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KFL: Kai-Fu Lee

Transcript:

AC: Welcome, everyone. Thank you for tuning in from around the world to hear a talk by the world renowned artificial intelligence expert, Dr. Kai-Fu Lee. My name is Anne Chao, and I'm the executive director of the Frank and Cindy Liu Distinguished Visitor Series. Thanks to the generosity of Frank and Cindy, the Liu Lecture Series feature leaders who have been influential in Asia related realms such as government, business, law, medicine and the arts. This talk is co-sponsored by the Chao Center for Asian Studies, the Liu Idea Lab for Innovation and Entrepreneurship and the Ken Kennedy Institute at Rice University. Now, I would like to introduce Dr. Yael Hochberg, who is the head of Rice Entrepreneurship Initiatives.

YH: Thank you, Anne. On behalf of the Liu Idea Lab for Innovation and Entrepreneurship at Rice, the Chao Center for Asian Studies, and the Ken Kennedy Institute, we are delighted to welcome all of you to tonight's distinguished visitor series lecture by Dr. Kai-Fu Lee. The Liu Idea Lab for Innovation and Entrepreneurship funded by the generosity of the Liu Family Foundation is honored to be able to co-sponsor this fascinating event. Lily which serves as the Center for Entrepreneurship education at Rice is proud to hold the ranking of number one graduate entrepreneurship program in the US and has been consistently ranked in the top 10 graduate entrepreneurship programs for the last decade. The lab also hosts Rice's new undergraduate entrepreneurship minor, and an array of programs for Rice students, faculty, staff and the broader community. We invite you to find more information about Lily's programs and offerings at entrepreneurship.rice.edu. I'll now hand the floor back to Anne Chao to introduce our distinguished speaker.

AC: Thank you, Yael. I also want to thank two individuals who generously donated their time and expertise to enable tonight's lecture to be streamed on multiple platforms: Mr. Steven Li— Li Fanghe of JD capital, and Mr. Davy Wang— Wang Yi of Tencent.

Now, it is my great honor to introduce our distinguished speaker Dr. Kai-Fu Lee. Dr. Lee is currently Chairman and CEO of Sinovation Ventures, a US $2 billion dual currency investment fund and president of Sinovation Ventures Artificial Intelligence Institute. His stellar career includes having been president of Google China, and having served in senior executive positions at Microsoft, SGI, and Apple. Dr. Lee received his bachelor's degree from Columbia University in computer science and his PhD from Carnegie Mellon. He holds honorary doctorates

from Carnegie Mellon and the City University of Hong Kong. He is also the co-chair of Artificial Intelligence Council, the World Economic Forum Center for the Fourth Industrial Revolution, and a Fellow of the Institute of Electrical and Electronics Engineers. Dr. Lee has 50 million followers on social media. A giant in the field of artificial intelligence, Dr. Lee built one of the first game playing programs of Othello and defeated a human world champion player of the game in 1988. He also created the world's first large vocabulary, speaker-independent, continuous speech recognition system. He founded Microsoft Research China, later renamed Microsoft Research Asia, which trained a generation of AI leaders in China, such as the Chief Technology Officers in Baidu, Tencent, Alibaba, Lenovo, Huawei and Haier. During his time with Apple, Dr. Lee led AI projects in speech and natural language, which were featured on Good Morning, America. He has authored 10 US patents, and more than 100 journal, conference papers. His book, "AI Superpowers, China, Silicon Valley, and the New World Order" was on the bestseller list of both the New York Times and The Wall Street Journal. Now please join me in welcoming Dr. Kai-Fu Lee.

KFL: Thank you very much. It's an honor to have a chance to talk to such a large group of young people, entrepreneurs. So to fit in with the event, I am giving a talk I've not given before, "Things that I wish I'd known when I was 20." So I will chronicle my career, things that I learned, and talk a bit about entrepreneurship, technology, and family values. And in the closing, I'll be happy to take questions about any of these topics.

So starting when I was 20, this– this was a long time ago. I was at Columbia, a liberal arts major in the humanities. This was something I really was glad that I did. Because I didn't know the difference between a liberal arts college and an engineering school. And being an engineer, I ended up in the liberal arts school. But it was a happy mistake, because it was there that I got to read really a lot of the classics and taken a lot of courses that would not have been possible in engineering, and absorbing all this human wisdom and literature made it possible for me to speak and to write; and I think to the extent that I've been somewhat successful as an author and a speaker, a lot of it was due to this decision. At the time since I was in liberal arts, I thought I would be a pre-law; because at the time, being a doctor and a lawyer were the two most desirable professions. However, after about a year and a half to two years, I found that pre-law was just not for me. I was a political science major, and I was falling asleep in class, had not- not really doing very well and really not appreciating all the wonderful things that I knew my classmates enjoyed. So, at the time, I was 20. I made a change and became a computer science major. And sorry, let me make sure I'm still presenting. [Pause] Okay. All right. Yeah. So, so when I was 20, I found that something that I really loved, and it was computer science and artificial intelligence. I was very lucky that at Columbia, I had an excellent professor in natural language and in computer vision and in classical artificial intelligence. And this really fascinated me because as a young engineer and scientist, I wanted to understand how human cognition works. And I thought this pursuit would allow me to do that. And I also found that I was quite good at computer science, unlike political science where I struggled to get B's. At computer science, I hardly had to study and I was getting A's. Probably the only small regret moving on from computer science, was I transferred out of political science into computer science in my junior year, and that was the year Barack Obama transferred to Columbia and became a computer a— sorry— a political science major. So just barely missed getting to know President Obama. But computer science was wonderful. Artificial Intelligence was wonderful. It became the cornerstone of my career.

