URL: https://stvp.stanford.edu/videos/sanjit-biswas-samsara-making-a-real-world-impact-entire-talk/

Sanjit Biswas is the co-founder and CEO of Samsara, a global leader in allowing physical operations organizations to harness data, AI, and the Internet of Things. He started the company with the mission to increase the safety, efficiency, and sustainability of the operations that power the global economy. In this presentation, Biswas tells the story of how he co-founded his first company as a graduate student and pivoted to a new industry to found Samsara, sharing advice for aspiring entrepreneurs on finding meaningful problems to solve, building a team, and running feedback loops to understand what customers need.

Transcript

(bright music) - Welcome everybody to the Entrepreneurial Thought Leaders' Seminar at Stanford.. The Entrepreneurial Thought Leaders' Seminar is The Stanford Seminar for Aspiring Entrepreneurs, and it is brought to you by STVP, the Stanford Technology Ventures Program, and BASES, the Business Association of Stanford Entrepreneurial Students.. I am Ravi Belani, a lecturer in the Management Science and Engineering Department at Stanford.. And today we are thrilled to have as our eTail keynote Sanjit Biswas, the CEO and co-founder of Samsara.. How many people have heard of Samsara? Okay, well, if you haven't, you're gonna know more about it today.. Samsara is a $20 billion publicly tradable company, which is really transforming industries using the power of the Internet of Things, or IoT.. Sanjit is continuing the tradition this quarter of the Stanford School of Engineering Centennial, the hundred-year celebration of the School of Engineering, because he's truly one of the School of Engineering's owns.. In fact, he literally took this class, he was a student a little over 20 years ago.. He was in your seat.. He graduated with a bachelor's in computer science and engineering..

How many people are CS majors? How many people are EE? Okay, so Sanjit was literally in your seats, and in fact even more than that, he's a graduate of the community around Stanford.. He grew up and went to high school nearby Stanford at Lynbrook.. He graduates from Stanford with a bachelor's in computer systems engineering.. He then goes to MIT to get a master's in computer science in EE.. And while he's at MIT and he even continues on a little bit, he flirts with getting a PhD.. He stops out and commercializes with some of his colleagues, research on wireless mesh networking that becomes a company called Meraki.. And Meraki gets acquired by Cisco a few years later for $1.2 billion, okay.. Sanjit then goes and becomes, was a VP at Cisco for a stint, and then he starts his new company, which is Samsara, with really the mission of digitizing and optimizing physical assets.. So think about everything around digitizing data and hardware, and the intersection of software and hardware in the physical world is what Samsara is all about.. He has more accolades than I have time to do justice for..

He is a World Economic Forum technology pioneer, one of Goldman Sachs' most intriguing entrepreneurs, a top 50 SaaS CEO.. But what matters the most to us is that there are rare moments when we have students who become the teachers.. All of you are students and in 20 years you may be invited to be a keynote back.. When that happens, it's a particularly special full circle moment for us.. So with that, please join me in giving a warm ETL welcome to Sanjit.. - Can I get a show of hands while we're setting up, how many of you are undergrads? Okay, and how about grad students? Just okay, cool.. And engineering-ish majors? Okay, most of the room.. Very cool.. So as Ravi said, I was very much in your seats in your shoes not too long ago, or maybe kind of long ago.. And what I'll do is kind of just give you the quick backstory and then we'll dive into both the startup companies..

So as Ravi said, I majored in computer systems engineering.. That's kind of the mix of CS and EE.. I don't even know if it's around anymore as a major, but it's all about technology.. And this is something I was always passionate about, whether I was in high school or when I was an undergrad here, I was super fascinated by technologies and how they had impact in the world.. And when I was an undergrad here, Google was getting started, which is kind of like mind blowing to think about, my kids were like, "There was a time before Google?" and it's true, and it was started here, and it was an example of how much impact an idea could have.. So when I started as a freshman, it was still called Backrub, like an on-campus only system.. And then by the time I graduated, it was like a global phenomenon.. Like anywhere I traveled in the world, people were doing Google queries and all kinds of stuff.. And so for me, that's what motivated me was this idea that you could have massive

impact from developing these new technologies and getting them out there.. So that's kind of the theme for my talk today is just having a real world impact..

And as Ravi also mentioned the bio, I went from being an undergrad here to grad school.. So I wanted to go really deep and understand what is it to build and research new technologies.. I applied to PhD programs.. I got into the program at MIT and moved across country.. And that's really, I think where this story begins, which is right around the first semester of grad school for me.. So because I was so excited about technology and research, when I got to MIT, the first thing I did was just try to go as full immersion as possible.. And I wanted to do tons of research, write tons of papers, and go have that impact instantly.. And this was an exciting time.. This is like 20 years ago, there was like distributed system stuff and peer-to-peer happening.. People were building really big web systems for the first time..

