

Skyroot Aerospace's Pawan K. Chandana On Becoming A Unicorn & The Cab-to-Space Model | Episode 68

55 MIN · YOUTUBE · [HTTPS://WWW.YOUTUBE.COM/WATCH?V=6_7ZFYA80PA](https://www.youtube.com/watch?v=6_7ZFYA80PA)
https://www.youtube.com/watch?v=6_7zfyA8oPA

SUMMARY

Skyroot Aerospace, founded in 2018 by former ISRO scientist Pavan Kumar, is on the verge of launching India's first privately developed orbital launch vehicle, Vikram 1. The company aims to revolutionize access to space by providing affordable and efficient satellite launches, leveraging advanced materials and technology like carbon fiber composites and 3D printed engines.

- Skyroot Aerospace is building rockets using carbon fiber composites, making them lighter and more efficient.*
- The company has signed an MOU with ISRO and is one of its largest users, benefiting from government support in the evolving Indian space policy landscape.*
- Skyroot's business model aims to make rocket launches as accessible as booking a cab, targeting the growing demand for small satellite launches.*
- The Indian space industry is projected to grow from a \$500 billion market today to \$1.8 trillion by 2035, with Skyroot positioned to capitalize on this growth.*
- The company has raised \$160 million in funding and recently achieved unicorn status with a valuation of \$1.1 billion.*
- Skyroot's upcoming launch is a tribute to Dr. Vikram Sarabhai, the founder of the Indian space program, and aims to demonstrate India's capabilities in the global space race.*
- The company emphasizes a culture of innovation and rigorous engineering, with a focus on building a high-performance team to tackle complex challenges in rocket science.*
- Pavan Kumar expresses confidence in India's potential to become a global leader in the space sector, driven by its engineering talent and supportive ecosystem.*

We build the rocket entirely with carbon fiber composite you know which is super lighter the lightest material to build anything which can go to space. Next 10 20 years I think space is going to transform like no other thing and I always say that if steel built modern civilization space will build future civilization. Getting an access to a rocket launch to launch a satellite to space has always been the toughest challenge and it will remain the toughest challenge for the industry in the next 10 years. As a venturebacked company, we felt like this is a good niche to address. You know, build smaller rockets. When we started in 2018, there was no policy for space and we signed the first ever MOU with ISRO.

Now we use ISRO's facilities. We have one of the largest users of ISRO facilities. >> There are no Indian billionaires in the space tech business. How do you explain that? >> I think it's just lack of initiative. But now it's

changing, right? So policies are opening up. There is capital. there's investment interest all coming together now. >> So now is the time. >> Let's talk about now this big launch. >> We're going to start stacking the rocket on the launch pad and take off uh you know it should be likely uh June July launch literally a zillion things can go wrong uh uh in the rocket launch and that's where like it's a different rigor of engineering. The next rocket we launching have have parts from 400 suppliers all from India. This launch is a tribute to Dr. help him survive because if he has not started the space program 1960s we would not be in a position to be able to launch a rocket now >> India's chances of actually leapfrogging this race you feel confident of that >> absolutely no doubt thousands of suppliers in India who can build a spacerade part or product in the next 10 years I think billions of people will be connected through space is today \$500 billion industry and by 2035 the world economic forum estimates it to become 1.8 trillion economy.

From made in India to launched from India, the country's private space race is entering a whole new orbit. And one startup wants to make rockets as accessible as booking a cab. Hello and welcome to Young Turks Reloaded. I'm Shireen Bhan. Founded in 2018 by former ISRO scientist Skyroot Aerospace is building India's first privately developed orbital launch vehicle for the fast growing global satellite market. After scripting history with Bikram S in 2022, the first private Indian rocket to reach space, Skyroot is now preparing for the launch of Vikram 1, its maiden orbital class rocket built with all carbon composite structures and powered by 3D printed engines. Vikram is designed for rapid, lowcost and dedicated satellite launches. is what the company calls the cab to space model. And the opportunity is massive.

With satellite demand surging, driven by broadband, earth observation and defense applications, the race for faster and more flexible launch access is intensifying. Backed by investors including GIC, TESC, Black Rockck, and Sherpalo Ventures, Skyroot recently became India's first Space Tech Unicorn with a valuation of \$1.1 billion. The company is now scaling manufacturing, expanding launch capabilities and aiming to become a leading global launch player by 2030. But beyond the valuations and the milestone lies a bigger question.

Can India become a serious global launch powerhouse in the new commercial space economy? Joining me now is Pavan. It's great to have you joining us here on Young Talks Reloaded. Thanks very much for stopping by. You know, before we talk about all things rockets, uh let's talk about rocket science. The idiom uh it's not as hard as rocket science. I mean all of us have grown up with that. What made you want to do which is often considered the pinnacle of engineering problems?

>> Yeah. So say I always wanted to work on complicated stuff that really excites me and uh I studied engineering and I thought like the toughest >> from IIT Karakur >> from I Karakpur and uh as a mechanical engineer I thought the biggest toughest most challenging machine ever built by human uh is a rocket you know which can defy gravity and magically go to space and that really excited me to get into the sector. M so there was nothing about life uh outside of earth extraterrestrial sort of adventures that wasn't really the motivation. No, the really the engineering was my motivation and uh and also the fact that you can create science fiction into reality with this.

>> You're living it. You're you're living it. >> Living science fiction. >> You are living science fiction. >> But you

know for somebody who grew up in Visag you don't come from a family of entrepreneurs. Your father in fact shortly was an entrepreneur and then you said that he went on to join the government. Uh but you always wanted to be an entrepreneur. Yes. Yes. Where where did that motivation come from? uh so I used to watch watch around and uh you know I used to feel that uh entrepreneurs are great uh wealth creators and great value ads to the society and I used to respect them a lot especially like all the entrepreneurs coming from India whether it is the Tatas or the Amanis you know and across the globe you know whether it's the Musk or Bizos or you know Steve Jobs really the all of them inspired me a lot and I thought it's uh I should also become an entrepreneur and uh that really excited me because I I that's a callinguh which I had from childhood and even in college I always you know in fact in the IIT especially in IT corporate during my time >> uh there's a lot of entrepreneurial energy out there you know everybody wanted to build companies and that really made me feel that you can actually build a a company from scratch you know without anything you know >> in India >> in India you know and that that was the time you know I studied from 2007 onwards in IIT and then that was I think the startup uh sectors taking off you know we had the flip cards and myntra of the time, >> you know, they're all taking off and that >> young trucks also.