And that leads to the first thing that I want to share with you, and it's a common saying in, in the West, “do what you love, and you'll never have to work another day in your life.” Many people attributed it to Confucius, many other people say, “there's no way Confucius would say something like that.” For those of you who are Chinese, this is the closest saying from Confucius that I think matches it. And I think there's a lot of wisdom in that. Because if you're doing what you love, you will be thinking about it when you're sleeping, showering, eating, and you can't help but be successful. And if you do something you love, you'll be good at it. And if you're good at it, you will love it. This kind of virtuous cycle continues. And beyond artificial intelligence and computer science. I found that to be true for many, many other things that– that were, are dear to me.

Then moving onto from Columbia, I went to Carnegie Mellon and studied speech recognition and artificial intelligence, and there's my father trying the system that I built. And I was there at a very critical time: it was a time when expert systems were about to go out of favor. But my PhD advisor, Raj Reddy, a very well known expert, who was very much strongly in belief that expert systems were the way to solve speech recognition and AI problems. He was a wonderful man, tremendous mentor. But I really did not agree that expert systems are extensible. I wanted to pursue machine learning that is teaching the computer using what it's good at, crunching numbers to, to exhibit intelligent behavior; rather than follow step by step, how humans thought. So for the first year, he gave me directions; I wrote a paper on expert systems. It got accepted. It became clear that I could graduate with my PhD and get it over with, and be done with it, and move on to do what do what I love. But I thought deeply about doing things that I love. And I did not love doing expert systems. My intuition was that this was not scalable; this would be fragile. And only technologies that scale with the power of computing, that scale with Moore's law, that scale with more data, can be powerful enough to change the world. So one day I drummed up enough courage and went to my professor and said, "I love you as my advisor. I want to study with you, you're wise and give me great directions. But on this expert systems, I just don't want to do it anymore. Here's the approach I want to take." And I proceeded to explain hidden Markov models, which are a variant of neural networks, and why I think it was a better approach. And the thing that he said to me will stay with me forever. He listened carefully, asked me questions. And then he said, "I don't agree with you, but I support you." And that was tremendous feedback for me that I did not expect I would convince him; and I was prepared for the worst outcome, that either he would force me to do what he wants, or force me to go get a new advisor, but he actually supported me.

And this was not just an act of generosity, and it was not just a respect of individual thoughts, but that he really saw me as a scientific equal, and that I should pursue what I believe in; and that he not only verbally supported me, but he gave me resources. He actually had millions of dollars of funding from DARPA, and it was a lot of money back then. And he let me use all the machines of the people who were doing expert systems. As for those of you who are computer scientists, you know, expert systems don't take any cycles. So I wrote programs that took over all of their computers and ran all night, and achieved great results that persuaded them it could work. And he proceeded to persuade DARPA to collect what was then the largest database for speech, which was also critical to making my PhD thesis work.

So I dedicated my book to him and I called him my mentor in AI and life, because of what he said that “I don't agree with you, but I support you” is not just an act of generosity. It is a management style. It is a leadership style.

It's something that I hold dear to myself. And whenever one of my employees tells me something I don't agree with, this is my default answer. And I truly support them to try what they want. Very likely, they're right; if they're wrong, if they love it, and it's still time well-spent; and if they learn they're not right, then they move on having felt they had the support. So this is really an amazing leadership style.

And, and as I was lucky enough to work at Apple, Microsoft, Google, full of smart people, this is the way to lead smart people. Not to be smarter than them, that's never possible; but to let them know that you understand and support them. There's nothing more important than that about leadership. Fortunately, my PhD thesis did work out, we built the first working speech recognition system. And I then went to Apple and the technologies became a part of Apple Computer. Siri that you use today is now managed by the team that I then recruited. I did quite well at Apple, it was a lot of fun. But then Apple got in trouble. So I went to a company called SGI, no— probably no longer that famous nowadays; but then it was the hottest company to work at in Silicon Valley. It was the equivalent of Google at its height. In fact, Google's building was bought from SGI, that's how cool SGI was. And I had a group of smartest engineers work with me on very exciting new technologies. The technology we work on was called, “3D browser.” Hmm, you're probably thinking I've never heard of that. You talked about “Siri,” I heard of that; “Speech recognition,” I know that, you know; “Neural networks,” okay; but what is a 3D browser? Well, it was an idea that a bunch of engineers had, that wouldn't it be great if we had the virtual reality inside the browser, and we were in- inside virtual 3D worlds, we can navigate, we can move objects, we can build wonderful ads. And we proceeded to build it. It was amazing how, how well the system worked, given how slow the computers were at the time. And we believe strongly that if we build it, they will come— *they* being the customers. And what actually happened was we built it and nobody came. We hardly sold the products. We couldn't— we got a bundle with Netscape browser, but people didn't use it. There was not much content.

