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走進未來城市 打開無限想像

Infinite possibilities of a futuristic city

獨步全球！自駕改裝公車引領智慧交通再升級
Self-driving Repurposed Bus Takes Intelligent Transport to the Next Level

用AI管理號誌，路口交通不打結
Directing Traffic through AI-controlled Signals

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編者的話
Editor's Words

科技會報辦公室執行秘書 蔡志宏
Zse-Hong Tsai, Executive Secretary of the Office of Science and Technology

未來，就在你我身邊！智慧城市是邁向未來城市必要且不可或缺的一部分，在世界各國積極推動智慧城市建設之際，臺灣也於行政院「前瞻基礎建設計畫－普及智慧城鄉生活應用計畫」的擘畫下，打造出許多出色的智慧城市建設成果，不僅領先全球發展的步伐，更成功地將智慧經驗輸出海外，與世界分享成就。今年邁入第六屆，已是亞洲規模最大智慧城市展會的《2019 智慧城市展》，便是臺灣多元豐沛智慧力的最佳見證，每年皆吸引了全球大批城市首長與科技團隊前來，尋求與臺灣在地優秀智慧城市解決方案合作的機會。

過去臺灣在資通訊、半導體產業上積累了相當雄厚的實力，可說人才、研發與創新兼具，為智慧城市發展提供了相當充足的能量。現在，臺灣在邁向智慧城市的道路上，產官學的持續推力固然重要，但它其實更需要你我一同共同參與、監督和見證，因為一個以人為本，圍繞你我生活需求而建立的城市，才會是真正的智慧城市。

本期季刊將透過與 Taiwan AI Labs 創辦人杜奕瑾、天下未來城市頻道總監陳芳毓、臺灣智慧城市產業聯盟秘書長林智清三位的對談，以及呈現多個活生且豐富的智慧城市建設成果，

The future is right around the corner! Smart city is a vital step towards future city. While the world actively embraces smart city constructions, the Executive Yuan, too, introduced a program called "Forward-looking Infrastructure Development Program:Smart City Taiwan" that has inspired many outstanding smart city solutions to date. Not only did the program put Taiwan ahead of the world in terms of smart city development, it allows businesses to export their ideas overseas. "2019 Smart City Summit & Expo," the largest smart city exhibition in Asia, is now in its sixth year and bears witness to the strong creativity Taiwan has to offer. The exhibition attracts sizable visitors each year, including mayors and high-tech companies from all over the world who are eager to find answers in Taiwan's smart city solutions.

Having developed strong competitiveness in ICT and semiconductors over the last few decades, Taiwan now possesses the talent, the R&D and the innovative capacity to succeed in smart city development. While it is essential to have continual support from the industry, the government and the academia, the path to smart city also requires participation from the general public because a true smart city is one that is built specifically for the needs of its residents.

In this quarterly issue, we will take a closer look at smart technologies through an interview with Ethan Tu - founder of Taiwan AI Labs, Fang-Yu

來拉近智慧科技與你我之間的距離。刊內有已經載客多達七千人次，是全世界第一部「自駕公車」的豐榮自駕公車精彩故事；以及一探「健康存摺」是如何運用智慧巧思，來幫助實現自我管理並守護你我健康；還有阿龜微氣候用物聯網與資料科學，成功幫助農民打造出國際知名農產品牌的創業歷程；並且也深入了解義隆電子是如何用人工智慧來解決塞車問題，同時縮短寶貴的通勤時間；最後還呈現了新創之星宇陽能源科技、傳產轉型的尼采實業和系統整合商皇輝科技在技術研發，以及成功將智慧城市解決方案輸出海外的寶貴經驗談。這些案例都是你我生活周遭正在實際發生的智慧變革，未來，真的不遠了！藉由這樣分享的過程，我們希望能夠凝聚起全民參與智慧城市建設的共識，在面對許多新應用場景與新需求到來的同時，都可以調整好心態，一同朝未來城市大步邁進。

Chen - Director of Future City, and Chih-Ching Lin - General Secretary of Taiwan Smart City Solutions Alliance and by presenting several intelligent accomplishments that currently exist around us. Read on for exciting stories about: "self-driving bus" - world's first driverless bus by Green Transit Company that has transported over 7,000 commuters; "health book" - a smart solution to individual health management; "Agri Weather" - a solution incorporating IoT and data science that helps farmers grow world-class produce; ELAN's AI solution to traffic congestion; and the success of Universe Circular Technology, Nietzsche Enterprise and Glory Technology in developing and exporting smart city solutions overseas. These stories are living examples of how smart technologies are changing our lives, and together, they show us a glimpse of what the future is like. By sharing these stories, we hope to invite our readers to support smart city development, and prepare them for the many new applications, scenarios and requirements we may encounter as we progress towards future city.

走進未來城市，打開無限想像

Infinite possibilities of a futuristic city

未來城市會是什麼樣貌，又應該是什麼樣貌？依據聯合國統計資料顯示，全世界在 2025 年將會有超過 70% 以上的人口居住於城市。人口超過 1000 萬的巨型城市 (megacities) 將由 2018 年的 33 個成長到 2030 年的 43 個。巨型城市的形成，將衍伸出更多交通、汙染、高齡化照護和醫療不足等諸多問題，科技要如何有效回應巨型城市本身的困境，以及城市與鄉村之間的高度差異化需求，並提出友善、永續且貼近不同民眾生活所需的解決方案，攸關你我生活品質和未來社會的發展。

Have you ever wondered what our cities will or should be like in the future? According to the United Nations, more than 70% of the world's population will be living in urban areas by 2025, and the number of megacities (with population exceeding 10 million) will increase from 33 in 2018 to 43 by 2030. Megacity presents many challenges, from traffic congestion, pollution, aging population to shortage of medical resource, and the way we incorporate technologies into sustainable solutions to address the shortcomings of megacity and narrow the urban-suburban gap will largely determine the quality of our future lifestyle and the society's growth.

未來其實不遠，我們每分每秒都正在跨向新的未來。過去，面對都市化所造成的問題，我們只能等待基礎公共建設到位，而如今 AI 及物聯網時代來臨，許多新技術開始進入城市、鄉村去嘗試解決生活、社會、經濟、環境等各面向的問題。我們已經可以看到自駕車開始在路上運行，也能感受到智慧醫療、智慧金融和智慧教育等各種新應用所帶來的便利，這些科技已經開始出現在你我身旁，但就像知名科幻小說家威廉吉布森（William Ford Gibson) 所說的，「未來已經來臨，只是尚未流行。」

透過與 Taiwan AI Labs 創辦人杜奕瑾、天下未來城市頻道總監陳芳毓、臺灣智慧城市產業聯盟秘書長林智清三位的對談，可以發現臺灣在面對未來城市一波波的挑戰之下，其實充滿著無限機會。政

The future is not far from us, and we are approaching it one second at a time. In the past, people used to react to the problems of urbanization through infrastructure, which can be time-consuming, but as AI and IoT mature, many new technologies are being adopted in cities as well as rural areas to solve lifestyle, social, economic and environmental problems. We have already seen self-driving vehicles hitting the road, and experienced for ourselves the wonders of smart healthcare, smart banking and smart education. New technologies are starting to surface, but like what the renowned science fiction novelist William Ford Gibson had said: "The future is already here - it's just not evenly distributed."

Through a series of interview with Ethan Tu - founder of Taiwan AI Labs, Fang-Yu Chen - Director of Future City, and Chih-Ching Lin - General Secretary of Taiwan Smart City Solutions Alliance (TSSA), it becomes clear that Taiwan has been presented with infinite opportunities amidst

▲ Taiwan AI Labs 創辦人杜奕瑾 Ethan Tu, founder of Taiwan AI Labs

府、產業界與民眾如何協力打造出「市民有感」、「數據累積」、「開放共創」的智慧島嶼，端看你我以什麼樣的心態去擁抱新科技、擁抱未來。

未來城市，以人為本

關於未來城市所浮現的第一個想像，大多是各種新科技諸如無人車、機器人四處奔馳遊走的智慧力量展現。科技似乎主宰了我們對未來的思考，在世界各國積極走向未來城市的道路上，智慧科技的各式新應用往往是最顯而易見的場景，也是必要基礎。那麼未來城市是什麼？跟智慧城市又有何不同？Taiwan AI Labs 創辦人杜奕瑾認為，「未來城市一定是有智慧的，未來城市一定是包含著智慧城市，你要走向未來城市，智慧城市是一個必需品。」可以看到，智慧城市是未來城市的重要一部分，天下未來城市頻道總監陳芳毓也認為，「未來城市的範圍會比科技應用更大，其中包括了人文的反思，以及一些在過去沒有解決，在未來可能更必須思考的一些議題。」

因此，智慧城市的科技應用，就必須要立足於未

the challenges of future city. How we choose to embrace new technologies and the future will largely determine the way the government, the industry and the general public cooperate towards building a "smart," "data-driven" and "open" island nation.

The future city is all about people

For most people, the first image that comes into mind upon mentioning future city would be driverless vehicles, robots and other uses of new technology. Technology seems to dictate our imagination about the future, and based on what other countries have envisioned future city to be, the use of smart technology seems to be the most common, obvious and fundamental change. So what is future city? How is it different from a smart city? According to Ethan Tu, founder of Taiwan AI Labs, "A future city has to be smart and built on the foundation of a smart city. Smart city is a state we must go through to build a future city." Essentially, smart city is a major requirement for future city, which Fang-Yu Chen, Director of Future City, concurred and said: "Future city encompasses a broader vision than the use of technology. It concerns our perspective towards human culture and certain issues that were not resolved in the past but may become relevant in the future."

