

Flashes of Genius: An Interview with Touch Screen Inventor Hal Philipp

<https://mindmatters.ai/podcast/ep320>

Robert J. Marks:

Greetings and welcome to Mind Matters News. Today we air a classic podcast with Hal Philipp, originally aired November 28th, 2019. You've used the inventions of Hal Philipp. If you've used a touch screen today on your computer, you've used an invention of Hal Philipp. How about the automatic door opener, and how about the automatic faucet? Listen to this podcast and listen to how Hal conceived of his inventions, how he marketed them, and how he did so using no venture capital or angel funding. You'll find that the audio in this podcast isn't perfect, but the content is really full of good value. So hope you enjoy. Here we go.

Build a better mousetrap and the world will beat a path to your door. Today, this is far from true. Small entrepreneurs fall in the shadow of large corporate giants like Google, Microsoft, and Amazon. So what does it take to bring a clever idea to market? We talked today to Hal Philipp, the inventor and entrepreneur who made touch screens inexpensive and whose technology is today used all over the world. You have probably used Hal Philipp's invention today. Hal Philipp is the founder and former owner of Quantum Research. His company was sold to Atmel in 2008. Am I saying that right, Atmel?

Hal Philipp:

Yes, you are.

Robert J. Marks:

Okay, good. And Hal Philipp has over 80 patents. He actually can't count them all since some of them were in process when he sold the company, and he really hasn't followed up to find out whether they were granted or not.

Hal Philipp:

That's true. That's true.

Robert J. Marks:

That is true? Okay. I first met Hal in 1987 when he was a budding entrepreneur working on many R&D projects. Hal, when we first met, you were working on some really interesting projects. One I recall was a robot boxer. This was way before its time in 1987. What was the robot boxer all about? I remember going in there and it would punch you and all sorts of interesting things.

Hal Philipp:

Yeah. This was the brainchild of one Jerry Wilson, who was the founder of Soloflex. I don't know if any of you in the audience know the company Soloflex, but they pioneered the home gym equipment using resistance training using rubber bands, basically just giant rubber bands. And this guy made a huge business out of it outside of Oregon, near Hillsboro somewhere.

Robert J. Marks:

It really shows what you can do if you're an entrepreneur and you just have rubber bands and need something to do with them, I guess.

Hal Philipp:

Yeah, you have to do something with those rubber bands. That's right. So he had a huge factory and he wanted to broaden his horizons into other areas, I guess. He was making lots of money. By the way, he pioneered telemarketing on these half-hour infomercials on television. He was the pioneer of those.

Robert J. Marks:

Really?

Hal Philipp:

Yes. He used really attractive young people, and he had them exercising away, and he sold a ton of product that way.

Robert J. Marks:

And I bet you he showed a lot of guys with big muscles.

Hal Philipp:

He did. He showed a lot of guys with big muscles, beautiful bodies, all that stuff.

Robert J. Marks:

Okay.

Hal Philipp:

Anyway, he got it in his head that he wanted to diversify into other areas, and one of them was, well, boxing. And he wanted to create something you could exercise with to go along with his other equipment, I suppose, that would help you spar, a sparring partner. So a boxing robot was what he had in mind.

And so he had a mechanical engineer who did some of the work, but he couldn't figure out how to control the thing. It had a very heavy duty motor inside of it and so on, and he needed somebody to do the control hardware and the software and everything to make this boxing robot box. It was a bit of a ludicrous contraption, to be honest, a little bit flimsy, but it did do its job. But I think ultimately he saw the light when his lawyers probably told him that this was probably a good way to end up in litigation-

Robert J. Marks:

I guess so.

Hal Philipp:

... when somebody got their lights knocked out of them from the-

Robert J. Marks:

Was it his idea of to market these things?

Hal Philipp:

Yeah, of course. He was going to build them and market them, so yeah.

Robert J. Marks:

Wow.

Hal Philipp:

It was a fun project and I got some photos of that. Jerry Wilson himself was quite the character, but that's a different story for another time, I guess.

Robert J. Marks:

And we probably don't want to go there from things you've told me.

Hal Philipp:

Yeah, probably don't want to go there entirely.

Robert J. Marks:

But he was a nice guy, right?

Hal Philipp:

Yeah. He did write a book about his time, and I think he's deceased now. But if you look up Jerry Wilson on Amazon, you will find out that he wrote a book.

Robert J. Marks:

Now, you also had a lot of success with optical sensors, and they were used for example, on automated doors and water faucets and other sort of things. Could you elaborate on that? What was the principle behind your optical sensor and how you marketed it to do some of these different applications?

Hal Philipp:

Sure. So to give it a little bit of context, my optical work started at a company called Tektronix in Beaverton, Oregon. They're very famous for test and measurement equipment, dating back to pre-World War II days. So anyway, I was working on an optical fiber cable tester. It's called an OFTDR in the industry, or optical fiber time domain reflectometer. And it sends an optical pulse down a fiber, and you can see where the breaks are or any discontinuities are in the fiber, many kilometers away.

Robert J. Marks:

Is this time domain reflectometry, kind of?

Hal Philipp:

Yes. It's optical time domain reflectometry. I was responsible for the time-based section and also for the microprocessor control section. I wrote the firmware for it and so on. So that was at Tektronix in the late '70s, and I kind of got an itch after that. That became a very successful product, by the way. It lasted in the marketplace for about a decade, so that was hugely successful. In the TNM world, that's quite unusual.

Anyway, I got the bug to go off and do something on my own. So I did some consulting work for another company in the area also doing optical work in the same vein. Their name was Photon Kinetics, started by a certain PhD. His name was Phil Shearer. Anyway, he was quite a guy. He was running his operation out of the garage. That's now become a fairly large company, as I understand.

And so I was doing optical things. I found myself doing all this optical stuff, and so I wanted to find a way to make money as an independent contractor or consultant in that industry. It was burgeoning or just budding at that time, I should say. And so I started designing optical sensors and came up with an idea for an application that, well, I called it the Photon Bridge. In fact, you and I did a paper on it.

Robert J. Marks:

We did a paper on it.

Hal Philipp:

We did a paper together on it. That's right.

Robert J. Marks:

Is it okay if we link that on the podcast notes?

Hal Philipp:

Yes, you can.

Robert J. Marks:

Okay, we will link that.

Hal Philipp:

Sure, absolutely, link it on the podcast.

Robert J. Marks:

So this is my brush with greatness. This is good.

Hal Philipp:

No, it's my brush with greatness. So anyway.

Robert J. Marks:

We're a mutual admiration society.

Hal Philipp:

Okay, mutual, yeah. Okay. Anyway. So I did the sensor and filed for a patent on it, and I nicknamed it the Photon Bridge because it looked like an optical version of an electrical bridge circuit. And you have to be an electrical engineer, I guess, to know what that really means. But anyway, it was kind of novel and it was worth a patent. I got a patent granted, and then I was looking for places to get revenue from this patent. To get revenue, you have to license it or create a product and sell it, something like that.

Robert J. Marks:

Now, this is an interesting aspect. I think a lot of engineers think if they create a new project that immediately, as we said in the introduction, the world is going to beat a path to your door, but that's not true. You have to package it. You have to market it.

Hal Philipp:

Sure.

Robert J. Marks:

And as a single entrepreneur, you did all of this.

Hal Philipp:

Yes, I did. Yeah, I was a one man band. That's true. I don't recommend doing that necessarily, but it is certainly one approach. And I did that, and I did it quite successfully. There was a lot of trials and tribulations on the way.

Anyway, about this optical bridge patent. I found a company out of Sweden. They had a US subsidiary called BESAM, B-E-S-A-M. They still exist today. I think they got bought out by another company, but it doesn't matter anyway. They did automatic doors for grocery stores and airports, the kind that opened sideways when you walk into them. They did swing doors too, but mostly they did sliding doors.

And these doors had a problem in that when you stood in the middle of them, they typically would tend to close after a little while and hit you. And if you were an elderly person with a walker or a cane or something and you couldn't move out of the way fast enough, you'd get hit. And then you would fall over, you'd break your hip, you'd get an embolism, and sometimes people died. So this was a constant source of litigation for these companies, and they needed a way to avoid trapping people or getting people hit by these doors when they came closed.

So they were looking for some kind of an optical system to do that. Back then cameras were not a thing because it was just too expensive to do optical processing. So my patent came in because I could do a light curtain from the top looking down at the floor, and it could be very, very sensitive, and it could detect if anything was in that doorway just before the doors would close.

So it was an interesting project. It was a very difficult, challenging project actually. But for me, ultimately, financially, it was also very rewarding. It was my first patent license ever. The company gave me a \$50,000 advance, which at that time was a small fortune. It certainly was a fortune to me, and I thought, "Wow, the American dream is coming true for me." So I then proceeded to do the development. So I got paid even more work to do the development work for BESAM. And then later went into serial production. Of course, I got royalties from it.

Robert J. Marks:

Now, is your technology currently being used or a modification of it?

Hal Philipp:

I don't know for a fact if it is. I've lost track.

Robert J. Marks:

You haven't followed that-

Hal Philipp:

I've lost track. That patent long since expired. So it could be that it's being used, but I would have no way to track that now because it is an expired patent. So that dated back to around 1987.

Robert J. Marks:

I see.

Hal Philipp:

Yeah. And I did use that patent for other things. I did get into the automatic faucet business. That was another area where people were using optical sensors to detect your hand and to make the water come on in washrooms, for example, at airports and restaurants and McDonald's and so on. So I started doing sensors in there, in that area.

