

INDUSTRY 4.0

An AI for inspection

BY JENNIFER JACOBS

Alvin Koh started Blinkware Technology Sdn Bhd in 2013 because he wanted to use technology to improve his father's quality of life. The formerly invincible old man had been diagnosed with Parkinson's disease and had to quit his high-profile job at a bank because he could not control his shaking.

By this time, he could not even do simple things like lift a spoon to his mouth or turn on the lights. "I thought there had to be a way that technology could improve the quality of life, not only for those who require assistance but in general," says Koh.

The start of the company coincided with the emergence of Connect Camera, a motion and gesture-controlled gaming tool that was exclusively used for entertainment purposes. "I looked at how to integrate motion and gesture technology into smart homes and workplaces, like using a simple hand movement to turn on the radio," he says.

Motion and gesture technology allows you to use your body to initiate a response from hardware. Instead of typing with keys or tapping on a touchscreen, a motion sensor perceives and interprets movements as the primary source of data input.

"For example, if I lift my finger and point up, that gesture is recognised as 'turn on the lights'. So, it is an integration between a software and handshaking it with a hardware or an electronics platform," says Koh.

But this technology is not just confined to motion and gestures. "If you cannot move your body or your hands, this technology can also detect retina movement. So, you can use your eyes and look in a particular direction to perform certain actions," he says.

Koh contacted 52 programmers in India via LinkedIn and three replied. "It started from there. We talked about bringing in a simplified platform using technology. In 2013, nobody was really thinking about motion and gesture. It was a new thing... and such a challenge," he says.

Koh decided to come up with a mass market application to introduce the technology. "We launched digital screens with 3D cameras that would allow you to control your advertising through hand gestures. By closing your fist and raising your hand, you could move to the next advertisement."

This was a good way to teach the public how motion and gesture technology actually worked. The company did well and by 2014, it was already in the black. Being a start-up, it had husbanded its resources very carefully, spending no more than RM100,000 in its first year of operations.

"We hired one of the programmers who responded to my inquiry and hired the other two on a contract basis, bringing them in on a permanent basis much later," says Koh.

Blinkware did not even have a user interface team to begin with, which was a very big deal, he says. "In interactive technology, there are two aspects — technology and user experience. If you have good technology but the user experience is not there, people will not play with it. If you have a good user experience but the technology is mundane, no one will even look at it."

There was a lot of digital advertising at the time, but they served as mere distractions because the advertisements did not "do" anything, says Koh. "You would see credit card ads on screens but nothing was reaching out to the audience. With a motion control system, as soon as someone walks past, the body tracking happens and it reacts to you specifically."

He says Blinkware then moved into gender and age detection as well. "So, we could detect your gender and push ads out to you based on that. We were doing this in 2013. We only saw other companies catch on in 2016."

Koh started to grow the business but found that each project took too long. The company had to generate cash flow and turn the business around quickly. So, he looked at the possibility of selling software tools.

"We introduced a software development kit that allowed programmers to use our motion and gesture libraries to create new technologies. At that stage, we were doing some facial recognition, through which we were able to detect emotions, age, gender and even certain races, although that was not very accurate. This was in 2015 and we wanted to create a technology that allowed you to integrate with any platform," says Koh.

The company discovered that hardware played a major role in the technology space. "If you launched a software, it needed to be hardware-agnostic. It needed to work on your laptop, your mobile phone and any type of digital camera," he says.

DIVING INTO THE OPTICAL SPACE

Blinkware dove deep into the optical space. "And that is what Connect Camera is all about. It is a 3D camera, which can cost between US\$500 and US\$50,000. A normal user would not buy a US\$500 camera just because he wanted motion control. So, we created software specifically for 2D web cameras," says Koh.

This became a pivotal point for the business. The 2D cameras were getting more advanced and the cost was coming down. "A 2D camera cost about US\$50. And as the space became more advanced, it opened up a huge business opportunity for us," he says.

That was when things became interesting. "In 2016, we were approached by a tier one assembler of Japanese vehicles in Malaysia. They said they had seen our detection ability on faces and also object recognition. But could we do it for quality control systems?"

Koh and his team pointed out that there was already technology on the market for this. But the company said what was out there was too expensive. "A lot of the time, the hardware element [in this case, 3D cameras] made it undesirable. It was cheaper to use human labour, especially foreign labour," he says.

