

C2iBRIDGE NEWSLETTER

CONNECTING TECHNOLOGY BETWEEN

CANADA AND CHINA

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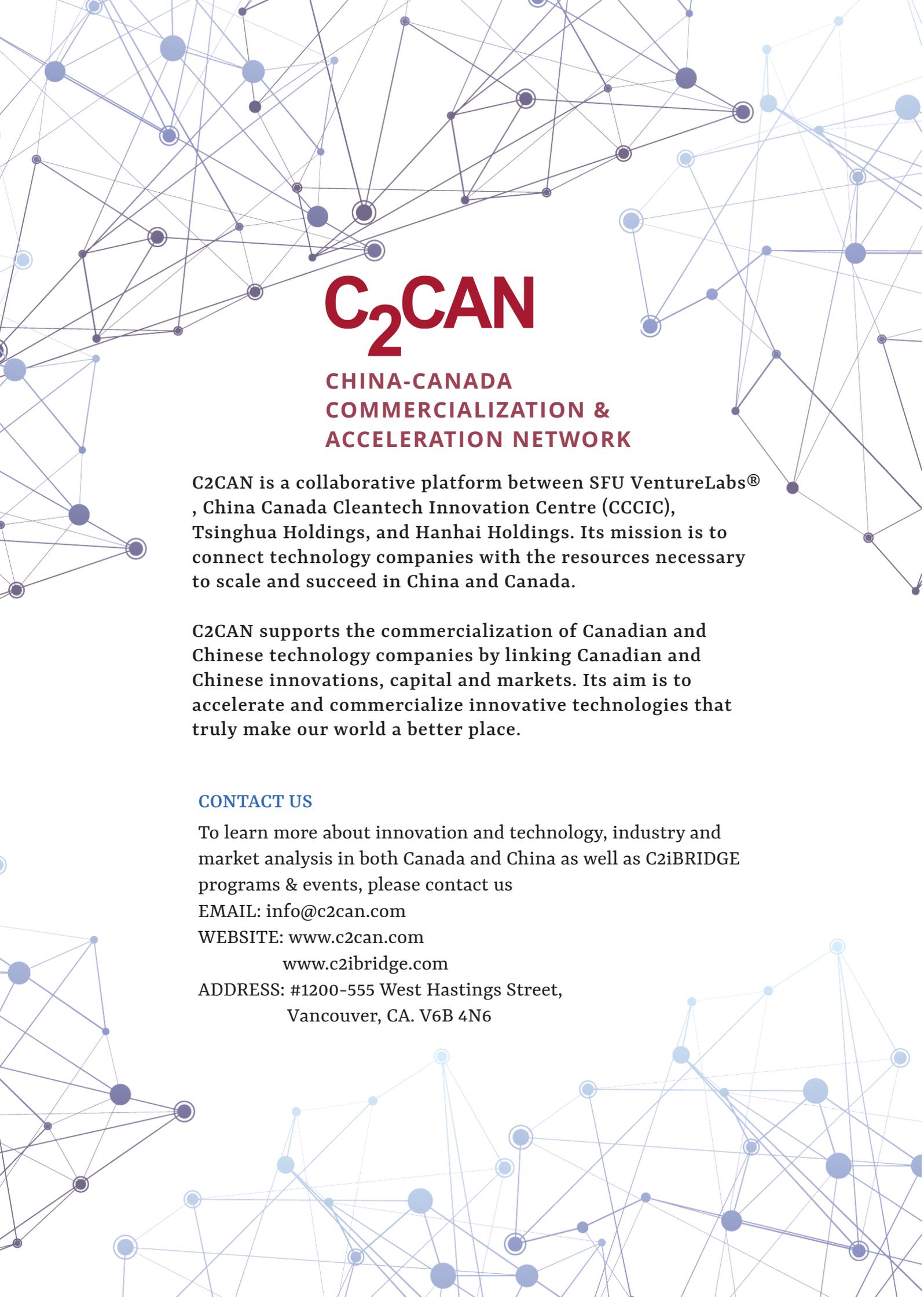
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A PRACTICAL ROBOT FOR EVERY TASK

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A complex network diagram with numerous nodes of varying sizes and colors (blue, grey, white) connected by thin lines, creating a web-like structure that fills the background of the page.