There were new chip architectures that were coming out.. So there was a lot to work on.. And I remember getting there and thinking like, "Okay, I gotta get in gear.. I've like worked really hard to get into this program.. I need to start publishing papers." And so I was kinda frenetic, I was working on lots of things, and at some point my PhD advisor, Robert Morris, stopped me and said, "Hey, just FYI, you're probably gonna be here a while.. PhDs take over five years in computer science.. You don't need to publish papers instantly.. So instead of trying to like work on everything, why don't you just work on something?" And that was really great advice, because I was sort of in a frenzy trying to just work on all the interesting problems.. And his suggestion was work on something big and meaningful, an area where you can really go deep.. And in the process of that, you'll probably find something interesting, you'll find some insights that you can publish on, and that's where you'll get your papers from and so on..

So kind of just trust the process, but the problem that you work on is really important, the problem selection.. And what he suggested is that I team up with another new PhD student who'd started at the same time as me.. His name was John Bicket.. He joined the lab, same research group, same year and everything.. And he said, "John's a new student too.. Why don't you guys work together on this project?" And Robert knew my background was in CS and EE, I knew about networking, that's what I'd worked on here as an undergrad.. So he said, "Maybe you can help him out.. He's building this big wireless network." So I paired up with John.. John's now been my co-founder across both these companies.. And we ended up building a system called the MIT Roofnet..

And that's what you see on the side here.. This was like our experimental platform.. And the basic idea behind Roofnet was we wanted to try to cover the entire city of Cambridge where MIT and Harvard are, with basically free wifi, with wireless internet access.. And 20 years ago this was a big deal, because this is before like 4G and 5G and all that stuff.. Broadband internet was pretty expensive.. And we thought this would be kind of cool.. We could give our fellow grad students something of value, like get them internet access, do it for free, and in the process build a really interesting wireless networking test bed and go do research on it.. So that's what Roofnet was.. On the right-hand side, you can see what that equipment looked like.. So there's like a black box in there that had our hardware, ran all of our software..

There was this cable that went up to the roof and an antenna and it formed a mesh network.. And that's what this image here on the left is.. So it's a big wireless network.. And for the first couple years, this ended up just being a ton of work.. We were building all the software, we were actually running the network.. So this was kind of like a startup in the sense that we had customers, these users.. We weren't a very big team, so we had to make the system just kind of always land on its feet after a power outage and how it configure itself.. And we were doing research to figure out, "Well, how can you make this network really work?" And at that point in time, wifi was like a super nascent technology.. Like some people had it in their living rooms, it wasn't really widespread.. So we were kind of pushing the limits of what was possible..

And in the process of that, we learned a ton.. So on the networking side, we learned about RF interference and how do you plan these networks, we learned about routing traffic.. And then on the user side, we had hundreds of students using it.. So we started to figure out, "Okay, what do you do when it's like peak time and everyone's downloading a bunch of stuff?" Streaming was starting to happen, so what do you do with all that network load? So lots of interesting research problems.. And true to Robert's prediction, about three years in, we just started publishing lots of interesting work about all those topics, and the research started getting really picked up.. So it got into the top conferences, won a bunch of awards, and that was great.. It was really fun to see that.. As we were building this, we also had this idea of like, "Wouldn't it be amazing if we could enable other people to build big wifi networks?" So we just thought this was super cool technology, everyone's gonna want internet access.. So we open-sourced it, we put it on our research website, and we published all the papers about how it worked, and we even put like a bill of materials and basically how to assemble that kit for yourself and set up networks.. But the reality was not a lot of people were computer science grad students..

They didn't have the budget.. That box, by the way, cost about $3,000 per router.. So it was pretty expensive.. And it wasn't practical for them to download the code and set it all up.. But this was like an idea that was in our minds of like, "Everyone should have wifi." This was again, early 2000s.. It just felt inevitable to us.. And just in terms of how we got started with Meraki, it wasn't actually a thing that we wanted to do.. It wasn't like, "Okay, let's go start a company now." We just simply wanted to see this technology go have impact in the world.. So the connection here is we had this idea that we could take all of that technology and shrink it down and get it to run like a little tiny circuit board, make it relatively inexpensive, and enable other people to do it.. But the only problem was we didn't have money to go do that..

Like we didn't have money to start a company.. We were grad students, we had no funding of our own, and it was kind of still a research project, but this idea was like in our heads.. We really wanted to make it happen.. And it so happens that academic research had been getting enough momentum that we started getting invited to give talks.. So I think I came here to Stanford in 2005, and right around that time, I got invited to go down the street to Google and give a talk there as well down in Mountain View.. And they were really interested in wireless networks too.. They were just starting with the Android project at the time.. They wanted to see a lot of free internet because it was good for their usage.. And so we presented on the routing protocols and all the stuff I talked about earlier.. And at Google they loved crazy ideas, big kind of large scale ideas..