And ultimately, a new CEO came into SGI, and he was very upset at me for starting this project and spending so much of the company's resources on it. And I told him, "Look, this is the world's best technology in virtual reality. You don't– you don't want to keep it. We should figure out how to– how to create value out of it." So he gave me a deadline to sell the company. And we originally thought we sell it for a decent amount of money. We eventually settled for a much less amount; we did get it sold. But unfortunately, after it was sold, the company that bought it got into financial trouble. So they laid off all of the hundred engineers who worked on this project with me. And I felt extremely guilty and also extremely stupid that why would I have started the project like this without thinking about utility, only thinking about coolness? This is a mistake that I think a lot of young people make when they want to go into entrepreneurship.

So I would urge all of you listening to be thinking about innovation. Not– not what matters about innovation is not innovation itself, but useful innovation. That, something looks really cool like this picture is actually not only useless but counterproductive. And that has been my model in developing both my research and technology. Now, of course, researchers in universities should not be bound to thinking about utility at the time of doing innovative work. But if you're thinking about a company, a technology, a product, then the utility must come ahead of innovation. In fact, when you start meeting with venture capitalists, you will realize that venture capitalists are taking huge risks by investing– by investing in you. They're taking people risk, market risk, competition risk, and execution risk. They don't want to take a technology risk. So you want to go to them with a proven technology

that already works, and– and you want their money to make it useful and valuable. And that's something that's very obvious today.

I'm sure most of you already know, but I did not. And I think someone with a PhD, coming from academia, may fall into the same mistake. So I thought I'd list that as my third lesson that I would share. After SGI, I moved to China and started Microsoft Research China, which later became Microsoft Research Asia. It was a huge success. MIT Technology Review called it "the world's hottest computer lab." Many of the founders— by the way, I'm having a reunion with them this weekend— became CEOs and CTOs of some of the biggest and hottest and most exciting technology companies in China. I was very lucky that I had a big brand like Microsoft, and the funding to attract great people like that.

Year 2000, I'd be repatriated back to Microsoft Headquarters, had the fortunate opportunity to work with Bill Gates on a number of projects. And it became boring for me after a while, as I saw internet emerge, and Microsoft at the time was slow to catch on internet. The hottest company everybody wanted to work for, at that time was, of course Google. That people would joke that if they didn't get invited to an interview, they must not be very smart. So I thought I had to get myself an interview. So I emailed Eric Schmidt. Many of you may think, "Wow, you're, we're already doing pretty well! Shouldn't that– shouldn't they have poached you or called you or something? Wouldn't it be beneath you to, to contact them and promote yourself?" But actually, that's an interesting small lesson I want to share, also. As it turns out, Google and Microsoft at the time, were in negotiating a non-solicit, non-hire— that agreement never came to fruition. And that agreement would have been illegal had it come to fruition, but they were nevertheless negotiating for months. So they were forbidden from contacting Microsoft people in hopes that maybe a– an interesting agreement could be reached.

So as it turns out, had I not written Eric Schmidt indicating my fascination, respect, and interest in working for Google, I would never have gotten the job. So don't let your own so-called self-esteem get ahead of you. If you want something, go for it, be proactive. That's what I learned. But what I also learned was a very rude surprise, which was that Microsoft decided to sue me over trying to go work for Google; it was over something called "non-compete". I won't go into the details in here. I would just say that many of the accusations made at the time, sometimes by Microsoft, sometimes by various people, and sometimes just by speculative press, were incredibly inaccurate and damaging. There were many, many headlines that talked about, "Is it possible that I might have taken intellectual property?" Of course, I did not. "Is it possible that I may have been compensated to not leave Microsoft?" Of course, I was not. There were talks about, "Did I try to bring people into Google from Microsoft before I left Microsoft?" Of course, I did not. But those speculations persisted.