>> Yes. Yes. Yes. Yeah. Yeah. Yeah. I I used to watch the show your show from college days, you know. So, I think it's it's really uh exciting to see all that happening >> and uh that really inspired me to wanting to start at some point of my life. It all happened uh you know then I joined ISRO as a scientist. >> Yeah. A quick detour to ISRO before you decided to start up. What what was that like?

>> Uh yeah. So, so in fact uh started out of college I wanted to start a company but I didn't really didn't have an idea of what exactly I should do I was not ready exactly but then my passion was engineering passion was rocket science uh um so I I thought like you know at that time came to campus one the very early times and I thought I'll not join any other company let me uh you know let me join the space program because I was really fascinated by it and then uh I joined ISRO as a scientist I was part of >> do you remember your interview >> yeah yeah so in interview in fact like uh I I think um uh four people got selected from Idikarakur and I was uh I was probably a backbencher and you know I was I was probably the least uh least uh you know educated guy among the four and uh and then like but I was really really passionate uh with science and engineering and uh and then really the interview committee really liked uh you know how I think and uh >> what did they ask you? uh so they asked me like uh all fundamentals you know so I'm really I think uh one thing which uh I really I used to get into the details I really like getting into the details and they asked me a lot of uh interesting questions like you know uh why do aircrafts only fly at 10 km why not 30 km all this you know basic questions and what is like uh the fundamentals of uh propulsion and you know all all these things but I was really uh uh fascinated I used to study a lot uh and and then like they really liked me and then you know I got in and uh in fact I think I remember like all the other three were toppers of the batches >> something and I was not like of that uh you know I was probably somewhere in the middle and then uh I really got selected there. It was uh it was surprise for me but I got it there.

>> Yeah, you got in there and that is where you found your co-founder. >> Yeah. So so yeah. So, so 20 uh 2012 is when u you know I joined ISRO and then I met Barat uh we both were flatmates for a long time. Uh you know uh you know like every day we used to you know have dinner together and you know we were >> and your startup startup ambition. Yeah, this is finally you know it happened that you know we both started

together but but yeah we built a really great uh uh you know relationship uh we had that uh intellectual uh sync really well and uh really uh became very good friends and the moment I got this idea to start the company I pitched to him and then he happened to come on >> he was the first investor pitch that you made in a sense right >> correct correct that's it >> so what what did you tell him >> I told him yeah I think there's something interesting we should start a rocket company you know because uh Um does >> he look at you in shock and awe or >> Yeah. Yeah. No, it it surprised anybody you know because it's it's literally you know rocket science and in fact even when the thought came to me itself I was a little bit shaken >> but something in me said you know this is something should be done you know and uh and that was more like a calling and then you know took the leap of faith and we both started the company. So >> you know you make it sound very easy. We both decided to start a company that is going to put rockets into space. But from putting this thought out there in the universe, having the conversation about it to actually getting started, putting pen to paper, uh, and then looking for investors, looking for land, looking for how to get this going. I mean, what was that process like?

>> So, in fact, uh, we we took it, I mean, in fact, like I took it like a science or engineering problem, you know? So, it's like learned everything on the go. In fact, I remember googling, you know, how to raise capital, you know, and and and I learned how like people raise capital. I didn't even know what is equity, you know. So, nothing literally, you know, just wanted to start a company and make it uh as successful as possible and do everything possible to make it big. And I learned on the go, you know, and typically didn't, in fact, what happens is most technocrats, you know, they think that, you know, business is out of the league. I mean, it's not our DNA or our league, but uh I never felt that way. it's still a problem to solve like an engineering problem and that's why you see like I think one of the most successful entrepreneurs are engineers you know so so so it's it's we look at the problem break down the problem you know like like solving a math puzzle >> and learned everything on the go and then like you know so so that I think gives a new perspective you know you don't have a baggage of past learning you think everything in fresh perspective and then >> it's ground zero pretty much every day >> yeah just follow the fundamentals and then like you know make it happen so >> you know but let's talk about uh the first few conversations that you had as you pitched now your idea to other people and I want to address the the the the premise of the company which is really you know the Uber for space so to speak how did that come about >> yeah so in fact uh if you see today if you want to launch a satellite all the satellite smartphones got smaller with time satellites are getting smaller with time and more than 90% of the satellites are small satellites you know something below 500 kg and then many of them actually need a unique ride you know for example if you want to go to our friend's house we take an Uber, you don't take a train.

>> Okay. So that time a lot of trains like for example the companies building big rockets were like trains and the there was need of like >> like SpaceX you know and and there was need of cabs where where satellites can book a rocket and go to very unique destinations which works best for the satellite you know whether it's for imaging whether it's for communication etc etc. And that was just evolving you know satellites are getting smaller and new niche orbits and constellations instead of building one big satellite people were building smaller satellites in large numbers for better coverage. So I think that is a very niche market and you don't need to spend billions on a very big rocket uh you know which is what probably governments would do best right so so as a private as a venturebacked company we felt like this is a good niche to address you know build smaller rockets and these smaller rockets actually are not small these are like for example the rocket which we're going to launch >> I was just going to ask you that I mean what does small really mean >> yeah so so just the payload is small that means

like below 500 kg but to launch a rocket I to launch a satellite below 500 kgs For example, our rocket is sevenstory building tall. You know, it's a it's a pretty >> it's a sevenstory building tall rocket.