So I presented a slide that had our idea, and this was the last slide of the presentation.. We showed this circuit board, and this was our concept or big crazy idea.. And it was basically all that equipment that you saw on the previous one, but shrunk down.. This thing would cost less than a hundred dollars to make, way less than a hundred dollars.. And we felt like if we could make this, we could make Roofnet possible anywhere.. So what was cool was, the Google folks, they were really receptive.. They listened to the talk.. And a team came up at the end of the talk, and said, "Hey, we loved your crazy idea.. We wanna make it happen.. How do we get those boards?" And I had to explain one thing I forgot to mention, this is Photoshop, this was like a concept..

It was really we wanted to kind of see it through, and because we had that technical background, and knew about all the EE of it, we were able to make a photorealistic rendering of how this could work.. And they said, "Well, okay, we're happy to help you make this happen." Why don't we put down an order for these circuit boards, and you guys can make them and we'll help deploy them.. So I basically came back from that talk at the end of 2005 with a commitment or an order for about 2,000, I think, of these units, which is really exciting.. And that was what we felt like was the spark that we needed to get the stuff out there.. At this point, it still wasn't a company though, this was still just Roofnet.. And I remember going to MIT, and I had this basically purchase order from Google, and I went to the Institute and I said, "How do I cash this? Like I need to make these boards, like how do we do that?" And at MIT they kind of like looked at me funny, and they said, "We're a research institution.. We can take grants, we can take donations.. We can't take purchase orders." And I said, "Okay, got it." And so then I think I went back the next day and I was, "Well, if we started a company, could we set that up to fulfill this and we'll put our software on it?" And they said, "Yeah that makes sense.. You guys have done this all in the public domain, it's all open source, go for it." And so that's actually what prompted us to start Meraki.. And you may think, "Okay now we're off and running." There was one snag which is we still need to get these circuit boards made..

So we figured out who the largest manufacturers were of this kind of stuff.. In order to get the price point to where it needed to be, it had to be made in Asia at scale.. And it just so happened that one of our lab sponsors was this company Delta Networks, lab sponsors at MIT, was Delta Networks.. And they made a lot of these for like Netgear and Cisco and other companies.. So we ended up pitching them.. They saw the circuit board, and they're the manufacturers of millions of these things.. I remember an engineering VP kinda studied it really closely and he looked at it and he is like, "You did a good job except that one part's backwards." And he said, "Okay, we can do this." But the catch was they needed to do a minimum order quantity or a minimum run of 5,000 units.. So we had 2,000 from Google.. And at that point it became kind of a Kickstarter, and we had to kind of go shop around and figure out, could we find other people who wanted to help us get these made.. So that was really the bootstrap..

We ended up finding a bunch of non-profits that wanted to do free wifi in low-income housing.. We found some other people interested in wifi for main streets and things that.. And we were able to kind of scrape all these orders together.. We did a big discount in order to get the prepayment.. And we got these things made.. And at that point we did start the first startup company, Meraki, but it was totally bootstrapped.. In other words, we were just customer-funded.. We had no outside financing of our own.. And so it was pretty modest, humble beginnings.. And our real goal is it was almost like a summer project..

And the other context here is John and I, we both started the PhDs at the same time.. I think we were about four years into it.. And at that point Robert, our advisor, said he was gonna go on a sabbatical for six months.. His wife was going to do some research in Africa.. So he said, "You guys have six months, do what you want with this project we'll see where it goes." And so we kind of took that as like, "Okay, we can kind of do this as an experiment." And so that's what Meraki was, was basically a big experiment.. We recruited our friends from grad school that had been in our research lab.. I recruited one or two of my friends from undergrad as well.. The guy on the top left is Morgan.. He was my EE lab partner as an undergrad.. And we basically wanted to fulfill that initial order..

So we wrote all the software, got it on the devices, got them out to Google.. This is like a little tiny office space that we rented.. It was like not quite walking distance, but it was a long walk to Google.. So we'd raid their free food, bring it back to the office and just hack and work on this stuff.. And this is super fun.. Looking back on it, we were just super fortunate to have met so many incredibly talented people as both undergrads and grad students that this was kind of like the beginning of the seed crystal, really, of our company, Meraki.. So we got those a couple thousand units out there, and then we got to really run the experiment, which was, could we enable other people to build big wifi networks? With the dollars we got for the prepayment, we were able to get a couple thousand units made extra, and we put them on our website and just wanted to see would anyone buy these things and set up networks? And the coolest part was they somehow found us.. I don't know if it was from our research or the Google searches or who knows what, but by the end of the summer, I think by the fall, we had a

network deployment map that looked like this.. And you can't quite make it out from all the red markers, but there were about a thousand networks that we helped set up in the first six months.. So the product really worked, like you could just plug these things in anywhere, they could form a really big wifi network, they would balance all the traffic, and folks were using it for wifi in apartment complexes, on main streets..