It was a very interesting area because optical sensors, of course, pick up on the proximity of an object, but also based on the color of the object. So if you have dark hands, these optical sensors that were out there didn't react too well. So they were a little bit racist to be blunt about it.

Robert J. Marks:

Racist sensors.

Hal Philipp:

They were racist sensors, and we can't have that in society.

Robert J. Marks:

No.

Hal Philipp:

Of course not. So no, seriously, it's a big problem. So I had a sensor that was much more sensitive. It really didn't care about the color of your skin. And so it got an immediate audience in the plumbing industry. And I did license agreements with several of the big plumbing companies back in the late '80s and early '90s.

Robert J. Marks:

So same question, do you know if your technology is currently being used at all, or you haven't followed...

Hal Philipp:

It's an expired patent, and I suspect there are ... It probably is, yeah. I don't know for a fact. It probably is. Yeah, but I don't know. I haven't researched it. I've gone long past that in my career.

Robert J. Marks:

Now you moved your business from the US to England, I think in 1996. And you told me that you accidentally formed a company as a result of that move.

Hal Philipp:

Yeah, that was-

Robert J. Marks:

Tell us what happened. Why did you move to the US to England?

Hal Philipp:

From the US to England? Well, I was living in Florida at the time, and I was still doing this optical sensing stuff, and I had also migrated over towards the capacitive version of my patent. So I was filing patents in the capacitive realm to do electric field sensing and proximity sensing in a similar way to the optical stuff, but shorter range, less power consumption, and had a lot of human and industrial applications associated with it.

I first did this technology to benefit the plumbing companies, the automatic faucet companies, because they had asked me for a sensor that would operate on batteries for up to five years on a single battery, And you couldn't do that with optics. The energy requirements were just too extreme. And when I pointed that out, they said, "Well, see if you can find something else." So I did.

I started to go into capacitive sensing, and that's what made me segue from optical into capacitive sensing, because capacitive sensing uses electric fields. Electric fields consume nano watts of power, very low amounts of energy, and they're fairly robust, but only over very short ranges, which is fine for a faucet sensor.

And so I developed one for the plumbing industry, and I did my own video of it and everything. I did my marketing video. I took a page out of Jerry Wilson's handbook on how to market stuff.

Robert J. Marks:

Jerry? You have to educate us-

Hal Philipp:

From Soloflex, the Soloflex boxing robot guy.

Robert J. Marks:

Oh, it's the same guy that did the Soloflex. Got you.

Hal Philipp:

He did infomercials.

Robert J. Marks:

Okay.

Hal Philipp:

So I did my own video of this product and everything, and I took it around. I made prototypes and took them around.

Robert J. Marks:

This was before YouTube, right?

Hal Philipp:

Yeah, of course. It was before internet.

Robert J. Marks:

Wow, okay. Yes.

Hal Philipp:

There was no internet at the time. I think there were bulletin boards. Remember bulletin boards?

Robert J. Marks:

Yes, I do. Yes.

Hal Philipp:

There were dial-up bulletin boards.

Robert J. Marks:

Yes.

Hal Philipp:

But that wasn't a very effective way of doing any marketing at all. So I sent around VHS tapes. Okay?

Robert J. Marks:

Yes.

Hal Philipp:

Yes.

Robert J. Marks:

Totally obsolete.

Hal Philipp:

Very obsolete now.

Robert J. Marks:

Very 20th century.

Hal Philipp:

Very 20th century. Very amusing. Anyway, yeah, I sent around these tapes and I had made some prototypes and shipped them around to different companies, and all of them said, "Well, that's very nice, Hal. It works great, but it's so different and new. We have to put it on test now for 20 years."

Robert J. Marks:

20 years?

Hal Philipp:

So come back in 20 years.

Robert J. Marks:

And then your patent would be over, right?

Hal Philipp:

Yes, of course, it'd be over at that point. So I only had luck with one company that decided that they would buy for a fixed fee upfront, a license to it, but I don't know if they did very much with it past that point. So I did develop it for them. I don't think they ever went into production with it, though. Again, this fear in the marketplace of something too radically new.

Robert J. Marks:

So again, what brought you to England?

Hal Philipp:

Well, that's the background of the story. That's what got me into capacitive sensing. And I was frustrated now because this capacitive sensing technology wasn't getting any customers. I couldn't find any customers for this, and I knew it was unique. It was new, it was different. It was a technology and solution in search of a problem to solve.

And in a trip that I had done to Europe in around 1995, I found a company in England that was interested in some kind of a joint venture to pursue the industrial market, mostly in Europe, for proximity sensors for machine tool controls and things of that nature. Conveyor belt sensing to sense if a package or some nuts and bolts were coming down the line, or a car or something like that, robotics and so on.

So I said, "Okay, well, I've nothing else going on. This technology isn't getting any other takers." And I had a German passport as well as an American, and my wife at the time had an Irish. So I said, "Let's move to England. We'll be there for two, three years. We'll get this company set up as a joint venture kind of deal, and then we'll come back to the States."

So in 1997, we packed up our belongings and sold the house in Florida and moved over to England in a little village called Hamble, H-A-M-B-L-E on the South Coast near Southampton, England. And the company that I was partnering with was not too far away, and so that's what brought me over there.

So it was supposed to be a couple or three years. I rented a house instead of buying a house there, figuring that would be a short-term proposition. And then after a few months of working with this company, I realized that after about one o'clock in the afternoon, the phones didn't answer on a Friday afternoon because they were just gone.

Robert J. Marks:

They just left you?

Hal Philipp:

They just leave. Yeah.

Robert J. Marks:

Did that hurt your feelings?

Hal Philipp:

And even over the lunch hour during the middle of the week, they would never answer the phone. And I thought, if somebody's going to be calling up and wanting product, they call at all hours of the day. So I confronted them and said, "You got to have somebody on the switchboard. We're selling this product. People are going to be calling." It wasn't web order, there was no web. It was 1997, the web was just beginning really. Actually, there was a web, but it wasn't really that popular at that time. It was just coming up.

Anyway, the point is, the short version of the story is that I got very frustrated with these guys. And by the way, their product quality wasn't that great either. So I just said, "Look, I'll just do this myself." I had a product at that point, and I had customers. People were actually buying the thing, it just needed to be marketed properly. It needed to be manufactured properly, which they also were not doing correctly.

So I just took all the technology back. They had no problem with that. They didn't really care that much. And yeah, I started hiring people to build this product, and that was the start of my company.

Robert J. Marks:

And the name of your company was?

Hal Philipp:

Quantum Research Group.

Robert J. Marks:

Quantum Research Group. Hal, we had talked about you, last time, moving from the United States to England and how you accidentally founded a company. I don't know if it was accidental, but it was unplanned when you moved over here.

Hal Philipp:

Well, it certainly is more amusing to think of it as unplanned, accidental and yeah, okay.

Robert J. Marks:

Yeah, there was-

Hal Philipp:

No, I didn't plan on it, and it kind of was accidental in the sense that it was not a deliberate choice. I never saw myself as being a CEO or as being a company founder. I was really a consultant. That's what I did. I preferred other people do the heavy lifting. I loved the consulting and contracting model, and especially the patent licensing model for the simple reason that if you're doing patent licensing, you're not involved in the manufacturing. You don't have hundreds of employees or however many it takes. You don't have to do the marketing so much, or you might be involved in that if that's something you want to do, but you just get checks in the mail. You just get amounts deposited in your account, which is really, really cool. And so I just wanted to continue that.

That's really why I went to England. I was hoping this company would generate revenue for me. And then when the relationship fell apart, when it was clear they couldn't really produce the product very

well, they certainly couldn't market it, they couldn't even answer the telephones after one o'clock in the afternoon much to my shock and horror. I obviously didn't do my due diligence correctly, did I? So shame on me.

But it put me in the position of having to rethink what I was doing and having to actually decide, well, I did decide to manufacture the product myself. And as soon as you do that, you're talking about hiring people and doing all the things that you didn't want to do. You incorporate a company, you start worrying about your expense levels and marketing and everything else in a different way. But I did that. I rented some space and I started hiring people.

Robert J. Marks:

One of the areas that you pioneered was charge transfer sensing. Could you explain that at a level which somebody who isn't a nerd can understand?

Hal Philipp:

So when you comb your hair on a dry day, your hair kind of flies up. Okay? If you walk across a carpet on a dry day and touch a doorknob, you get a spark. Your body has a charge at that point, your hair has a charge when you comb your hair, and you can reduce this charge down to a single electron, or the absence of an electron as a unit of measure. So the unit of measure is an electron of charge. And so if you want to measure capacitance, you can do so, capacitance, by the way, being the ability to hold charge.

The way that I discovered to do this was to charge up the object in question to a certain voltage, and then transfer that charge into a known capacitance, in other words, a known holding tank for this charge, and then measure the amount of voltage on that. I don't know if this is coming across right. It's very difficult to describe in layman terms, but it's like the touching of the doorknob. You're transferring the charge from your body to the doorknob. It's coming off of you and going to the doorknob.

Robert J. Marks:

In a half inch spark.

Hal Philipp:

In a very small spark.

Robert J. Marks:

Yes.