For this reason, we must have broad imaginations about what our future cities could be and use this vision to guide the development of our smart city. Instead of going where new technology takes us, we should adopt a "people focus" and use new technologies to meet the needs of residents. Based on AI-related studies, Tu said that the smartest goal of future city is to "ensure proper care to everyone at different time, location and circumstances." In other words, smart technologies should be applied where people's needs are, and cities are ideal places to try out new technologies. The conventional idea of mass-producing a single product hoping that it would solve everyone's problems will soon be replaced with more versatile solutions. Chih-Ching Lin, General Secretary

▲ 臺灣智慧城市產業聯盟秘書長林智清 Chih-Ching Lin - General Secretary of Taiwan Smart City Solutions Alliance (TSSA)

來城市寬廣的想像，拋開技術驅動的思考，從「以人為本」的角度出發，用新科技去滿足每個城市居民不同的個性化需求。杜奕瑾以 AI 人工智慧的研究為例，他認為，未來城市的最大智慧，就是要做到「讓每個人在不同時間、不同地點、不同狀況都能有妥善的照顧。」因此，人的需求在哪裡，智慧應用就會在那裡，而城市即是新科技最佳的試驗場，過去那種單一產品、大量生產的時代，將會被多元的解決方案所取代。臺灣智慧城市產業聯盟秘書長林智清就 ，「城市本身的需求可以刺激在地科技發展，也能刺激更多新創團隊進駐，彼此整合，找技術來做各式各樣的創新應用，帶給城市新的發展機會。」

於是我們進一步思考，臺灣在邁向未來城市的進程當中，這種以人為本的新智慧科技要如何發展，才能真正切合政府治理、經濟發展和生活品質等各面向的真實需求？杜奕瑾認為，現在我們要做的，是將解決問題的思維從過去的問題驅動、數據驅動，開始走向 AI 驅動，「AI 驅動的並非是一套法則，它不像是紅綠燈交通號誌那樣

of TSSA, said: "A city has the diverse demands to inspire technology development and attract creative minds. Their interactions will give rise to creative applications of available technology and present new opportunities for the city."

This leads us to our next question: How should Taiwan develop new smart technologies based on this "people focus" to properly address governance, growth and lifestyle needs of a future city? Tu said that it is necessary to change our problem-solving mindset from problem-driven and data-driven to AI-driven. "AI is not about following a set of rules like controlling traffic lights, but being able to make timely and the most appropriate decisions under the prevailing circumstances, such as changes in traffic flow." Tu further explained that data gathered through 5G network and IoT can be used to train AI to cater for the needs of every citizen at different time, location and circumstances. "This is what we meant, that the government's future construction efforts should not be defined by human, but by AI as it uncovers the issues that are most important to citizens."

The AI-driven era requires extensive collection and use of big data relating to people's lives, which makes "people focus" the most important as the solution has to be designed, produced and applied in close relation to "people." Tu believes in addressing people's needs from a "humanity" perspective and emphasizes "privacy" and "integrity" of the solution process. These are the fundamental principles that AI Labs and all AI researchers must adhere to in Taiwan, "because these are the outcomes that are useful to us."

Promoting awareness through storytelling

Renowned architect Le Corbusier once mentioned in "Toward an Architecture" (1923) that: "A house is a machine for living in." This prophecy will become a reality as AI, IoT and cloud computing mature and become popular in the future, by which time the entire city, and not just our houses, will be

規律運行，而是可以依照當時的各種狀況，例如交通流量的變化等等，即時做最好的決策。」杜奕瑾繼續解釋到，透過城市中 5G 與物聯網所蒐集到的各種資料，配合 AI 人工智慧的訓練，就可以依照每個市民在不同時間、不同地點，面對不同狀況的需求，去給他妥善的照顧，「這就是我們說的，未來施政建設不是由人去定義我要改善什麼，而是由 AI 人工智慧去自動找到哪些是對市民最重要的事物。」

在 AI 驅動的時代裡，各種與人類生活相關的大數據搜集與應用，都讓以人為本的思維更顯得重要，它必須在設計、產出及應用上的每個環節都緊扣住「人」這個主角。杜奕瑾認為，以人性（Humanity）為出發點，解決人的需求，同時重視個人隱私（Privacy），且過程中還需具備誠信（Integrity）與正直，是 AI Labs 本身，也是在臺灣做人工智慧研究所必須堅守的基本原則，「從這個角度所做出來的成果，才會是我們所需要的。」

用故事打破冷感，掌握未來脈動

建築大師勒 柯布西耶（Le Corbusier）在 1923 年的名著《走向新建築》中曾提到：「房子是居住的機器」。在未來城市裡，這樣的預言將隨著 AI 人工智慧、物聯網、雲端運算等相關技術的成熟與普及化而轉變為現實，屆時，不僅我們的居住空間，甚至連整個城市都會是一個懂思考的機器。而臺灣也正在這樣的發展道路上，可以看到的是，這幾年無論是自駕車、智慧交控、智慧教室、智慧農業到智能醫院等各式多元新應用與日俱增，臺灣已經向世界展現了精彩的成果。

不過，林智清由多年來辦理《智慧城市展》的經驗發現，不僅是一般民眾，甚至連產業界在面對

one giant thinking machine. Taiwan is en route to this reality, given the remarkable progress it has made in recent years with respect to self-driving vehicles, smart traffic control, smart classroom, smart agriculture and smart hospital.

However, having organized the "Smart City Summit & Expo" for many years, Lin found that the general public or even industry participants were somewhat unsure what to expect from a smart city. He considers it the side effect of Taiwanese businesses being too accustomed to mass production, a business model that has run its course, and what businesses should do is to redirect existing technologies and talent into new applications such as intelligent transport, smart architecture, smart education etc. However, concerns about "how do we adapt to the new business model once we make the switch to smart city?" are making industry participants reluctant in taking the leap of faith.

Faced with an ongoing, foreseeable and imminent transition towards smart city, it is necessary to help the general public and industry participants familiarize with this topic, and develop the consensus needed to progress into the future. But what can we do to grow out of this trap? Tu suggested storytelling as a means to convey Taiwan's smart city potentials. "Like Disneyland being created from stories of different princesses, we can use AI to show people the things they need and try to solve them. This process will eventually create a new value chain." Tu believes that it is especially important to inspire innovation in "software," because it is the humane component that learns people's needs and attempts to solve them through technology. Smart nursing, for example, was inspired by the goal of providing people with full nursing care in the comfort of their homes. Through software development, a solution was formulated along with a complete ecosystem. "New accessories will surely be designed to work with the ecosystem in the future, by which time Taiwan's hardware strengths can be utilized to market the whole solution to the world."

智慧城市的到來，都顯得有些不知所措。他認為，臺灣過去太習於做大量生產，但這已經面臨到瓶頸，現在應該要更積極把原有的技術、人才等能量，轉進到智慧交通、智慧建築、智慧教育等新應用領域才會有出路。但「轉進智慧城市的領域後，經營模式會跟過去截然不同，那到底要怎麼做？」這樣的疑慮，成為產業界躊躇不前的心魔。

面對這樣正在進行、可預見的智慧城市脈動，從民眾到整個產業界，由上至下，其實都更應該要打破冷感，讓前進未來的共識更加凝聚。但要怎麼做，才能跳脫這樣的集體困境？杜奕瑾建議，可以用說故事的方式，來建立屬於臺灣的智慧城市價值，「迪士尼樂園也是在講各種公主的故事，後續周邊就會不斷出現，」他繼續解釋到，「我們以 AI 驅動的方式看見需求，並想著要怎麼解決它，自然會有新的價值鏈產生。」杜奕瑾認為，勇於開啟「軟體」的新創氛圍尤其重要，軟體的思維，就是以人作為出發點，理解人的需求，然後用技術去解決。他以智慧照護為例，從讓民眾可以在家就能享有完善醫療照護的發想開始，透過軟體的開發，建立起一套解決方案、一套 ecosystem，「後續一定有很多東西可以搭配，自然而然就能把我們臺灣的硬體強項一起帶進來，走向國際化。」

對此，林智清也表示，《智慧城市展》在去年就特別設有智慧醫院場景，裡面有病房、急診、照護等等，需要各種智慧解決方案，「這就不會是一家廠商來提供，我們就找了七八家廠商，把他們的產品技術在現場整合起來，展示給大家看。」他希望能透過這樣的方式，營造應用場景，讓新科技的力量能夠更快滲透，「這就是智慧城市展跟傳統展覽非常不同的地方，它會影響產業界的思維，促成連鎖轉變。」

▲ 天下未來城市頻道總監陳芳毓 Fang-Yu Chen - Director of Future City

Lin added that during last year's Smart City Summit & Expo, a medical section was created to demonstrate smart solutions for scenarios such as ward, ER and nursing. "We asked for products from 7~8 suppliers and integrated them on-site to show the audience our vision of smart healthcare." By creating applicable scenarios that people may not have thought of, Lin hopes to make new technologies popular in the shortest time. "This is what sets Smart City Summit & Expo apart from other exhibitions; it attempts to affect how an industry thinks and create a chain reaction of changes."

