in a group because if he has some issues indeed, he should understand how other peoples feel and all.

Prof. Prathap Haridoss: Yes.

Shabri Lal: If he don't know that women culture and all it is difficult to get a positive result from this.

Prof. Prathap Haridoss: Okay so, you are talking about good. So, you are mentioning

team work, team work and also patience that these traits should be there, or at least may be if you are coming you will end up getting those traits I mean, some of it will come. Yeah

Mahesh Balan: So, my advice to people who wanted to do research in PhD is that unlike M. Tech or MBA don't have any expectations. So for the next 4 semesters I am going to put my heart and soul, get good GPA get into a company, that doesn't work for research. So, never have expectations particularly when are you going to graduate and all those things.

Prof. Prathap Haridoss: Yes.

Mahesh Balan: Because in research if you have expectations it doesn't work in that way, if you don't have any expectations you will enjoy the journey and that surprise will make you happier.

Prof. S. Sankaran: Yes fantastic.

Ram: I would suggest that you should really take up a topic which that fascinates you to the core because you are going to spend your hell a lot of time with your research topic. So, something which does not fascinates you stay. So, stay out that's it.

Prof. Prathap Haridoss: Ok.

Zeeshan: Falling upon that point in my opinion I would think that after you do your bachelors it's better that you try to work on something. I mean actually go to the industry try and do something. That will, that way you will figure out what you want to do your research in because that's really critical when you come and don't just say I want to do MS or a PhD, MS in what, PhD in what. So, I think the focus will actually come when you try and do something.

Prof. Prathap Haridoss: Ok.

Srikanth: I just have one suggestion like one important thing is the area in which you are working is very important and whom you are working is important. So, these two things are the basic things before you are joining at research program.

Prof. Prathap Haridoss: So, you apply a thought on both of these so that it goes on smoothly.

Srikanth: Yes and then it is a calculated risk basically.

Prof. Prathap Haridoss: Calculated risk Okay.

Shruthi: Another advice is whichever area you are interested in a topic you could take it, but you shouldn't be worried if your background and the department or the faculty having that say you are from biotech and you want to do research in some materials department or mechanical department that shouldn't come in the way of choosing your research topic. This is out of personal experience and I have seen fellow research scholars, they are still able to make it through as in if they are UG was in biotech M Tech was in nanotech and still they are able to make it and get very good research results.

Prof. Prathap Haridoss: Yeah, I think that's a very important point, that the Indian context because we tend to think that you know especially through our educational process where there is an entrance exam and which puts you into a department and then you some of how think that you are stuck to that particular line of activity. But I think that's a valid point that when you get into research it is much more open in liberating in that sense you can. In fact, almost every department these days says that their work is interdisciplinary. So, in that sense you can always have one foot in one department and still you know seek problems which are more broad based and constrained by that one department.

Prof. S. Sankaran: We had taken a Dentist.

Prof. Prathap Haridoss: Yes.

Prof. S. Sankaran: We have successfully finished PhD in Metallurgical and Materials Engineering Department. So, that it tells.

Prof. Prathap Haridoss: Yeah and who did very well, I mean very well.

Prof. S. Sankaran: Very good excellent no problem, yes.

Asha Kranthi: So, I would like to add one thing B. Tech or M. Tech is more core centric whereas research is where you are trying out things. So, do not wait till you complete your B. Tech to try out something either in the industry or anything. May be right from your second, right from after completing your second year or so in your B, Tech itself start tinkering with something's, start trying out something's beyond the course work.

Prof. Prathap Haridoss: (Refer Time: 69:12) Course work yes, yes, yes.

Asha Kranthi: So, that would also help the students get a clarity as to this aspect of the subject is what I am interested in. So, that would help them get a clarity as to what area of research they want to go in so. Right from the second year or after second year itself start some practical things beyond the course work.

Prasanna: One more point, I would like to add sir, here research scholar, he has to seriously attach to his work and he has to appreciate his work in all the stages failure and success.

Prof. Prathap Haridoss: Okay great! That level of involvement and attachment is very important, something that in aspiring students should be prepared for and have the at least. Okay so, on that note I think we will close this discussion it's been a pleasure to have you all here.

Prof. S. Sankaran: Yes.

Prof. Prathap Haridoss: For us also it's been a nice opportunity to meet so many of you

in this kind of a setting which we don't often have in because of various other scheduling requirements and so on. And very nice discussions, so many of you had so many nice lovely points to make on you know what it is to be a research student here. What's nice about it? What's challenging about it? Where do you think it is going to take you and how much it has impacted you in your life.

So, thank you very much for joining us and I hope other people would also come in to positions that are similar to what you are doing right now, thank you.

Prof. S. Sankaran: Thanks a lot.