C₂CAN

CHINA-CANADA COMMERCIALIZATION & ACCELERATION NETWORK

C2CAN is a collaborative platform between SFU VentureLabs[®], China Canada Cleantech Innovation Centre (CCCIC), Tsinghua Holdings, and Hanhai Holdings. Its mission is to connect technology companies with the resources necessary to scale and succeed in China and Canada.

C2CAN supports the commercialization of Canadian and Chinese technology companies by linking Canadian and Chinese innovations, capital and markets. Its aim is to accelerate and commercialize innovative technologies that truly make our world a better place.

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C2IBRIDGE CHINA BUSINESS DEVELOPEMENT TRIP

In November 2019, C2CAN will organize its 9th China Trip, taking selected Canadian technology companies to Wuhan, Changsha and some other Chinese cities to participate in the Global Innovation and Entrepreneurship Competition organized by C2CAN's counterpart organizations in the two cities. Canadian participants will also conduct business exchanges with local large enterprises, investment companies and research and development institutions, as well as visiting local well-known large companies to explore opportunities in future cooperations.

The C2CAN team has organized the China Trip program since 2016. After multiple rounds of screenings, nearly 100 Canadian companies so far have been invited for the program from Vancouver, Toronto, Montreal and other Canadian cities.

C2CAN's China Trip program has taken Canadian companies to about 20 cities in China including major cities such as Beijing, Shanghai, Guangzhou, Shenzhen, Hong Kong, Tianjin, Dalian, Ningbo, Foshan, Jiangmen and Zhuhai, facilitating extensive exchange and cooperation with local (high-tech/economic) development zones, science parks, Chambers of Commerces, business associations, listed companies, investment institutions and universities, etc. The program also provides Canadian technology companies with opportunities for participating in international innovation and entrepreneurship competitions, investment roadshows, science and technology expo and cultural experience activities. It helps Canadian companies to better understand China both as a country and as a market and to connect them with Chinese resources in the capital, market, manufacturing and other relevant fields.

So far about ten companies participating in the C2CAN China Trip have made tangible connections with Chinese resources, achieving direct or indirect financing of more than USD\$20 million dollars.



ADVANCED INTELLIGENT SYSTEMS (AIS) – A PRACTICAL ROBOT FOR EVERY TASK



A farm job was posted and was unfilled for months until BigTop applied, the employer responded right away; except BigTop is not your average worker but a robot developed by Advanced Intelligence Systems(AIS) here in Vancouver, and this is just a sign of what is yet to come to the agriculture sector.

Based on a recent report by The Canadian Agricultural Human Resources Council, the sector's labour gap is expected to reach 123,000 people by 2029 with 37 per cent of the current workforce expecting to retire in the next decade. Within the sector, "greenhouse, nursery, and floriculture" industry will continue to have the largest labour gap, with an expected gap of 29,900 workers in 2029, accounting for one-quarter of the sector's total labour gap.

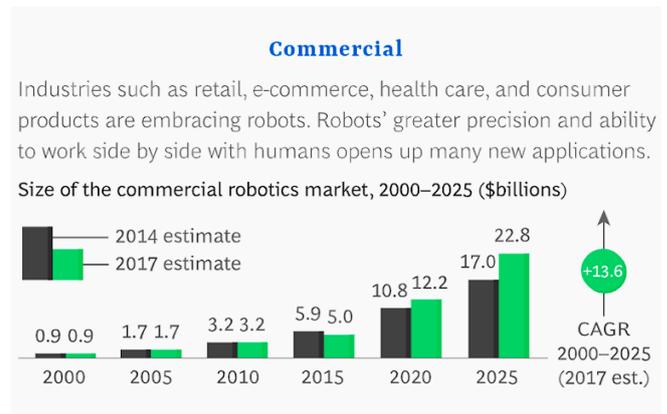
"Horticulture was something that came to us, a nursery approached us, and they had a problem managing plant pot movement and spacing. As we started working on the solution, more people from within the same industry approached us with other problems," Afshin Doust, CEO of AIS says.

AIS came into operations in 2014, it was initially more of a robotic consulting company focusing on implementing industrial automation. After quickly realizing where the market demands are, the com-

pany made a shift in 2015 to focus on commercial service robots, prototyping its first flagship robot, BigTop in 2017.