And it became really the darkest moment of my life during the two months that we were pending for the judge to make a decision. It became so stressful that I could not sleep anymore, that I was frustrated and unhappy, and I could not eat, lost a lot of weight for the first few weeks. And one time, I was so sick and tired of hearing, seeing myself on TV and on newspapers, that I thought I would, on the– on the trip from Seattle to– to New York, I thought I would finally get a rest by going to my– my seats, opening up a magazine, and there was— I was again on the cover, because this was the lawsuit of the century. Probably the corporate lawsuit of the century, because it's two giant— it's David versus Goliath. And it's a very something that news people love to write about. But it

resulted in incredible frustration for me. But what got me out of it was that about two weeks into it, my wife told me, "Look, you gotta calm down and don't be this frustrated. Think about what makes you peaceful and serene." And what occurred to me was when I went to Catholic Middle School in Tennessee, I learned the Serenity Prayer. And the Serenity Prayer is such a three sentences of wisdom. It says, “God, grant me the serenity, to accept the things that I cannot change, the courage to change the things that I can, and the wisdom to know the difference.” And when applied to my lawsuits, it became very clear that the fact that reporters will write what they write is something I cannot change. And what I needed was to have the courage to change the things I can and the wisdom to pick the right ones.

So with that, I went into the lawsuit, thinking about what are some ways to fight back? What– what are some things that I can change? I can change the way the judge sees things. There are all these terrible things in the press. Why don't I get him to see the truth? I, of course, cannot talk to him. And, and my lawyer and my company won't let me talk to the press. But I thought I'd take a chance. There was this reporter I knew from Seattle Times. I know that everyone, Seattle, in Seattle, including the judge, reads the Seattle Times. So I called her and asked if she could write my side of the story. And, and she did, and I think that was a very influential piece. And then I was energized by small things like that, and still faced huge challenges. For example, during the discovery process, I asked for some emails that would prove my innocence. Of course, Microsoft was obliged to send me the emails, but they were not prevented from sending more than I asked for. So they sent me 300,000 emails that I had to sift through. And they not only sent 300,000 emails, but they were not in text format. There were pictures, because that's what legal law allowed them to do. Fortunately, I was at Google. So we had very good OCR technology. We scanned everything, and we use Google Search, and we found all the things I needed to find. So things really changed around when I realized that our time is limited, and we can only focus on things where we can make a difference. If we allow things that we cannot change, to frustrate us, to slow us down, even to stop us, then we're destined for a bad outcome. So this was something that was very helpful to get me out of the, a big, big difficult situation.

I spent four good years at Google; I learned a lot. We build a lot of great products. And then Google asked me to stay, stay four more years beyond my original commitment. And at the time I saw that mobile internet was, was blossoming in China. And many of my smartest people have already left from Google. They went to start their own companies, some started VCs, and some of them started very successful companies. Some of the companies you hear about today, were started by my, my employees back then. For example, “Kuaishou” is a company valued at about $20 billion. It's kind of a Tik Tok competitor in China. That was by one of our engineers. And “Pinduoduo” over 100 billion dollars, also by one of our engineers. So I saw people like these left, one by one, and– and very successful in raising money. So what became clear to me was, this is going to be the Silicon Valley of China, back in the days of early Silicon Valley, back in the days where Apple, Microsoft and many— Intel and many great companies were founded. This is the time to be in entrepreneurial space. But it was risky. And I didn't have quite the right experience. And of course, Google made me a nice offer to stay. So how would I choose between the two? And that comes down to another very wise advice. You've probably heard Steve Jobs commencement speech at Stanford. If you have not, I would suggest that you listen to it. In it, he talks about, “follow your heart.” That is, your heart knows the answer. You just need to introspect- introspectively look in and get that answer; and not over rationalize and explain, and, and debate; and believe that if you know your heart and

follow your heart. What happens in your life will be like connecting the dots. But he also warns not to plan your life by connecting the dots forward. Because you cannot know what will happen in the future. If you plan your career by doing job A, job B, job C; and then starting company X, company Y, company Z. That's just fantasy. You cannot connect them going forward. Just make the one decision you need to make, based on what your heart tells you. Years later, you will look back knowing that you, your heart made the right decision because these dots connected. So as it relates to my decision about whether to leave Google and start Sinovation, which is a tech VC, I can show you the thoughts that I drew at the time.

So at the time, I was at Google, at crossroads. I realized that in my life, because I love computer science, I picked it. It wasn't like it was very good for getting a job back in 1980. There were almost no computer science jobs. Doctor and lawyer was the way to go; to if you're a computer science major, you got to go work for IBM or Bell Labs. But I chose it anyway because my heart tells me, that's what I wanted to do. Then I went to Microsoft, and Microsoft China, above all things, something that many people would not do. But I thought this was the company that knew how to build software. And I wanted to learn that. Then I tried. Then I, I tried to go to SGI, and we tried to sell the company and raise money. And I failed at the feet of Silicon Valley venture capitalists. So I learned my lessons, and how they think and what they do. Then I went to Google, which taught me the hardest things about internet, mobile, ecommerce and so on. So I then realized, “Well, I now have just what it takes to become a tech investor.” Not any investor. I wasn't ready to build a SoftBank or a Sequoia. But as a tech investor, investing in early stage companies, I know technology, I can relate to them. I understand what VCs are looking for. And my thoughts were being connected. So this would be my final thoughts relating to Steve Jobs' speech.