Hal Philipp:

Correct. That's a switching action. It's like throwing a light switch. You're coming close enough that the energy will bridge across the air and go into the doorknob and drain the charge away from you into the door or the door frame or wherever it's going. And the charge transfer sensor is a way of measuring how much that charge has been accumulated in the door in this case. But in the case of an electronic circuit, it's done on a very small scale, of course, to fit inside of your phone or whatever. And it's done using semiconductor switches instead of using spark gaps in the case of you and the door.

Robert J. Marks:

Now, we do know that you use this in the touch screen, but there were some other interesting applications that you used this technology for.

Hal Philipp:

Were there?

Robert J. Marks:

Well, I thought they were.

Hal Philipp:

Okay. Well, I did do the faucets. The faucet was the first application of this.

Robert J. Marks:

I thought the faucet was optical.

Hal Philipp:

It was, but I did do the capacitive version of this.

Robert J. Marks:

You did do a capacitive version?

Hal Philipp:

... and they all said, "Forget about it. We have to wait 20 years."

Robert J. Marks:

Okay.

Hal Philipp:

So the first application was really for the automatic faucets, but I did also do liquid level sensing. In fact, I worked with Formula One teams in England, including McLaren.

Robert J. Marks:

What is a Formula One team?

Hal Philipp:

Formula One racing. It's like NASCAR.

Robert J. Marks:

Oh, really? Okay.

Hal Philipp:

Yeah.

Robert J. Marks:
European NASCAR.

Hal Philipp:
Well, it's not NASCAR. They're custom-made cars.

Robert J. Marks:
Okay.

Hal Philipp:
But if you go to McLaren, for example, you can get a Formula One car. They're special cars.

Robert J. Marks:
I see.

Hal Philipp:
NASCAR are modified stock cars, right? Well, I guess a little bit different, but similar concept. Anyway, they had a lot of problems with sensing liquid levels, the engine oil and the water and the radiator and all this kind of stuff. They were sloshing around at high speeds and so on, and so they needed an accurate way to measure these liquid levels. And they approached me, and I designed sensors for them. For several years, I was the only source of liquid level sensors for certain Formula One cars. Not all of them, but certain ones.

Robert J. Marks:
How did they fit in to the car? What was the purpose of it? Just to tell you how much gas was in the tank, or?

Hal Philipp:
Yeah, gas in the tank was one of them, but oil was a big one.

Robert J. Marks:
The oil level? I see.

Hal Philipp:
Oil level, yeah.

Robert J. Marks:
Okay.

Hal Philipp:
You got to make sure you have enough oil in your engine, otherwise your engine seizes up and dies. It's kind of embarrassing on the track.

Robert J. Marks:

Well, it seems to me this would be applicable to any car.

Hal Philipp:

Yes, and it was. In fact, I did projects with Ford, for example, later.

Robert J. Marks:

Really?

Hal Philipp:

Yeah. I did a lot of projects with Ford together, and liquid level was among them.

Robert J. Marks:

I'm going to ask you again, and I suspect you'll give me the same answer, but do you know the degree to which your technology is still applied?

Hal Philipp:

No idea.

Robert J. Marks:

No idea?

Hal Philipp:

No idea. I know that it was used in keyless entry systems. The keyless entry systems are where you can just walk up to the car and it will unlock for you without touching anything.

Robert J. Marks:

Yes, yes.

Hal Philipp:

You just put your hand near the handle of the door and the car magically unlocks itself.

Robert J. Marks:

And you don't need to put a key in the ignition. You just push the button?

Hal Philipp:

You don't need to push the fob button. You don't need to push the remote control either. You just bring your hand near the door handle or just inside the door handle, and it's enough to unlock the car. So that requires a capacitive sensor to sense your hand and those are mine.

Robert J. Marks:

Those are yours?

Hal Philipp:

They were. Whether they are today, I don't know, but they were definitely mine, almost all of them.

Robert J. Marks:

So you have a pattern going here. Once the patent expires, you lose interest in keeping track of what's going on. You just know-

Hal Philipp:

Well, I lose interest. I usually lost interest when the next big thing came along, and I just lost track of the first one because the next big thing was always 10 times bigger than the previous thing.

Robert J. Marks:

I see.

Hal Philipp:

So cars were kind of a bump in the road. Well, not a bump in the road. It was a pleasant thing in the road because it generated revenue, but I also did a lot of appliance stuff. I did a lot of kitchen appliances too.

Robert J. Marks:

So let's get back to the car key. Is the capacitive sensor the way that the car knows that I'm there because the fob is in the neighborhood?

Hal Philipp:

Yes. And the specific problem with cars is that there is a way read the key in your pocket through radio fields, but it takes a very strong energy field to read that out of your pocket.

Robert J. Marks:

Yes.

Hal Philipp:

Okay? And the problem is that this consumes a lot of power. And eventually your car battery will go dead if you leave your car at the airport parking lot and disappear for a couple of weeks on vacation.

Robert J. Marks:

Oh, so you have to-

Hal Philipp:

You come back, your battery's going to be dead.

Robert J. Marks:

Gotcha.

Hal Philipp:

So you have to turn it on only when it's really needed, so it will then interrogate your key. And the way to do this is by sensing using capacitance. It's not sensing your hand near the door handle. And that capacitive field is very, very low energy. You can run the car for a year on that, more even. It'll die of just a natural death on the battery from disuse.

So that capacitive field is used to sense your hand, which then triggers the radio frequency identification system to come on, generate a lot of power, but generate this nice field. Your key in your pocket will respond to that, and then the car will unlock.

Robert J. Marks:

So your foundational technology is used today in these fob things?

Hal Philipp:

As far as I know that's still used in that area, but again, I haven't really tracked it. But I would say that's one area it probably is used. And also in kitchen appliances, as I said before.

Robert J. Marks:

Kitchen appliances? What-

Hal Philipp:

Yeah, touch controls. My first project in that area was General Electric in Louisville, Kentucky. And they had the high-end Monogram family of kitchen appliances at the top end and they were struggling with their ... They were using capacitive sensing before, but it was a previous supplier using a much more primitive technology that didn't work well. It was much more expensive. And so they approached me in the early 2000s to do a project with them, and we became the preferred supplier for capacitive touch for GE.

Robert J. Marks:

Wow.

Hal Philipp:

And then went on to Miele in Europe and Electrolux in-

Robert J. Marks:

Miele? I'm not familiar with Miele.

Hal Philipp:

Yeah, Miele is a big European brand.

Robert J. Marks:

Okay.

Hal Philipp:

Yeah, very big German brand and Bosch, Siemens and so on. So yeah, we became very big in the appliance sector, really big.

Robert J. Marks:

Now, these were all licensing agreements, right?

Hal Philipp:

No.

Robert J. Marks:

You were actually manufacturing-

Hal Philipp:

No, we sent chips.

Robert J. Marks:

You did send chips?

Hal Philipp:

We sent chips, yeah.

Robert J. Marks:

So you hired a lot of people in order to make these chips, I guess, right? Or did you outsource-

Hal Philipp:

No, we outsourced it. We used standard microcontrollers. We didn't design our own chips at all. We designed the firmware that went inside the chips, that turned them into sensors. That was what was really unique about the technology. Nobody else could do that. Everybody else needed a custom chip. We didn't need a custom chip. So not only were we fabulous, in other words, we didn't have to have our own factory for making these chips. We could have somebody else make them for us.

But even beyond that, we didn't have to do anything special. We just needed to use a suitable off-the-shelf microcontroller, design the correct firmware to go inside, have them manufacture the chips, put the firmware inside for us. So we didn't even have to do that part. They would laser mark our company logo, the part number, everything on the top surface of the chip. So when somebody bought one of these chips from us, it looked just like a Quantum Research Group chip, but actually it was somebody else's chip that we were rebranding with our software inside.

Robert J. Marks:

Is that right?

Hal Philipp:

That was our business model. We had tremendous growth and very high gross margin. It was a beautiful business plan. We had very little inventory to deal with, so it was low cost, low overheads.

Robert J. Marks:

Sounds like the ideal business.

Hal Philipp:

It was great.

Robert J. Marks:

So Hal, we were talking about all sorts of things, but I wanted to get to the idea of the touchscreen. As documented in your patents, you made touchscreens robust and affordable, but you weren't the first to propose a touchscreen. It's actually a pretty old idea that you honed to perfection. What's the history and the background of touchscreens, which I'm sure you know because you had to do research in order to do the patents, right?

Hal Philipp:

Yeah. I went back through the patent literature quite a long ways. It started out somewhere back in the 1920s where people were doing two-dimensional sensing. I'm not exactly sure what they were using it for back then, but the idea was to use, well, to use some kind of capacitive sensor technology to sense multiple points on a plane. And by sensing these points on a plane, you can define where somebody is touching. It's usually the four corners of that plane, like if you took a sheet of paper, you would connect up an electrode to one of the four corners.

And with CRT technology and radar and so on, this technology became useful in certain military applications later on, and evolved to the point where it became cheap enough that in the 1970s and '80s, I would say, it became used on ATM machines and other applications, airport ticketing kiosks and so on and so forth. But these were pretty expensive methods of sensing still. You really couldn't reduce them down to the size and cost-effectiveness of something that would work in a phone. But they did work. They were based on using a capacitive layer made of indium tin oxide, which is rare.

Robert J. Marks:

Okay, that's India?

Hal Philipp:

Indium. Indium is the-

Robert J. Marks:

Okay, it's a chemical.

Hal Philipp:

It's a metal. It's metal.