It cuts off the tip of the map, but we had a deployment at this little tiny fishing village at the southern tip of Chile.. It was really cool.. And then we had a decision to make which is, well, what do we want to do? Like it was an experiment.. We said let's try this for six months.. It had been successful, and we had to make a decision of, like do we go back to Boston and go finish our PhDs, or do we see this thing through? So we all kind of talked about it and we said, "This is too cool, this is too interesting.. We have to see where this goes." And up until this point we hadn't raised any money, and we were just kind of lik trying to figure out how to bootstrap this thing.. But we were realized if we were gonna do this in earnest, and we were gonna hire all of our friends, we need to pay for salaries and healthcare and all that kind of stuff.. And at that point we did decide to raise venture capital.. We raised a Series A from Sequoia who became the lead investor, and that was the end of our first year.. So that kind of gives you a sense of how we went from academia and a research concept to an initial product..

We ended up selling about a million dollars of the product the first year.. And I think that's actually what got investors' attention.. It wasn't so much that we were doing networking.. At that point in the mid-2000s, networking had kind of been done.. It was like a really 1980s and 1990s wave.. But they just thought it was amazing that we got to this point without any sales or marketing, without any big seed funding or any of that stuff.. So this was again the kind of very beginning of the journey at Meraki.. Unfortunately I don't have time to tell you the entire story and how it all played out, but there were a couple years that were just amazing.. After 2006, 2007, it was really fun.. We got the stuff out there, we got to make lots of different products, and people were just continuing to scale this stuff..

And then 2008, which was the year of the global financial crisis hit, and all of a sudden all of our interests that we had in putting a big free wifi networks went away.. So there were a number of challenges like that that came along the way, but we had that same sense of like willpower and determination that we did when we started the company, trying to get it made, and basically found ways to pivot.. So we ended up pivoting to enterprise networks.. The product started getting used on campuses like this, in companies.. And the interesting thing there was they went from basically having really big networking teams to actually being really lean because it was a recession, and so easy-to-use, easy-to-deploy networking was super relevant to them.. And that was the second wave.. This was also around the time that the iPad and the iPhone and inexpensive laptops were coming out.. So there was an interesting confluence of things going on that lucked out for us.. So we managed to double revenue every year, and then we did it very capital efficiently.. There wasn't a lot of funding out there either..

So it was a very different time where basically venture capitalists were very, very conservative.. And we got to the point where we were doing about $100 million in revenue, and then we had a new decision to make which was like, "Okay, do we take this company public?" And that was the plan.. We were about to go public when our largest competitor at the time, which was Cisco, the big networking company, showed up, and they offered us basically three times the valuation of the previous funding round to buy the company out, which was a huge number.. There had not been many billion dollar acquisitions at the time.. So that definitely got everyone's attention, and we had a big discussion about it.. But it actually was an opportunity to run another experiment, which is what would happen if you could take this product, put a Cisco-like logo on it, and then sell it through all of Cisco's salespeople and reseller partners? So that's what the sort of next leg of the journey became.. We went through the acquisition, I think I got a picture of that.. These are my co-founders.. This is Hans Robertson on the left, that's John on the right.. So this is right around the time that Meraki became part of Cisco..

Those products did get the Cisco logo put on them, and then our sales were already growing really fast, they accelerated even further.. So over the next couple years, it got to basically a billion dollar run rate.. I think these products are now sold into many billions a year.. And it's really cool 'cause if you get a chance, I look up often at ceilings 'cause this was like what we did.. And if you are in a Starbucks getting your pumpkin spice latte or whatever, if you look up, you'll actually see our product.. And I still see the product at my kids' schools and airports and at companies we visit.. So it's really neat to see that idea that we had, that other people were gonna want to build big wifi networks came true.. It took a while to roll it all the way out.. This kind of scale of impact has to compound over many, many years.. But it was neat to see this whole thing from that research idea to all the academic papers, to the prototype to the first couple of customers, to millions and millions of these units out there..

So that's kind of leg of the journey number one.. And for most people that's like the journey of a lifetime.. And it really was, we just learned so so much and kind of crammed so much experience into a short period of time.. But at this point, this is like right around 2014-2015, we realized, "Okay, our work with Meraki is done.. We've kind of contributed what we can and it's probably time for us to go and do something else." So at that point, we basically left Cisco without any plan of what to do next.. And it was a little bit of like an unknown time, 'cause not a lot of people end up at that point in life so early.. And so we're like, "Well, we have way too much energy to be retired.. What should we do?" And I was thinking, "Well, I technically took a leave of absence from grad school, maybe I should go back and finish that PhD?" So I actually thought I was gonna go back to grad school.. John, my co-founder, is way smarter than me.. He is like, "That's not gonna work..

