

Jeffrey Funk on AI, Startups, and Big Tech

<https://mindmatters.ai/podcast/ep230>

Robert J Marks:

Greetings. Welcome to Mind Matters News. I'm your fiscally solvent host, Robert J. Marks. How is artificial intelligence doing as a business? AI is hyped everywhere, but is it doing well in the marketplace, or is it a bubble? The status of artificial intelligence should not be judged by click counts on the web, or all these Chicken Littles who wave their hands for attention screaming that the sky is falling. Technology is ultimately judged by reduction to practice. Has the technology found use commercially? Has it found use industrially? Or possibly in the military?

Right now it looks like AI is a bubble. How big a noise is it going to make when the bubble pops? That remains to be seen. Recently, Google's parent company stock dropped sharply when it's AI chat, Bard, gave wrong factual answers. And I don't know why anybody is surprised with this, because anybody who uses large language models like ChatGPT knows not to trust the facts generated by the AI. These chatbots are not trained using meaning, but they are trained, rather, using syntax.

Nevertheless, ChatGPT, for anybody that's used it, is really impressive. It helped me to write a bunch of articles. I wrote something which was kind of clunky. I said, that was clunky. I gave it to ChatGPT, and I said, "Rewrite this for me". And it did a pretty good job. I had to edit it a little bit. GPT-3 has, or ChatGPT has been used to pass MBA exams, and so it does some pretty interesting stuff.

Our guest today to talk about technology companies and the marketplace is Jeffrey Funk. He is a consultant on business models and the economics of new technology. He has served in professor positions at the National University of Singapore. Hitosubashi. How did I do, Jeffrey? We practiced this before we started to talk.

Jeffrey Funk:

Hitosubashi University.

Robert J Marks:

Hitosubashi University. My, oh, terrible Japanese. Also, Kobe University and Pennsylvania State University. His book, published by Stanford University Press, a pretty prestigious publishing group, is called Technology Change in the Rise of New Industries. Jeff keeps his fingers on the pulse of the impact of new technologies, and he is a frequent contributor also to Mind Matters News. Jeff, welcome.

Jeffrey Funk:

Thank you. It's good to be here.

So a little background on myself. I got my PhD back in 1984 from Carnegie Mellon, which was during the second wave of AI hype. So the first wave is fifties and sixties, and during the eighties, there was a lot of hype about expert systems. And I was part of that hype because I did my dissertation in the faculty of engineering on the economics of robots.

So these expert systems were supposed to play a major role in reducing the cost of programming robots. And at the time, I believe robots were going to take over the world, and well, they've diffused somewhat slowly over the past 40 years. Remember, this is 1984, and a lot of the things that people get

excited about now, I assume they would be available for 1990 because that's what my professors told me. And of course, I believed in my professors.

And instead, it's been very slow. Not only robots, but AI. We're now kind of on the third wave of hype, neural networks. So neural networks began to replace expert systems as the preferred method for AI as Moore's Law proceeded. So a lot of people look and they think, "Oh, all this ChatGPT, it's so new. It's all so new. Oh my gosh, it's so new, and yet it's doing so well". It's not new. AI is not new. AI is 70 years old. ChatGPT and other generative AI models are based on neural networks, which have become economical through Moore's Law, through this incredible increase in computing power that has been going on since the 1950s. But it's slowed dramatically.

If you look at the cost per transistor, it's not going down anymore. And a lot of cases, it's going up. And if you buy any kind of integrated circuits, like video chips or something, you'll notice that they're a lot more expensive than they were a few years ago.

Robert J Marks:

So can I ask you, is Moore's Law over? Is Moore's law ended?

Jeffrey Funk:

Well, that's generally what the insiders say, and I can show you data on it. Show you data on the rise in costs as we move to what they call these new nodes, these smaller feature sizes. So 10 nanometers, five nanometers, two nanometers. In fact, I just had a visit from a fellow I worked with in Summit Conductor Industry back in 1978. He's now at the University of Rochester. And I showed him the graph. He said, "Yeah, this is true. This is what goes on". So in general, people agree, these people don't want to talk about it. So the AI proponents want to say, "Oh, no, no, no. We're in the early years". In reality, it's very mature, what they're using.

Robert J Marks:

So yeah, the things you talk about in, gosh, since the middle of the 20th century are really true. I know Bernie Woodrow at Stanford was using one of the first neural networks in the late 1950s in order to do things like recognize speech in order to do an inverted broom balancer. Just incredible stuff. But it's Moore's Law which have made all of these recent accomplishments possible.

