WE ARE ETH – Episode 5

With Philippe Kahn, mathematician, innovator, inventor and entrepreneur

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[00:00:00] **Philippe Kahn:** I got really fascinated by the work of Einstein and particularly his thought experiments. I decided that I wanted to go to the school that he went to and that's what took me to Zurich really. And that's how it happened

[00:00:16] **Susan Kish:** Today, I'm talking to mathematician, innovator, inventor, entrepreneur – Philippe Kahn.

[00:00:22] He changed the world on June 11th, 1997 at 14:21 and created the first photo taken by a mobile phone with a picture of his new baby Sophie. Today, he's the founder and CEO of Fullpower, an AI powered algorithm company that focuses on bio sensing, which translate into simple terms means measuring and understanding things like sleep. Phillipe lives in Santa Cruz a wonderful surfing sailing university town on Monterey Bay in California.

[00:00:53] And we're going to talk about his story, how ETH made a difference in his life and why it's still important here today. I'm Susan Kish host of the We Are ETH podcast. Telling the story of the alumni and friends of the ETH Zurich, the Swiss federal Institute of technology based in Zurich. ETH regularly ranks amongst the top universities in the world with cutting edge research, science and people. The people who were there, the people who are there and the people who will be there.

[00:01:24] These are their stories.

[00:01:29] Welcome and good afternoon.

[00:01:31] **Philippe Kahn:** Well thank you for having me.

[00:01:33] **Susan Kish:** So on that list of mathematics, innovations, inventions, and the all four companies that you founded, I understand that you're also a flutist and a sailor. So, can you connect the dots for us to cross all those different hats that you wear?

[00:01:49] **Philippe Kahn:** The music part is because my mother was a concert violinist, and that was part of the home. My grandfather was also, uh, ran a band and I grew up playing music. I couldn't go to school, uh, if I hadn't practiced for 30 minutes, at least in the morning, before that.

[00:02:06] **Susan Kish:** You practiced in the morning before you went to school?

[00:02:08] **Philippe Kahn:** Yeah, my mum made me do that. That was part of the thing, is get up 30 minutes early and go practice.

[00:02:14] And if I didn't practice, I didn't get any pocket money or something. So we didn't have tape recorders or anything else, so we couldn't fake it. So, and it was a small little apartment, so, so you could hear everything, but anyway, so music is kind of an accident, a genetic accident that came from the fact that I grew up in a professional musician family.

[00:02:36] So I play every day. The same thing. I got into that, that mode, uh, since I've little and I've always done it when I wake up.

[00:02:46] **Susan Kish:** You still play the flute?

[00:02:46] **Philippe Kahn:** I continue to play every day and first thing, so that's my wake up routine. And the sailing happened really fundamentally when I got into Santa Cruz, you know, I moved to Silicon valley because I, you know, I was attracted by technology. And Santa Cruz is that bottom south of Silicon valley and, and it's on the ocean. And one weekend I got there and I said, oh, I love this place. And then I, I moved there and sailing became natural.

[00:03:16] **Susan Kish:** Is there any connection I've read that you said sailing is in some ways a metaphor for business.

[00:03:24] **Philippe Kahn:** So there's different sides to the metaphor.

[00:03:27] Sailing competitively is definitely a metaphor for business. Ah the same things apply and the same challenges building great teams, uh, you know, forecasting, uh, thinking ahead. But there's another side to sailing, it is, I think,

it's the science space side of sailing. I mean, people don't realize that sailing is the theory of fields.

[00:03:51] If you do physics. And in fact, there are pictures of Einstein, uh, at his 50th birthday, his friends gave him a 23-foot boat I think in Princeton which was the end of his life. He pretty much sailed all the time. And he was fascinated by the fact that the sails, the wind, the field of winds, the waves, et cetera, all had kind of these patterns. And I, I think it was a great thing for Einstein.

[00:04:20] **Susan Kish:** That sounds very cool. A sort of a different approach to system thinking, trying to figure out how all those things...

[00:04:28] **Philippe Kahn:** When you think about, you know, how waves propagate, you know, what the mathematics of fields and the physics of fields are, you are sitting on a sailboat and you're looking at all this in action, and you look at the patterns of the clouds and the sky and the wind and all that – there's something pretty transcendental, and it's a natural thing.

[00:04:53] **Susan Kish:** So along with Einstein, you're listed as one of the most notable alumni of the ETH.

[00:04:59] **Philippe Kahn:** Oh.

[00:05:00] **Susan Kish:** Tell us how you went to the ETH. You, as you mentioned, you grew up in a small apartment in Paris. Your family were cabinet makers, if I understand, how did you make that move?