Leveraging Taiwan's distinctive strengths

Taiwan's advantage in ICT and semiconductors provides the critical foundation for our transformation into smart city and future city. As long as the government, the public and the industry are able to reach a favorable consensus, Taiwan's existing advantages can be utilized to maintain its global lead in smart city solutions. Chen said that Taiwan not only has a competitive ICT industry, but is also an ideal place to experiment smart technologies. "Our territory

深化臺灣優勢，擘畫未來城市

臺灣 ICT、半導體產業實力雄厚，是我們朝智慧城市轉型、往未來城市邁進的重要基礎。從政府、民眾到產業界，只要能持續凝聚共識，並深化臺灣既有優勢，便能在全球智慧城市建設上保持領先的步伐。陳芳毓表示，臺灣不僅有蓬勃的資通訊產業，更是一個非常完美的智慧科技實驗場域，「我們的範圍不是那麼大，但多元性又很高，加上產業供應鏈也很俱全，這些新科技只要能在臺灣試驗得很好，那麼就能有非常好的機會輸出到國外。」

林智清也從這幾屆《智慧城市展》的參訪嘉賓口中發現，我們對自己的 ICT 優勢常常會覺得「習以為常」，但對其他國家的人而言這其實是很厲害的一件事。「像是澳洲代表就說，在澳洲，一個州搞不好也才幾家電子公司，臺灣可以發展成這樣，實在太強大。」林智清解釋到，臺灣發達、完整的資通訊產業供應鏈，對智慧城市的建設非常有幫助，而這一點正是讓許多國家的城市首長，如法國、捷克等，一來再來，每年都會到《智慧城市展》取經的原因。林智清 ，臺灣的產業經驗對他們來說有著「致命的吸引力。」

臺灣不僅在硬體方面有優勢，軟體方面也一向人才濟濟，杜奕瑾談起他回臺創辦 AI Labs 時說到，「我們這邊有很強的軟體技術人才，也都很努力去想新的事情，加上數位化程度高，這讓我們整個產業的創新思維是很強的。」杜奕瑾 ，臺灣在九零年代時，網路跟軟體發展走得非常前面，這造成「第一我們技術不輸人，第二我們擁有像是 PTT、零時政府 g0v 這種鼓吹共享、開放的組織，所以 AI Labs 當時便是成立於這樣的邏輯與基礎上。」

杜奕瑾的 AI Labs 結合臺灣軟體人才與創新優

may not seem sizable, but is highly diverse with no doubt. Furthermore, we have the complete supply chain to materialize our designs, meaning that we have very good chances of exporting our solutions."

In the last few years of Smart City Summit & Expo, Lin noticed that Taiwanese businesses have grown too "accustomed" to their ICT strengths while people from other countries could only admire in awe. "Australia, for example, only has a handful of electronic companies in a single state; it is unimaginable that Taiwan could even grow to such a large scale." Lin explained that Taiwan's efficient and comprehensive ICT supply chain will prove very helpful in smart city development, and this is the type of advantage that attracts mayors of French and Czech cities to Smart City Summit & Expo year after year. To them, Taiwan's industry experience is "absolutely astonishing."

Taiwan not only possesses distinctive advantage in hardware production, it has no shortage of software talent either. Tu recalled the time he founded AI Labs and said: "We have exceptionally strong software talent who are constantly coming up with new ideas. With the support of a highly digitalized environment, the industry as a whole can be very creative." Tu said that Taiwan's network and software capacity took a giant leap in the 1990s "that not only provided us with the ability to compete with the world, but also gave rise to open-share platforms such as PTT and g0v. These were the foundations that led to the birth of AI Labs."

Tu's AI Labs was the first non-profit, non-government organization in the world to specialize in AI research, by leveraging Taiwan's software talent and creative advantages. "We place great emphasis on the openness and verifiability of our algorithms because this is what makes the best academic research and earns enough trust from businesses to use them." Tu further mentioned that Taiwan had been thorough converting old data into digital form, which is key to our transition into the AI-driven era. He suggested that "we should

勢，打造出全世界第一個以非營利、非政府方式做 AI 研究的組織，「我們非常強調算法跟資料的開放、可驗證性，因為這樣才能造就最好的學術研究、最公正的信任，並帶動各行各業去應用它。」杜奕瑾進一步說到，臺灣過去在資料數位化的部分做得很好，提供了我們邁向 AI 驅動時代的一個重要基礎，他建議，「我們這些有用的資料都要持續匯集、整合起來，去建立一個政府的智慧城市資料中心，才能依照不同狀況，去打造人工智慧模型，解決相關問題。」

打造跨領域整合平臺，輸出臺灣智慧力

未來，我們還能從哪方面去加強臺灣的智慧城市競爭力？林智清表示，智慧城市是對未來生活的想像，它必須針對城市問題去提出解決方案，「這就要綜合技術、產品還有創意，跟我們以前的產業型態截然不同。」可以說，跨領域的整合能力就是打造智慧城市科技力的關鍵，這樣的整合不僅僅是技術上的，更需要政府、民間與產業界全體一同努力。杜奕瑾就認為，臺灣有很好的底子，智慧城市以及 AI 人工智慧絕對是我們未來十年值得好好發展的方向，而這就需要有陽光、空氣、水的整合與支持，缺一不可，「陽光就是要有政府政策的持續支持，把障礙降到最低、增加鼓勵；空氣說的是這種軟體新創思維要在臺灣醞釀起來；水則是鼓勵臺灣的資金要往對的方向去投資。」

陳芳毓表示，媒體也可以成為推動跨領域整合的一股重要力量，天下未來城市頻道目前正努力打造出一個地方治理的分享平臺，希望把科技，還有很多不同面向跟地方政府的工作連結在一起，讓一般民眾、地方政府和廠商之間可以彼此學習與共享，透過這種鼓勵的方式，賦予臺灣邁向智慧未來的能量。

continue gathering useful data and store it inside a government-operated smart city data center so that people may have the resources to build AI models for problem-solving."

Government-initiated platform that outputs Taiwan's brightest minds

How else can we improve Taiwan's smart city competitiveness in the future? Lin said that smart city represents people's imagination towards the future lifestyle. It has to incorporate solutions to the city's problems, "which involves integration of technology, product and creativity, a process that is very different from our industry experience." It can be said that the key to building smart city lies in the ability to integrate different fields of expertise. This integration has to occur on many levels, not just technical, and would require efforts from the government, the general public and the industry. Tu is convinced that Taiwan has all the right elements to succeed, therefore we should make smart city and AI our industry focus for the next 10 years. Similar to plants needing sunlight, air and water to survive, "smart city and AI require the government's ongoing support and incentives, the industry's innovative thinking, and private sector's funding to thrive."

Chen said that the media can be an influential force that facilitates integration between different fields of expertise. Future City is currently working on creating a locally governed sharing platform where the general public, the local government and businesses can learn from each other and exchange knowledge. These are the types of influence the media can exert to expand Taiwan's smart potentials.

Taiwan has been fruitful in the integration and output of smart city solutions, and the "System Integration Award" presented during Smart City Summit & Expo is one way of commending exceptional accomplishments. Lin said that Smart City Summit & Expo is currently the largest smart

臺灣目前在智慧城市解決方案的整合與輸出上，已經有了許多豐富的成果，《智慧城市展》所頒發的「系統整合輸出獎」便是一項很好的示範。林智清說，《智慧城市展》已經是亞洲規模最大的智慧城市展會，它每年可以吸引這麼多國的城市首長與科技廠商過來，就表示說我們有很好的產品與解決方案。他建議，政府可以持續推動跨領域整合的力量，集中力道，讓產業界能夠充分掌握現有優勢，專心地去思考要幫全世界解決什麼樣的問題，去針對智慧城市、未來城市提出各種解決方案，「這樣就會有更多人願意到臺灣來取經，而臺灣也能邁向更大的國際舞臺。」

city exhibition in Asia, and being able to attract mayors and technology companies from all over the world is a testament to the strength of products and solutions we offer. He suggested that the government may continue playing its role as coordinator between industries so that businesses may put their existing advantages to work and think about the world's problems and how they can be addressed with smart city and future city solutions. "In doing so, more people will look to Taiwan for answer, giving us the opportunity to expand our audience worldwide."

獨步全球！自駕改裝公車 引領智慧交通再升級

Self-driving Repurposed Bus Takes Intelligent Transport to the Next Level

臺灣大學教授 施吉昇 Chi-Sheng Shih, National Taiwan University (NTU) Professor

全球第一輛自駕改裝公車在臺灣誕生！在工業局智慧城鄉計畫的推動下，臺灣大學施吉昇教授研究團隊結合光達、電腦視覺技術，與臺中豐榮客運及實力堅強的臺灣在地 ICT 廠商如理立系統、緯創、星瑞林、臺佳光等，一同攜手改裝你我再熟悉不過的公車，成功打造出獨步全球的自駕公車系統。

Taiwan Introduces World's First Self-driving Repurposed Bus! Inspired by the Smart City Program of the Industrial Development Bureau (IDB), the research team lead by National Taiwan University (NTU) Professor Chi-Sheng Shih incorporated LiDAR (Light Detection and Ranging) and computer vision technologies and worked with local transport/ICT companies including Green Transit Company, Lilee Systems, Wistron, Startrii and Taiwan Optical Platform to develop a self-driving bus system that is unique to the world.

這輛獨步全球的自駕公車，日前已在臺中水湳智慧城花博園區內完成一個月內載客超過七千人次的創舉，而多項領先全球的亮點技術彼此順暢協作無礙，引起自駕車研發領域的熱烈關注，並成功吸引各國的目光，「這件事情全世界都在看，現在美國、日本還有土耳其都積極向我們詢問合作的可能性，」施吉昇 。

多項第一，成就自駕研發領域新亮點

這輛由國內產官學界所共同支持、研發的自駕公車，擁有許多「第一」的頭銜。施吉昇表示，它不僅是臺灣《無人載具科技創新實驗條例》實施

This unique self-driving bus has been deployed at the Floral Exposition in Shuinan Smart City, Taichung, and recently accomplished the service record of transporting more than 7,000 passengers a month. This project has attracted the attention of self-driving car developers from all over the world, not only for its advanced features but also for how these new technologies work seamlessly together. "The world is watching, and we are being approached by U.S., Japanese and Turkish companies to apply our know-how in their projects," said Chi-Sheng Shih.