Now, you were into expert systems. There is a difference between expert systems and so-called connectionist models, which the neural networks would fall under. Could you kind of unpack that? They're a little bit different in their philosophy.

Jeffrey Funk:

Well, expert systems are a set of rules, and whereas these neural networks is based on statistics, it's all about figuring out which word is most likely to follow another word for ChatGPT and other generative models. So they're very different. If you come up with a rule-based system, AI people found it got complex very fast because there's so many rules that are involved. And so the neural networks work better, but they required a lot of computing power. And so the cost of these neural networks goes up a lot as we increase the size of these databases, sometimes they say the number of parameters. So it's the number of parameters in the model. So those are huge. We're talking about billions, hundreds of billions, now trillions coming up. So these are very huge. They're very computing intensive. So as we increase these, as we increase the size of these models, increase the amount of computing power, we increase the amount of costs. So they're going to get very expensive. So people talk about using these ChatGPT for search. Well, if you do that, then the cost of search goes up a lot.

Robert J Marks:

I see. So what do you think about the technologies that exist today? In the paper you wrote, and let's see, I don't have the name of it, but it was as a PACE paper you recently wrote, which was that this hype concerning artificial intelligence is kind of like it's in a bubble. It's in this peak of hyperbole. And with some of these things, we're starting to find out about some of the limitations of these large language models, and you and I are going to talk about that in a little bit.

But you mentioned that many of these tech companies were really kind of facing doom and gloom. Now, this was about a year ago, you mentioned, for example, that Lyft had fallen 70%, video conferencing, Zoom, had dropped 70%. Meta, which is just a big catastrophe, it sounds like, fell down 60%. Netflix fell down 60%. So how has AI doing today as a business?

Jeffrey Funk:

Well, it's hard to say what goes on inside Google and these other big companies, because they don't separate their accounts out for the AI business. But startups, there's no profitable AI startups. There is hardly even any pure play AI startups that have gone public. I think there's SoundHound, C3 AI, there's a few, they're all losing money.

But then startups in general are losing money. 90% of the publicly traded unicorns in the US are losing money. 17 of them have losses greater than 3 billion. I use this 3 billion figure because that is the amount of cumulative losses, and cumulative losses are the losses that add up over time. That's the amount that Amazon had at the peak when it became profitable. 3 billion. So people say, oh, Amazon had big losses, so it's not a problem. But 17 have bigger than 3 billion. And of course, Uber's up there about 40 billion. There's some foreign ones that are upwards of a hundred billion like Kwaisho, a Chinese AI company. So these AI companies, most of them are not public traded, but we know some of the finances from it, particularly the Chinese one, they're losing big money.

So AI is a business that's not doing that well, outside of the big tech companies. We don't know what's going inside them.

Robert J Marks:

Well, first of all, could you define what a unicorn is for somebody that doesn't tiptoe around business very much. What's a unicorn?

Jeffrey Funk:

A unicorn is a startup that's valued at 1 billion before it goes private. So there were unicorns 20, 30 years ago, but it became a popular term in 2013 when, I think her name is Eileen Lee, pointed out that there were a lot of them now in 2013. And since then, there've become a lot more, not only in the US but globally. So by my count, there's about 144 publicly traded, I should say ex-unicorns, because they're no longer privately owned, they're publicly traded.

If you look globally, there's about 3.5 trillion evaluations for these privately held unicorns. That's in addition to the publicly traded unicorns. And if the publicly traded unicorns are losing money, then what do you think about the privately traded unicorns? They're probably losing money, right? That's just a very simple statistical trick analysis that I've done. I've said, taking a sample of unicorns that I've looked at, the ones that are publicly traded, 90% are losing money. Well, most likely the privately traded ones are losing money.

And when we look at data, I decided some data from Kwaisho and other Chinese, they're losing money. We hear, for example, a lot of the news about Revolut, this FinTech company. It's generally reported it's

only one of two European FinTech companies, of which there are many, that have been profitable for at least a year. But then it turns out that, well, they're not really profitable. The accountant who did the accounting says, "Well, there's a lot of weird things, a lot of irregularities, so we don't really know if it's profitable". And Revolut says, "Well, we had all this crypto income back in 2021, so we think we're profitable". And of course, anybody's going to be suspicious about this, particularly with crypto dropped in 2022. So 2022 numbers, they're just talking about 2021, the 2022 numbers they're definitely going to be losing money.

So we look at this kind of data and we say, well, wait a minute. Let's not get too excited about all of these AI startups. We know all the others are losing money. Why are we thinking that AI is going to make big money?