>> Tall rocket which needs to launch a less than 500 kg satellite you know because that much energy is required to uh go out of earth lift off and go out of earth's gravity well which is so big and then go to space and you know put a satellite into orbit which will rotate around earth for several years. So I think it's it's a phenomenal feat in engineering and then building a rocket is like literally rocket science.

possible. >> So you know the building part and now let's talk about what you've done differently. What are the key differentiations as far as the building part of the rocket itself is concerned. You know you're you're based in Hyderabad. You've got your manufacturing facility in Hyderabad. But again you know going to the government and saying hey we want to be India's first company in the private sector that launches rockets. What was the response? What was the reaction? Did they sign off on the land immediately or did they look at you in disbelief? So in fact if when we started in 2018 there was no policy for space >> yes >> you know and uh so there's no way we can work with the government at that point of time because there's no uh policy for space sector and in fact I thought it would take probably a decade for the policy to come that was because we were literally all in for the long longest time you know we thought even if it takes 10 years uh we were ready you know and with that we started early on and then government announced the policy in in two years they said that you know now in space >> set up in space and uh and uh and that was really a game changer for us and then all support came in like you know we became the beneficiary of the policy very early on and we signed the first ever MOU with ISRO now we use ISRO's facilities we're one of the largest users of ISRO's facilities outside of ISRO and we had access to you know multi-\$und00 million facilities you know like uh at the the government uh uh you know uh agent space agency and uh that gave us access and then the state government's also liked what we're doing and uh we got land we got facilities you know everything in fact I was really surprised to see how the government works efficiently typically we are brought up thinking that you know government may not be very efficient >> you know and that could be a biggest bottleneck but I think I was really pleasantly surprised that uh red tape actually is now red carpet in the country >> well that's good to that's certainly good to hear but I'll come back to the difference between the public and the private sector at least the difference in perception and your experience of that in just a second but I want to go back to the building part right >> like how long did it take to actually build the first rocket which was suborbital >> what does it cost >> yeah sure so so uh in fact like we launched Vikram as India's first private rocket to space in 2022 >> yes we spoke that morning on the morning of the launch >> of launch you know and uh and typically that was a very successful launch you know typically first launches don't go successful and you know lucky that you So we made it and we made it well. The rocket was built well and it succeeded in the first launch and that took two years you know from design to launch in two years and which is also like one of the record times globally where a rocket can be built which can be launched to space.

>> So how did you build a rocket in two years? What did you do differently? >> Yeah. So I think what we did is that we chose like really good tech uh good architecture for the rocket. For example, we build the rocket entirely with carbon fiber composite, you know, which is super lighter, the lightest material to build uh anything which can go to space and uh we chose that and uh you know it is a tough learning curve initially but we mastered it and we are pioneers in this particular technology right now and um and we used 3D >> nobody globally is doing

it. There are very few.

>> Okay. >> But most people still use a conventional metals you know which are very just to imagine like regular steel if you take you know carbon composite is almost 20 times lighter >> you know just uh you know of regular steel and there are like very high strength rocket grade steels but still carbon fiber is five times lighter >> uh you know for the same strength. So it's it's like really really magical uh uh thing and then we thought like you know many experts told that you know it would take probably decade to build this technology in India in the right way with the entire rocket can be built you know reliably with that but I think we cracked it and uh we spent enough time we put like fundamental engineering to make it happen that is one and then >> how many engineers were solving this rocket problem >> yeah so in fact >> how many engineers does it take to build a rocket >> yeah so so uh with Vikram's time we had like 150 engineers you know pretty pretty lean team to build a rocket from scratch. all Indian so zero foreign foreigners in our team >> all IIITs or >> it's a mix you know it's it's a good mix uh you know it's a mix of uh uh you know Taiwan tied to colleges passionate people across the country you know mix from various industries it's a very very diverse mix of exceptional >> and how did you get these 100 people together >> so in fact like uh when we started off you know we didn't even have a website you know no credibility nothing you know people even uh when we went and pitched uh saying that you know we're building a rocket company people you know thought is it real you know >> is this a scam >> is this a scam you know so most people thought and even when we gave offer letters uh you know people were telling after joining that they had the doubt whether is it like a is it really a company you know because there's no website there's nothing you know how can we build a rocket from India etc they were >> you don't have a website >> yeah so so that's that's how you know like how we pitched to investors we pitched to early employees and I think we should really appreciate them they took that leap of faith uh you know to start a very early stage company literally no background no policy you know and we don't know what is a very uncertain future yeah right but they took the leap of faith and joined and many of them are doing phenomenal job right now many of them are in leadership positions you know doing phenomenal phenomenal engineering you know at at our place so it's good it's it's good to actually we pitched to investors we pitched to early employees >> what was the first check like >> getting the first check >> yeah yeah yeah so getting first check was in fact uh I had friend like you know uh uh who was working with me and like you know raising capital because as I said as I told you know what equity was >> we didn't know what equity was so uh and uh you know we were all figuring it out you know how how to do it and so the only platform we knew was LinkedIn and we were like you know messaging everybody and then uh and then my friend messaged MKkesh Bansil you know at that time saying that you know we're building a rocket company and uh you know something >> a man far removed from the rocket world or the space world ended ended up being the the first >> investor because because he's very passionate with deep tech and he's been an engineer you know he studied in uh you know it kur and u and then like I think he wanted to be an aerospace engineer at some point you know so so uh so he was really uh you know excited to meet uh and then uh he was very close to startups so he he knew entrepreneurs and we had a meeting and he said like let's catch up and then we had a quick very exciting meeting and then like you wrote the first check of 10 crores and uh that I think gave us the first three years of Skyroot.