Robert J. Marks:

Okay, metal. Okay.

Hal Philipp:

Indium and tin are metals, and the oxide thereof forms a semi-transparent layer, mostly transparent layer, which if deposited on a sheet of glass is conductive, but you can still see through it. And if you connect electrodes to the corners of the screen to this layer and connect those to the suitable electronic circuitry, you can sense where somebody is touching on that.

But this required that this indium tin oxide layer be on the front surface of the glass. So basically when you touch the screen, you're touching the indium tin oxide layer directly or maybe through a very thin insulating layer. And the problem with this was that it was very difficult to do the sensing. The sensing circuitry was very expensive, and also it was very easy to damage. So if you had a ring on your finger and you grazed the surface of this screen with your ring, for example, a diamond ring or any kind of metal ring, you would create a scratch and this would basically destroy the screen.

So what was really useful would be to have the sensing layer on the back side of the glass as opposed to the front side of the glass. And also, these older technology sensors, touch screens couldn't sense multiple fingers. They could only sense one at a time. And so if you could do that to put the layer on the back of the screen and sense two or more fingers at the same time, that would be absolutely fabulous.

Robert J. Marks:

So what did you do to make touch screens cheap and reliable?

Hal Philipp:

So going back to the business model, we had a business model of using standard off-the-shelf microcontrollers. These were very inexpensive because they were produced in very high quantity for all kinds of applications. We did the firmware that went inside these chips that made them into capacitive sensors. Back in the late 1990s, I had devised a way of sensing many, many points through a single chip, not just one point. And that was called a matrix sensor. I trademarked that as QMatrix.

And basically it has rows and columns of electrodes, and these rows and columns function to localize where your touch is on the screen. And the beauty of that is that you can have multiple touches. You can touch in several places at the same time and it will discriminate them all perfectly. And then you can interpolate mathematically between these zones of crossovers to get very fine resolution. And that is the basis of the touchscreen as used today and that was developed by myself.

Robert J. Marks:

And you patented these, right?

Hal Philipp:

Yeah. I patented the underlying technology for this. The first application was just for the appliance industry really, because the appliance people had like 50 buttons on a key panel on an oven or something, crazy number of buttons, and you just couldn't have a chip behind each one of these. It was just too expensive. So the first application was to be able to sense all of these 50-plus locations with one chip. And so we did that. But the extension of that is once you did that, it's pretty easy to create a touchscreen out of it. You can sense to an infinite resolution or nearly infinite resolution across the screen.

Robert J. Marks:

Okay. Okay. Now, some people think that when you get a patent that solidly anchors your invention, and anybody that uses it is obligated to come and to pay you money. Your experience is that patents don't do this. What does a patent do?

Hal Philipp:

Well, a patent is a license to sue. So if you have a patent, basically it gives you the right to sue somebody if they infringe on that patent or you think they're infringing on that patent. Unlike stealing a car, stealing a patent is not a criminal act. It's a civil act and you have to proactively go out and sue somebody in civil court to assert your rights over that patent.

And by the same token, the defendant in that case has the right to try to destroy your patent to say it's invalid for various reasons. Maybe it was preceded by some prior patent or some prior technology or prior academic article or whatever it was that anticipated it years before you're filing it, in which case you don't have a patent anymore. Your patent has been destroyed. So this is the risk of going to court because your opponent will try to knock your patent out. But it's not a criminal case. It's a purely civil case.

Robert J. Marks:

This is one of the big problems. We have some of the larger giants such as Apple, Google, and Microsoft that have stables of lawyers. And many of these companies actually pursue the adaptation and the introduction of technology into their products without really paying attention to where the technology comes from. And their modus operandi is sue me. Or if they are sued and it looks like they're going to lose, they say, "We'll buy you out. We'll give you some money."

I know from personal experience, I did some consulting at Microsoft, and the first thing we did is meet with the lawyers. The lawyers are incredibly important. In fact, Bill Gates's father was at Preston, Ellis and Gates. And one of the big successes of Microsoft was not due to its technology. Everything that Microsoft really, in my opinion, that they've done, has actually been stolen, bought, or co-opted in some fashion.

But as I said, I did some consulting for Microsoft, and my first day there, I sat down and it was with a bunch of lawyers, first half day. The first thing they said is they said, "When you consult for us, everything you do is owned by us." And I thought, "Yeah, that makes sense." And then they said, "We don't want you at all to look at any patents while you were doing your work." And I thought, "Why don't you want to look at patents?"

Well, it turns out, if I looked at patents and they were sued later on, and they showed that I knew that this technology had been implemented before, they could actually sue for punitive or extra damages. Whereas if I had accidentally recreated the technology, that wouldn't be the case. So these companies are really dominated by high-priced lawyers that I think, they put small entrepreneurs in a difficult place in terms of developing and marketing their patents. In fact, you related to me that there were a lot of people that actually swiped your patents in some sense or copied them.

I'm actually doing some work now for a company, and I said, "Don't patent your idea." It's for data mining. "Because if somebody sees the patent, they're going to go out and they're going to duplicate it or change it a little bit to work around the patent. The best thing to do would be to keep a trade secret, which is to keep it very close to your chest, keep your cards close to your chest, and not let everybody in the world know what you were doing."

But you chose to patent, which was the proper thing to do, I think, in this technology. But you were plagiarized more than once. What happened there? This was such a revolutionary idea that you had a lot of people come and begin to plagiarize you.

Hal Philipp:

Well, first, as a general comment, you're right, it's really a big boy's game, patenting. Patenting and licensing is an area of great interest for major corporates. The entrepreneur trying to enter this game is

faced with a veritable field of landmines in approaching the subject, there's so many traps you can fall into.

But yes, in my case, I was copied by quite a few companies and individuals who saw a good thing and just saw an easy target and thought that I didn't have the money to pursue them. And they were both large and small, but some very surprising ones. One was a professor from MIT who decided to write a paper on my technology and claim it as his own. That wasn't a commercial use, but it was really very unethical in my opinion. And in other cases, a major defense contractor-

Robert J. Marks:

Actually, you appealed this to IEEE.

Hal Philipp:

I did. I went to IEEE and appealed it, and they didn't give me the time of day.

Robert J. Marks:

They didn't give you the time of day. I'm a member of IEEE. If you don't know, IEEE stands for Institute of Electronic and Electrical Engineers, largest professional society in the world with like 420,000 members. I mean, it's humongous, but like many organizations, what they do is not make decisions in terms of fairness. They make decisions in order to maintain the peace. And I think that you were the recipient of that sort of...

Hal Philipp:

Yes, but they actually had an ethics officer, and the ethics officer did nothing.

Robert J. Marks:

Okay.

Hal Philipp:

The response was, "It's MIT. So what do you do?" It's MIT, you're going to attack an MIT professor or some no-name guy working out of his shed in England? It's just the way-

Robert J. Marks:

It's a David and Goliath thing.

Hal Philipp:

It's the way the power structures lie, so I didn't have a chance. But anyway, that wasn't the worst of it. I was also copied by a major US defense contractor. I was copied by a Canadian company that did automotive equipment, a major tier one automotive supplier who supplied to General Motors, Ford and other companies. I was copied by Apple. It was public domain as everybody knows about it because of the lawsuit. Apple did quite a bit of copying of my stuff.

Interestingly enough, the most ethical companies that I encountered were Korean companies, Chinese companies.

Robert J. Marks:

Koreans and Chinese, really?

Hal Philipp:

Yes, Chinese companies. English companies were okay too, but the Germans were right up there with ripping me off. I had some real problems with the German companies. But yeah, I did very good ethical business with the Koreans. American companies, yeah, they were really hell-bent on stealing stuff.

Robert J. Marks:

My goodness.

Hal Philipp:

I wouldn't say as a general rule, but there were a lot of them that engaged in that.

Robert J. Marks:

It was kind of the attitude that neener, neener, neener, what are you going to do about it?

Hal Philipp:

Well, as my attorney in the Apple case said to me, "Don't take it personal Hal. They just want to do business, and they want to do it the most economical way possible. And if they think that stealing your patent is going to get them further down the road, they will. They do it to everybody, not just you."

Robert J. Marks:

I was once contacted on the phone by some attorneys, and I found out they were patent trolls and decided not to pursue any relationship with them. You were also affected by patent trolls. What's the story there?

Hal Philipp:

There was a company in Michigan actually headed by a guy who was a lawyer, strangely, or maybe not so strangely enough and he had acquired a portfolio of capacitive sensing patents that went back quite a way. Some of them were about to expire, but he was going around in the industry, bludgeoning companies to pony up money, otherwise he would sue them. He would actually sue the companies and it was really just a shakedown. I looked at the patents and they were garbage. There was nothing there and didn't apply to anything that any of these victims of his were involved in.

Robert J. Marks:

But I tell you-

Hal Philipp:

But just to settle the case and to get it out of their hair. And one of the victims was General Electric, oddly enough.

Robert J. Marks:

Oh.

Hal Philipp:

Yeah, because they were a customer of mine, but they were also using an older capacitive technology from another company. And on the basis of that, this guy was going after GE. And I looked at the patents, and it was just, as I said, it was a garbage case, but GE didn't even blink. They just paid the money.

Robert J. Marks:

Is that right?

Hal Philipp:

Yeah, they just paid the money.

Robert J. Marks:

So it's almost blackmail.

Hal Philipp:

It was kind of blackmail, yeah. They just paid the money. They just didn't want trouble.