Ground-breaking accomplishments in self-driving

Developed and supported by the industry, the government and the academia, this self-driving bus

▲ 在臺中水滴智慧城花博園區出現的自駕公車，不僅是臺灣第一輛上路自駕公車，更是全世界第一輛成功改裝並載客的自駕公車。
The self-driving bus operating at the Floral Exposition in Shuinan Smart City, Taichung, was Taiwan's first self-driving bus to hit the road, and the world's first bus to be successfully modified driverless for passenger transportation.

後第一輛上路的自駕公車，更是全世界第一輛成功改裝並載客的自駕公車。不同於其他自駕車全新打造或破壞式改裝的高成本，「平行，不影響原本車子的操控，」是這輛自駕公車的重要特色之一。它的低成本讓民間業者能更輕易地投身自駕車領域，大幅降低進入門檻，產生普及化效應，加快自駕科技融入我們日常生活的步伐。

而擁有「行控中心」則是這輛自駕公車的另一項新亮點。由於團隊成員理立系統在美國多年的火車通訊建設經驗，讓以追求安全為唯一首要目標的研發團隊，納入原本屬於火車產業的行控中心建置。透過雲端收集、整合各項資料，並進行即時監視、控制的方式，大幅提升了自駕公車的行車安全性，更加深民眾對於自駕公車的信賴感，「我們不是完全交給電腦，而是有個類似安全官的角色在雲端監控，」施吉昇接著補充到：「以自駕車這個產業來說，全世界其他計劃都沒有行控中心這項建置，它是第一個。」而因為有了行控中心，也讓所有珍貴的大數據資料都能全數存放在中心伺服器裡，將自駕科技的核心關鍵根留臺灣。

團隊合作，齊心打造 MIT 自駕車產業聚落

自駕公車不僅能有效解決大眾交通運輸成本高、人力不足、效率低等痛點，在擘建及回應未來智慧交通需求的同時，也進一步形塑出臺灣自駕車

delivers "ground-breaking" accomplishments on many aspects. Chi-Sheng Shih said that not only is it the first self-driving bus to hit the road after the implementation of "Regulations Governing Innovation and Experiment of Unmanned Vehicle" in Taiwan, it is also the world's first successful attempt at converting an ordinary bus driverless for passenger transportation. Unlike other self-driving vehicles that are either created anew or involve destructive, costly modifications, Shih's solution uses "a self-driving system that operates in parallel and does not affect existing controls of the vehicle." Its low cost significantly reduces the entry barrier and makes self-driving a more approachable technology to private businesses, and popularity is key to implementing driverless technology in our daily lives.

Another highlight of this self-driving bus system is the "control center." Lilee Systems, one of the research team members, has many years of experience in developing train communication system in the U.S., and it was Lilee's suggestion to incorporate a control center similar to the train system for safety reasons. The control center gathers and consolidates data over the cloud and performs real-time monitoring and control in ways that significantly improve the safety of the self-driving bus, and thereby enhance the public's confidence in this new technology. "We don't leave everything to the computer, but have a safety officer monitoring over cloud at all times," said Chi-Sheng Shih, "as far as self-driving vehicles are concerned, no other project in the world incorporates a control center. Ours is the first of its kind." The control center also enables storage of precious data in a centralized server, which will support future developments of the self-driving technology.

產業聚落的蓬勃樣貌，可說是臺灣資通訊實力與產官學團隊合作下的豐碩見證。從工業局「智慧城鄉生活應用發展計畫」到臺中市政府的支持，加上各家 ICT 廠商的心血投注，為自駕公車的研發打下良好基礎，施吉昇認為，「臺灣堅強的 ICT 產業是一項很重要的因素；另外就是我們的交通狀況非常複雜，可以搜集到很多數據來強化自駕公車的學習與應變能力。」

施吉昇接著提到，這也是全世界首次有民間客運業者進入自駕車研究團隊的案例。此輛驚艷國際的自駕接駁車，正是利用豐榮客運原有的公車改裝而成，「我們把臺灣最強的 ICT 帶進客運、汽車產業，讓它改頭換面。」這套自駕系統的所有軟、硬體皆是臺灣在地設計、研發和生產，它證明了一般公車與乘客也能透過簡單方式享有自駕科技的便利，更甚者，「我們還希望能帶起一個自駕公車的產業聚落，它包含了電腦軟硬體、通訊、汽車和改裝等等各個部分；也期待有出海口，能夠讓這項技術順利輸出國外。」

立足臺灣、放眼世界，豐榮自駕公車研發團隊聚集了來自臺灣各界，深具未來城市視野的堅實 ICT 力量，像原本施吉昇團隊就是臺灣大學研究機器人踢足球的佼佼者，由於「機器人的設計跟自駕車系統有很多相通之處」，因緣際會之下，讓他一同跨入這次自駕公車系統的研發。另外，負責此自駕系統的光纖鋪設、監視系統 CCTV 架設與路側資料傳輸等部分的廠商，正是臺中有線電視業者「臺佳光」；臺灣資通訊製造大廠「緯創資通」則針對雲端資料，以及紅綠燈優先號誌控制等部分進行整合；而知名智慧交通解決方案供應商「理立系統」主要是負責低延遲通訊（車端到雲端約 0.02 秒）以及 4G 通訊和 AI 模組等建置；最後，電動商用車輛系統整合廠商汽車「星瑞林」是做車端跟 AI 模組端的整合，也就是將電腦命令傳達至車體，轉換成踩油門、煞車等指令，並負責車體改裝。除了這些民間廠商，政府的力量也不可少，例如由內政部所製作的高精地圖，它讓這輛自駕公車在停紅綠燈、靠站等定位上都無比精準，施吉昇 ，臺灣自駕車產業聚落要發展，「高精地圖會是其中很重要的一個部分。」

Creating the domestic self-driving vehicle industry

Self-driving bus addresses several shortcomings of public transportation, such as high cost, shortage of manpower and low efficiency. In addition, it meets the requirements of intelligent transport and outlines the future potentials of Taiwan's self-driving vehicle industry. The project has been a strong representation of Taiwan's ICT capabilities and what the industry, the government and the academia may cooperate to achieve. The IDB's "Smart City Program," support of Taichung City Government and contribution from ICT partners all provided a solid foundation for the development of self-driving bus. According to Chi-Sheng Shih, "Taiwan's strong ICT background has been a critical factor, and the complexity of our traffic conditions enabled us to gather abundant data to train our self-driving bus with better responses."

Chi-Sheng Shih also mentioned that this was the world's first self-driving vehicle project to involve a private transport company in the research team. This self-driving shuttle bus that astonished the world was modified from one of the existing buses of Green Transit Company. "We applied our ICT strengths into passenger vehicle and created new possibilities out of the ordinary." Software and hardware of this self-driving system were designed, developed and produced entirely in Taiwan. Its success proves that self-driving technology can be made simple and accessible even for ordinary buses and passengers. More importantly, "We hope to create a sustainable industry cluster for self-driving buses that incorporates expertise from fields such as computer software/hardware, communication, automobile and modification. With the presence of an international agent, we may even export this technology."

Green Transit Company's self-driving bus research team comprises experts from several ICT fields that share a common vision of Taiwan's smart cities. Chi-Sheng Shih, for example, is NTU's leading expert in the study of soccer robots, and he became involved in the development of self-driving bus because "robot design shares many similarities with the self-driving system." As for the rest of the team: "Taiwan Optical Platform" - a cable TV service provider in Taichung, was responsible for the deployment of optic fiber network, CCTV surveillance and roadside data transmission systems; "Wistron" - a major ICT manufacturer in Taiwan, was responsible for integrating cloud data with traffic signal control;

▲ 施吉昇與臺灣大學研究機器人踢足球的團隊，一同跨入自駕公車系統的研發。Chi-Sheng Shih and his soccer robot team at NTU joined in on the development of self-driving buses.

解決智慧交通建設的第一與最後一哩路

豐榮自駕公車於《無人載具科技創新實驗條例》實施後，在臺中為大眾運輸智慧化建立了一次成功且安全的最佳示範。對此施吉昇認為，自駕車監理沙盒是在「建立車與自駕車、民眾與自駕車之間的信任感，」他繼續解釋到：「這種信任能被建立，客運業者才會有收入，進而才可以把更多自駕車帶到交通系統上面來，讓產業群聚效應繼續擴散。」

未來，豐榮自駕公車團隊成員們皆希望政府單位從規劃試驗場域，到法規監理等部分，能持續秉持著開放、創新的精神，讓自駕公車儘早進入「混合車流」階段去做驗證，並開始試營運，施吉昇，「這對於我們把這套系統輸出到國外是很重要的里程碑。」而理立系統行銷經理徐仁慧也表示，這套系統若能真正營運、落實，「對智慧交通、智慧城市發展有很大幫助，同時對偏鄉、還有塞車問題都會有很好的改善。」從更長遠的擘劃來看，豐榮自駕公車以其獨步全球的領頭羊角色，將能完整串連智慧城市的交通整合服務 Mobility as a Service (MaaS)，成為第一哩路和最後一哩路的接駁關鍵。施吉昇與徐仁慧異口同聲地說，「我們不想要試跑一下就結束，而是這套系統可以真正上路，發揮它商業與智慧科技的價值。」

"Lilee Systems" - a renowned supplier of intelligent transport solutions, was responsible for the implementation of low-latency communication (0.02 second from vehicle to cloud), 4G communication and AI modules; and "Startrii" - supplier of vehicle system integration solutions, was responsible for vehicle modification and integrating vehicle with the AI module, or in other words, converting computer commands into acceleration, brake etc. Apart from private businesses, the government, too, played an important role. For example, the high-precision map created by the Ministry of the Interior enables the self-driving bus to stop at traffic light and its designated stops with extreme precision. According to Chi-Sheng Shih, "High-precision map will be a very important factor" for the development of Taiwan's self-driving vehicle industry.