>> Yeah. >> You know from 10 crores the first three years of Skyroot to today becoming India's first space tech unicorn. Uh and it's it's been a very quick journey for you. I mean from 2018 now to 2026 uh and valued at a billion dollars. >> What has been the most challenging aspect of the journey so far? So I always say I think you

know raising capital is rocket science for us you know so it's especially in uh deep tech uh you know where uh you know the gestation periods are very long the tech is very difficult to understand and the risk is very difficult to gauge uh you know I think it's toughest journey for us is to break the glass ceiling every for every round of capital you know we every round of capital we raised we were the highest uh you know raised capital in this sector very new in fact you know so far I think we have raised like close to \$160 million Yeah, >> commercial.

I don't know whether anything of that sort has happened in India before and that was really challenging because you need that level of capital to get this. >> So again and I want to understand from your point of view like as an investor you know they're investing in deep tech. They're investing in this opportunity that they believe is likely to open up. But what are we talking about? What you know it's it's easy to talk about the addressable market when you're talking about D2C brands etc. What is the addressable market for a company like yours?

>> Very good question. And in fact like uh rocket business is the easiest business in in terms of business you know because it's it's more like a >> that's not rocket science. >> That's not rocket science. It's easy and it's very visible like for example you build a rocket let's say you manage to build a rocket which is the most difficult part and there's only few companies doing it and uh the space industry together today is \$500 billion industry. You know people think that space industry is just government. It's a very big, you know, commercial industry and with very few rocket launch companies because that's the central to space industry. You need to launch something to space to be able to do business from space and that's a \$500 billion business and very few people are able to build rockets and launch to space and always and always access getting access to space. That means getting an access to a rocket launch to launch a satellite to space has always been the toughest challenge and it will remain the toughest challenge for the industry in next 10 years and that's what so you crack it. It's a you know you launch a rocket um you get paid really well and rocket industry like you know like SpaceX approved it's like a very profitable uh you know venture if you crack it well and very few players and huge barriers to entry you know building a rocket can take decades sometimes extremely tough engineering and that's what it is. So you so it's it's just like you know business part is easier actually to get to the product the level where you can do business is very difficult >> you know and here's the unusual story about what's happening in Indian space tech if you look at it globally it's largely either been the government you know the NASA the east of the world uh or it's been the big boys it's the Elon Musk it's the Richard Branson's it's the Jeff Bezos in India there are no conglomerates in the space tech business there are no Indian billionaires in the space tech business.

It's largely a startup story. How do you explain that? >> Yeah. So, so I I think uh you know I always say that you know to be a very successful uh uh space startup or a space company you either have to be a billionaire or you have to be a very very frugal uh frugal and uh very different intelligent uh engineering team and entrepreneurs coming together to make it happen you know. So that's and and then that's what I think the Indian ecosystem is pretty f frugal very very uh you know competitive uh in engineering like you have like some of the best engineers in the globe here and uh you can make it really really big uh so either you have to be an Elon Musk or you have to be like a very very frugal efficient entrepreneur based in India >> you know but why do you think that the Indian billionaires haven't taken to space in the way that we've seen global billionaires take to space >> so so I think um rocket science is bit intimidating you know it's like people think that's very >> it's not intimidating to you who grew up in visag and graduated from IIT Karakpur but it's intimidating to billionaires you think >> yeah I know because because India is uh you know building tech from India if you see like it's very

little you know so if you see like deep tech um you know where what is the largest deep tech company in India so still like very early phase and uh >> again why do you think that's the case because this is the this is the big challenge this is also the big debate that what is holding India back from addressing large complex problems. Are we going to be left behind? Is it going to largely be a race between us and China? How do you respond to that and does this worry you?

>> Yeah. So I think see we have very strong foundational elements like the engineering talent. We are the largest home of engineers in the world. You know we produce 1.5 million engineers every year. You know largest in the world. So so I think essential ingredients are very very strong and in fact like the best engine Indian engineers power the world tech world tech. you know we all know it right so I I think it's just the lack of initiatives like you said you know why the billionaires are not doing it you know why the not so many entrepreneurs doing it I think it's just lack of initiative but now it's changing you know I think people want to do startups now this in fact uh the funding from the government coming in you know with one crdif etc so it's I think it's a enabling ecosystem has started now policies have started know just imagine like you know just few years ago the space policies opened up right so policies are opening up there is capital there's investment interest all coming together now.

>> So now is the time >> but but you know and I want to push back a little bit on this because when you started there was no policy there was no capital uh you know there were no Indian space tech unicorns that that you could follow uh the the template of >> it was just ambition and it was the ability to have an audacious dream >> you know and that's the X factor that I'm trying to understand where that comes from.

>> Yeah. No, I think as I as I told like I always wanted to be an entrepreneur. So risk I I had the ability to take that risk and like >> is it also because you feel like you didn't have anything to lose. >> Uh no or >> not much to lose. >> It was like a more like a calling you know and I was ready to risk everything you know. I was ready to give 10 years of my life uh not achieving anything and still fail you know. I was I was ready to take that risk.

>> But that didn't scare you? >> Not at all. Yeah. So because uh even if you see like you know I always took very unconventional choices like for example I studied in an IIT and and went to >> that's hardly an unconventional choice in India. >> No no what I'm saying from from joining an IIT to join a government job is very unconventional. I took that leap. Uh I took that risk. For example, I think I still remember I think my first salary was something like 40,000 rupees a month >> you know and I took that risk you know very very rarely you know I do take the risk uh of of you know taking dominant job uh in the very early start of their career because for me uh I think for me the passion is more important for me like what I'm doing every day you know 16 hours a day is very important and uh and for me that was the calling. So I I chose like you know cutting edge tech working on cutting edge tech in the country not leaving the country and that paid off really well.