Robert J. Marks:

And what was your response?

Hal Philipp:

I stood up to the guy. I mean, he came after me too, ultimately. And so-

Robert J. Marks:

What did he say? He said, I found a patent that makes your patent no good, or?

Hal Philipp:

No, the basic idea is he has technology he claims precedes mine, and therefore I have to buy a license to it and pay him money.

Robert J. Marks:

Oh, I see. Okay.

Hal Philipp:

Yeah. So no merit to the case. The merits have nothing to do with it. It's a pure shakedown attempt. So he tried that on me, but on the basis of some letters that he wrote to me, shaking me down before he filed a lawsuit, I went to an attorney in Pittsburgh. Now, he wasn't in Pittsburgh, he was in Michigan. But I went to an attorney in Pittsburgh, Pennsylvania, and I said, "Here are these letters. I know for a fact that he's done business in Pennsylvania. Can we not file suit against him with counterclaims and drag his case into Pennsylvania?" This way he has to pay Pennsylvania lawyers. He can't be using his own lawyers who are getting a percent commission off of his blackmail activities.

Robert J. Marks:

That was probably the lawyers that contacted me. They were working on a percentage.

Hal Philipp:

They were working on a percentage.

Robert J. Marks:

Yeah, okay.

Hal Philipp:

So if you can get it out of their jurisdiction, it's great for you because it means that he has to suddenly pony up real cash to defend his position. And so in the end, we came to an amicable settlement.

Robert J. Marks:

An amicable settlement.

Hal Philipp:

Absolutely nothing.

Robert J. Marks:

Is that right?

Hal Philipp:

Yeah.

Robert J. Marks:

But it did cost you some attorney fees.

Hal Philipp:

It cost attorney fees. But if you let these people get away with it, you'll attract other people that'll do it too. You become an easy mark.

Robert J. Marks:

It's like the US saying that they won't negotiate with terrorists because it will escalate. It's the same sort of principle.

Hal Philipp:

Yeah, you become known as a soft touch, and everybody comes after you. You have to be known as tough. Hey, if you're going to play in the heat of the kitchen called patents and licensing, you have to be able to withstand that. You have to be covered in Teflon and asbestos and everything else, otherwise, just get out of the kitchen. You have to be tough as nails, and you have to vigorously oppose these people, otherwise other people get ideas.

Robert J. Marks:

Now Hal, the majority of touch screens in the world use your technology, right?

Hal Philipp:

Yes.

Robert J. Marks:

Have you ever estimated how many touch screens there are?

Hal Philipp:

No. Billions and billions, Bob.

Robert J. Marks:

Billions and billions. Where did that come from? That's Carl Sagan.

Hal Philipp:

Carl Sagan.

Robert J. Marks:

Billions and billions, yeah, exactly. And what do you think, do you have a sense of pride when you look at all of these different touch screens and say, "Hey, I did that"?

Hal Philipp:

I have mixed emotions, honestly, Bob. I mean, part of me is very proud of what I did, and it's really something I guess to talk about. But on the other hand, well, I helped create a planet full of zombies.

Robert J. Marks:

A planet full of zombies. Yes. Everybody sits around the dinner table and everybody's on their phone and-

Hal Philipp:

Nobody's talking to each other anymore.

Robert J. Marks:

And you're responsible for that.

Hal Philipp:

They're texting each other while they're sitting next to each other.

Robert J. Marks:

I actually did that. I was at a meeting one time, and this was, I guess it was with touch screen, but I was sitting on the other side of the room of a friend of mine named Mohammed Al-Shikari, and he was next to the donuts. So I texted him and I said, "Please bring me a donut on the other side of the room." So he got up and just embarrassed me. He bought the whole big box of donuts over and put it in front of me.

So yeah, you're right, this sort of stuff does get abused. But there is quite a story in the implementation of touch screen and the battles that you waged. We talked about, last time, of you being copied by an

MIT professor, a military contractor, and other people, but the big one was indirectly associated with Apple computer. And this started with something called FingerWorks. Is that right?

Hal Philipp:

Yep. Well, my relationship with Apple started in about 2000 when they approached me for a license on my technology for a power button on the G4 Power Cube.

Robert J. Marks:

Now, it was a little cube. It was early, what year was it?

Hal Philipp:

2000.

Robert J. Marks:

2000. So it was a little cube, and they wanted your technology in the cube?

Hal Philipp:

You can look it up on Wikipedia. The G4 was a cubic shaped computer with a radiator sticking out of the top or vents sticking out of the top, and it had a capacitive touch button that they had developed themselves to replace the mechanical button for on/off, and it didn't work at all very well. So they were looking around for a replacement circuit, and they came upon my technology and bought one of my chips, stuck it in, liked it a lot. And then they started talking to me and my company about licensing. And that was in the 2001 timeframe.

The G4 was discontinued, but the engineering efforts went over to a different group that made monitors. So we dealt with them on monitors, and that's where the licensing took place with the monitor group for a power button and a menu button on the same monitor. So there were two chips involved.

Robert J. Marks:

Okay, so you actually had a very nice technology agreement with Apple.

Hal Philipp:

Yes, involving royalties.

Robert J. Marks:

Okay, but then things got kind of sour. Steve Jobs is very known for being aggressive, and I think we mentioned at a previous podcast how some of the larger companies really don't care about the rights and technical contributions of others. They just bulldoze ahead recognizing that if they infringe on a patent, well, they'll either settle with the people, maybe drown them in court with lawyer's fees or end up buying up the company. And you had such a situation develop later, right?

Hal Philipp:

Oh, yes. Well, the relationship had unfortunately soured with Apple fairly early on because I refused to sign their terms and conditions and the terms and conditions of Apple were that I would never sell to

one of their competition. And of course, for a small company that was very untenable. So I refused to sign. I think, well, I know that one of the mid-level managers there got fired over that.

Rolling forward, the license agreement still was in place, and we were getting money from this license agreement from Apple, and we kept presenting them with other things that we were developing, including touch screen. In about late 2004, we had a meeting with a bunch of managers and engineers and Jony Ive at Apple.

Robert J. Marks:

Jony?

Hal Philipp:

Jony Ive was the design engineer who was the head of design, English guy. Well, he's described in the book, the biography of Steve Jobs. So we had a big meeting and we described and showed the touch technology at that time for capacitive screens. And then we didn't hear from them anymore, and it sort of went silent. And we found out later through a third party that Apple was using my technology in various applications. For example, the trackpad on the notebook, the Mighty Mouse as they called it at the time, had one of my sensors in it, and also the rotary wheel on the iPod, so the capacitive version of that.

Robert J. Marks:

Well, let's back up a little bit because I know with FingerWorks there was an early connection.

Hal Philipp:

Yes.

Robert J. Marks:

And what was FingerWorks?

Hal Philipp:

Well, I didn't find out about that until later.

Robert J. Marks:

Oh, you didn't? Okay.

Hal Philipp:

FingerWorks was a company based in Delaware. It was started and run by two professors from the University of Delaware. And without naming them, well anyway, they had developed a capacitive technology for use on keyboards to turn a whole keyboard into a mouse surface. Unfortunately, I had done that back in the mid '90s and had filed for patents on that. And unfortunately, they also were using my capacitive sensing technology to accomplish this.

First of all, I didn't know about FingerWorks until quite late in the game. But also, I was not aware that FingerWorks was also working on supplying Apple with this technology. And so Apple was maybe wittingly, maybe unwittingly, I don't know, I suspect it was wittingly, was using my patented technology

through the conduit of FingerWorks through their consulting and manufacturing activities. They were supplying a chip, I think, to Apple at that time.

And this all broke out more into the open when I talked to a third party who published an app note on their website, which described my technology perfectly.

Robert J. Marks:

Was this describing the technology at FingerWorks?

Hal Philipp:

Yes. It was describing the technology at FingerWorks and mine, because it started with mine, of course. It was really my technology. And this company was Cypress Semiconductor in the Bay Area. And so they had published an app note, and I went out and talked to them, and they actually pulled the app note away from their website, but they were-

Robert J. Marks:

So they did the right thing.

Hal Philipp:

They did the right thing initially, but they were still in a contractual relationship with Apple to supply chips using the software that was apparently provided by these two gentlemen from FingerWorks in Delaware. I don't have absolute proof of how this relationship took place or what exactly happened, but that was my understanding.

And then of course, we sent a letter, a cease and desist cut type of letter to FingerWorks because they were clearly violating my patents and also to Apple and also to Cypress. And the result was within a few weeks, FingerWorks went out of business, their website put up a big notice saying, "We're no longer in operation. FingerWorks is gone."

Robert J. Marks:

Hal and I just looked on the, what is it?

Hal Philipp:

The Wayback Machine.

Robert J. Marks:

The Wayback Machine. We looked at the webpage of FingerWorks and yep, there it was, FingerWorks is no longer doing business, period.

Hal Philipp:

Ceased to operate.

Robert J. Marks:

Ceased to operate was the terminology they used.

Hal Philipp:

And they left a lot of customers in the lurch. They actually had loyal customers for this technology. Apparently their product was pretty good because if you look at the comments from their users, they liked it.

Robert J. Marks:

So clearly-

Hal Philipp:

But suddenly there was no support, nothing, no warranty service, nothing.

Robert J. Marks:

So your cease and desist letter scared him?

Hal Philipp:

Absolutely.

Robert J. Marks:

Yeah, okay.