[00:05:10] **Philippe Kahn:** There was a lot of accident. It turns out that when my mom passed away, I was a teenager, one of her good friend sponsored me and took care of me. And he told me that he would help me get to the university I wanted to. Somehow, I got really excited in high school, I got really fascinated by the work of Einstein and particularly his thought experiments because you know, pretty much everyone can understand him.

[00:05:38] And I thought I could. I really couldn't. But I pretended I could. And I decided that I wanted to go to school that he went to. And that's what took me to Zurich really. That's how it happened.

[00:05:51] **Susan Kish:** And how did you decide what to study?

[00:05:53] **Philippe Kahn:** I had no clue what I wanted to study. I think I wanted to study physics and mathematics, and that was a natural thing.

[00:06:01] I mean, I liked that and it's, you know, probably very related to music in some ways. I mean, it's, uh, has this a "Gestalt" that comes from all of them. So when I got there, I said, I'll take mathematics and take some physics courses. And that's what I wanted to do. There was no, no other impetus in that.

[00:06:22] **Susan Kish:** And while you were in Zurich, you still studied music down the street at the conservatory, right?

[00:06:28] **Philippe Kahn:** That's the first thing I did. I think I signed up to the Zurich music conservatory at the same time as I signed up to the ETH. So, I'm an alumni of both. And I hate to say that I was probably a more serious alumni at the music conservatory than I was at the ETH. And I hate to say that. You know, I had a good background in music, so it was easy. They put me directly in the high classes.

[00:06:55] **Susan Kish:** How did you go from mathematics and physics into programming? Because if I understand you, you worked for Niklaus Wirth on programs like Pascal.

[00:07:03] **Philippe Kahn:** Well, it happened before, because I did some programming on PDP computers in high school because the high school had one and all that.

[00:07:12] But programming, wasn't that interested initially to me, what we're interesting, where the languages used for programming, basically the tools. When you studied at ETH at the time, I remember you had a choice between two programming language and on one side they taught Fortran and Fortran is the language of science, or it was the language of scientists.

[00:07:40] And then there was this new class that was started by this Professor Niklaus Wirth about Pascal. And it was, I think the first or second year it was taught. There were a lot of people in the Fortran class and not that many people in the Pascal class. So I said, oh, I'll go to the Pascal class.

[00:07:59] And that's how I met Professor Wirth. And that was great. That was my favorite class from that moment because he's such a, such an enlightened person and a clear thinker that it was a great, great experience for me.

[00:08:12] **Susan Kish:** After you studied there, then if I understand correctly, you went to the Sophia Antipolis. Did some more studies and ultimately moved to the states in 1982. And how did you, why did you pick the states? Why didn't you stay in Europe? Either in France or in Switzerland?

[00:08:29] **Philippe Kahn:** I didn't pick the states. I absolutely no. I picked Silicon Valley. And if Silicon valley had been in Zimbabwe, I would have gone to Zimbabwe.

[00:08:39] **Susan Kish:** You just decided that that's where you want it to be because they were... Why?

[00:08:43] **Philippe Kahn:** Well to make a living, you know, after I graduated and all that, you know, I taught a little bit and all that.

[00:08:50] I actually wrote some software. I sold my services to an American company that wanted to localize, computer games and stuff like that. And the people I met there who are Americans, who were in Europe, told me you should move to Silicon Valley. You're perfect for that. After people told me that a few times, I decided to try it out.

[00:09:12] So I thought I'd go to Silicon Valley. I had no idea it was part of America. Yes, I did. But that's not what mattered to me. What mattered to me is it was Silicon Valley. You know, the place where Intel started, where Hewlett Packard started, where, you know, you know, it's just as simple as that.

[00:09:32] You have to understand that in 1983, there was very little high-tech in Europe, a little bit. But not much. I mean, when you came to Silicon Valley it was all high tech and it was all interesting and it was kind of a fascinating place. A place where I thought that I could do some very interesting things.

[00:09:53] **Susan Kish:** So the story is you arrived with $2,000 and a tourist visa.

[00:09:58] **Philippe Kahn:** It's the reality. Yes. I came in as a tourist. I didn't have a green card and I didn't have much money. So, when I got to the states, I got a bedroom on top of a garage, actually on Stevens Creek Boulevard, which is where all the car dealers are. And next to it was, one of the first computer stores.

[00:10:21] And as I was interviewing and looking for a job, I went into the computer store and I say, can I do anything for you? And the, and the people

said, do you know how to make printer cables? Because printer cables were an extremely precious thing at the time, because there were no standards and plugs and cables and all that stuff.

[00:10:42] And of course, I had no idea how to make a printer cable but I said, absolutely I can make printer cables. So, I started making printer cables and my printer cables were pretty good. And I made printer cables and I sold them for about $35 at the time, $35. And they resell them for probably a hundred and more.