>> Never never contemplated doing this outside. >> No no somehow I think I really like the opportunity in India you know because uh uh because I think like you know there's a lot of potential which is untapped and I found it an opportunity like you asked right when we started off there was no policy but I found it as an opportunity. That's that's when you need to start you that's that's exactly because when the policy is there,

funding is there everything is there it's it's it's not really a risk-taking venture and you'll not because they'll be like uh early early birds always have an advantage and uh people who can uh take early bets uh I think they they'll do really well because uh their risk appetite is larger their hunger is larger you know their uh you know uh and they're like their learning is faster right I think that's that's what people I think should take very large bold risks and that's how that's what we did it is paying off >> you know and it's it's interesting that you said that you didn't have any fear of failure that even if you said you didn't achieve anything for 10 years you would be fine >> where did that confidence come from >> because say that because in India you know we're now just about getting used to the idea of people not making it or things not working out we still we still don't We still are not accepting of failure uh in the way that is required in the process of creative destruction that entrepreneurs entrepreneurship requires. But where did that come from?

>> I think it's just my passion to become an entrepreneur you know because because all my role models were like you know watching entrepreneurship shaping up >> you know I used to read about like you know uh the entrepreneurs of of India across the world that inspired me. So when they're able to take that risk, you know, I didn't feel like actually I didn't feel like it's a big risk what I'm doing. >> Uh and uh so I didn't really feel that as a big big risk at all.

>> And and there was there was never any questions from the parents and the family and all of that saying like what are you doing? Are you serious? You're trying to put a rocket into space. >> Yeah. Yeah. No, it's it's a very interesting thing that you know what happened is that uh I I resigned my job and told my parents that I'm going to start a company you know. So even even after doing it because >> so there was celebration or there was there was oh my god what have you done >> of course there's surprise you know because because for them there was concern right for example worked so hard you know got into an IIT you know and then worked and then became a scientist at ISRO very respectable job you know people are excited you know every technocrats want to you know be part of the space program and you're there and then that time is doing really well you know we had like moon missions Mars missions and uh it was always uh in the news and you know it was a dream job for many technocrats and uh and then like you know why you have to start over again and then you know work so hard and you know they were more concerned about what what what will be the health you know of my son or you know what is going to happen why to work so hard and start from the sky that was the concern but uh they were never like they were always supportive of uh you know starting up and uh you know because they knew that you know uh even if it fails you know going to get back get another job because good brain which and then like you know >> so you can always rely on that >> already uh yeah always you can rely on uh you know what you can do again. So they were not so concerned about it.

They were more concerned about like you know working really hard the tension or the pressure you need to you know take in etc. That was the only concern and I was really sure that's that I want to do this. So that's why I uh so I I I just resigned and then like told my parents and then you know >> and you were 28. >> Yeah. Yeah. So and start the company. Yeah. You know, so today uh as you look at people screaming about the the valuation number and the fact that you've turned a unicorn, does that really matter to you or is it just a means to an end that you now have more capital that you can deploy to fund the ambition that you have?

>> No, it's actually like valuations are um it's it's it's a fleeting temporary number as we all know, right? So so it's really good to have a good value. So you're able to raise more capital by uh by less equity by you know shelling out less equity. So it's always good for an entrepreneur. So that way I think it it really adds a lot of value because capital is really very essential in building a large space company and so so but still at the end of the day I think you know what value you're bringing in you at the end of the day rockets should work. It should become like you know uh a good revenue generating profitable business you know that's a core goal and which is real rocket science. So always our our our focus is always there and all these are means to good means to you know get there and get better. That's >> so let's let's talk about building the business case now which you kind of alluded to. So there are very few players who doing what you are doing globally and that's the that's the headroom for growth that you're betting on. So a at this point in time you know what does it cost in India for a company like yours to be able to put a rocket into orbit which is the next target for you and what do you believe that opens up by way of opportunities what could revenue look like once you start to make revenues >> yeah sure I I think like as I mentioned in fact like the world's most valued private company's a rocket company >> you can you can just imagine the level of opportunity which exists if you execute really really well and we're in a very early phase you know like you know we're just like you know not even 8 years old company right so I think it's just a very beginning phase for us and uh if we do really well I think you know typically the rockets of our the kinds which we build you can get revenues as high as uh probably 10 million per launch and um we can do as many launches as you could you know so but it's a really tough challenge to be able to scale uh you know rockets to very high production level and then like consistently launch >> what's the ambition how many can you hope to make in a month, in a year.

>> Yeah. So, so right now we build a factory which can do like one a month and which can be extended to building you know doing two a month right now. Uh but but we're we're yet to get uh to that scale of production but we built the infrastructure to be able to get to that uh scale of production >> to be able to get to two a month. >> Yeah. So one to two a month. So in starting would be like you know one a month and which itself is a very large we're doing launching a rocket to orbit itself is a large global milestone and the next milestone is when we can get to one a month you know so that's where I think we are planning early planning better so that you know we can do uh as quickly as possible we never know you know when we can get there and uh and that's what you know best efforts is to get there as early as possible >> so let's talk about now this big launch which is going to be a global milestone not just an Indian milestone but a global milestone for you know, take us through the prep that's on and how soon can we expect this to now finally lift off.

>> Yeah. So, in fact, like uh uh the biggest milestone so far at Skyroot is building the entire rocket orbital grade rocket which can put a satellite into orbit. Building a hundreds and hundreds of systems subsystems we tested them over years and then we integrated. >> This is all designed and developed 100% manufactured in India. >> Yes. 100% designed and manufactured in India. And this deep deep tech as is building a rocket 100% designed and manufactured in India that's what we're doing and u and yeah so it's very exciting and fascinating to do what we're doing and we build the rocket the sections are made it's assembled and now it's at the spaceport you know in Sri Har you know India's launch site um it's already there now we commenced integration operations there um and I think it's very satisfying to see the rocket come to shape and then like you know getting uh integrated the launch pad that itself is a very big milestone stone and in the coming weeks we're going to you know complete testing at the launch site and we're going to start stacking the rocket on the launch pad and take

off uh you know it should be likely uh June July launch >> likely June July launch so you know when you're stacking the rocket so to speak what is the process how because this this is going this is a business that requires zero error right so I mean what is the process to be able to go through this test phase typically how many test flights do you need to take >> so it can take up to you know three test flights uh you know initially as as you know like I think the famously SpaceX three flights failed you know and the fourth flight was successful and it's it's all history so so rockets are very tough and you know failure is an option that's the only way to learn and u so it could take up to three test flights and this will be the first uh uh test flight for us and uh so we need to be super super sure that everything we know of is done really well >> you know and typically you'll see like issues or failures in a rocket is most triv trivial things which you can you never imagine goes wrong >> like what >> like you know like a connector snapping off uh you know the some arcing happening in the battery or you know uh and some bolt failing it could be as as trivial things which you never imagine right or some uh some system the process was not really good the the one part quality was not good one among thousand parts was not really uh done and that's it you know rocket can fail so literally a zillion things can go wrong uh uh in a rocket launch and that's where like it's a different rigor of engineering.