I also realized something else I did over the past 20 years. At the time I did this, maybe the past five or six years, I had written seven letters to the Chinese students, because I felt at the time— this was year 2000s— that the Chinese students were not as exposed to a lot of the mentorship and thinking that American students were more privileged to. So I felt an obligation that I should do that. It was something that my heart told me to do. My corporate PR said not to. My corporate PR said, "Who are you to write letters? You didn't even grow up in mainland China." But I thought this would be helpful to people so I did it. And then I gave many, many speeches to a total of maybe 500,000 students. This is face-to-face before the days of Zoom. I wrote about nine books in Chinese; four of which were dedicated for Chinese students about their similar content to this talk. So you can imagine this, these are efforts to help them. And I had 50 million followers on social media. So what better basis and background could one ask for, to be to, to declare myself now, “the mentor to young entrepreneurs,” and because I have been sincere in helping young people. So this is just the natural next step to close the loop on connecting the dots.

So in fact, the first year, we helped about forty people, forty the young entrepreneurs. And many of them came in as engineers, and I taught them entrepreneurship. Not all forty became CEOs, but the numbers are staggering. Here you see the recruiting poster that we created after one year. And the recruiting we had for campus hires was, “join your company.” Meaning: join as an engineer, become a CEO, get our funding and become the next great company. And these eight people— who are, who were more or less randomly picked; maybe just picked under good looks or something— out of these eight, there are now five CEOs of companies valued over $200 million. In particular, the lower left is someone who actually runs Taobao and Tmall today, so about a $40 billion revenue

business. And he runs it inside– inside Alibaba. His name is Jiang Fan, and he was one of the engineers we brought in. So I'm incredibly proud of the work we have done in nurturing these young entrepreneurs.

Then finally, what about connecting the dots for AI? As I told you, I started AI early at Columbia. I applied to CMU to learn AI, lower here you see my— a clip from my PhD application letter. I decided AI would be my life fairly early, while most people at the time laughed at AI. AI was called the thing, that things that never work. Whenever something in AI worked, it would become engineer- engineering, products, technology; if it doesn't work, it's called AI. So we were laughed at for decades. And nevertheless, I joined it because I thought this pursuing how people's cognition works was something that was really dear to me. And I wanted to follow my heart. So I went on to lead the AI team at Apple, at Microsoft. And also I went to learn modern AI at Google. This was where distributed computing, deep learning and using massive technology and TPUs, it really elevated AI to a next level. And reflecting on all the things I've seen invested, I wrote a best selling book, “AI Superpowers.” And we invested in at Sinovation, 50 AI companies, including five— soon to be six, Unicorns, the largest in the world. And we also built an AI Institute of our own AI people. So these thoughts also connected for the age of AI. And, and reflecting back my own AI journey, I pursued it with total dedication. I really loved my work as it relates to technology, AI, whether it was with Apple, Microsoft, or Google, I felt like the luckiest man on earth. And luck— the work was the only thing that mattered to me.

The picture you see on the left, you're probably wondering what it is. That was my bedroom after one of my surgeries. I had a surgery in late 2000s. And I was bedridden— not allowed to leave my bed. At the time, there was no mobile phone to play with. I only had a Blackberry. So I had my company, my team, my IT team, construct this device that allowed me to lie on my back, put the keyboard and mouse, on my stomach and continue to work with a monitor over my head. So I was that much of a workaholic. And I worked alongside— and after Google, I worked alongside the Chinese “996” entrepreneurs— “996” means 9am to 9pm, six days a week, and that's a standard workstyle. Some Chinese entrepreneurs do “007”; that's noon to midnight, seven days a week. I wasn't that crazy, but I was working incredibly hard. And you see all these New York Times headline talking about the crazy work, work hours, that exemplify the– exemplified China. And that's a large extent, I think the reason that– that China has been successful. So I believe the work ethic that was born out of the Industrial Revolution, really brainwashed all of us that working hard was important; and that work define the meaning of our lives. And I became a willing victim to this workaholic brainwashing; and, and that's why I worked so hard, starting in corporate, and then also into Sinovation. And the work has led to many great results. I'm quite proud of the accomplishments of my team and the work that I have done; and also raised some concerns. I was talking to Frank earlier, he asked about, “What about AI is getting so mature, so good that it can take routine jobs and blue collar job, white collar jobs? Should we all be worried about our jobs being taken taken away?” So hold that thought I'll come back to this point. But I want to get back to my life, my obsession with– with work.