[00:11:04] And actually they had such success with these printer cables that eventually I hired two people to work for me to make the printer cables.

[00:11:15] **Susan Kish:** So, how did you get interested in working with software and hardware. I mean, did that come from your time at the ETH or is that just something you always did?

[00:11:24] **Philippe Kahn:** In the early days you kind of had to figure out both, because there were no standards.

[00:11:30] Like you buy something and you buy something else, you plug them in at, it works. Things didn't work that way. And so you had to figure out how to build drivers, modify drivers and figure out hardware, et cetera. And so that was a big piece of what we had to do. So, it was a completely natural thing.

[00:11:50] You know, the first computers didn't have standardized protocols that allow you to go into the store, says, I want a printer, I want a computer, and I want whatever microphone and I wanted it to all work. Well, yeah, you could go and buy them, but then you had to do a little bit of work. That changed, you know. That's one of the big things that Apple did, you know, when you went on a Macintosh, actually more than an Apple Two. The Apple Two had the same problem. But when you bought a Macintosh, that was a big thing, is everything worked together and Apple, you know, did a great service, getting people to understand that the better user experience is to have a system of devices that had enough standard interfaces so that they would work together.

[00:12:42] **Susan Kish:** So, then you started Borland, where you went face-to-face with companies like Oracle and Microsoft.

[00:12:48] And then you founded Starfish and then you founded Light Surf and now you've founded Fullpower. So, can you tell the story of what was the

problem you were trying to solve with Fullpower? How did you get interested in bio sensing and sleep?

[00:13:04] **Philippe Kahn:** So, our company Light Surf that had built the first camera phone and the infrastructure on the camera phone, we actually were building server systems to manage pictures of the largest carriers in the world. And the company got acquired successfully. And we had basically put sensors in phones because nobody had phones with a camera. Now, everybody has that, but you know, the first time that there was a phone with a camera and that was 1999, the first one we worked with was in Japan.

[00:13:39] And then we brought it to the U S. It took to 2002 for a similar device to be in the U S. And we're involved in that, but fundamentally the idea is that we put a sensor in the phone and those were the first sensors in phones, because now there are zillions of sensors in phones. You have a GPS sensor or axon meters.

[00:14:02] And then we started thinking, you know, what else can we do with sensing? Because the idea of making a more intelligent machine in order to have intelligence, you have to have some form of sensing. And so the sensorial world is very important to that. So we decided to figure out, can we understand the big, mysterious thing such as sleep, because you start thinking about your life and a third of your life is sleep.

[00:14:31] And we looked at the science of sleep. We felt like well, it's just mostly opinions. People will tell you, you should sleep, blah, blah. You should sleep in a very quiet room with complete darkness and all that. We started looking at that and said, well, we'll look at the literature. And what people thought about sleep 200, 300 years ago, we figured that a lot of the opinions of sleep came at the time of the industrial revolution, just like three square meals, where they wanted people to have a breakfast, a lunch and a dinner so to have people in factories for a long time and have them do stuff at the same time, say, well, if they can sleep that amount of time in a compressed way, that's great and we'll have more productive factories. And that's part of the industrial revolution and a lot of the stuff that happened. So we started getting interested and we started thinking about what technology can we develop to understand sleep better?

[00:15:29] We started looking at different forms of sensing, on wrists, you know, like a wearable and we did work on wearables. And then we realized that most people didn't want to wear wearable that was intrusive while they were sleeping. And we needed to create some invisible system that was very accurate.

[00:15:47] That would be commensurate with what was the gold standard in sleep, which is polysomnography. And we did that. We basic use AI modeling methodologies and built a system to do that. And it's been very, very gratifying because it's not only a business. But it's also, I think, a way to help improve people's lives and understanding the great mystery of sleep.

[00:16:15] You know, sleep is like this mysterious ocean. You just see the surface, but you never see the depth of it and the creatures that lie into it. So, we're trying to break through these myths. Understanding and creating practical solutions that will improve everyone's lives.

[00:16:37] **Susan Kish:** So, I also understand that sleeping connected with the time that you were a sailor where you had to take really short periods of sleep and probably make those as efficient as possible.

[00:16:48] **Philippe Kahn:** The kind of sailing I got into at one point was, you know, only one or two people and trying to get across oceans for several days.

[00:16:57] You get very sleep deprived, and sleep becomes one of your most precious commodities. So initially when we started doing that about 20 years ago, I started to work on optimizing for sleep deprivation. Because when you cross oceans like that in a short-handed way, uh, a lot of times you never get to sleep more than 25 minutes at a time.

[00:17:21] **Susan Kish:** Good heavens!