The first and last mile to intelligent transport

Green Transit Company's self-driving bus in Taichung is the model example of safe intelligent transport following the implementation of "Regulations Governing Innovation and Experiment of Unmanned Vehicle." Chi-Sheng Shih believes that regulatory sandbox for self-driving vehicles "should be created for the purpose of building the public's trust towards self-driving vehicles." He further explained: "This trust is what generates revenues for passenger transport companies and brings more self-driving vehicles into the traffic system, thereby allowing the industry to grow."

Green Transit Company's self-driving bus team hopes that the government may continue to adopt an open and innovative mindset in the future, particularly with respect to experimentation and law-making, so that self-driving buses may "join the traffic" for tests and trial runs at an earlier date. "This milestone is critical if we ever want to export this system overseas," said Chi-Sheng Shih. Ren-Huei Hsu, Marketing Manager of Lilee Systems, said that the system "will prove very helpful to the development of intelligent transport and smart city, and is an ideal solution to transportation in remote areas and traffic congestion." From a long-term perspective, Green Transit Company's self-driving bus places it ahead of the world in terms of Mobility as a Service (MaaS), which is the first and last mile to creating a smart city. Chi-Sheng Shih and Ren-Huei Hsu both agreed that "We don't want to stop after the trial-run, but expect to see the system in action in the real world, where it will create the most value."

推動健康存摺 民眾自主管理更樂活

My Health Bank: self-health care management for quality wellbeing

臺灣的全民健保制度舉世聞名，為了進一步守護國人的健康，衛生福利部中央健康保險署自2014年9月起，推動「健康存摺」(My Health Bank)，儲存攸關健康的就醫、用藥、檢驗等紀錄，方便民眾掌握自身健康細節，更進一步關懷管理家人的健康！

Taiwan's National Health Insurance (NHI) system is world-famous. In a bid to further safeguard the health of Taiwanese citizens, the National Health Insurance Administration (NHIA) under the Ministry of Health and Welfare launched My Health Bank (MHB) in September 2014. This service stores the medical history of doctor visits, medication, and examination records in a personal account so that people can access their health data or even check the health of other family members!

衛生福利部中央健康保險署署長 李伯璋 Lee Po-chang, NHIA Director-General

內政部在去年公布「2017年簡易生命表」，國人的平均壽命為80.4歲，創下歷年新高。行政院主計總處則公布，我國2016年平均壽命已達80.0歲，但不健康的存活年數達8.8年，健康的平均餘命僅71.2歲！為了強化國人自我健康照顧的意識，健保署在2014年9月推動「健康存摺」(My Health Bank)，並獲得第八屆「政府服務品質獎」肯定。

掌握資訊 自我照顧 健康一生

「自我照顧 健康一生」為健康存摺的設計理念，而推廣標語：「健康存摺帶著走，健康掌握在你

From the 2017 Abridged Life Table released by the Ministry of the Interior last year, the average life expectancy in Taiwan is a record high 80.4 years. According to data published by the Directorate General of Budget, Accounting and Statistics, the average life expectancy reached 80.0 years in 2016; however, after deducting an average of 8.8 unhealthy life years, the average healthy life expectancy is reduced to just 71.2 years! To raise people's awareness of self-health care, the NHIA launched My Health Bank (MHB) in September 2014 and was honored in the 8th Government Service Quality Award.

Health records plus self-care for a healthy life

手」更是呈現設計的初衷。身為外科醫師，也是國內腎臟移植權威，健保署署長李伯璋分享，透過健康存摺，讓民眾可以了解自己的健康問題，有疑問可請教醫師，醫師間也可以透過病患的健康存摺作更有效的溝通。

健康存摺儲存民眾近三年的就醫資料，包括中醫、西醫、牙醫的門診紀錄，以及住院、手術、用藥、過敏、檢驗檢查等資料，還可以轉換為英文版呈現，消弭語言的隔閡。以檢驗為例，如果民眾在近三年有多次檢驗醣化血紅素，系統就會以圖表顯示檢驗時間、檢測結果，進一步掌控健康趨勢。

整合健康管理
照護全家人的健康

在自主健康管理上，除了三年內的就醫等資料，還能進行疾病風險評估，並輸入血壓、血糖、心跳、身高、體重、腰圍等生理量測資料，紀錄追蹤身體狀況。

透過健康存摺的單一平臺，就能連結健保署、衛福部醫事司、疾病管制署、國民健康署等單位，獲得健保、成人預防保健、四癌篩檢、器捐 / 安寧註記 / 預立醫療決定、預防接種等跨機關健康整合資料。

李伯璋署長深知民眾就醫的各種狀況，特地舉例說明：「年長病患時常會忘記要跟醫生講的身體問題，或是就醫後忘記醫囑，子女都可以透過健康存摺補強。」因此，健康存摺除了有益於個人健康，近期將進一步提供「眷屬管理」功能，只要父母授權，子女就可以查看父母的健康存摺，而監護人也可以查看年幼子女的健康存摺，幫助家人更積極管理健康。

進化服務功能
使用人次破千萬

從推動至今歷經建置期、推廣期與精進期，功能、介面與服務不斷進化，原本提供一年內門診與住院的資料，民眾僅能使用自然人憑證插卡登入。2016 年 7 月 21 日起，「健康存摺」系統進行全

"Self-care for a healthy life" underscores the concept of MHB—its slogan: With My Health Bank, health is in your hands. Lee Po-chang, NHIA Director-General and a top kidney transplant surgeon, remarks that MHB lets people keep track of their health problems and consult a doctor if they have questions. Meanwhile, physicians can also use a patient's MHB to communicate more efficiently.

An MHB account stores the medical records of an individual over the past three years, including outpatient records for Chinese and western medicine and dentist visits, as well as hospital admission, surgeries, medications, allergies and medical exams. It's also available in English to eliminate language barriers. For instance, if a person has their glycosylated hemoglobin tests several times in the past three years, the system will display the time of the tests and results in a chart so a trend can be mapped and monitored.

Integrated health management keeps tabs on the health of the whole family

In terms of self-care health management, MHB can also perform disease risk assessment, and record and track physical condition by inputting physiological data like blood pressure, blood sugar, heart rate, height, weight, and waist circumference.

Through this one-stop platform, information is integrated by linking the NHIA, Department of Medical Affairs, Centers for Disease Control, and Health Promotion Administration, as well as access to cross-institution health-related data on NHI premium, adult preventive health care, screening for four cancers, consent to organ donation/palliative care/advance decision, and immunization histories.

Lee knows well the plethora of situations that can occur in the hospital. "The elderly often forget what they want to ask the physician or tend to forget what the doctor said at the visit. Now, their children can access their medical history using My Health Bank," Lee noted. Therefore, in addition to taking care of personal health, a "Family Management" feature is expected to be added—children can access their parents' account as long as the parents grant them authorization, while guardians can also check up on their young children's account, thereby empowering health management for the whole family.

Evolving services: now with more than 10 million log-ins

面改版，包括：疾病評估、連結外部衛教資訊、健康資料以圖呈現、擴大提供 3 年就醫資料，並且可以不需使用讀卡機完成健保卡註冊等功能。

自 2018 年 5 月 21 日起，健保署與國內五大電信公司合作，並啟動「全民健保行動快易通 APP」，採用手機快速認證機制，讓使用更便利，更降低登入與認證門檻，並新增醫療檢查影像自費健檢、兒童預防接種提醒等功能，資料更以視覺化圖表呈現，讓每一位使用者都能輕易了解掌握。

李伯璋署長分享，在 2014 年 9 月健康存摺第一版上線後，兩年後達到 25 萬人、154 萬人次的使用狀況，2016 年 9 月新版健康存摺 2.0 上線，至今年 2 月底使用人數達到 107 萬人、使用人次高達 1080 萬！

追蹤自身健康 加值衛教服務

由於健康存摺的設置，落實民眾知情的權利，縮短過往醫病間醫療資訊不對等的狀況。民眾平日就可以追蹤了解自身的健康狀態，若有身體不適需要就醫時，更「有所本」地向醫師陳述用藥與病史。民眾在就醫時，還可以出示健康存摺的資料，提供醫師診斷與用藥參考，幫助醫師即時有效掌握健康狀況。

健康存摺更能延伸加值運用，連結衛教資訊、就醫評估、就醫提醒與推播服務。例如民眾進行血糖檢查，就可以連結血糖相關的衛教資訊；而有腎病或肝病疑慮的民眾，也可以進行末期腎病評估、肝癌風險檢測等疾病評估；系統還能夠建議安排洗牙的日期、領藥提醒、建議回診時間、預防保健及癌症篩檢等檢測的建議時間，針對兒童則會有常規疫苗接種時程推播等訊息，有如全家人的健康管家。

政府企業教育 全面推廣宣傳

提起在臺灣社會推動健康存摺的優勢，李伯璋署長強調，因為全民健保是很好的招牌，已經累積正向的品牌形象，民眾十分信任。「只要有使用過健康存摺的民眾，全部都是正面評價！因此，現階段就是要加強推廣、擴大知名度。」健保署

From its initial launch to the promotion and continuous updates, its functions, interface and services have evolved tremendously. At the beginning, it could only store data on outpatient and inpatient records within one year and only be accessed by inserting one's Citizen Digital Certificate into a card reader. MHB received a major overhaul on July 21, 2016 to include disease assessment, links to health education information, graphic presentation of health data, expanded records storage to 3 years, and people no longer had to use a card reader to complete the registration.