Basically, the availability and relatively low cost of foreign labour impeded the development of viable technology solutions to solve this problem. But foreign labour was getting more expensive and difficult to procure. Besides, the defect rates were rising, not to mention the periodic raids by the Immigration Department, which could leave the entire facility bereft.

The assembler asked Koh whether Blinkware could come up with a visual inspection unit for car parts using the much more cost-effective 2D cameras. "In a span of six months, we created our first artificial intelligence (AI) visual inspection system. It was the first time we really delved into AI," he says.

"The system needed to be sophisticated and very accurate. If you were using normal image recognition, you would not be able to get to the next level of predictive maintenance, which could tell you if there was a hole where there should not be one, pre-empting the problem before it became a big issue. We needed AI for that."

This was a new area and the company needed money to get into it. At the end of 2016, it raised US\$2 million. That was when Dimishtra Sittampalam came in as an investor and director and Arafat Azwar came on board as a strategic adviser on Industry 4.0 and how to deal with government agencies.

The US\$2 million allowed Blinkware to hire experienced programmers. "We started moving into specific types of programming — machine learning and deep learning — which are the core functions of AI," says Koh.

What is the difference? "In the old days, if you asked what a cat was, it would describe a cat — that it is a creature about this big [he holds out his hands], with this type of ears, fur and all that. Now, what you do is give a bunch of images to the system. The system sees things that you do not and it is able to identify a cat based on characteristics that may not be the same as the ones you used," says Dimishtra.

"You are not telling the system what to think. You are saying, 'This is what it is. You figure it out for yourself.' So, it is much more robust."

Koh adds, "Machine learning is really image comparison. You train the system to know just one thing."



Meanwhile, deep learning allows one to segment images, machine learning does not, he points out. Having said that, you need a blend of both to control the cost and amount of processing power required.

The focus on cost is crucial, especially when it comes to small and medium enterprises (SMEs). "One of the major things we found when speaking to factory owners was that they were worried that they would need to buy the whole conveyor system or train people to do all these new things," says Koh.

It was too expensive and too much trouble. And if that was the case, most would rather make do with



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KENNY PARTHE EIDGE

what they already have. "That is what SMEs are really facing right now. They just do not want to move. They do not know there are technologies and solutions out there that are affordable," he says.

When Blinkware deployed its first system for the assembler, it started to learn about Industry 4.0. "We did quality inspection on their car parts. At that point in time, they were visually checking the housing component, that is, the massive front-end of the car. We were doing analysis and defect control on the big housing part, which had 41 child parts and 8 defects which we had to detect, including missing holes and welding spots as well as rust precisioning," says Koh.

Blinkware customised the solution. "One of the key aspects of our business is that we customise a lot of solutions. There are many off-the-shelf products that you can buy that are very expensive to customise," he adds.

"I think the rule of thumb with cars is that out of 1,000 parts, they test a random sample of one. Blinkware's software allows you to test all 1,000," says Arafat.

"If both of us bought the same model of car on the same day, we will not know why mine has to go to the workshop every three months while yours is perfectly fine. It is because of this [random testing]," says Dimishtra.

"Each of these components were checked via random sampling and it took them 45 minutes to check one part. They had to release 300 parts a day. So, they started hiring more and more workers and the defect rate was hitting 20% to 25%," says Koh.

"Every time a part is rejected by the automotive principal, the cost is on the tier one assembler. So, they were bleeding money and did not have any solutions."

Dimishtra says, "A lot of these components were coming from different places. If a car was rejected, they had no proper system to pinpoint who was to blame. We came in to do this for them."

Koh agrees. "Once you have identified the defects, the data is what helps you to be corrective. And the data that they were generating before was fully manual — one big Excel spreadsheet pinned to the wall that took a week to fill and collate," he says.

"Management could not get any real-time data. By the time the defective parts went to the principal, it was too late. And they never had enough data to con-

front the culprit."

With Blinkware, the assembler was able to cut down its defect analysis from 45 minutes to less than 25 seconds and bring the defect rate down to 5% from 20%. "It was in real time as well. So, you are sitting in an office and you know exactly what is going on at any point in time," says Dimishtra.

"We are providing management with web and mobile responsive data. At any point in time, they can log into their phones and see all the reports, all the scans, how many parts were defective, where the defects occurred and more," says Koh.