Hal Philipp:

That's the only thing you can possibly conclude.

Robert J. Marks:

Right.

Hal Philipp:

And through the lawsuit with Apple, we found out through depositions later that FingerWorks actually, that the two professors involved there had been subsumed or contracted with by Apple. So they were now Apple employees.

Robert J. Marks:

Really?

Hal Philipp:

Yes.

Robert J. Marks:

Do you think they did that to get it under the Apple legal team? I guess the only thing you can do is guess, but it seems like that would be a wise move.

Hal Philipp:

Yeah, it protected these two professors clearly, because I couldn't really sue them personally. It was a suit against their company, and the company just ceased to exist, it vaporized. And so now they were

under the protection of the umbrella of Apple and continuing to do what they were doing with Apple, even though Apple knew full well they and the FingerWorks guys were in violation of my patents.

Robert J. Marks:

Wow. So you were informed when the iPod came out that iPod was violating your patent. Do you remember who told you that?

Hal Philipp:

Yeah, those were the Cypress guys, Cypress Semiconductor.

Robert J. Marks:

Oh, they told you.

Hal Philipp:

We had a very candid conversation with them, and their executives told me in no uncertain terms where this stuff came from and that they had a contractual relationship with Apple to supply chips. But the chips that Cypress was making were generic, like programmable logic array type chips with a microprocessor built into them. And apparently what these two professors had done was incorporate code into these chips so that they performed the function described in my patents for Apple's benefit for use in trackpads and for the scroll wheel in the iPod and so on. So that was where this came about or where we got the understanding from.

Robert J. Marks:

Did you purchase an iPod and kind of inverse engineer it?

Hal Philipp:

Yes. Yes, we did. We looked at all that stuff and it was really 100% clear it was in violation. And so we sued Apple in 2006, and that's a whole other podcast, probably.

Robert J. Marks:

Okay, so let's see. Your patent, I think that they infringed was made in '98, at least one of them.

Hal Philipp:

That sounds right.

Robert J. Marks:

There were actually, I think three patents.

Hal Philipp:

Five.

Robert J. Marks:

Five?

Hal Philipp:

We just looked at the paperwork here.

Robert J. Marks:

Oh, gotcha.

Hal Philipp:

There were five patents that were cited that they were potentially in violation of.

Robert J. Marks:

So one of the patents was '98. The iPod was introduced in 2001.

Hal Philipp:

Yes, but that was with the mechanical wheel.

Robert J. Marks:

Oh.

Hal Philipp:

So they started with a mechanical scroll wheel and then quickly moved over to a capacitive wheel. The first iteration of that was not in violation. So as I said before in one of the other podcasts that capacitive sensing is not my creation. I take no credit for that. It goes back far earlier in the last century, the 1920s. So it's not about that. It's about making one that actually works well and is efficient and cost-effective.

So what they were using was one from another capacitive sensing company that did trackpads called Synaptics. So Apple was using the Synaptics technology. It was very expensive, by the way, in the iPod initially. Well, initially it was the mechanical, and then the first iteration of capacitive was with Synaptics. And then the next iteration was with my technology under the guise of the stuff from the University of Delaware guys and Cypress Semi.

Robert J. Marks:

Okay.

Hal Philipp:

Yeah.

Robert J. Marks:

Interesting. I know that patent litigation, I've worked as an expert witness a few times for patent litigation, and it can become ugly as lawyers talk to lawyers, as the legal bills mount up, and hopefully you make some sort of progress. But while this lawsuit was going on, you had something called a Markman hearing. What's a Markman hearing?

Hal Philipp:

A Markman hearing is a decision process about the claims in a particular patent, and the opposition in the case will try to knock out as many claims as possible to invalidate the patent. So I don't know the

exact history of Markman hearings, but the general thrust of it is that the court is trying to get clarification of what are valid claims, what are valid claims in the patent, and that's an oppositional type process between the plaintiff and the defendant. And the defendant, of course, is trying to knock out as many claims as they can.

Robert J. Marks:

Shouldn't this be something that's fleshed out by the patent office when they grant the patent?

Hal Philipp:

Well, they should, of course, but patent examiners are only human and they have a huge overload in their in-basket. So they rush through these things typically, and so it remains for the courts to actually determine what is valid and what is not. But the courts can only subtract from a patent, as far as I understand, they cannot add to the claims of a patent. So you're limited by the claims of the patent that you file and are granted, but then later on, some of these claims can be knocked out through this Markman hearing process.

Robert J. Marks:

Wow. Okay.

Hal Philipp:

And by the way, you can end up with nothing. It's a very dangerous process.

Robert J. Marks:

Oh, is it really? That happens?

Hal Philipp:

Because they can knock out your whole patent? Absolutely, it happens.

Robert J. Marks:

So that's the reason good lawyers cost a lot because they're the ones that can come in and make arguments.

Hal Philipp:

Sure.

Robert J. Marks:

Yeah.

Hal Philipp:

And by the way, it could be from something that was done 50 years ago and you just never heard of it. Prior art, somebody did the same thing a long time ago.

Robert J. Marks:

I was sharing-

Hal Philipp:

And it impacts your claims.

Robert J. Marks:

Yeah. I was sharing with Hal that when I was an expert witness, I learned a new word, which was construe. I knew what it meant, but I never heard it used as much. They would look at a claim and they would say, "Can you construe this claim as meaning such and such?" which they were trying to hedge on the words, and it's all a fight against meanings of words and things.

Hal Philipp:

It is. It's semantics and attack strategies.

Robert J. Marks:

I remember at the time when you were going through this, and I looked at some of the press releases, including statements from you during the lawsuit, and you were specifically nice. There are a lot of lawsuits where people come head to head and they get kind of nasty towards each other. But at least in one of the accounts I read, you said, "Look, we have nothing against Apple. We use Apple at Quantum Research. We love their computers. It's just that they have used our technology without paying royalties, which are appropriate." So why were you so nice?

Hal Philipp:

Well, I genuinely liked Apple products, and fundamentally, Apple kind of did me a favor in a backhanded sense, because by using the technology, they validated it.

Robert J. Marks:

Oh, okay.

Hal Philipp:

So you have to look at it from that perspective. Once everybody understood that this was really my technology that Apple was using, everybody else in the industry came to me. So I had Nokia knocking on my door, Motorola, Samsung, LG, Sony, Ericsson, all these guys came to us saying, "Well, we know what's in these Apple products. We want that too."

Robert J. Marks:

Is that right? Okay.

Hal Philipp:

So it was a boon for the company. Yeah, it's a negative in that we had to instigate the lawsuit and pay all the money. I think in 2007 alone, no, I know, in 2007 alone, we were paying 3 million a year, just in that year, I'm sorry, just for litigation on patent issues. It was a very expensive proposition for a small company to undertake, but it's a big boy's game. If you're going to be doing patents and licensing and be in the intellectual property space, there are a lot of legal bills to cover, and they can come out of left field. It just hits you, blindsided, and you have no idea what's going to happen in the future or tomorrow.

Robert J. Marks:

So this again addresses the point that was made, I think in the first broadcast that if you get a patent, you all of a sudden don't have all your rights protected. You have to defend it, and it costs big bucks to protect it.

Hal Philipp:

It costs really big bucks to protect it. And big corporates will try to smash you with legal fees.

Robert J. Marks:

Yes.

Hal Philipp:

They'll make it a very expensive process, especially if they know that you're right and that they really are violating. They'll try to raise the legal expenses as high as possible through appeals, through dilatory actions, and depositions, and requests for discovery and all kinds of mechanisms. They'll raise the cost as high as possible to try to bankrupt you and that's just a normal strategy. If you're a big corporate and you want something bad enough and you don't want to pay the price, you just go through those motions. It's a lot cheaper than paying honest money for it.

Robert J. Marks:

That's a little bit chilling when your bottom line is profit. Your bottom line is your bottom line, I guess.

Hal Philipp:

Well, when you're a small business, it's your livelihood and also the livelihood of all your employees. You have a responsibility to everybody in your organization.

Robert J. Marks:

And you would not have been able to fight this had you been in the beginning of your company.

Hal Philipp:

No, there's no way. No, no, we didn't have that kind of money. But towards the end, before I sold the company, which is probably a future podcast, we had cash in the bank. We were doing very, very well. We were very solvent. We had no debt problems whatsoever. In fact, we had no debt. So it wasn't a problem to fund the litigation. But on the other hand, another company in a lesser situation would've probably gone bankrupt.

Robert J. Marks:

Yeah. Did you end up licensing to these other companies that knocked on your door like Samsung?

Hal Philipp:

Yes.

Robert J. Marks:

You did?

Hal Philipp:

Yeah. One of the first big licenses, in fact, was to Motorola for phones.

Robert J. Marks:

Really?

Hal Philipp:

Yeah, for handsets.

Robert J. Marks:

Okay.

Hal Philipp:

But we did also knock on the door of Nokia, and we had a continual dialogue with them dating back to about 2001, I think. Nokia never took it up, strangely enough. That's another conversation, another podcast.

Robert J. Marks:

Okay. Well, we'll give the Reader's Digest version here.

Hal Philipp:

Sure.

Robert J. Marks:

You mentioned that you had the Markman hearing, and then of course it went to trial. What happened to the lawsuit?