>> Yeah, that's what I want to understand. There is of course a different rigor of engineering, but there's also a different rigor as far as manufacturing is concerned. I mean, you know, we know the TPM and the six sigma and all of that. What does it take uh on uh you know as you're sort of building this out in terms of process? >> Yeah. So, I think it starts with the design. When you design a rocket, you should imagine all the failure modes there itself, you know. So, you have to think where this component can fail. It could fail even through like the coatings of the material. it can fail due to the even material properties. It could fail because of the source of the supplier. There are probably you know 100 things can go wrong in that component. So I think it starts from the thinking of designing of of the component and then once you design component then manufacturing should be really good and there can be a lot of things which can go wrong in manufacturing. Then after manufacturing you have to test it. You have to design a test campaign so that you test them exactly how it can be in flight. There are always limitations because you can't create vacuum. You can't create the exact environment in flight. Right? So you have to rely on simulations uh a lot and they have to be really really accurate and then after that you know you build a component and then all components will come together hundreds of them sometimes thousands of them in fact our rocket may have even thousands of them and all of them come together and when they come together there will new issues coming because they all have to work together talk to each other really well at all times in all scenarios right so it's and then we we have a very long test campaign and also test campaigns are also very innovative you know how well you can design a test campaign on the ground to simulate how it is happening in the flight and some things you can never test on the ground.

So that's where you have a test launch where you integrate everything you know everything works well to the best of your efforts you test it on the ground and then you integrate and then in launch surprises come and then that's a learning and so that's where like you know you understand the weaklings in the rockets are learning and once you undergo the process very very few people even can get there and that's the beginning of a great story yeah >> you know and I think as you very rightly pointed out that the foundation of a great story or potentially a great story is built on the daily learnings how do you build that culture of improvement which leads to excellence because excellence is a milestone. You know there's there's many steps that you have to work on every day to be able to get there. How do you build that culture?

>> Absolutely. In fact like at at Skyroot >> as a 28-year-old who started a company. >> Yeah. Yeah. So I think I think the really good foundation uh I was I was a scientist at ISRO. I spent six years there. I was part of the team uh you know which built India's largest rocket uh called LVM3. You know it's the same rocket which put uh India on the lander spacecraft near the south pole of the moon first time in the world. I mean like I was really proud to be part of the program. I was part of the first couple of launches right. So that foundation you know I I was able to see raw rockets close. I was I was even like you know working sitting on them you know I saw like how things come together how various what is the complexity of it. So that foundation really helped me get that trigger of uh engineering you know know that how things can fail how things can not work because I built some systems which didn't work uh as well on the ground when we went for testing so that I had that cycle of development which happened and luckily you know because of the new rocket program at ISRO I was you know part of it and uh so that I think that experience really built the foundation but then building a company is new different you know ballgame because it's not just the product it's the people it's the culture everything and That's why we always say at Skyroot we do two things. One is docket engineering, other is people engineering, you know. So, so, so without both you cannot build a successful rocket.

>> Which one are you better at people engineering or rocket engineering? >> Both. Both you know. So building high performance rockets and high performance people and teams has to be and of course it's it's a work in progress always but I think we're very cautious that it should be the culture the rigor of engineering should be built in the culture and that's what we managed to do and we've been fairly successful in all the ground tests so far and we had one flight test which was successful so I think we're doing well but of course you know the big picture is yet to see. Yes.

And the big picture is still work in progress and and we're working working towards that. But you know it's interesting that you talked about people engineering and I want to focus a little bit about on that because again these are not things that are codified typically. Absolutely. What is what is the the mantra for you to create a high performance team? >> Yeah. So I think like uh we uh did lot of iteration like like an science experiment right. So you try it out experiment doesn't work you build another experiment right? So learning for us from the fundamentals and uh from that like what we learned uh is that I think uh very small lean team of exceptional people really works uh you know should not be layers over layers >> agree with you.

>> Yes. Yes. Yes. And and then and then like the definition of an exceptional team or exceptional people is not just technical excellence but also their spirit. You know some people have spirit of never saying no. Some people have a spirit of getting into the details. uh really well. Some people have uh the spirit of uh you know going taking that extra bar like going cross pushing the boundaries right so I think exceptional people have like really good technocrats plus that spirit to achieve great things ambition to achieve great things and do newly you know innovatively right so once you have a small team of exceptional people coming together and where the paranoid you know for example paranoia I feel is very very important people should know that you know anything can go wrong you know from from the beginning you know for example anything from from design to thought to how you handle things to how you put a component on the ground you know and everything you know end to end people should get be paranoid of that component or that system working the rocket flies all the time every time right so I think that building that culture and that thought process in people is really really difficult and everybody has to build their own recipe we build our own recipe and it's a work in progress >> you

know speaking of building your own recipe I think again a lot of these conversations happen around how do you structure your life how do you structure work how much of work life can you structure uh together? What what has what has it been like for you? I mean, how many hours do you come to work, for instance? You're clearly very passionate about what you do that drives you, that motivates you to come into work, but how do you how do you build for a team that's high performing, but also a team that is able to take time out to be able to think of the next big idea?