Robert J Marks:

So you talked about the creative accounting. I think I read somewhere that Deep Mind, which is owned, I believe by Google, was losing money hand over fist. And then maybe it was two years ago that they showed a profit, but if you look closer at the profit, all of their customers were Alphabet associated companies. Alphabet is the parent company for Google, so they were kind of selling to themselves in a way, in order to make the books look better. That's the sort of thing you're referring to as far as this creative accounting that makes some of these things look better. Is that right?

Jeffrey Funk:

Well, that's part of the story, but that's not the worst ones. The ones with Revolut are worse because...

Robert J Marks:

Okay, Revolut, how do you spell that? Revolut.

Jeffrey Funk:

R-E-V-O-L-U-T.

Robert J Marks:

Okay. Revolut.

Jeffrey Funk:

Yeah.

Robert J Marks:

Okay. And that's a company where?

Jeffrey Funk:

In the UK.

Robert J Marks:

UK, okay.

Jeffrey Funk:

But you're right, they're selling to themselves. We don't know what the transfer price was. It's all uncertain. What we do know is that Google said about five years ago that it had completely used AI to completely transform data centers and reduce the energy cost by 30%. And then later they rescinded that, retracted that statement.

You have a lot of this stuff that people forget about. These kind of creative accounting, creative statements that people at Alphabet and Google have said, and that make me suspicious. I'm sorry. I'm an old man. I'm 67. When I was young, and when you were young, when somebody told a lie, we said, "Okay, I'm not going to believe this person much anymore". And that's what Google has been doing. They've been stretching the truth here and there. And yet, people are so willing today to jump on the hype and to forget about the old exaggeration. And I like to come back to some of the other exaggerations with AI in a moment. But the media forgets about it and jumps on this bandwagon of, "Oh my gosh, AI is going to put everybody out of work".

Robert J Marks:

One of the things about the short-term memories, I think, at least for me, some of the social media that we have out there is causing my memory to become shorter and shorter. So I'm wondering if all this social media is having these investors have short-term memories. Where does that go? We're also seeing this in politics where you don't remember lies for a year or two, it just kind of goes away with whatever the current news cycle is. So it's something similar, isn't it?

Jeffrey Funk:

Yes, it is. And I know, social media's very interesting. I get people all the time telling me when I give them something that happened a year ago, "Well, that's old news". Everything is changing so fast, right? This is part of this argument. Everything is changing so fast that none of that stuff in the past matters. And you wonder, well, what's changing? Productivity growth is slowing. VR, AR, blockchain, delivery drones, a long list of technologies that aren't diffusing. What's changing quickly? You want to ask what is changing quickly that causes people to think that, "Oh my gosh, it doesn't matter what happened in the past". Everything is changing quickly. It's only matters what happened yesterday.

Robert J Marks:

What do you think about the introduction of blockchain and its use. It's very clear, I think, that non-fungible tokens went belly up. I don't know. Is blockchain making an impact outside of crypto?

Jeffrey Funk:

Well, when you look at the market size for Blockchain, it's a few billion. It's not big. When you try to find a really successful application, there doesn't seem to be any, there was a report given to the UK Committee on Science and Technology that said they couldn't find a single successful application. There's been all these cancellations by Marist and IBM over the last couple of years. And basically the problem with blockchain is that it's too intensive. You're basically, if you want to have this complete transparency and have every transaction remembered and shown in some account, some screen, you have an enormous amount of computing power required. So in order to get around that, IBM and Marist and some of these companies, well, they would say, okay, we're not going to show them all. We're not going to repeat them all. We're just going to be selective.

So right away, this transparency and decentralization starts getting thrown away. And despite that, despite throwing away some of this transparency, they're quitting. They're quitting the Blockchain.

Robert J Marks:

So you think the Blockchain is falling out of favor now?

Jeffrey Funk:

Well, there's a core group of people who support it. This is the thing, you pick any technology, and there's a core group of people who will keep publishing articles on it, and they pay websites to publish it, or they have their own website and they just keep pushing it out. They'll keep pushing it out. And it never goes away. So even though companies aren't implementing it, there'll be somebody in the background who keeps pushing out these articles so that we think that, "Oh my gosh, it's still going on", when it hasn't. This is something that's very different from 20, 30 years ago. 20, 30 years ago, there was a small number of news sites, a small number of television stations, major newspapers, television news stations. Now it's infinite. And so if you want to keep the hype going with something, you can do it. All you need is money.

Robert J Marks:

Doesn't it boil down to, though, Jeff, that it is reduction to practice? And in order to assess the success of any technology, one has to do what you do, which is to look at the market and actually look at the profitability of these companies as accurately as you possibly can. And if there isn't the reduction to practice, if there isn't the profit and there isn't the use of the technology in a widespread manner, then well, after a while, you got to give up on a technology, I believe.