BigTop was designed specifically to solve the repetitive and laborious task of moving and spacing pots within nurseries. According to Doust, it is designed to work on three different surfaces, carry up to 50kg and move up to nine plant pots at a time. It's currently being deployed as a pilot test at one of Canada's largest nursery operations – Van Belle Nurseries in Abbotsford, B.C.

Commercial Robotics Growth Projection



Source: BCG Analysis

"BigTop is fully autonomous, we can create different modules based on client needs and it is AI and IoT enabled. The robot can interact with the environment, it can be equipped for tracking temperature, humidity, carbon content etc, and even to take a picture of the plant," says Doust.

The company uses a robot-as-a-service (RaaS) revenue model, where the customer does not need an initial capital to acquire the services of the robot. The robots are shipped to the customer with a multi-year contract, the customer then pays a monthly fee and only pays for the volume of the work done by a robot - in BigTop's case, how many pots it has moved.



Beyond BigTop, AIS is also developing other lines of robots for the agriculture sector, including a mobile manipulator and a pruner, both of which have already been prototyped. With the assistance of \$2.2 million in federal government funding from SDTC, AIS is also developing an electric autonomous tractor that can toll carts in all kinds of environments. According to Doust, the company currently has numerous patent filings and trade secrets to protect its intellectual assets.

“We have robotic platforms, modules and software in the AIS Library. We use these assets from the AIS Library, to create the AIS products. We are a platform company, we can customize our solutions for any kind of vertical that can use our products, and we have had inquiries ranging from film industry to surveillance. Basically, we find a problem, and we build an IP around the solution to the problem, and then we take modules from our library, customize them, add more inventions and create the product,” Doust explains.

He believes AIS has an upper hand over its com-

petitors as the company builds everything in house from software to hardware, so all the elements work seamlessly together.

2019 has been an eventful year for the company as it entered into multiple strategic partnerships to grow its business. It has partnered with Valid Manufacturing to manufacture the robots, with the first batch of BigTop to hit the market in 2020. It has also partnered with AgriNomix, a leading horticulture automation company in the North American market to distribute its products.

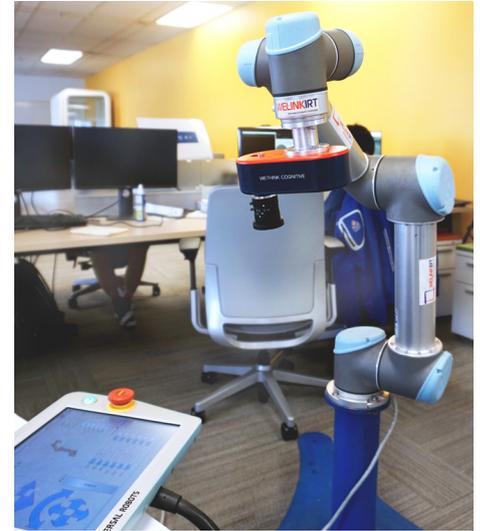
“Our primary market is the US & Canada, Europe is also a significant market for us,” Doust says.

To fuel its growth, AIS is currently looking for a mezzanine financing to get the company ready for the next larger round of funding, which is currently in preliminary talks with international and Canadian investors according to Doust.





DAO AI/WELINKIRT - NORTH AMERICAN TECHNOLOGY WITH CHINESE APPLICATIONS



Industry 4.0, Smart Factory, Industrial Internet of Things, all the buzzwords have heralded a new phase of industrial development - the so-called “Fourth Industrial Revolution”, with AI as the driving force behind.

The best of both worlds

“Since the 1960s automation has already been in process but traditional machines are still machines, they can only execute repetitive tasks and that is the bottleneck of manufacturing,” says Ran Xiang, CEO of DAO AI Robotics/WELINKIRT, who is a serial entrepreneur with over 20 years of experience in the IT industry in China.

He moved to Vancouver in 2010, already semiretired but got really interested in AI and subsequently founded WELINKIRT in China and DAO AI Robotics in Canada in 2016, with the former focusing on machine vision’s industrial applications and the latter on machine vision’s theory, calculation methods and general fundamental research. Ran thinks Canada has a leading position in AI and computer vision globally, surpassing even its US peers when it comes to fundamental research.

“How to give robots cognition? That is the problem we are trying to solve,” Ran says. “Robots are not like humans, they don’t have eyes; when you have

eyes you can make judgments, so first we need to digitalize human vision, to make complicated things simple.”