I'm gonna go play video games while you figure this out." So he played video games for like a month, and he was right, like

I started doing the academic research thing again, and I realized the feedback loops were way slower than what I was used to in the sort of commercial world.. And so kind of took a step back and said, "Okay, I love working on interesting technologies.. I wanna have an impact.. What can I do?" And this actually brings me back to another Stanford moment.. I picked up this book that I'd had.. When I was an undergrad here, there was a class called Zen Buddhism that fulfilled like three requirements at once.. And I think as an engineering undergrad, I was like, "What's the most efficient way for me to meet my graduation requirements?" There's cultural studies, religion, and something else.. So I took this class sort of like, "Okay, I'm just gonna like get through this." And interestingly 20-something years later, this is like one of the classes I remember the best.. And I still have the textbooks, They've kind of moved around with me over the years, and I picked up this book called "Zen Mind, Beginner's Mind." And as you can kind of guess from the title, it's all about like the importance of being able to kind of clear your mind and see things the way that a beginner would, fresh eyes.. And kind of fun bit of trivia, this is literally the book that I had from an undergrad..

That label is from the Stanford bookstore.. So it's cool that it's still relevant.. I still read it once a year.. But this reminded me of the importance of just hitting reset and not having a ton of expectations.. Almost similar to the advice Robert gave me 10 years before of just kind of calm your mind.. And for me this was kind of everything that I needed.. So I started just doing kind of following my interest, and got interested in like, I think space and satellites.. I was like, "Could you do Roofnet but from the sky?" Which we realized would be very, very expensive and you needed to launch rockets and all kinds of stuff." We started reading about energy and like how does the electrical grid work, and solar was starting to take off, so we're researching that.. And over and over we found ourselves in all these books, and John and I were swapping books all the time, and at some point we were like, "Dude, you gotta check out this book." What's it called? "Infrastructure." And we were like the only people that were buying these books, like nobody else cared about this stuff.. But this was absolutely fascinating to us, because what we realized is our natural curiosity and interest was driving us towards areas where we could be relevant and have an impact..

And infrastructure like energy, utilities, logistics, the way the the roads and the bridges work, it's all part of the shared infrastructure of our planet.. And what we realized about it was that we didn't know anybody else that was interested in this stuff.. And that was a sign to us that this might be an interesting problem space for us to work on, because we could have an impact, we could bring our technology background to this world of operations and infrastructure and be useful.. And that's kind of what we needed.. As engineers, we love building things, we love fixing things, but really we love doing things that are useful.. And so this was the spark that led us to Samsara, and this is about 10 years ago, 2015.. And I'm going fairly quickly here so we can get to the questions, but happy to spend more time on this process.. We kind of ran a similar playbook to what we did with Meraki.. 'cause we realized the reason that Meraki was successful wasn't just like idea and excitement, it was also you needed a great team.. So we ended up recruiting a bunch of our friends, again, people that we'd worked with in undergrad and grad school, at Meraki..

And it was a kind of similar feel.. Except the last time we were doing networking, we were all like PhD students in networking.. So we were kind of domain experts.. This time, none of us knew the first thing about operations or infrastructure.. So we were completely beginner's mind in like a really fundamental way, steep learning curve.. What we did know how to do however was build product.. So that's what you see us doing there.. We knew how to build hardware, software, cloud services.. So we built the simplest possible sensors and connected sensors that we could imagine.. These were temperature sensors..

And we said, "Okay, great, let's get these out in the world, let's start working with customers." And we ended up getting these sensors out into, I think it was the food and beverage industry and the pharmaceutical supply chain folks that were in and around San Francisco, which is where we were starting the company.. And it was great because, we were building products again, we were getting the stuff out again.. The only challenge, however, was that because we didn't know anything about operations, we didn't realize that temperature sensors weren't that useful.. So we got the stuff out there, and we were kind of expecting, "Hey, this is gonna be just like Meraki, like people are gonna get thousands of units.. The company will take off." And it was kind of crickets for the first week.. And then we realized like, "Oh, maybe magic just like doesn't happen twice." But we had this determination of like, "We wanna figure this out; we know we can be useful here." And it turned out the way that we could be useful was not necessarily by making lots of temperature sensors, but it actually getting them visibility into their operations.. So those same companies that were trying out the temperature sensors ended up taking these products, sticking them on their delivery vans and trucks, and that's how we found our way to our first real use case, which was around GPS tracking and telematics.. So that ability to sort of pivot and be nimble was really important.. I think I'm really glad that we didn't have the stubbornness of we're just gonna make temperature sensors, but we were willing to just figure it out.. So the next thing we did was we got some trucks, we didn't have any big trucks we had to rent them..

And then we got our laptops out and we started figuring out like, "Well, okay, what can we do here to help solve some of these operational problems of realtime tracking and knowing what's on the truck and all kinds of stuff?" So this was us cracking open our laptops, just figuring this stuff out from first principles.. And what was cool about it is the way we built our product was unlike any other product in this market.. So we got the first like GPS tracking products out there, and they were modern so they were real-time, they could show you all kinds of stuff about the truck and about the sensors and all kinds of things.. And what was amazing is it knocked people's socks off.. So like our demos started wowing people, and that's how we found traction.. So again, not knowing anything about the industry, we spent time in the field, we spent time with these

customers running a feedback loop, and that's how we learned about logistics and food and beverage distribution.. Eventually, it's how we learned about other industries.. But this idea of being able to run a customer feedback loop, it's what we've done in all of our past lives.. Like at Roofnet we were like talking to grad students about how they're using the network.. At Meraki it was about wifi and how they wanted to use it..