Jeffrey Funk:

Well, I agree a hundred percent. So I have a very different approach from many people. A lot of the very optimistic forecast about AI and robotics 10 years ago came from people looking at, well, is there a startup offering this product or service? Is there an academic paper describing this product or service? And so the Rise of the Robots and Eric Jolson's books and World Without Work, these kinds of books came from people looking for examples of something in an academic paper, maybe a patent, maybe a startup was offering. They never took it to the next step, which was, is it succeeding? Is the startup succeeding? Is the technology being used and they're happy customers?

This is the way that people looked at it 40 years ago. And now the academics have this new kind of approach where they use a very quantitative approach and everything begets. There's a black box, basically, because that's popular in academia, doing very empirical research, because that's supposed to be objective. And then what happens is that all the assumptions and everything get hidden inside there, but there's this fancy result that says, "Oh my gosh, robots and AI are going to take over the world".

When in reality, if you look at the assumptions, they're wrong. Just because a paper was published, doesn't mean something's going to happen in the next five or 10 years. If that was true with the 3 million papers published in the world, our world would look completely different from it did five years ago, because there'd be so many new products and services coming up, but they're not. Productivity growth has been slowing. We look outside, we look in our houses, things aren't that different from what they were 10 years ago, 20 years ago, 30 years ago. Look in your house, well, you see a better television, but outside of that, and a computer, things aren't much different.

Robert J Marks:

Well, let me offer you a few other examples. Yeah, you mentioned the TV, but now we have these incredible cell phones, we have GPS, we have Uber services. So there are some things which have made impact on how we live day-to-day aren't there?

Jeffrey Funk:

No, I should have thrown in phones, because yes. So anything associated with computing, anything associated with Moore's law, mobile phones, computers, also with liquid crystal displays. So that was a great innovation. So that's impacted on televisions a lot. Even OLED, so organic light emitting diodes, people make displays from those. They're a little thinner, they're more flexible, so you can have foldable phones. So that's one of the biggest innovations, I think, of the past five years. And I think you're going to see many people using foldable phones in 2030. So there are at these innovations there, it's just that, not that many, right? Our refrigerator isn't that different. Our couches, our beds, our water heaters, a lot of stuff, it's very similar. Houses are built the same way.

Robert J Marks:

Yeah, I've heard it said though, Jeff, let me push back a little bit, that there are certain technologies that reach a point where further improvement is not necessary. One of the examples that I've heard is the common screw. You know, you have the screw, and it's been that way for the last few decades. You go with the Phillips screwdriver and you have one way screws and things like that. But basically that technology has remained exactly the same because it's reached the pinnacle of it of a juice. There are no more innovations that one can use. So maybe some of our technology has reached that plateau where it shouldn't be improved. Maybe there is no improvement that could really make a big difference.

Jeffrey Funk:

Well, I agree that performance speaking, that a lot of technologies, they mature, they don't get any better. But cost reduction, think about houses getting cheaper, thinking about cars getting cheaper. All of these things are important. Think about healthcare getting cheaper, think about education getting cheaper. So there's a lot of people in the world who don't have a lot of money. They depend on things getting cheaper. If things don't get cheaper, they don't have them. And a good mattress doesn't get cheaper, but I'll tell you, a good mattress is really important. It really impacts on your sleep. And yet most people don't have access to good mattresses. So we wish we had a technology that would make beds cheaper and so that people could sleep well at night.

Robert J Marks:

Yeah. Well, we're going to talk at a subsequent podcast about education and the fact that education is not getting cheaper, and one of the reasons is you got to pay all these great high publishing professors, right? You got to pay them the big bucks.

Jeffrey Funk:

Yes you do.

Robert J Marks:

So that's what happens there. One of the things you mentioned in your paper, and we're going to put a link to this on the podcast notes. It was called Web3, the Metaverse and the Lack of Useful Innovation. This is kind of a new topic, but you pointed out, and I thought this was very interesting, that some of our new technology today is really not improving life across the spectrum. That if we looked at some of the older technology and technical innovations, it helped everybody. This would include this, this is from your list, running water, electricity, mass production, the telephone, the automobile. I would even include cell phones. If you go to Haiti today, all of the people there, even though the average income, I think, is a dollar a day, most of the people there have cell phones. Even the cell phones have improved

life across the board. But I think your point is, is that we don't see this help across the board for technology being developed today, right?