Later on May 21, 2018, NIHA partnered up with the five major telecom operators in Taiwan to launch the NHI Mobile app that allows quick authentication using a phone to provide more convenient, user-friendly service and simpler log-ins. New features were also added: medical examination images from out-of-pocket health checkups and reminder for kid's scheduled vaccinations, and data are presented in visual charts for intuitive comprehension.

Two years after My Health Bank 1.0 was released, registered users reached 250,000, with 1.54 million log-ins. Then came My Health Bank 2.0 in September 2016. As of February 2019, registered users reached 1.07 million, with 10.8 million log-ins.

Tracking personal health & value-added health education service

With MHB, people's right to know is put in practice by narrowing the information asymmetry in medical health care. People can track their health on a regular basis and seek medical attention when they are unwell. Moreover, they have the records to back up their medication and medical history during a consultation. They can also present the information on MHB as a frame of reference for physicians to have a greater grasp on their health history to make proper diagnosis and medication prescriptions.

MHB also boasts some value-added features: links to health education information, medical visit evaluation, reminders and push notifications. For example, if a person is getting their blood sugar checked, they can click on links to related health education information. People suffering from kidney or liver diseases can get end-stage renal disease assessment or liver cancer risk detection. The system can also suggest time for dental scaling, reminders for medication pick-up or follow-up visit, as well as preventive health care and cancer

積極透過政府、企業、教育等管道持續推廣。

在健保署的努力推動下，有越來越多民眾使用健康存摺，也獲得許多免費的宣傳機會，例如，中華電信將在用戶的繳款單上印製健康存摺的相關資訊，讓更多民眾知道這項優質的服務。未來推廣也將深入企業，利用例如公司動員月會之類的場合，可跟健保署聯繫，由健保署同仁前往宣導推廣，強化民眾對於健康存摺的認識。

為了強化下一代的健康知識，健保署更與翰林和南一出版社合作，將健保理念與健康存摺的知識納入 108 學年度國小五年級的國語教材中，讓孩子從小建立健保正確觀念，也讓全民健保理念向下扎根。

除了對於個人的健康有積極的效益，健康存摺更是醫療管理的利器，可以避免重複用藥、重複檢查等，此外，例如，民眾如果發現自己並未做過某項檢查檢驗，這項資訊卻出現在健康存摺的紀錄中，就可以向健保署查詢。

健康存摺是以人為主軸的健康資料庫，未來除了持續推廣、精進優化使用功能與設計，鼓勵健檢機構將個人自費健康檢查資料提供健保署。而在物聯網、大數據的時代，健康雲的概念已然成形，未來健康存摺有機會提供民間加值應用，共同推動臺灣民眾的健康管理服務！

screening information. It also sends push notification to remind parents about scheduled vaccination for their children. MHB is like a health butler looking over the health of the entire family.

Getting the word out through government, enterprises and education

When talking about the advantage of promoting MHB in Taiwan, Lee points out that the NHI enjoys a good reputation, having earned public trust with its positive brand image. "My Health Bank has received positive praises from people who have used it! So now, we focus on promoting it to reach more users," said Lee. The NHIA is committed to engage more users through government, business and education channels.

Thanks to the NHIA's diligent promotion, more and more people are using MHB and are spreading its benefits through word of mouth. Meanwhile, Chunghwa Telecom is printing out MHB promo materials on its subscribers' phone bills to make this quality service known to more people. In the future, the promotion is expected to expand into enterprises. If a company wants to raise awareness on health, it can contact the NHIA to send representatives over to company events, e.g., monthly company meetings, to let people better understand the perks of MHB.

For the purpose of strengthening the health knowledge of the younger generations, the NHIA has cooperated with Han Lin Publishing and Nani Book Enterprise to include materials on the NHI and MHB in the fifth-grade Chinese language curriculum starting in the 2019 academic year. This helps children establish the correct health concept from an early age, setting deeper roots in universal health care.

In addition to positive benefits for personal health, MHB is a practical tool for medical management, like avoiding repeated medications or examinations. If a person finds an examination record in MHB that they never had, they can query the NHIA for more information.

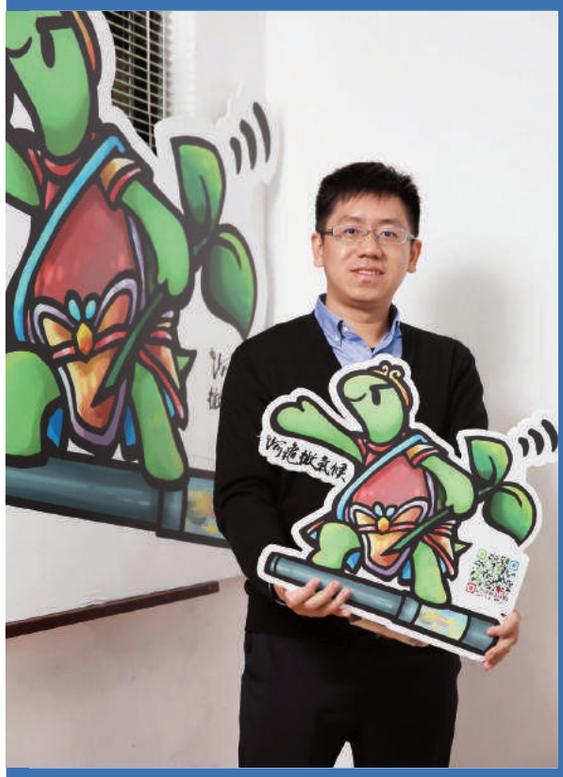
My Health Bank is a database that revolves around people. In addition to continuously promoting and optimizing the functions and design of MHB, the NHIA encourages health checkup clinics to provide out-of-pocket health examination results to them. In the age of IoT and big data, a health cloud is already taking shape. MHB is slated to offer even more value-added applications to deliver a range of comprehensive health management services!

阿龜微氣候 整合科技力 用資料科學打造智慧農業新生態

AgriWeather capitalizes on the power of technology Using data science to create a new ecosystem for smart agribusiness

阿龜微氣候運用資料科學，一步步在這塊土地上實踐著智慧農業的寬廣願景。對內它為臺灣農業生產體系的每個要角，帶來更為互信、有效率且聰明的新工作模式；對外它則串連起在地生產的智慧能量，打造出極具國際競爭力的農業新生態。

AgriWeather uses data science to step by step realize the broad vision of smart agriculture. Domestically, it brings forward a new mode of operation that is trust-worthy, efficient and intelligent, which can be applied by important players in Taiwan's agricultural production system. Internationally, it links together the smart energies of local producers to shape a new agribusiness ecosystem that delivers a competitive edge in the global market.



農業生產除了拿起鋤頭看天吃飯外，在數位科技席捲而來的時代裡，它還會有著什麼樣的新面貌？阿龜微氣候以資料科學導入農業生產的方式，透過嚴謹收集、爬梳、清洗田間資料，提供包括作物最適生長狀態、生產狀態與產期預測等等的專業數據分析，希望能創造一個所有農民都可用的工具，解決數位時代下的農業困境。對此，阿龜微氣候執行長吳君孝娓娓說到，「我最想做的，就是藉由這些透明化的資料，為臺灣農業打造出一條更有智慧、更有競爭力的新生產、銷售渠道。」

It has long been said that the agriculture market depends largely on weather. In the era of digital technology, what kind of new tools are here to help the farmers? AgriWeather applies data science in agricultural production. Through rigorous collection, analysis and filtering data from the fields, it offers professional data analytics for the most suitable crop growth conditions, production status and predictions. AgriWeather aspires to create a tool that can be used by all farmers to overcome the agricultural hurdles in the digital age. "What I want to do most is to create smarter and more competitive production and sales channels for Taiwan's agriculture through available data," said Shaw Wu, founder and CEO of AgriWeather.

建立新信任機制，幫助農產業智慧轉型

身為資料科學家，吳君孝在長年資料分析工作中，發現到臺灣許多農業問題的根源，其實皆是肇因於資訊不對等。在複雜的農產業結構裡，訊息如何在小農、小型農企業、小型契作商、合作社、大型契作商、大型農企業、採購商、終端通路到消費者之間有效傳遞，大大影響著農產業的整體競爭力。吳君孝就表示，「過去在資訊不透明的狀況下，農產業的互信機制其實相當薄弱。若單單靠著人與人之間的傳統信賴關係，則彼此在合作上都會有所保留，導致農產業競爭力長期不足。」於是資料科學成了吳君孝的切入點，阿龜微氣候的創立，正是「用數據科技導入農業的方式，去幫助臺灣農業提升競爭力，幫助它轉型。」吳君孝 ，如何從農產業的需求面出發，將生產種植、產後處理、運銷等各個不同專業做整合，其實是非常難的一件事情。阿龜試圖透過數據科技的透明化，來協助不管是農民、契作商、甚至是終端消費者，在整個產銷過程中是處於一個資訊對等的狀況，「雙方站在對等的地位上再談的時候，其實反而有助於建立與增強彼此之間的信任。」

吳君孝從阿龜微氣候所處理的實際案例中發現到，在透明資訊進入產銷過程後，它開始讓農夫、契作商等角色能更完整地掌握整個產地變化的狀況，同時對彼此有更多且更深入的理解，大大增進各方的信任關係，也有了整合的強大力量。吳君孝進一步舉例說明，從傳統的「人 人」，到現在的「人 數據 人」，這種信任機制的轉變，讓導入阿龜微氣候服務的高雄鳳梨田，在去年一片外銷逆勢中，售價硬是成長 15%，還一舉打入中國最大水果批發通路「佳沃鑫榮懋」，轉型的成果相當豐碩。

跨領域串連、合作，開拓農業產銷新渠道

而不僅農產業本身需要透過資料科學做整合，在

Establishing a new trust mechanism to support the smart agriculture transformation

In the planning and development of smart cities and towns in the future, how to satisfy their highly differentiated needs to strike a balance is the long-term goal for the government, industry, and academia. Among them, the urban-rural gap in information services, particularly something like the development of smart agriculture, presents big challenges. "When something from the city makes its way into the rural fields, it can be very daunting," explained Wu. "During this process, we must think about exactly what kind of technology will be most effective."