That obsession ended about six years ago when I was diagnosed with four stage lymphoma. What you see here was my PET scan, and it shows about 20 malignant tumors jumping out in my intestines area, melting away my ambition and any desire to work further. I was faced with the real likelihood that my life may end in a just– just a matter of a few months. And during that time of ultimate uncertainty, I did a lot of thinking. And I sought a lot of wisdom. I read a lot of books. And I talked to in particular, one very wise person, Master Hsing Yun. He's one of

the oldest and wisest Buddhist monks and priests. And he was very approachable. And he took the time to see me. I spent a weekend before my surgery with him. And he had a— we had a great conversation, about one hour. And he– he basically asked me what my wi- life was about. And all I could say was, “work, work, work.” And he said, "Why do you work so hard?" And I said, "Because I wanted to maximize my impact. Make a difference in the world." And then he said something that really surprised me. He said, "I don't believe you." He said, “Whenever someone says they want to maximize the impact, change the world, I always doubt— are they really doing something altruistically for the world? Or are they just trying to make themselves more famous, trying to get more wealth and fame?” And I could not tell him that I was fully altruistic. And it's the kind of thing that sounds grandiose, that we really tried to fool ourselves. But when in reality, it feeds our greed and feeds our desire. And he left me with the phrase that, “Remember Kai-Fu,” he said, "The richest man is not he who has the most, but he who wants the least." And whenever I feel overcome, again, by desire, I rethink about this; whenever I want to have the urge to change the world again, which I do, I want to separate, “Am I doing it for the world or am I doing it for me?” This was one big lesson that once took too long for me to realize. And through his wisdom, I saw how foolish it was to base my entire self worth completely on my accomplishments and my work. And I also realized that my life was quite out of order. I neglect— had neglected my family in my hard work. My father had passed away, and I never had the chance to tell him that I loved him. My mother had dementia and no longer recognized me. And my kids had grown up, and I really didn't get to know them. And one of the books that I read during my chemotherapy was Bronnie Ware's book about the regrets of people on their deathbeds. And she found that no one wished that they had worked harder, but the single thing they wanted the most— and there are five here, but the number one thing was— Spend more time with their loved ones.

So fortunately, with some sense coming back to me, having learned from Master Hsing Yun and Bronnie Ware, I now am in remission. And that's why I can come here and give you this talk. I've changed my work style, so that I'm spending much more time with my loved ones; I was able to move back near my mother for a period of time, before she passed away, to finally spend with her. And I, whenever my children want my time, I put that as a priority; work must take a backseat. And I travel with my wife whenever she would go with me. So this near life experience really changed how I thought. And, and another thing that Master Hsing Yun told me was that, changing the world was too presumptuous, and maybe a cloak of magnanimity for my own greed. And that he suggests, the thing to do, is to care for others from your heart, and lead your life by giving unconditional love. And it was then that I realized that while I did not give conditional— unconditional love to others; but my family and my friends have done that for me. So I'm really— I've recommitted myself, this is something I would change. And I think, the last few years, I've done a much better job.

And that also leads us back, to the AI taking jobs away, because it gave me a new epiphany, epiphany about how to look at AI and humanity, that AI will beat us at doing all kinds of repetitive tasks. But the type of thing that separates us from AI is *love.* Also creativity, as shown here. AI is good at doing routine things. AI is good at computing, optimizing; but AI cannot create, has no self awareness, and no love. And love is what differentiates us from AI. Despite what science fiction may portray, I can tell you responsibly, that AI cannot love. AlphaGo does not love to play Go, it does not feel good that it beat Ke Jie; it does not feel sadness that it lost the game. In fact, it doesn't know why people play Go at all. So with this idea that the two dimensions that people can do that AI cannot do, our creativity and love, we can rethink about a blueprint of human-AI coexistence.

So if we put creativity on the x axis, jobs that require lots of creativity on the right side, jobs that are more routine and optimizing on the left side; and then love not needed on the bottom, love needed on top; we will see that the lower left jobs are destined to be taken by AI; but all other three jobs are human AI symbiosis. On the lower right, we will have tools, AI tools, helping people to become more creative, helping scientists invent new drugs; on low— on the upper left, we have jobs like doctors and teachers where AI can do the analysis, the diagnosis, the statistics, the root— the work about patient statistics, whereas the doctor is the human interface, making the patient feel better, in confidence that he or she would recover. And then on the upper right, jobs that require creativity and love, only human can do that. So the, what's incumbent us in— upon us in this society is realizing that the largest number of jobs are on the left side. After all, we all wish everyone in the world can be creative, but only a small percentage are. But– but on the left side, we can see that the many people who are on the lower left who might be faced with AI displacement, there is a path that they should move up to jobs that require greater empathy. To give more precise examples, talking about people who work in factories, assembly line, truckers, people who do repetitive jobs, BPO, paper pushing, those jobs will be replaced by AI. But jobs that require human touch and love, jobs that involve a great tourist guide, a great concierge, a great nurse, great teacher. These are jobs of love that only people can do. So migration from lower left to upper left is the path to go.