Jeffrey Funk:

Yeah. So mobile phones is a good example. And by the way, I was heavily involved with... I lived in Japan around 2000 when Japan had the first successful mobile internet services. So I was a big pusher of this in saying that there was a lot that the West should be thinking about, because it took a long time for the West to have successful mobile internet services. Japan was the first, Korea was the second, around 2000. But it took a while for the rest of the world to catch up, and it took until the iPhone. But I was back in the 2002, 2003, 2000s talking about how this was needed. I remember Americans telling me, "No, no, no, no, that's just because they don't have a good PC internet, so they're going to use a mobile phone, but they'll soon quit that and move to the PC internet".

And I also, in 2004, gave a presentation arguing that the future was these apps, because with an app, you could download a lot of data at one time and then read it, read news or do something for a long time, before we had to download again. And I wasn't the only one. There were lots of people in Japan who saw these apps as the future. And so I was an optimist then. That's when I was very, very optimistic. And people were telling me, "No, it's not going to happen". It happened. It happened.

But after the iPhone, well, you had the iPad, you had a few other things, folding OLEDs displays and folding phones, but not many, not many. And I began to become pessimistic when I was teaching this course at National University of Singapore that was dealt with the economics of e-technology. So I covered all kinds of technologies from superconductors to quantum computing, a whole set, to more just general IT. And I began to see that I had updated the slides each year, and I'd realized that there wasn't a lot of improvements in admitting these technologies. Wasn't a lot of progress. So I gradually, between 2012 and now, I began to become pessimistic, and so now I've become very pessimistic. But it started back 10 years ago.

Robert J Marks:

So I'm wondering, you mentioned quantum computing. I know that there's people at the Hudson Institute, for example, that are Chicken Littles, are running around saying, "Oh my gosh, we have to be aware of quantum computing", and things of that sort. I remember quantum computing being discussed in academia, I don't know, 30 years ago, what's happened? Do you have any hope for the future of quantum computing? You hear these press releases that they have so many cubits, hundred cubits or whatever, but I don't see them having the impact that everybody says that they're going to have. What's your feeling about quantum computing? Do you think there's going to be a breakthrough there?

Jeffrey Funk:

Well, I think that I'm more optimistic about quantum computing than almost any other technology, because there is progress.

Robert J Marks:

Really. Okay.

Jeffrey Funk:

So you talk about the number of cubits, that's progress. That's progress in the number of cubits. I don't see the progress in all these other technologies. So I have a book that I'm finishing now that deals with big promises, small results. It deals with all kinds of technologies, all kinds of startups.

Robert J Marks:

Is that the title of it, by the way? Jeff? Big Promises, Small Results.

Jeffrey Funk:

It's still undecided, that's kind of...

Robert J Marks:

By the way, that's a great title. I was going to say, man, that resonated with me very nicely. But go ahead.

Jeffrey Funk:

So it covers a lot of technology, all the technology we've talked about today, but all the ones that are being discussed by the media today. And I don't see the progress in these technology. That's what makes me pessimistic. It's not because I hate technology, it's because I don't see progress. When I was optimistic about mobile phones 20 years ago, I was optimistic because I saw progress in Moore's Law. So all of that progress helped the app store become possible, because in order to download apps, you need lots of memory on phones. And so Moore's Law helped that memory become available. That's why I was optimistic.

So I'm optimistic about quantum computing because I see much more progress there than I see in other technologies. But it's going to take a while. The thing to remember about quantum computing is that most people say that it's mostly going to be used for science, to do science better. So it's in cases where you need a lot of computing power, much more computing power than that we have available now with conventional computers. So it's going to be for science. So once it starts being used, it'll still be a lag before we see anything useful, because it has to not only become useful to scientists, it has to enable the scientists to develop something, some new science, and then that new science become new products and services. That's decades away. It's decades away.

Robert J Marks:

Right, back then, 30 years ago, they were talking about Grover's algorithm and Shor's algorithm for accelerating search and cracking encryption and things of that sort. So we've had these problems around for a long time, and it's going to be interesting to see what other algorithms they can actually come up with to use in quantum computing.

So yeah, I'm a little bit more pessimistic, but we will see, and I do know that some of the quantum cubits that they're coming out with are the last, I talked to Eric Blair, he's a professor in our department that teaches a graduate course in quantum computing. He said that some of these new technologies with these cubits are using cubits that aren't entangled together. They're kind of used disjunctively instead of conjunctively. And that's kind of a trick to get the number of cubits upwards, but we'll see. So the jury is still out, so hopefully we'll be able to see some of these stuff in the future.

So thank you, Jeff. We've been talking to Jeffrey Funk. He is a consultant on business models in the economics of new technologies. Thank you for joining us in Mind Matters News. Until next time, be of good cheer.

Announcer:

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