He says that this could not be done decades ago as computers didn’t have enough calculating power then and there are too many variables to take into consideration in real-life situations. “It is easier to calculate a 2D space but there are many variables in a 3D space, this is very hard for machines, so you need new technology such as neural networks and deep learning.”

Advances in neural networks and deep learning have given a great push to the field of computer vision in recent years. According to Ran, machine vision is already at the mass application stage, but there are many problems that remain to be solved, and he hopes his company will be a global leader in solving them.

According to him, the company has already developed some state-of-the-art visual recognition software centre on neural networks; its WEROBOTICS Cognitive System is capable of solving complex applications that are too difficult, cumbersome or expensive for traditional machine vision systems.

His company in China is mainly focusing on applications in the automotive industry and the 3C



industry, namely Computer, Communication, and Consumer electronics, though he also sees potential opportunities in logistics and ‘smart city’. The company offers a whole product solution - intelligent machines equipped with advanced cameras.

“There is a huge demand coming from industries for better automation, the demographic dividend is disappearing in China, many young people don’t want to work these factory jobs. This is a realistic problem,” Ran says.

He believes DAO AI/WELINKIRT combines the best of both worlds - North American technology with Chinese applications. “We are a unique company, there are not many companies like us in the world, very few in my industry for sure. The sound of AI in Chinese means ‘love’ and we are devoted to liberating people from heavy and repetitive tasks so they can engage in more creative works.”

Canada’s technology positioning

Beyond talking about his own company, Ran also shared some observations and wisdom as an industry veteran who has experience in both the East and the West.

“There is always specialization in the product chain. In terms of AI fundamental research, North America has a leading position, but when it comes to applications, China is world-first. If there is no application for the technology, it is a soulless technology; but if you have a market but there is no technology, then you need to burn a lot of capital to attract and retain talents to develop that technology,” he says.

He believes companies and on a bigger scale even countries, need to understand their own strength and positioning, and really focus on what they are good at rather than trying to be something they are not.

“For example, Germans make the best industrial hardware such as lenses, the whole population in a German village will spend their entire lives making lenses, that is their strength, there is no need to catch up with the Germans when we have

achieved a lot of progress in other fields,” he adds.

He believes Canadian companies are in some way similar to German companies, where the successful ones tend to specialize in one thing. “Big companies such as Microsoft or Amazon, they have a huge platform and can do everything, Canadian companies can’t do that or they will die because the market is too small.”

Talking about the synergy between Canada and China, Ran says Canada is not just complementary with China but with the whole world but China is an important business partner since 35 percent of global manufacturing takes place in China. He advises start-ups to have the market demand in mind while doing R&D so that the product can be commercialized quickly, as, without sustainable profit, a company can’t last long.



Ran says there is a Canada spirit to be admired as many Canadian R&D companies are very down to earth in solving problems and the country attracts some of the top technology talents in the world with its stable political and social environment.

“Everyone can make a product, but when it comes down to application, what makes a product stable might come down to just a few lines of codes, but one product can be used for five years with no problem and the other will need constant adjustments. It is a spirit of focusing on doing simple things well, and to make what is already good enough even better is actually not easy,” he says.

With that in mind, he hopes the drive for excellence will be instilled in his companies as they push the boundaries in advancing 3D computer vision technology and its industrial applications.

INTUITIVE AI: A NUDGE TO RECYCLE RIGHT FROM AI

The world we live in has a waste problem, and it is a two billion ton problem every year. The dumping of first world waste to third world countries is a common practice, and these often not-recyclable wastes impair workers' health, pollute the environment and risk to drown the already poor countries in toxicity.

Moreover, even with cheap and dirty labour from poor countries, a large percentage of waste still cannot be recycled as they were already contaminated at the point of disposal. In fact, according to the British Royal Statistical Society, the winning (most shocking) International Statistic of last year was that the proportion of plastic waste that has never been recycled was 90.5 percent. Out of this 90.5 percent, 12 percent have been incinerated and the other 79 percent end in either landfill or the natural environment.



“I am from Pakistan and my co-founder Vivek Vyas is from India, both of us came from third world countries and we have seen a lot of trash around. Since we are both immigrants, it was quite clear to us that if we were to work on something, it has to have a positive impact on the world. From our research, we understood that if we make a small wrong decision here, for example, if something that can be recycled but it still

has liquid in it, it will have to go to landfill now or it could be sent to other countries,” says Hassan Murad, CEO of Intuitive AI.