Hal Philipp:

Well, so we had the Markman hearing, and one of the claims was knocked out. The company that bought my company later said, well, that shouldn't have happened, my lawyer made a mistake. I don't know what the truth of the matter is, but so many claims survived that the patent was really fully functional. It was just a minor thing that got knocked out. What happened with the lawsuit was that I decided to sell the company and the lawsuit and everything surrounding that, all the intellectual property rights, everything went with the company. And I sold to a company called Atmel, A-T-M-E-L. It was literally one phone call to the CEO, and he said, "I'm coming right over to England. I'll make you an offer you can't refuse."

Robert J. Marks:

Is that right?

Hal Philipp:

Yeah.

Robert J. Marks:

Did he look like Marlon Brando?

Hal Philipp:

No, sorry.

Robert J. Marks:

Okay. Okay. So you sold out to Atmel. Why did you want to sell it at that point?

Hal Philipp:

Well, this was in the last quarter of, or last half, I should say, of 2007. And because of the Apple litigation, we had attracted a lot of interest from other parties that wanted the technologies I mentioned before. So we were doing so much business, and there were so many demands being placed on the company. As an example, Motorola alone wanted a team of six of our engineers just to work on Motorola projects. We only had 15 engineers in the whole company.

Robert J. Marks:

Oh, really?

Hal Philipp:

And Nokia wanted the same thing, and Samsung wanted the same thing.

Robert J. Marks:

They couldn't do it in-house?

Hal Philipp:

No, they didn't have the talent, which is why Apple ended up with these guys from the University of Delaware.

Robert J. Marks:

I see.

Hal Philipp:

Because the talent doesn't exist inside the handset companies, it was outside. It's in academia or small companies like mine.

Robert J. Marks:

Okay.

Hal Philipp:

All these companies didn't know how to do it. They couldn't just hire people off the street. There was no expertise. It's very specialist. And I was the only guy around who had this knowledge, me and my company, my other engineers. But we didn't have enough engineers. It was really hard to find good engineers. We were in a little village on the South Coast of England, and being on the coast means you only have 180 degree view of the labor pool.

Robert J. Marks:

That's true.

Hal Philipp:

So half of the population is already knocked out. And then on top of which, there really weren't any engineering communities down there. It wasn't Silicon Valley exactly, so finding people was tough.

Robert J. Marks:

You could say this in San Francisco too.

Hal Philipp:

Well, no. Yeah, but there are lots and lots of engineers. South Coast of England is not Silicon Valley. We were getting engineers in from Bulgaria and other-

Robert J. Marks:

Seriously?

Hal Philipp:

Yeah. One of our best guys was from Bulgaria, actually. Probably the best guy, to be honest.

Robert J. Marks:

Really? Okay.

Hal Philipp:

Luben, if you're listening, you're a genius.

Robert J. Marks:

What was his name?

Hal Philipp:

I'm so glad I hired you. Luben.

Robert J. Marks:

Lumen?

Hal Philipp:

Luben.

Robert J. Marks:

Luben. Luben.

Hal Philipp:

L-U-B-E-N.

Robert J. Marks:

Okay.

Hal Philipp:

Yeah. Great guy, really great guy. Soviet trained, by the way. Anyway, I digress.

Robert J. Marks:

So you sold the company to Atmel, and now you're sitting pretty and it's all Atmel's problem. They're the ones that settled the lawsuit?

Hal Philipp:

That's correct.

Robert J. Marks:

Right?

Hal Philipp:

Yeah.

Robert J. Marks:

And do you know what the settlement was?

Hal Philipp:

Yeah. I was never told the actual amount. It was private. It was never published, but my understanding was it was in the low millions. That's all they got out of Apple. The deal, as I understood it was that Apple and Atmel shook hands on a proposition where Atmel would continue to sell chips to Apple or would be a supplier to Apple for various handset related things, so phone-related chips, including touchscreens and stuff. And Apple for its part would also give Atmel some millions, but it was low single-digit millions.

Robert J. Marks:

So it was a settlement, but then an agreement for further licensing.

Hal Philipp:

Yeah, but the stupidity of it was this was a handshake agreement.

Robert J. Marks:

I see.

Hal Philipp:

And Apple immediately renegeed and never bought anything from Atmel other than some flash memories.

Robert J. Marks:

So all of that is behind you now, and you're still involved in a few things, but I want to talk to you about some other things. I want to talk to you about your achieving of success. Most young entrepreneurs dream of doing what you're doing in order to end up with the success that you're enjoying today. Based on your experience, what is your advice to the budding inventive entrepreneur?

Hal Philipp:

I would advise somebody to go join a startup where there are other people and outside capital involved. In my case, I risked my own capital, my own hours, my time, everything, my life, my social life. It was 100, 120 hour weeks.

Robert J. Marks:

120 hour weeks?

Hal Philipp:

Yeah, there were no weekends. Believe me, from morning till night, I was eating, living, and breathing my company. And so it was a very risky proposition.

Robert J. Marks:

And that's not good. You get ingrown personality sometimes when you do that, right?

Hal Philipp:

Yes, I guess so.

Robert J. Marks:

Okay. 120 hours a week. Wow.

Hal Philipp:

Yeah.

Robert J. Marks:

Okay.

Hal Philipp:

Sometimes, but 100 was not unusual at all. 120 happened quite frequently.

Robert J. Marks:

Okay. So you would advise them against going into a venture without the support?

Hal Philipp:

Yeah. I think entrepreneurs need support, especially if they're starting out for the first time. It's better to learn at the hands of somebody who's done it before or at least be just a part of the process so you're not risking everything. In my case, I had a long torturous career starting from an employee of a major at that time, Fortune 500 company in the test and measurement space to becoming a consultant, a contractor, then inventor and patent licensing guy, and then finally a company owner and operator,

which I never intended to do. So that fell into my lap sort of by accident, which I think we covered in a previous podcast.

But anyway, it was a very torturous path, and it was fraught with many, many risks, a lot of heartache, a lot of people attacking my patent portfolio, ripping it off, generating thousands and millions in legal fees. And so, yeah, it was not for the faint of heart and I don't advise people to go down the path that I did. But I don't want to dissuade anybody from becoming an entrepreneur. I just don't want to see ... I would not like to see somebody going down the path that I trod. Don't do this at home is what I tell people. This is not a good way to go about doing it.

Robert J. Marks:

I'm encouraging Hal to write a book about his experience, and he came up with the title, what was it?

Hal Philipp:

Don't do this at home.

Robert J. Marks:

Don't do this at home. Okay. In fact, because of my experience with you and the work that I did with Neopath as an expert witness, I tell young budding entrepreneurs to be very careful in what they do and to make sure that the first thing they do is involve lawyers. They need to know the cost of patents and the cost of patent litigation. Because almost invariably, as soon as you achieve a degree of success, you're going to be sued.

Hal Philipp:

Yeah. You're going to be ripped off and sued.

Robert J. Marks:

Ripped off and sued.

Hal Philipp:

At least ripped off, and maybe you're going to have to sue or you will be sued as well. So it's really fraught with enormous risk. And that is something very characteristic of intellectual property generally, especially patents and that kind of intellectual property as opposed to copyright intellectual property. Copyright is much more secure.

Robert J. Marks:

Oh, it is.

Hal Philipp:

Unless you're actually plagiarizing somebody, you're pretty safe in whatever you do, writing music or books or articles or whatever. But in terms of actual technology, intellectual property where you have patents, it's fraught with enormous amounts of risk and nobody will come to your aid and assistance. Nobody. Nobody, you're alone. So you better have deep pockets to defend yourself or you're going to go broke very quickly.

Robert J. Marks:

Okay.

Hal Philipp:

If you have a great idea, if you're really as successful as you think you're going to be, which is why you're going into business in the first place, you're not going to go into business to be a has-been, or some wishy-washy company in the middle of the road, you want to be excellent and outstanding and be a smash success. So if you were actually going to end up being those things, you're going to be attacked from all sides. You get ripped off from all sides and attacked.

Robert J. Marks:

As we mentioned, I guess these larger companies don't have a sense of morality that they will go ahead and bulldoze forward in order to make profits at the cost of leaving some entrepreneurs underfunded in their wake.

Hal Philipp:

That's correct. I mean, it's a very amoral process. There's nothing personal about it. They just want to take your stuff when they find it and use it in their own products and services and pay the least amount possible for it. And sometimes the least amount possible is to start out by paying you nothing, acknowledging nothing, and letting the lawyers take over, if it even gets that far.

For big corporates, it's a matter of attrition. When they take somebody's technology from outside and incorporate it inside some product or service and don't pay for it, they're inviting you to do something about it. But most times, people don't have the money. Who has the money to go sue Apple? Who has the money to go sue Microsoft for something? They will crush you with legal fees. So most people don't even start. And if you have enough money to go sue, they'll employ a pattern of attrition against you. They'll make it a very expensive lawsuit with lots of discovery process and so on and the lawyer bills will ratchet up on you.

Robert J. Marks:

Explain discovery, because that's a big part of litigation.

Hal Philipp:

It is a huge part of litigation. So discovery is when your opponent gets to come in and search through your file cabinets for everything and anything. By the time they're done, they'll know the color of your underwear.

Robert J. Marks:

Okay.

Hal Philipp:

Almost literally. They'll see your receipts for everything. They'll see letters for everything. They're entitled to all this stuff. And if you don't give it to them, the judge will throw the book at you. So you have to give them what ... And now your lawyer can contest what they're trying to discover, but if it's in the least, possibly even minutely related to the case at hand, they will end up being entitled to it and you'll have to fork it over. And it could be very embarrassing to you, by the way. There's no guarantee of any privacy unless there's a secrecy order clamped around the case, and that's not a given.