>> Yeah. So, so in fact, like personally, um I I think I want to be the most hardest working person in the company. For example, last few weeks probably I think I'm going home at uh 12:00 a.m. or so, you know. Uh so whenever is needed like I stretch 18 hours uh a a day, you know. So I I want to uh you know be one of the hardest working people in the that sets a good standard for everybody else >> and the team itself I think uh uh you know so when building a rocket everybody should be on the toes you So the moment the whole feature of building a rocket itself like makes people feel responsible and our average a median age is 28 years you know so you just imagine like you know 28 year olds you know coming together building some of the toughest feats in engineering it's magic literally you know so so it's is the I think the spirit the culture we built and and the agility you know because it has to be dynamic you have to learn and then immediately should be able to change you can't be stuck with the past it's all that so we build we embody that uh in a way that you know uh and build our own recipe. So >> yeah.

>> So so let's talk about the launch >> July assuming that all falls into place and that happens. What next then? And where do you really see potential clients coming in for from you? >> Yeah. So so even even the first launch we have some clients coming on. So in fact uh they are like partially commercialable commercial missions uh you know so because there's risk involved in the first few flights and uh so typically from the third or fourth flights is when like there'll be like full commercial missions at least like after one or two successful flights is when it kicks in and then the world needs more access to space. I mean any literally anywhere I go the biggest discussion in the space industry is access to space >> you know so so there's no enough access to space >> access to space to what end and for what purpose uh you know and I think we've we've now moved past that joy ride stage where if you have money and you know this is this is bragging rights and so on and so forth of the curiosity and you know uh excitement and now we're talking about being able to address problems that are now causing trouble on earth for instance taking data centers uh you know to to the orbit. Yeah. Uh to what purpose is this excitement around the space race building up?

>> Yeah, it's major. In fact like I think u in the next 10 years I think billions of people will be connected through space internet from space and that's what you know for example starlings of the world are about you know thousands and thousands of satellites and just there is not enough uh you know satellites to give connectivity to billions of people right and that will be a very growth uh you know phase where there will be you know several constellations each constellation being several thousands of them all adding up to you know several tens of thousands of them just for connectivity. to earth and just imagine billions of people getting access to highsp speeded internet directly from space and if you see in India like if you you know we >> the cost of that >> yeah so the cost will be into billions but but you know that's that's a very attractive industry to be in you know it's it's like a it's it's just literally you know multi multi-billion dollar industry as I mentioned space is today \$500 billion industry and by 2035 the world economic forum estimates it to become 1.8 8 trillion dollar economy >> but

making it affordable for people I mean that's the problem with services like Starlink at this point in time.

Yeah, that's exactly you know so so we are in the trans even still you know Starlink I think does like more than \$10 billion revenue today you know because there's so many millions of people not even having even opportunity to have high speeded internet you know which it's providing you know so that that is one and then with time you know the costs go down the launches get cheaper satellites get cheaper and you know there'll be a transition phase where it becomes very very affordable to everybody >> so in rupee terms how much does it cost you to be able to put a rocket in space versus what we are seeing globally. Uh no I think so in as as I mentioned we're like caps to go to space you know so caps to go to space is a premium segment in the market and it's like a business Uber X >> yeah it's like yeah it's like Uber X and or like you can think of like a a metaphor of a as a business jet it's not like a commercial jet charter jet you know because people book very unique destinations uh so among the charter jets we uh we uh aspire to be like the lowest uh uh you know most affordable I would Okay. And most accessible that means like you know you know have more launches more accessibility for that globally is is our aim and uh I think we we can get there uh soon you know depends on how fast we scale and u that's where it is. So it'll be like a pretty I would say like affordable compared to global prices today.

>> Okay. A and you know as as we look at where India stands in the global space race uh this is a sector where we actually do have a right to win uh not just on the back of the work that ISRO has done but also on the back of the work that's happening exciting work that's happening in the Indian space tech ecosystem uh >> India's chances of actually leapfrogging this race you feel confident of that >> absolutely no doubt you know if you see like you know the fundamentals are very very strong like for example as I told you know where the nation of engineer engineers uh you know so the best engineers and then uh we have for example we're a launching nations one among the only seven eight nations in the world who have capability to build their own launch rockets and launch them you know and build their own satellites and launch them we are very unique ecosystem we're among the top five space fairing nations in the world and we have like a island complete island dedicated for launching huge island dedicated for launching very close to the equator geographically very good and when you launch a rocket you need very long sea you know India has a very long coastline you know and you Geographically we are blessed. We have a lot of engineers. We are like >> now companies like yours.

>> Yeah. So I think entrepreneurs coming up and doing things. Investments are coming up now in a big way. So I think it it's all the ecosystem and then regulatory agency is so so good you know and I think they're super fast working like a startup enabling the sector right. So I think it's it's a very unique place where India's real chance to go big big in the global sector because all all the ingredients are there and one very unique ingredient is we have thousands of suppliers in India who can build a spacerade part or product you know in fact the next rocket we are launching have parts from 400 suppliers all from India >> and and and then 100% of the rocket is designed and manufactured in India and majority is sourced within India you know so I I think that's a very unique statement uh you know capability ility in this sector which you cannot see in any other deep tech sector.

>> It's almost close to 100% localization. >> Yes. Almost close to more than 90% localization and uh and and then in fact most of the value is generated within India and with very less dependency globally. It's it's the deepest of the deepest tech like a rocket. >> So we're truly at >> truly atbar. Yeah. So that's where we are and

that that's where I think the this is space is a very unique sector where Indian companies can go to very large global space companies and and the competition is always global you know space is a global industry and we can go heads on with the best in the world.