As a data scientist working with data analytics for many years, Wu discovered the root cause of many agricultural problems in Taiwan: information asymmetry. In the complex agro-industry structure, the overall competitiveness is heavily dependent on the effective transmission of information among small farmers, small-scale agricultural enterprises, small-scale contract farmers, cooperatives, large-scale contract farmers, large-scale agricultural enterprises, buyers, distribution channels, and consumers. "There was little information transparency in the past, so the mutual trust within the agricultural industry was quite weak. If we rely solely on the conventional trust between just people, there will always be some reservations in cooperation. This leads to long-term lack of competitiveness in the agricultural industry," said Wu. Wu saw this as an entry point and founded AgriWeather—it introduces data science to agriculture, helping boost Taiwan's competitive edge by facilitating a smart agriculture transformation. "It's very difficult to integrate the demands of various agriculture segments, e.g., crop growing, post-harvest processing, transportation and marketing. What AgriWeather does is to help local farmers, contract farmers or even end consumers to have information symmetry throughout the production and marketing process by making the data transparent with the power of technology. "When both sides are on the same level of playing field, conversations actually help build and enhance mutual trust," added Wu.

From his practical experience in handling actual cases, Wu saw that after transparent information enters the production and sales process, it allows the local and contract farmers to more fully grasp the microclimate in the entire production area, and, at the same time, understand each other better. The enhanced mutual

▲ 阿龜試圖透過數據科技的透明化，來協助不管是農民、契作商、甚至是終端消費者。AgriWeather—it introduces data science to agriculture, helping boost Taiwan's competitive edge by facilitating a smart agriculture transformation.

未來智慧城鄉的脈動中，從農業人到科技人，從政府到民間，各領域之間其實都需要更積極地串連。吳君孝認為，「要把各種不同專業、不同角色，透過跨域交流的方式，讓他們能夠相互合作，臺灣農業才有機會。」對此，吳君孝先從建立阿龜的跨領域團隊開始做起，「我們內部有資料分析師、軟硬體工程師、農業專家以及行銷團隊。外部也有生物統計教授、作物種植專家、改良場專員和智財顧問等專業人士。」對外，吳君孝希望藉由「資料科學」與「商業機制」的串連、鏈結，將更多不同專業團隊整合成一股強大的力量，把智慧農業科技解決方案變得更完整，打造出臺灣的科技農業生態圈。

在商業上串連實踐之餘，透過黑客松的方式，則可讓各專業團隊間有更多、更好的機會彼此交流，帶來源源不絕的創意與合作契機。由行政院農委會所舉辦的「農業黑客松」活動，在阿龜參與、協辦的經驗裡，吳君孝發現，不同專業團隊

trust among the various parties provides a powerful force for integration. Wu gives a further example: the transition of trust mechanism from the conventional "people people" to the current "people data people" has been fruitful. A pineapple farm serviced by AgriWeather was able to increase its selling price by 15% last year against a lagging export climate, and earned entry into Joy Wing Mau, one of China's largest fruit distributors. The transformation was a huge success.

Cross-domain dialogue and cooperation open up new channels for agribusiness

Agriculture is not the only industry that needs integration through data science. In the future, smart cities and towns call for the combined forces of multiple disciplines, from farmers to tech people, from the public sector to the private sector. Wu firmly believes that "it is necessary to pool together people from different domains who play different roles and let them communicate with one other, so as to create opportunities for Taiwan's agribusiness." Putting this belief into practice, Wu has recruited a cross-disciplinary team at AgriWeather, with data analysts, software and hardware engineers, agricultural experts and marketing professionals working in house. He also enlists help from biostatistics professors, crop experts, specialists in agricultural research and extension stations, as well as intellectual property consultants. Wu hopes to link together and consolidate data science and commercial mechanism by unifying different professional teams into a powerful force in order to bring forth comprehensive smart agriculture technology solutions, and ultimately create Taiwan's very own tech-driven agribusiness ecosystem.

Besides forging business connections among professional teams, a series of hackathons are organized to promote experience sharing and exchanges to foster an endless supply of ideas and collaboration opportunities. AgriWeather has taken part and co-hosted the AgThon event organized by the Council of Agriculture—Wu witnessed the explosion of innovative energy coming from different professional teams. "The government can offer a platform that connects the various people and entities to work together collaboratively. This is a prime example of cross-domain integration," Wu noted.

間的激盪，所積累出的創新能量是非常高的，「透過政府力量將大家串連起來，用共同協作的方式去發揮，這其實就是一個非常好的跨域整合典範，」吳君孝 。

串連與合作的腳步永不停歇，吳君孝透露，阿龜微氣候今年的新計畫，就是進行鄉村與城市的雙向串連，要把田間蒐集到的資訊串連至城市中的消費者，讓他們透過實質的回饋，跟鄉村建立起關係；也同時讓鄉村透過資料，去跟城市間達成一個良好的互動。

整合科技力 臺灣農產賣全球

「當農業人與科技人彼此更接近的時候，就可以創造出更多新的應用服務，而這正是全世界農產業目前最缺乏的。」跨領域的整合串連，不僅大幅提升臺灣智慧農業的發展，更能透過善用這些新應用工具，催生出臺灣農產業新契機。吳君孝一樣以高雄鳳梨田的例子說明，在他們導入阿龜微氣候的資料應用之後，鳳梨品質大幅提高，還營造出很強的品牌價值，對推動臺灣農業的國際競爭力非常有用，「跟我們合作的高雄鳳梨田後來變得非常有名，日本、韓國和東南亞全都知道，可見他品牌價值是非常高的。」

於是，臺灣未來智慧農業的發展策略，吳君孝認為，政府可以繼續發揮整合的力量，協助媒合各個不同的專業團隊；同時將數位治理所需要的基礎建設持續精進，並與民間廠商做有效的應用串連，來建立起一個充滿智慧與良善循環的農產業新生態。在這個智慧農業發展的風口上，「有效整合，將會是臺灣品牌怎麼樣邁向世界、打進國際一個非常重要的指標與推力，」吳君孝說。

Building connections and collaborations is a never-ending process. Wu reveals that AgriWeather's new plan for this year is to create two-way connections between towns and cities. It's necessary to deliver the information collected from the rural fields to consumers in the city, in which a relationship with the rural towns can be formed through substantive feedback. Meanwhile, rural towns can also establish a good interaction with the cities through information sharing.

Integrating science and technology: Taiwan's agricultural products go global

"When there's a closer connection between agriculture people and technology people, more new application services can be created, and this is what the global agricultural industry is currently missing," said Wu. Cross-domain integration improves more than the development of Taiwan's smart agriculture, but also enables the use of new application tools to create new opportunities for Taiwan's agribusiness. Wu once again points out the example of the pineapple farm in Kaohsiung. After AgriWeather's data science works its magic, the pineapples produced are significantly improved in quality. This builds a strong brand value that helps heighten the global competitiveness of Taiwan's agriculture. This pineapple farm has quickly garnered a reputation of quality and is now well-known in Japan, South Korea and Southeast Asia—a testament to its high brand value.

Talking about the future development strategy of Taiwan's smart agriculture, Wu maintains that the government should continue to play the role of making integration happen by matching up different professional teams. At the same time, the infrastructure needed for digital governance should be enhanced to effectively link up with the private sector, essentially building a new, smart ecosystem for agribusiness that's founded on a positive cycle. Taiwan is on the cusp of smart agriculture transformation, and "effective integration will be a very important indicator and push for Taiwanese brands to make it in the world," Wu concluded.

義隆電子 智慧交通布局 用 AI 管理號誌，路口交通不打結

ELAN Ventures into Intelligent Transport Directing Traffic through AI-controlled Signals

避開微軟、Google 等大廠的 AI 布局，義隆電子鎖定智慧交通的利基市場，目標全球第一。以 360 度魚眼鏡頭結合 AI 影像辨識車流的城市車流解決方案，已在新竹、宜蘭東澳、臺北內湖等地裝設，並進軍菲律賓宿霧，開拓南向市場。

Despite the dominance of Microsoft and Google, ELAN has identified a niche in AI application and aims to become the world's leading supplier of intelligent transport solutions. Urban traffic solutions incorporating 360-degree fisheye lenses and AI image analysis are being deployed domestically in Hsinchu, Dong'ao (Yilan) and Neihu (Taipei) and overseas in Cebu (The Philippines).

每逢交通尖峰時段，總是可以看到員警風雨無阻地站在路口指揮交通，現在只要安裝 360 度魚眼鏡頭，結合 AI 影像辨識技術，就可以依據車流量及左右轉車輛多寡控制紅綠燈，讓行車更順暢。這項由義隆電子所開發的「城市車流解決方案」，改善了從竹北到竹科的交通，將原本 16 分鐘的通勤時間縮短為 6 分鐘，更降低交通事故的發生率。

鎖定利基市場，做到世界第一

「AI 我們起步比較晚，亞馬遜、Google、IBM、蘋果也都在做，我們不一定要跟這些大象去競爭，要找他們沒有看到的利基市場，而且一定要做到世界第一，這樣才有機會。」談起智慧交通，義隆電子董事長兼總經理葉儀皓顯得信心滿滿。

The sight of police officers directing traffic at major intersections during rush hours may no longer be seen in the future. Today, all it takes is several 360-degree fisheye lenses and AI image analysis technology to monitor traffic and control traffic signals based on the number of turning vehicles, and therefore reduce congestion. ELAN's "urban traffic solution" has significantly improved traffic between Zhubei and Hsinchu Science Park, reducing commuting time from 16 to 6 minutes while lowering chances of traffic accident.