The pair, both with a background in robotics and engineering, began in 2017 to work on a solution



and quickly found out how difficult it is to make an impact in an industry where they are young outsiders. “We tried to reach out to companies, we reached out to property managers in neighbourhood buildings, and no one took us seriously,” Murad says.

Fortunately, passion and handwork paid off, they were accepted to the NEXT AI incubator at the University of Toronto, where they got access to the best mentorships in business and AI technology according to Murad.

Their initial thought on the solution was a garbage bin robot that can sort out different types of wastes, but they realized this didn't solve the contamination issue and would only result in more landfills. There is also a lot of hardware costs involved in making and maintaining the units.

“So we tried just putting a camera next to a bin. When someone notices there is a camera with a screen, you see a behavioural change. They become alert, and the process becomes more engaging. It is a ‘nudge effect’, you just change one design, and it completely changes human behaviour. That is what we did and the results were massively better,” Murad explains.

And thus ‘Oscar’ was born, an AI add-on system that can be installed on a garbage bin and it will instruct people what to do by predicting the type of trash a person is holding.

“It won’t be used on any garbage bin, but garbage bins in the busiest parts of the city, such as shopping malls, airports, universities or other public spaces. We will put a few Oscars in the busiest part of a building for example, and people will learn how to separate their garbages from them, and when they go back to a normal bin they will know how to throw away a Starbucks coffee cup properly. That is the ripple effect of education and behaviour change. Oscar can also incentivize people by randomly offering some awards, so once in a while, people can get quite excited throwing out

a piece of trash,” Murad adds.

The company has just moved into the product commercialization stage and plans to sell as many products as possible, first targeting property managers and Fortune 500 companies that have multiple locations. Currently, it has Oscars in Vancouver, Toronto, Calgary, and San Francisco.

Murad stresses that despite the company has plans to commercialize data collected in the future in order to provide actionable insights on product designs, privacy is of utmost importance to the company.

“Oscar only recognizes trash in the location, it doesn’t recognize a person at all, it is quite important to us, we only want to help buildings to get to zero waste,” he says.

To realize the lofty vision of a zero-waste world, Intuitive AI is in the midst of both expanding its current team of 12 and getting ready to raise the next round of capital in the next few months.





A CHINESE INCUBATOR’S APPROACH ON FOSTERING START-UPS

Perhaps there is no better example than Shenzhen that illustrates the transformation of China in the last three decades. A former dot on the map that no one knew anything about with just 59,000 inhabitants in 1980, when the town was first established as a special economic zone, has morphed into a global economic powerhouse with over 12 million residents today. The city, dubbed the hardware capital of the world and home to tech giants such as Tencent, Huawei, ZTE, DJI, and many others, spends around 4 percent of its GDP

ing from a capital market perspective, We have well-established connections with public companies who have a desire to acquire new technologies, so we will see if there is synergy with a potential start-up, if there is, we can continue to explore possibilities in partnership or acquisition, and support the start-up from a larger enterprise and that is where we can create value,” Bu says.

The incubator is the result of a strategic partnership between Dongfang-Shouzheng Investment

Peal River Delta Greater Bay Area



in research and development every year, double the mainland average, and matched only by South Korea and Israel.

A vibrant and innovative tech ecosystem always needs the support of incubators to turn ideas into realities, and Shenzhen alone has about 100 incubators. Different incubators have different approaches, Bu Dan, President of Dongfang-Shouzheng Investment Management Co. and Director of Panglin-Shouzheng Technology Incubator shares her unique approach sitting at the interception of academia, technology, and capital market.

“We are more of an accelerator, other incubators will look at the technology, but we are com-

Management Co., Shenzhen University’s National Big Data Lab and Panglin Group, the largest philanthropy enterprise in China. The incubator is funded by Panglin group with a charity goal to facilitate technology development that can truly improve people’s lives according to Bu. The innovation areas that the incubator is interested in include TMT, IoT, Cloud Computing, AI, big data, Edge Computing, Fintech and Medtech under the future 5G framework.

It just organized the first China Greater Bay Area 5G AIoT High-End Forum in August which gathered together top academicians from China and overseas, industry leaders such as Tencent and Huawei, as well as investment professionals. The



forum aims to create a strong interlinking community of academicians, industries and investors.