Give you an example, World Health Organization estimates that about 18 million more healthcare services jobs will be needed in the next 15 years to reach sustainability requirements throughout the world. So a lot of jobs are available. Just because AI is taking the routine jobs, it does not mean it does not mean that there will be no jobs for people. In fact, if we look at the longer term, I would tend to believe that in 30 years, looking back, we would feel that this has been the good, good thing that AI came about. Because it did not, we would not look at it as AI stealing our jobs, but AI liberating us from ever having to do routine job again, allowing us to do things that we love and things we're good at.

So in conclusion, these are the seven things that I learned. I would add an eighth thing now, in having heard my story, what should become obvious to all of you is that I learned the most when I face the greatest obstacle, when I have the greatest failure. It was when my SGI company fell apart that I learned the most important thing then. And it was when I was facing the lawsuit of the century that I learned a tremendous deal. And it was when I was facing death that I learned absolutely the two greatest lessons. So please take with you the importance of failure and learning from failure. Failure is not a punishment on what you didn't do right, but the chance to learn a valuable life lesson. Thank you.

AC: Thank you so much, Dr. Lee, for this wonderful, heartfelt talk, and I think I can speak for the entire audience that we have learned a great deal. And as you were talking, I received a text message that there were about 100,000 people listening to you, I think all over the world and the number was still climbing. We have some wonderful questions in the next few minutes. What AI area can US and China collaborate on now, despite the seasonal political tensions between the two countries?

KFL: I believe academically, US, China, and Europe, the three biggest groups in the world working on AI are still collaborating a great deal. And that has what that is what has propelled the world forward in AI applications.

So I think that will continue and I hope that can continue. Academia is without national boundaries, and people are able to make progress only by standing on the shoulders of giants.

And then specific to industries. I think healthcare would be an excellent one, certainly facing COVID-19 and the issues in dealing with that, whether it's social distancing, contact tracing, or coming up with AI assisted vaccine discovery, that would make another area. And also climate change, and anything I think that's good for the future of humanity would be a good topic for that discussion.

AC: Thank you. The next question, do you think AI will ever be able to articulate why they make certain decisions, aka verbalizing the black box?

KFL: Yes, I think they will. But there's a problem because, you know, we think of our reasons for making decisions as simple if-then-else. And that in some sense is a blessing because of the simplicity. But it's also an inaccurate way to make decisions. Whereas we think of three or five or 10 factors in making a decision, AI thinks of 3000. So when it has 3000 things intermingle in the mathematical equation, it's impossible to articulate it with fidelity. I think in some sense, AI is just too smart and too complex. And even if it could express the 3000 dimensional math equation, we can't understand it. So I think first we have to accept that, rather than criticize the blackbox. Now, now it is completely reasonable in certain domains, such as medical, autonomous vehicles to demand an answer. Of course, we as users, we need an answer. And I think the kind of work that needs to happen are working on explainability and interpretability for AI. The former approach is, take a large neural network that reached a decision, going back and finding the most concise way to approximate why it made the decision in a way that makes sense to people. That's one field of research. The other one is, are there learning methodologies that by definition is explainable when decisions are made? And I do think there's valid reason to work on both. Right now, the AI systems are still largely a black box; but I think for AI to become truly pervasive, we have to overcome this problem.

AC: Thank you. So the next question, I think there are two we can combine into one. What advice do you have for dealing with professional or personal rejection? How does one know rejection the simple roadblock and not a sign of something greater; and in the currents, how do you advise Asian Americans to break the glass ceiling?

KFL: Right um, I think rejection means that you are pushing the limit. It does not mean that you're unqualified. If I've been rejected, I'm sure many of you have been rejected. When you're rejected, find out why. Understand the true reason. Sometimes people if you're applying for a job, sometimes they just give you a form letter. Sometimes they only give you some nice words. Or sometimes they even tell white lies like the job has been filled, we're no longer hiring, when that may or may not be the truth. So be personable, connect to people, whether it's a headhunter HR specialist, or your hiring manager that rejected you. See if you could sit down with them; have coffee with them, understand the true reasons that you were rejected, and only then will you learn what are areas that you need to improve on.

Otherwise, it's like the black box we were talking about. If you're just trying a lot of black box applications, some say yes, some say no, you will never know why. What it is that made you special and what is that made you

unacceptable. And when you know the reasons that they rejected you, you can decide if that's something you can improve upon, or is that the company culture that you don't want to be in. So be inquisitive, be proactive, find out the true reasons. And then that becomes the potential basis for your self improvement plan.

And about the glass ceiling, I think many of the people in this call, if you're living in America, were probably born in the US or moved at an earlier age. I really think there is not that strong glass ceiling. Sometimes when you believe in something, it becomes a self-fulfilling prophecy. You know, we're seeing many Asian Americans do quite well in American companies. In particular, I think Indians have done exceptionally well. And if you think about why is there less so-called— um, or let me not use the word I don't believe in— why there's– there're more success by the Indian Americans in– in their careers. I think I find that the Indian Americans I work with in the US, they are very personable. They're able to connect with people, they try to melt into the society, and they're articulate. I think on the average, some of the Chinese– Chinese engineers focus too much on work, are not as good as at self promotion. I don't mean self promotion in exaggerating, I just mean, letting your boss know you did the work, or letting your boss's boss know that you're the person behind the work; making sure you get fair credit, not excessive credit; and make sure that you realize communication is very important. I think a very famous Greek philosopher once said that, "A person who has great ideas but cannot articulate is absolutely not different from someone who has no ideas." And I find that some Asian-American engineers are very quiet. And they expect their boss to learn about, find out how great they are; but it's really your job to let people know the successes in the work and the contributions that you have made.