Here it was about learning about operations, so always kind of in learning mode.. And what's been really fun about this is that it didn't just stop with one industry.. Operations, as Ravi was saying earlier, it spans many, many different industries.. So we get a chance to go behind the scenes now with our products.. The top left picture, it's just from a week or two ago.. We partnered with the largest school bus company in North America.. It's a company called First Student.. So they're putting our products in 46,000 school buses.. They move more kids every day than the airlines move people.. So super large-scale operation, got to learn about that..

Nutrien in the middle.. This is a large agriculture, or it's the largest ag retailer in the world.. Some big construction companies with really big trucks and things that.. We get to spend time with the airlines.. And this is like part of the world that you don't get to explore.. You can't learn about it from a book.. And we love it because there's so many problems, so many interesting challenges for us to solve that we can keep running this iterative feedback loop over and over.. So I crammed again 20 years of experience into about 20 minutes.. I wanted to go through this quickly, but hopefully this gives you a sense of the sort of through line here.. And for me there's really been three big takeaways..

The first is, again, the importance of problem selection.. What do you wanna work on? How could you have an impact there and be useful? And that tends to take a lot of time and patience.. So picking the right problem and kind of going deep on it.. The second was the importance of team.. You saw the pictures there, but these are some of the best teams I've ever had a chance, I could ever imagine working with.. They're just extraordinary.. Many of them were team members I met as a student here or in grad school.. So maybe a takeaway for you all is you're in some of the most talent-rich, talent-dense environments ever.. So who you meet and who you spend time with could have huge implications later on.. And then last but not least is the importance of being able to run feedback loops, kind of listen to customers, figure out what their real-world challenges are, and then build them stuff that's just practical and useful..

And for us it's, again, this was like a lot of history in a very short period of time.. There's challenges every single year.. You're always figuring out new stuff, but it's really fun.. It's the biggest engineering project you'll ever do.. Okay, so with that, that was a little bit of a speed run, but I wanted to make sure we got to questions.. Thanks.. (audience applauds) - That was fantastic.. We're just gonna make it interactive.. - Let's do it.. - CJ, kick us off..

- Yeah.. - [CJ] Hi Sanjit, thank you for being here.. You mentioned earlier how when you were in our shoes, you were inspired by the dot-com bubble and specifically John Doerr's ETL lecture.. My question is, is there anything that sticks with you now or today from that class? - Yeah so yeah maybe quick bit of history.. When I was here, it was dot-com boom, and then a little bit of the dot-com bust.. And it wasn't necessarily that it felt like a bubble, it was actually, it felt like this like explosion of ideas.. So what I loved about John Doerr's ETL lecture, which I still remember, he's a venture capitalist, very well-known, helped build Kleiner Perkins into this massive venture firm.. It was awesome to hear how many different ideas people had pursued and how they got them off the ground, 'cause many of them actually started here on campus.. So for me it was inspiring just to hear stories of people like myself who had been engineering students, who maybe had never sold anything or built anything at scale, figure it out.. And I still remember loving that about his lecture..

Yeah, thanks.. - I appreciate that.. (CJ speaks indistinctly) - Thank you for the question.. - [Audience Member] I think you were about to (indistinct) in here.. What's one unusual management habit that you have? And then a follow up question would be, where do you think people of companies might find defensibility right now in AI? - Yeah, unusual management habit.. it's funny, it's hard to know what's unusual about yourself, but I've been told something that is somewhat unusual, but maybe not for most founders, is the ability to go broad and deep at the same time.. So the company has many different functions, sales, engineering, all that stuff.. I find them all really interesting, and so it's like, the end of our quarter, I'll be really involved in deals and certain sales things.. Before a big product launch, I'm in the demos and we're debugging stuff.. So I actually love that from the something that only founders can do..

I think it's unusual in the sense that typically in like large companies, founders have moved on, or there's like a professional management team, we bring that kind of founder spirit to how we run.. And I've been told it's kind of unusual to just be hanging out with the engineers, figuring out the bug.. But you can't do that forever, so you have to be able to kind of bounce in and out in a sustainable way.. - And just following up on that, for all the people that are academics that are gonna start startups, 'cause you never had a job.. You went straight from academia to a founder.. Are there any tactical specific strategies or things that you've found to be incredibly valuable as a CEO? - There's a lot.. When I think about what we were doing in grad school, it was kind of startup zero, and we were having to figure it all out.. That spirit is really important of like, "We can just figure it out," right? And being able to kind of work backwards and reason from first principles.. So I would say that, if you can keep that seed alive, it makes a big difference.. - That's terrific, and I know there's a second question..