Robert J. Marks:

Okay. In the lawsuit I was in, they did clamp security around everything. So I guess that is something that could happen. So basically your advice to budding inventive entrepreneurs is to make sure you have the foundation before you launch, to have the foundation legally, experientially and other ways. Financially, I guess

Hal Philipp:

Financially is a big one, yeah, absolutely, if you're going solo. And the point is, as a first venture, don't go solo. I mean, learn at the feet of somebody else who's doing it or somebody else who's risking their money. Learn the ropes. By all means, be involved. Do the 80 and 100 hour weeks. By all means, do all those things, but try not to risk your personal life for it. So learn, but do the big risk a little later in life when you have a little more wisdom, a little more knowledge of how the process works.

Robert J. Marks:

And where would a budding entrepreneur go for this foundation? If I was a garage guy, putting together some sort of great invention, I don't know if there's anywhere you could go in order to get that foundation. It's almost a hopeless situation.

Hal Philipp:

No, you can find another company started by some other entrepreneur who has made a success out of themselves. You can get in league with somebody who has trodden that path before. There are, I think, many entrepreneurs who have been through that path who would have an open mind about forming a joint venture or starting a company together with you, or funding or mentoring you. I think that's very possible to do.

But if you can become a part of another startup, that's not necessarily of your idea, but just to learn the ropes of what it's like to start a company and to run it and to do all the things that go along with that, like marketing, everything else. Do that first and then start a company a little later in life with your own ideas.

Robert J. Marks:

I know that Peter Thiel has this thing called the Thiel Scholarships, where he gives people big bucks not to go to college, but to rather become entrepreneurs. But immediately they are backed with finances, they are backed with legal expertise, and so they have all of that.

Hal Philipp:

That's great. That's fantastic, really fantastic.

Robert J. Marks:

Too bad there aren't more of those.

Hal Philipp:

Correct.

Robert J. Marks:

I think there's just a handful a year.

Hal Philipp:

But the mortality rate is what I was trying to say there of startups is huge. It's probably 80, 90%. And everybody thinks that they can do it better and they will succeed, otherwise, you wouldn't become an entrepreneur. Of course, you think you're going to succeed and be a smash success and make billions of dollars. Everybody starts out thinking that way. But the fact of the matter is maybe 10, 20% at most become successful.

Robert J. Marks:

Okay. Yeah, you were mentioning a lot of young entrepreneurs, including yourself, are a little naive-

Hal Philipp:

Very naive.

Robert J. Marks:

... in what you were doing.

Hal Philipp:

When I started off, I was extremely naive. Knowing what I know now, I wouldn't have done what I did.

Robert J. Marks:

Okay.

Hal Philipp:

No way.

Robert J. Marks:

Well, let me change the topics a little bit. One of the things that the Bradley Center does is report that there are things that people can do that computers will never be able to do. One of the big ones is creativity. And going back to the work of Roger Penrose and Hadamard, who wrote a book about it, Hadamard the great mathematician, that creativity in the human mind comes in little flashes of genius. Roger Penrose talked about the idea that creative ideas would come to him, not in thoughts, not in images, not in words, but they would come to him and boom, there they were. Now, it might take him a day or a week or even longer to work out the details, but they were just implanted in his head from somewhere. And this is probably something that computers will never be able to do.

You and I have talked about this a little bit, and you've had epiphanies. Some of the ideas that you've come up with have been kind of flashes of genius. Okay? Could you relate to some of those and where you've had the flashes a genius?

Hal Philipp:

Yeah. It usually comes late at night in bed trying to get to sleep. I'm sort of tossing and turning, but I've got problems on my mind. I'm thinking about the workload or the work that I did the day before, and I've got a problem to solve, and suddenly something just pops in my head. And that's happened on

several, well, at least two occasions that I remember, and I think more. But I was very busy during that time, so I'm probably not remembering everything. But yes, it sort of pops in your head. It comes from out of nowhere. It's really weird.

Robert J. Marks:

Do you have some specific anecdotes?

Hal Philipp:

Well, I have two, but depending on time here, I guess the first one was an optical sensor, which actually we co-authored and presented a paper on, you and I, called the, what was it called again? The Optical-

Robert J. Marks:

Light Bridge.

Hal Philipp:

... Light Bridge. That's right. The light bridge sensor. And the basic idea was to create a virtual summing junction for photons, which of course is impossible in practice, but in a virtual sense, you can do that. Considering light as AC light sources, as alternating light sources, you can create a virtual summing junction. It was really a flash of insight that let me do some things with optical sensing that couldn't otherwise be done.

Robert J. Marks:

But you were saying that you needed dark-ons. You needed the opposite of photons.

Hal Philipp:

Yeah, you need to think about negative light.

Robert J. Marks:

Which is-

Hal Philipp:

What is negative light? There's no such thing as negative light, right? I mean, you can have darkness, which is the absence of light, but that's not negative light. So this thought process, this thought experiment required negative light, in other words, light that would cancel out positive light.

Robert J. Marks:

And you figured out your epiphany was how to get rid of this.

Hal Philipp:

Yeah, the epiphany was that I didn't need to actually create dark-ons. I just had to take an existing light source and pulse it off.

Robert J. Marks:

I see.

Hal Philipp:

Yeah. And that was a patent that generated a fair amount of money for me over its lifetime.

Robert J. Marks:

And you used it eventually for the garage door opener. Not the garage door opener.

Hal Philipp:

Automatic doors.

Robert J. Marks:

Automatic door openers, and the faucet-

Hal Philipp:

Faucet sensors, yes.

Robert J. Marks:

... that detected the hands underneath the faucet.

Hal Philipp:

Correct.

Robert J. Marks:

So do you remember how it popped into your head? Was it just kind of a vague idea? To what degree was it developed?

Hal Philipp:

It pretty much just popped in my head.

Robert J. Marks:

The whole thing?

Hal Philipp:

Yeah.

Robert J. Marks:

Nikola Tesla talks about when he invented, I believe it was the brushless motor, that it kind of popped in his head while he was walking along. And the whole idea was there fully formed, and he stopped and smoothed off some dust and actually wrote a schematic of what was going on in his mind. So that was the way it was with you too?

Hal Philipp:

Yeah, it was, but I would say it happens, at least for me, in the context of I had to solve a problem. So if I didn't have a problem to solve, it wouldn't have popped in my head because it wasn't on my mind.

Robert J. Marks:

Sure.

Hal Philipp:

So it just popped in as a solution to a problem that I'd been working on for quite a long time. So it just magically, there it was, and it was like, "Oh, yeah. Yeah, that'll work."

Robert J. Marks:

That'll work.

Hal Philipp:

It did.

Robert J. Marks:

Friedrich Gauss, the mathematician, also had a situation like that where he woke up in the morning and he just had an idea. It was a problem he was working on, but he was really surprised that his solution was nowhere in the area that he was thinking about. It was brand new, totally outside the box.

Hal Philipp:

Well, that's even more remarkable.

Robert J. Marks:

Yeah, that is even more remarkable.

Hal Philipp:

So you have another anecdote. You said you had two, what was the other one?

Well, the other one was capacitive sensing. So in that area, I was trying to figure out how to lower the cost of the capacitive sensing technology that I had patented. There were these very small eight pin microcontrollers that were available. You could buy them for about 30 cents, really incredibly cheap, and you could put your own software inside and turn it into whatever it was capable of doing.

So the question was, could I turn that into a capacitive sensor somehow with almost nothing, no external or extra parts involved? And that was also late at night, lying in bed, tossing and turning and mauling over the problems of the day and what I had to do tomorrow, and just suddenly materialized. That one I remember more because that was a more immediate epiphany than the first one, the optical sensor.

So this happened in about 1996 or early '97, and yeah, it just popped in my head. It was the most amazing thing, and it worked. It went against everything that the chip manufacturer told you that you could do with that chip. But I knew a little bit more about how the chips operated inside that the manufacturers weren't telling people. So I did cheat in that regard, well, it's not really cheating. I had that additional bit of knowledge, and that let me know, almost immediately when it popped in my head, yeah, that'll work, that'll work. And I tried it the next day. It was easy code to write to get us to do that, and it worked immediately. So that was very cool. And I also knew at the same time that that would make me wealthy.

Robert J. Marks:

Really?

Hal Philipp:

Yeah. I knew. The next thought I had after I thought of that lying in bed was, this is worth millions and millions and millions.

Robert J. Marks:

Wow.

Hal Philipp:

I knew it immediately. And it was. That was a correct intuition.

Robert J. Marks:

And so that was a very successful piece of technology for you?

Hal Philipp:

Yes, very, very successful. That really powered the company forward.

Robert J. Marks:

That is amazing. Hal Phillip, thank you for spending this last few podcasts with us. What an amazing story you have. When can we expect your book?

Hal Philipp:

Okay, let's leave it at that.

Robert J. Marks:

Okay. We don't want to go there?

Hal Philipp:

We don't want to go there.

Robert J. Marks:

We want to go there. I'm trying to encourage Hal to write a book, but he's a little bit reluctant. And with all of the challenges that he went through, I can understand that. Well, that concludes our time with Hal Phillip. What a wonderful venture, all the things we've learned. So until next time on Mind Matters, be of good cheer.

Announcer:

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