>> So is is the pinnacle as far as you know global space tech is concerned what is happening with SpaceX and Elon Musk is he the sort of epitome of or the one that you look up to the most? Oh, absolutely. I mean, he has completely changed the space industry. Uh, you know, in fact uh they've been in fact the as I mentioned like the largest private uh you know company in the world is a space company you know thanks to SpaceX and what Elon has done and in fact they he has shown path for entrepreneurs that you can make it big and also a lot of governments to invest in space because uh you know so so then they realize that you can do a lot of exciting things and something which can benefit people on earth. uh and I think this has completely transformed the space industry and um yeah we all look up to him and uh so definitely I think uh there's phenomenal opportunity in the sector >> you know uh while of course Elon Musk is a big inspiration but the rocket is also a homage to many of India's great scientists you've of course got Vikram Sarah and that's how the rocket is named Vikram but you also have a little bit of Kalam and you have a little bit of many of the other greats as well >> yeah yeah absolutely in uh in fact when we launched Vikram as you know uh so after the launch you know I I I I told that you know this launch is a tribute to Dr. Sarabai you know because if he has not started the space program 1960s we would not be in a position to be able to launch a rocket now because we're building on the ecosystem built by the great people great scientists early on in the country and just just look at the humble beginnings of ISRO in 19 uh 1962 you know just imagine India 1962 and he imagined the space program started with very few scientists driven people many of them come from abroad you know to to back to India to serve the nation and they started I had a very small church in a fishing village in Tumba where I had the opportunity to work as well and it's really really a phenomenal journey from there to go to the Mars to go to go to moon and to go to the sun and to we build our big rockets to build communication satellites I think it's been a phenomenal ride and and just imagine the entire budget of ISRO all put together so far is less than one year budget of NASA >> so so that's what we are able to achieve in such a uh such a period and in fact is six decadal inspiring journey in India and we are actually standing on the shoulders of that we are able to do what we are doing today thanks to I think Dr. Sarabay and that's he's one of my biggest inspiration. In fact, he's for me he's like a startup founder who started ISRO the space program and with a small funding from the government at that time started very lean with very few people in a very small very inspiring.

>> Yes. uh you know if if ISRO were to ever go public it would of course uh uh you know I don't know the kind of valuations it may enjoy but perhaps at least somewhere in the vicinity of what SpaceX uh is is being able to command at this point in time but what has it been about the way that ISRO has functioned within the public sector to be able to achieve what it has because as we talked about it you know the perception is that the public sector can't deliver the public sector is not efficient the public sector is not capable capable of excellence and sometimes it's it's these broad generalizations that actually do a disservice to the public sector as well.

But what is it specifically about ISRO that's been able to create the magic? >> ISRO because I was part of ISRO. I've I've seen the culture there. I think there's a lot of uh a spirit, national spirit to do something really big, you know, so that that that is shared across everybody. People people don't work for a paycheck, people work for the nation, people work for building tech, right? I think that uh I think that culture at the government agency is

really really uh something which uh I really liked at uh you know while I worked at ISRO and that really makes it really stand out and also the resources right we always had less resources and bigger ambitions >> right and uh that really made it uh uh really well. So you have to engineer high precision things at very low cost you know and and they're like you have to you have to think out of the box you have to build your own solutions you know you have very little resources so it's very resourceful uh you know way of working and in fact ISO is one of the most efficient government organizations you know despite there are a lot of rules and regulations which needs to be followed but still it's been very very successful just because of the spirit of the people and the culture from the veterans like you know Dr. Kamsaray or like you know Dr. Abdul Kalam they built lot of values which even today they're visible you know so that's is very very important >> you know you said that they were driven by uh a sense of nation building uh nationalistic fervor almost what drives you how much of that spirit drives you and what you're trying to do at skyroot >> uh yeah I think for for for me I think uh definitely I think inspiration is to take uh India global as much as possible you know through the global initiative because as I mentioned like the business wise it's a global industry you know so uh and India has very strong foundations which can be you know taken global so definitely that inspires to do things and uh but also like I think as as we say at Skyroot our mission is to open space for all >> you know so I think the bigger drive is to that we are actually serving the future of humanity in a big way because space is the future like you mentioned about data centers in space you know so the lowest cost of compute is going to be space you know and and then you'll you will have like large data centers in space and that will drive AI you know so so I'm very clear that you know AI can drive as fast as all the space economy can grow you know there's a very strong relation this communication you know billions of people getting connectivity you know in India almost like one in three fishermen use data from satellite to find the right shs of fish every year billions of dollars get saved in in but through satellite uh you know guiding the fishermen to find the road right shoulds of fish so I think it's it's transforming GPS we can't live without GPS you know like you have like the dish at home giving thousands of channels every day, right? So, it transforms lives right now. And this just the tip of the iceberg, you know, next 10, 20 years, I think space is going to transform like no other thing. And I always say that if steel built modern civilization, space will build future civilization.

>> Space will build future civilization. If they were to do a rocket boys 2, what what what do you imagine that story will be? Yeah know definitely I think should be uh about like uh the early beginnings of the space industry you know how how it is uh taking off the private space industry and taking off and that would be very exciting typically to uh to see like you know uh very young entrepreneurs you know taking bold risks and uh you know building companies competing globally in the world is something exciting and in fact but Rocket Boys is a phenomenal series by the way if people haven't watched yet you know so you can see uh the early busy beginnings of Dr. Sarabai and Kumi Baba all coming together willing the Indian national programs.

>> You think there'll be a series on you one day? >> I don't know. >> Who who would you like to play? You >> too small to to to imagine that now. But yeah, you're really focused on building the rockets and making them right now. >> Well, uh you know, we wish you the very best of luck with uh your plans for Skyroot. Best of luck for the launch. We look forward to speaking with you as and when that does happen. July is uh is the scheduled sort of uh time that you are looking at. Uh and thanks so much for explaining to us what the opportunities look like but more importantly what it actually takes to build a deep tech company here in India 100% made in India for the world. Thanks very much Pavan for joining us on Young Turks Reloaded.

Well, we are going to take a break. There's a lot more coming up. As always we like to have our conversations with you. So do send us your feedback and tell us who you would like to see on the program next. from all of us here for now. Thanks very much for watching.