Bu says the incubator currently has a new \$6 million fund to invest, after investing \$6 million in a previous round. Independent of the incubator, Dongfang-Shouzhen Investment Management Co. also has another tech fund in the size of \$20 million.

Bu, who personally has a Canadian connection, is interested in connecting Canadian start-ups with Chinese capital, however, she says there might be a gap in expectations and understandings that both sides need to accommodate and adjust to create a win-win situation.

“For Canadian start-ups to truly settle in China, they will need to find a Chinese partner, and if we need to get government investment, the policy will likely require the company to reorganize its ownership structure,” she explains, alternatively the easier way is to find a good Chinese partner who can acquire the start-up or the technology.

Additionally, she says the business frameworks are also very different in the two countries, sometimes when it comes to government procedures in China, the deadline can be a moving target so the Canadian side might think the Chinese partner is unreliable whereas the Chinese side just has to deal with different sets of constraints.

“In general the technology community and the capital market often speak two different languages, and we hope to fill in the gap and help either start-ups or already established companies to gain access to Chinese capital market for their growth or successful exits,” Bu says, she and her team of more than ten professionals all have strong expertise in Chinese capital market ranging from M&A to law.

Despite the potential obstacles, Bu says there are also a lot of policy perks for foreign tech companies, talents or even capital to come to China.

“There is a lot of support for Shenzhen at the moment, as part of the drive to develop the Greater Bay Area in China that is open and welcoming to the rest of the world,” she says.

China’s Greater Bay Area, a megapolis consisting of nine cities in Guangdong province and two Special Administrative Regions i.e. Hong Kong and Macau, is home to around 70 million people, more than the combined population of Australia and Canada, and the population is expected to further reach 100 million by 2030. Its annual GDP is around USD \$1.6 trillion, almost on par with Canada’s, and is projected to grow by nearly three-fold to reach USD\$4.6 trillion by 2030.

Comparison With International Bay Areas

	GBA	SF Bay	NY Bay	Tokyo Bay
Area ('000 km)	56.0	18.0	22.0	37.0
Population (m)	69.6	7.7	20.2	44.0
Population density (person/km)	1,185	434	686	2,617
GDP (US\$ trn)	1.6	0.8	1.7	1.9
GDP per capita (US\$ 000)	23	102	82	42
Tertiary as % of total GDP	66%	83%	89%	82%

Source: CEIC, CBRE, DBS HK



PARTNERS



International Technology Transfer Network (ITTN) , was founded in 2011. It's a professional organization committed to promoting international technology transfer and innovation cooperation. In 2018, ITTN has been nominated by International Cooperation Department of Ministry of Science and Technology of China (MOST) and Torch Hi-Tech Industry Development Center of Ministry of Science and Technology as “National-Level International Science and Technology Cooperation Base (International Technology Transfer Group)”. ITTN has established sub-centers in 13 Chinese cities namely Suzhou, Beijing, Shenzhen, Chendu, Zhengzhou, Luoyang, Tianjin, Shanghai, Qingdao, Zhejiang, Wuhan, Kunming, Jilin. It also has six other authorized overseas branches in Ljubljana, Houston, Milan, London, Perth and Waterloo.



Approved by Hubei Provincial People's Government, Hubei International Science and Technology Exchange Center is in charge of international science and technology exchanges. The Center is also approved by the Ministry of Science and Technology as Hubei International Technology Transfer Center. The aim is to strengthen the communication between scientists, entrepreneurs, engineers, and management personnel in Hubei with their counterparts in other countries and regions through a wide range forms of activities. Thus science and technology communication and exchanges are promoted and economic development is enhanced. Hubei International Science and Technology Exchange Center is Hubei's first national technology transfer agency targeting the entire world.



Nanjing Future Science and Technology City is located at the intersection of “Golden Axis” of South High-speed Train Station and Lukou Airport, and the city expressway. Driven by the “One City and Two Towns” strategy, ShangQinHuai Wetland Area has been successfully developed from an open space into a “Future Technology City” that encompasses technology incubators, office headquarters, movie studios and wetland park. Relying on China (Nanjing) Future Network Valley (Wireless Valley) and Southeast University, Nanjing Future Science and Technology City focuses on technology research and development and industrialization of information and communication industry (ICT), especially for wireless communication, future network, additive manufacturing (3D printing) and other frontier technological industries.