GETTING THE WORD OUT

But it was not enough to develop solutions in obscurity and the company could not really rely on word of mouth to publicise its work. So, Koh started putting himself out there. "I spoke at a few conferences and people started to notice us. We found that this was a huge space we could move into," he says.

Blinkware caught the attention of major companies such as Bosch and Fujitsu, which approached Koh and his team. "Our collaborations with these companies were very much about bringing accessible and affordable technology to their customers," he says.

Blinkware is working closely with Fujitsu to expand across Southeast Asia. "They brought us into the Philippines, Indonesian and Thai markets. This collaboration provides us with technical as well as sales and marketing support," says Koh.

"Bosch, one of the pioneers of Industry 4.0 globally, has also come on board to help us grow in the Malaysian market."

He says having partnerships with global companies allows Blinkware to expand more quickly and leverage technical support globally. "These guys are teaching us new technologies. We are transferring knowledge as well as producing new technologies together."

What markets are Blinkware going for? "The key markets for us are food and beverage (F&B), automotive and manufacturing. And we are starting to move into industrial building systems," says Koh.

Dimishtra points out that visual inspection technology is not something new. "If you are a manufacturer that wants to put in automated visual inspec-

tion technology, you go to one of these guys and they will say you have to buy a 3D camera together with the system, which will cost you a few million ringgit. Whereas we come in and say that for the vast majority of things, a 2D camera will actually suffice."

Affordability has been a major driver of Blinkware's growth. "Factories need to see a quick return on investment. I think many companies have been having trouble adopting Industry 4.0 because the cost is too high. They are looking at a six-month payback. But which system can give you that?" says Koh.

Apparently, Blinkware can. "We are hitting a six-month payback now and sometimes, it is only three months, depending on the size and intricacy of the system. That by itself has allowed us to go beyond Malaysia to the global market," he says.

Blinkware secured a major client in the F&B sector after Koh spoke at an industry conference. "This client was having a lot of issues in terms of the speed of the visual checks of their cereal. They needed to detect the cosmetic defects of their cereal and have real-time data. And they needed all this to be done quickly. It was taking them 15 to 20 minutes per check, which was a waste of valuable resources," he says.

The F&B player asked Blinkware to customise a solution for it. "No one could actually meet the level of customisation that it wanted. So, we built the first inspection system that would allow you to detect all the cosmetic defects on cereal. Now, we are moving to four different types of cereals and the system should be rolled out globally as well," says Koh.

In Malaysia, manufacturing is still the killer application when it comes to AI. "It generates the most in terms of payback," he says.

But most companies only look at the "sexy" parts of AI — facial recognition, surveillance, smart cities and smart controls. "They do not see that manufacturing is the area that benefits the most from automation and AI deployment. So, no one is really doing what we do. That is why we have gone really deep into that vertical and continue to garner so much business — because manufacturers are really trying to be highly productive at the lowest cost," says Koh.

Just how big is this market? "A study done in Singapore said there was S\$111 billion in potential value that could be created in Asean from AI adoption. The Federation of Malaysian Manufacturers says the global market for AI in manufacturing was US\$628 billion as at 2017. Obviously, it is much higher now," he says.

We are now in the third wave of AI, Koh points out. "According to Dr Kai-Fu Lee, founder of Sinovation Ventures and the real pioneer of AI in China, there are four waves in AI. And the wave we are sitting on is the third, known as perception AI. It is about visual and voice recognition," he says.

"This is the space that will lead into the next wave — autonomous AI. Without sight or sound, how do you create autonomous systems? If someone talks about giving robots intelligence without sight or some kind of stimulus, they can only be trained to do simple tasks. "We are creating the engine that can provide cameras with our software that integrates with drones, robots and machinery. So, we are giving birth to something bigger than what we are doing right now — creating autonomous systems."

The company is currently undergoing its Series B funding round. "The capital we are raising is to really grow our infrastructure, in particular, to hire more programmers and allow us to start servicing other countries. We are looking to raise RM8 million to RM10 million, which is not a lot of money, but we do not need more than that," says Koh.

"We are also trying to keep equity dilution to a minimum," says Dimishtra.

The company has pivoted three to four times in its six years of existence, Koh points out. "Yet, the root of what we are and my passion is to simplify things and give people with illnesses or disabilities quality of life through technology, and that is still the calling. I saw what my dad went through and if this technology had been available for him to do simple things, he would have had a much better quality of life before he died." ■

From left:
Arafat,
Dimishtra
and Koh