- Yeah, about AI defensibility? - Yeah.. - And is there like, you're kind of thinking there's so many companies working on things, or? - [Audience Member] Yeah, is there any technological defensibility, or is there a distribution, or is there any

defensibility at all? - Oh, I see, it's hard for me to generalize, but in general the kinds of things I would think about are not just moment-in-time defensibility, but the curve right? So for some companies, they start out in hyper-competitive environments.. We actually have 30-something competitors at Samsara.. But we've grown to be the largest in our industry by iterating, right? By really staying focused on the customers, by building new innovative technologies.. I think the same thing applies in AI.. So even though the starting line may have like 30, 40, 50 companies, the way you execute and the way you listen to customers and build products to connect with them makes a big difference.. And usually you see some companies emerge.. Once they emerge, they tend to end up with a compounding advantage, like they end up with more revenue to be able to reinvest.. They can train bigger models, they have more data, they probably have more salespeople, a bigger brand.. So that's where there ends up being kind of a runaway, winner or maybe set of winners..

Does that make sense? - Yeah, thank you.. - Awesome.. - Thank you for the question.. A great answer.. We'll keep going.. Gang, if you can keep the conversations to a minimum, we can actually really hear every word that you say.. So please try to keep them to a minimum.. Thanks.. Next question.. - [Audience Member] Thanks so much..

I'm really interested in logistics.. I think it's one of those most optimized and well-defined symmetrically industries in the world.. And so my question is sort of is, given, it's so incredibly optimized already, all the operations are very highly metropolized.. Do you see any parts of logistics which are incredibly underoptimized right now because the technology just simply has not existed until the age of AI? And if so, is it a better place to sort of build specifically for those verticals, or do you go more horizontal build modules like Palantir Foundry? And basically try and create an ecosystem, log these big customers in, and build those modules, sell those modules to other vendors.. - Yeah, so I'll talk about logistics specifically, but operations generally: I think there would be an assumption that these industries have been around 100+ years, like they must be hyper-optimized, and I would say they're operationally intensive but they're not yet optimized.. And I'll give you some specifics.. If you just stop 100 commercial vehicles on the road and crack them open, you'll see only about 50% of them have GPS tracking that's connected to the cloud.. GPS tracking's been around since the 1990s, right? Like really, really long time.. And so the idea that you've optimized your operation, if you don't have GPS trackers, how would you even start, right? So that means that people are just making phone calls to figure out where people are or kind of best guess kind of stuff.. So there tends to actually be a lot of room to improve these systems..

The reality though is like, well, why do they have GPS trackers? These things have been around for a long time, it's because they're busy, right? Like these operations companies they don't have a lot of extra time, and they don't tend to have a big IT team to go figure this stuff out.. So that was one of the reasons we got into it, is how can we help everyone, like the school bus company, optimize their routes and things like that.. How do we help them optimize maintenance? So I think you mentioned Palantir Foundry, like there's a lot of cool technologies out there, but fundamentally you gotta get the data into the cloud.. And so we ended up kind of assessing the landscape, and we're like, "This is the place where there's the biggest gap right now." And that may change, right? Like in 10 years maybe everything is connected to the cloud and it becomes about algorithms.. But right now in logistics, it's less optimized than you might think.. And the best way to find this out is just kind of go knock on some doors and spend time with people.. - Thanks so much.. - Yeah, great questions.. - [Audience Member] All right, thanks so much for your talk today.. I was wondering, when you're iterating your hardware product, what sort of signals or metrics do you track when doing pilot deployments with customers? And also do you take on like strategic partnerships and how do you get from like zero to end if you're building technology across different verticals like you are doing? - Yeah, So let me talk about the hardware part first and then how do you scale it when you're working with multiple verticals..

Hardware, like it's got the word hard embedded in it.. It's like actually really challenging.. And the first most difficult thing is actually just getting the thing to work reliably.. And one thing you probably, many of you, if you've taken electrical engineering classes, you know you can kind of cobble it together and make it work a little while, but making it stay working is its own challenge, 'cause the circuits have to be robust, the firmware has to work, it has to not have bugs.. If it can't upgrade, it kind of dies in the field.. So that's actually a pretty high bar.. You can get good at it.. And the best way to do it is by practicing, like build something simple, ship it, get it out there kind of thing.. So that's kind of like base-level advice on hardware.. And you see many hardware companies doing this, right, like just you can take your pick..

The second part of it though is multi-industry, multi-vertical.. And so what we do is we look for kind of the 80/20, like what's common across these industry verticals.. And one thing we realized in at Samsara was actually everyone across industries, construction, electrical services, waste management, school buses, they all actually use the same kinds of vehicles.. They're big diesel kind of large trucks, and or F-150 kind of small trucks, but they're from the same manufacturers, they drive on the same roads.. Many of these companies are hiring from the same labor pool.. So we looked for what's common, and then try to solve that common problem.. And then we partner for the things that are specific to the waste management industry or something that.. So looking for the 80/20, I think, has been the insight.. - [Audience Member] I have a follow-up question.. - Wait, just one question, sorry, 'cause we have a long, long line..