AC: That's great. Thank you. Another question, how do you see AI reshape the real estate industry in the next decade?

KFL: I think real estate is probably one of the not so early industries to be disrupted by AI. I think certainly AI can be used as a tool to estimate prices and to find the right piece of land, and things like that. It's not so fundamentally a part of AI. When you think about an industry or on whether it's a fit for AI, think about— do you have a large amount of data? And does that data connect to some very important objective function? Something that you can learn and get better over time. So, you know, when you think about real estate data, you know, having a couple of apartment complexes or a couple of malls, that doesn't help anything. The only data that's really large enough is data that's available, you know, Zillow, or companies like that. So using that to make projection, I know one company that is basically has an order for— let's say, they build a software to build a modular building. And what they would do is not only find that use AI to find the most suitable and low price materials to build a modular building; but also identify a site that fits the module, considering the price of real estate. So those are the kinds of things where this can fit. But I'm not sure anyone thinking about disrupting real estate with AI will, will find good entrepreneurial ideas at this time.

AC: Great. I have two more questions. I know you have to leave sharply at your time, 9:30. And the question is a scholar who's interested in literary accounts of AI. He said right now, there's a lot of writing about AI feeling emotion. He recount— this person recalls accounts about AI that can simulate love, empathy, and he was wondering if this kind of performance of love-empathy is a technical technology that you see will continue to advance in AI?

KFL: Yes, well, we should separate empathy, emotion, love into three different buckets. I think one, is being able to perceive it; second is able to fake it; and the third is to be able to feel it. Okay. So today, AI has actually made leaps and bounds of progress on perceiving it. In fact, I think I would not be surprised if the use of facial expression can— recognition and conversational agents and recordings of videos becomes an important part of forensic evidence. I think it can be a more powerful tool than a lie detector. Because the micro expressions that we– we show our face when we feel emotion, whether it is sincerity, or lying, or happiness, or love, or sadness, or anger, are really captured very, very well by AI, and better than most people. Obviously, there are people who are great at it, who are better than AI, but AI can do that quite well. And that's kind of one aspect. Obviously, some people will– will be spooked by these kinds of applications, but I'm just describing the capabilities of reading people's faces and expressions and feelings. That's quite advanced.

So obviously, if you can read it, you can execute it. Right. So there will be good progress in avatars that look like they have feeling. Mo— when you see today animation that looks like they have feeling— most of it is still from motion capture, that is, putting sensors on my face and having me say something with emotion and having the avatar do the same. But there is now beginning to be true synthesis of emotion that appears relatively real. But the problem is, you know, telling a 3D avatar, say this with happiness or say this and then cry, is not feeling. It's not true emotion, not true feeling. It is really acting. Think of AI as becoming better and better watchers of emotion and actors of emotion. But there is truly no feeling inside AI; it is simply following the instructions of a person to do something. And, and I have seen no evidence that software code can have emotion at this time. And I personally would like to think that there's still something special about our humanity and our souls. And that lies in the way we feel. And that it may very well be the case that AI will never capture that. In fact, if AI someday truly captured that, then I think we also need to question, what is it that makes us special as humans? So I think progress is being made but have, do not be overly worried that robots with feelings are coming out anytime soon.

AC: Thank you. So time is up. There's one question from a gentleman of South Africa, it's 3am there, and I think I just got the number you now have 350,000 people watching this particular talk. His question is a little more involved, but perhaps we can send it to you later. He said he's been writing to you for years, and he's in Africa, hoping you get advice for him to start a relationship with VCs such as yours in China to partner with the startups in the AI ecosystem in Africa; and he would like some advice. Perhaps I should just send you an email because we probably can't explain all that right now?

KFL: Okay. I would be happy to respond to his email. Thank you.

AC: Well, thank you for your talk. And we are so appreciative, learn so much from you today, from the heart. And so in appreciation, the Liu Series has a little plaque, the marble plaque with your name on it. We will mail it to you after the talk. Thank you so much again, we've learned so much, and thank you for your time.

KFL: Thank you. Thanks, everybody.

AC: And before everyone else logs off, we have a talk by Mr. Davy Wang of Tencent. He is the Chief Solution Architect of Tencent, and he will be talking at Lilie on November 4. And we will have the information online for you.

Well, thank you, everybody, for watching. I think we all learned a great deal. And, and this concludes our talk. Thank you.