[00:17:22] **Philippe Kahn:** But there are ways to manage that. And the ways you manage that is to use an approach called polyphasic sleep and actually time those naps. It turns out that it's better sometimes to sleep 22 and a half minutes than to sleep 35 minutes or an hour. And you probably experienced that yourself when you sleep. Sometimes you don't sleep as much where for you wake up and you're like wow, I feel good. And sometimes you sleep a long time, you wake up and you feel groggy, and it has to do with hormonal cycles.

[00:17:57] It has to do with the different, you know, their phases in your sleep. And if you wake up in the wrong phase of your sleep, you know, the natural ways in which body flushes, the flow of hormones doesn't completely happen and that grogginess that you feel has something to do with their body didn't do its job in garbage collection or something like that. But the idea that the stuff you don't use, you get rid of it. And when the body does that, you feel really good. When the body doesn't do that, you feel like groggy. And that led me to be really interested in sleep. And what can we do to optimize our sleep.

[00:18:38] **Susan Kish:** So, it sounds like this is a theme that you've been looking at in various incarnations over the time.

[00:18:44] **Philippe Kahn:** Absolutely. It's, you know, interesting things are interesting.

[00:18:48] **Susan Kish:** Right.

[00:18:49] **Philippe Kahn:** And especially when it relates to yourself, right. You start looking at things and say, oh wow, this is really interesting. Can I studied it? And there's, you know, nowadays there's always a lot of really smart people who have already thought about these things, you know? So, it's really great because you get a running start.

[00:19:08] **Susan Kish:** Right. You've had the success and the ability to study your topics of passion and places where you make a difference over your career. If you were to talk to a student at the ETH, now, a student graduated in mathematics and physics who was interested in figuring out how they can make a difference, how they can study areas, where they want to solve problems. These big questions. What areas would you encourage them to explore?

[00:19:37] **Philippe Kahn:** I think there there's different approaches.

[00:19:40] One is there's people who already know what they want to do. Then you study whatever it takes to do what you want to do. If you're fascinated by volcanoes, then you go and study geology and all that. And I'm sure there's a great geology department at ETH. If you're interested in pure logic mathematics, you go study it.

[00:20:04] But if you're not sure what you want to do, uh, but you know, you want to do stuff because we all want to do stuff. Then you need a bit of a, I think a little bit of a Swiss army knife, you know, a lot of different blades, different tools in it. And you need to learn the tools of modernity. I think the ETH does a great job at that and you're going to have to learn some physics and mathematics, but certainly some software engineering and probably the basics of logic.

[00:20:36] And what is commonly known as AI.

[00:20:39] **Susan Kish:** So those areas of mathematics, physics, software engineering, AI, those are all core areas. Is hardware still as important as it was when you described studying these areas?

[00:20:52] **Philippe Kahn:** I absolutely think so, but a lot of people don't, so I may not be popular. I think it's really important to understand how the machine works and what it does.

[00:21:04] And to be fair, it's more and more important. Uh, you know, part of what we do, with what we do is what people call internet of things, right? Which is connect things to the internet, et cetera, whatever that means. And if I want to connect my coffee machine, my espresso machine. So that it's really smart and understands when I get out of bed, then starts making me my delicious expressos that I can wake up properly. I need to have a little understanding how software and hardware interact. And, and so I think it's very important. I'm glad you brought this up because to me that's a given.

[00:21:45] **Susan Kish:** When you think about your time with the ETH. What was your favorite place? Where did you like to go?

[00:21:52] **Philippe Kahn:** Well, i, my time in the ETH, there was a big building, on Leonhardstrasse.

[00:21:57] It, so my favorite thing was the library actually. Because that's the first time they automated the library. It was a lot of fun. You could go onto the terminals and then you type in the name of the book and the book would come through a conveyor. It was a lot of fun.

[00:22:14] **Susan Kish:** When you think back to your time at ETH, what difference did that make for you?

[00:22:18] **Philippe Kahn:** I think that the main role for me was the ongoing contact that I had with, Professor Wirth. I stayed in contact with him. I built a business around the work he did when he built the first Pascal compiler, and it became very successful and I stayed in contact with him. And in fact, I talked to him about six months ago.

[00:22:44] He was a big influence in certainly my thinking and as a role model. As a very enlightened person. And so, so I think that's really, for me, been the most important part of my direct connection with ETH as I continued a productive connection over time.

[00:23:08] **Susan Kish:** I'm Susan Kish host the We are ETH series. Please subscribe to this podcast and join us wherever you listen. And if you have a chance, give us a good rating on Spotify and Apple. If you enjoyed today's

conversation, I'd like to close by saying thank you to our producers at the ETH circle and Ellie Media GmbH.

[00:23:28] And thank you, our listeners for joining us today.