- Okay, no worries.. - Thank you, though.. - [Audience Member] Hi, I'm here from Tokyo.. - Can you move the mic towards your, okay, thank you.. - [Audience Member] So I have two questions.. One is, why did you choose to focus on networks in the first place? - Why networks? - And give only one question.. Sorry.. Just because we're not gonna get to the end.. - Well, yeah, that's a interesting one.. I'm trying to remember..

So networks back in the late '90s and early 2000s when I was here, it was actually still an exciting time to build networks, like the internet build out was really happening.. And so there were lots of interesting problems of like, how do you make these things accessible? And then wireless networks, I thought, were mind-blowingly cool, 'cause you could just get, it was like a magic connection outta thin air.. So it was maybe just like fascination with it.. And then it was this blend of CS and EE, like where having a hardware background, it was the fundamental underpinnings of the network, but how you built systems out of those software.. So I like the confluence of those things.. And I think it was just personal interest.. I don't know that I would do networking again today.. Maybe I would be interested in AI or bio or something else, but that was just what caught my attention, yes.. - Thank you, sorry, we're just gonna do one question per, yes.. - [Audience Member] So when you started Samsara, you were entering an industry that you were otherwise pretty unfamiliar with, and still you managed to see an opportunity that a lot of experts in the field missed..

So what is your approach to seeing openings even in industries that you may not be familiar with? - Yeah, so I think there was that kind of natural fascination, like with networking, I was just like fascinated by infrastructure.. And maybe it was more of like, there was a gut-feeling element to it of like, "Hey, this area feels like it hasn't been modernized yet." And that was the gut instinct to get us in the door to go explore it.. But then actually spending time with the frontline, like with the people in the warehouses, and in the distribution centers, that was the way we validated, "No, this is real." And it was visceral, like you would see their systems, and they were running software from the 1980s and 1990s, like it was green screen systems.. There were printouts.. I was like, "I haven't seen something this for 20 or 30 years." So that's when you knew that it was an underserved market.. And the best way to figure that out is just get out there, and you'd be surprised how many people are willing to help you out.. If you just ask nicely and show up and try to bring some value to them.. We were bringing them value with that first product, and they were gracious enough to entertain us for an hour and say, "Yeah, this is how this business works," 'cause they were very proud of their work.. So I would just say get in there and try it.. - Thank you..

- Yep.. - [Audience Member] Hi, how would you, so as you move into more of like a platform play and expand to additional use cases, how do you make sure that you remain competitive in a place where people are hyper-focused, like I know you have some history there, but with motive for example.. How do you remain just keeping control of your primary vertical while expanding? - Yeah, well, the key for us is, we actually are a multi-industry company to begin with.. So I mentioned trucking and logistics, that's like 20-something percent of our business.. We serve all these other industries like field services and waste management and chemicals distributors and so on.. So the key for us is, again, that 80/20 of like, how do we make sure we're connecting with the market, right? Like, what do most people need? And then what we discovered is that they tend not to just need one product.. They have many, many problems to solve.. So if you solve the first problem well, they'll invite you back and be like, "Hey, can you help with this? So we did GPS tracking, then they said, "Could you help us on safety? We're seeing a lot of accidents." So we built a camera product and coaching product.. Those same customers we found had a lot of equipment.. So could you help us track the trailers and the generators and tell us if stuff's being used off-hours..

And then like from there it just keeps compounding.. So we're always looking for what are those common problems that we can solve across different industry verticals.. And then within that, you have to still do a great job.. You can't just be super broad.. So making sure that we're investing enough to just nail it.. And the customers appreciate that.. They tend not to want to be in 12 different systems.. They it when there's a vendor who's spending time with them, gets them, and is building products that really, really work.. Appreciate it.. - Thank you..

- This will be the final question, sorry.. And we have about 40 seconds to answer.. - [Daniel] My name is Daniel, and I was very interested in Samsara.. I just had a question: where and how do you see it expanding and what fields do you see it expanding into in the next five years, say? - Yeah, so we have a lot of sort of ideas of what else we can do.. The first thing though is to make sure that we unlock what's in front of us.. And so we are going deeper in these industries.. We've become a fairly large company.. We're the largest in our sector, but we're still only maybe 15% of the market, so we could see just getting much bigger there.. And in that process, I think we will understand even more use cases.. So we're always kind of going broader and deeper at the same time..

- [Daniel] Like what specific areas? - Oh like, I talked about some of those industries, like aviation is not a huge part of our revenue, but there's a lot of interesting operation problems.. You can kind of apply that to any of the ones you saw on the screen.. Yeah.. Thanks.. - Thank you.. - And with that I'm gonna have to draw this ETL to a close.. Join me in thanking Sanjit.. - Thank you, Ravi.. Yeah.. - That was awesome..

You can find this talk and other talks on the website at stvp.stanford.edu, or STVP eCorner.. And join us next week where we're gonna have Jane Chen from Embrace.. - I was looking.. (indistinct) - Oh sure.. (indistinct) - As the keynote.. (bright music)..