Targeting the niche market and aiming for the world's No. 1 position

"Our AI development began several steps behind major companies such as Amazon, Google, IBM and Apple, but we don't have to compete with these giants. What we should do is uncover niche markets that they have missed and become the best in the world at it in order

當初靠著鎖定利基市場，取得觸控 IC 龍頭地位，現在切入 AI 領域，葉儀皓同樣跳脫框架思考。

義隆以旗下子公司一碩科技所開發的魚眼鏡頭，結合本身 IC 設計的能力，將主力放在較新的邊緣運算（Edge Computing），與臺大人工智慧中心合作開發城市車流解決方案，在硬體端就能完成大量影像處理，降低對雲端運算能力的需求，省下來回傳輸資料的時間，更能即時掌控路況。

這項城市車流解決方案曾獲得「亞洲 矽谷物聯網產業大聯盟」票選第一，也在 2018 年代表臺灣到丹麥哥本哈根參加智慧運輸世界大會。相較於其他國家提出的智慧交通解決方案，葉儀皓表示，雖然美、日也有公司以 360 度魚眼鏡頭監測車流，或 90 度角監測車流結合 AI 辨識，但運用 360 度魚眼鏡頭結合 AI 技術，只有臺灣才有。更重要的是，臺灣有很多摩托車，這是其他先進國家沒有的情境，對於進軍交通環境與臺灣近似的東南亞市場，有很大的幫助。

AI 提升影像辨識率，交通控制更即時

發展 AI，得先要有大數據，有了大量的使用情境，人工智慧才能深度學習，一碩的監控系列本來就有大量交通數據，不必依賴開放資料或重新取得數據，已經站在領先的起跑點上。

在硬體方面，魚眼鏡頭的安裝相當簡便，只要一顆就能取代多支傳統攝影機，克服天候和環境限制，提供清晰的影像。產品裡搭載影像處理晶片，原本夜間車流影像辨識率較低、公車和摩托車辨識不易等問題，在結合 AI 影像辨識技術之後，日夜間都有九成五以上的辨識率；不管是小客車、公車或摩托車行進，都能立刻標記，包括摩托車專用車道、調撥車道的車流，無一遺漏。很多 AI 都在雲端運算，但義隆在產品端就已經做好處理，掌握了路口的車流，就能調控紅綠燈秒數，改善交通壅塞的情況。

to succeed," said Yi Hao Yeh, Chairman and President of ELAN, on the subject of intelligent transport. The attention to niche market earned ELAN the leadership position in touch controller IC today, and once again, Yi Hao Yeh is applying the same out-of-box thinking when venturing into the field of AI.

By combining the fisheye lenses developed by PiXORD Corporation, one of ELAN's subsidiaries, and ELAN's IC design capabilities, the company was able to incorporate edge computing into the urban traffic solution that it has developed in joint effort with NTU Center for Artificial Intelligence and Advanced Robotics. The terminals alone possess the hardware capacity to handle image processing at large volume, which in turn reduces the need for cloud computing and saves time on transmitting data for more immediate control of traffic conditions.

Not only was this urban traffic solution voted the No. 1 innovation by "Asia Silicon Valley Development Plan's Major League IoT," it was nominated for presentation at the 2018 ITS World Congress in Copenhagen, Denmark. When comparing intelligent transport solutions proposed by other countries, Yi Hao Yeh said that, although some U.S. and Japanese companies have adopted similar solutions using 360-degree fisheye lenses to monitor traffic flow, or using 90-degree lenses with AI, Taiwan is the first in the world to combine 360-degree fisheye lenses with AI technology. More importantly, Taiwan has an overwhelming number of motorcycles that are not seen in other developed nations, and being able to succeed under such a challenging environment provides great assurance to the solution's applicability in other Southeast Asian countries of similar traffic conditions.

AI-enhanced image analysis for more immediate traffic control

Big data is the prerequisite for developing AI, as the program requires data from wide variety of usage scenarios to learn. In this respect, PiXORD has already gathered massive volume of traffic data through its monitoring solutions, which places ELAN ahead of competitors without having to rely on public information or acquire anew.

In terms of hardware, fisheye lenses are very easy to install and offer the complete vision that allows one fisheye lens to replace multiple conventional cameras. This versatility helps overcome weather and environmental restrictions to deliver consistently clear image. With an image processor IC built in,

業界出題，學界來解決

以往學校做 AI 比較偏重學術發表，但這次以義隆的需求為主，業界出題，學界來解決。「一開始一秒鐘只能拍兩張，拍到的時候，車子都已經跑掉了，後來臺大慢慢調整，從一秒十幾張，到現在一秒鐘可以拍到二十幾張，時速 70 公里以下的車輛都能拍到。」對於雙方合作的成果，葉儀皓十分滿意，「雖然我們不以發表論文為目的，但城市車流解決方案絕對是業界領先，也適合作為學術論文發表。」

AI 剛開始發展的時候，比較局限在軟體工程領域，當硬體廠商加入之後，軟體工程師往往不了解產品端的需求，為產品商業化增加不少難度。義隆與臺大以同步開發減少溝通過程中產生的落差，提升彼此的合作默契，像是有些作法可能會導致成本大幅增加、有些運算希望在產品端就能處理，有了這次經驗，學校也比較知道原來業界要的是什麼。

不過，葉儀皓也提醒，由於 AI 比較先進，有時候業界開的規格不夠完整，往往開發兩、三一年後才發現必須修改，這時要花上更多時間，有些學校團隊可能不願意，「要做到最有競爭力，而不是以時間為主，除非願意和產業一起合作，而不是只看重論文發表，否則雙方很難合作。」

進軍東南亞，擴大智慧交通布局

目前，一碩的魚眼鏡頭已經在新竹 400 個路口安裝，其他地區如宜蘭東澳隧道出入口、內湖科學園區也都有裝設，東南亞市場中，菲律賓宿霧已經安裝，泰國、越南等地也正在洽談中。葉儀皓表示，未來一碩將偏重智慧交通，義隆以影像處理晶片支援，除了交通號誌的監控，將推出更多相關應用。比方，大型車的盲點偵測警示系統，當感應到車體周邊有物體靠近時可發出訊號警告；利用臉部辨識判斷駕駛是否符合安全駕駛的狀態；在科技執法方面，運用影像辨識技術監測違規停車、停車格收費等，透過 AI 技術，讓城市交通更完善。

images that used to be difficult to process, such as night time traffic flow, buses, motorcycles etc., can now be analyzed at more than 95% accuracy with the help of AI in daytime or nighttime. Whether they are small passenger cars, buses or motorcycles, the system tags all traffic instantaneously including motorcycle lanes and reversible lanes. Many AI solutions rely heavily on cloud computing, but ELAN pre-processes data at the product end, and with more immediate control of intersection traffic, traffic signals can be adjusted more flexibly to reduce congestion.

Leveraging the minds of the academia

The education sector's involvements in AI used to be focused more towards academic research, but this time around, ELAN had approached the academia with a more practical problem. "In the beginning, the system could only take 2 shots per second, which was too slow to capture moving vehicles. The NTU then made progressive adjustments, increasing the capture speed from 10 frames per second to 20 frames per second, thereby enabling the system to capture all vehicles traveling below 70km/hour." Yi Hao Yeh is very satisfied with the progress. "Although it is not our intention to publish thesis, our world-leading urban traffic solution definitely makes it an ideal subject for thesis publication," said Yeh.

Many companies began developing AI with a software focus, but when hardware comes into play, software engineers tend to lack the understanding for hardware requirements. This makes product commercialization difficult. To address this problem, ELAN worked in close synchronization with NTU and communicated in greater details about its requirements, such as practices that may cause significant increase in cost or computations that are ideally handled at the terminals. Through this experience, the education sector may have a better understanding of what the industry expects.

Intelligent transport in Southeast Asia

Taiwan develop its leading position in Smart City. Currently, PiXORD's fisheye lenses have been installed at 400 intersections in Hsinchu as well as other locations including Dong'ao Tunnel (Yilan) and Neihu Technology Park. In Southeast Asia, PiXORD's lenses have been installed in Cebu (The Philippines) whereas Thailand and Vietnam are also considering adopting. Yi Hao Yeh said that PiXORD will be shifting its business focus towards intelligent transport in the

▲ 義隆電子董事長手上的魚眼鏡頭正是「城市車流解決方案」的祕密武器。The fisheye lens held by ELAN Chairman has been the secret weapon to the company's urban traffic solution.

針對行政院所推動的「數位國家．創新經濟方案」，葉儀皓認為，南向政策應該與科技產業結合，尤其是智慧城市，需要大量數據和情境，臺灣的環境很適合發展具備亞洲特色的應用情境。臺灣有很多優秀的人才和團隊，而政府掌握了很多場域和情境，像是醫療、農業、畜牧等，應該思考如何提供資料和場域或用監理沙盒的方式，讓科技產業去努力。

AI 需要場域可以實驗，然而在現行法規之下，企業可能面臨一些問題，葉儀皓指出，「以前我們不需要和政府打交道，但公共建設要公開招標，如果等到有競爭者出現，已經失去市場先機，以產品本身的先進規格寫入標案，承辦人員又擔心會圖利廠商。」還有主管機關的歸屬，以智慧交通為例，究竟是交通部、科技部，還是經濟部？「政府部會需要整合，而整合的態度將會影響臺灣產業的發展，不要讓企業一個一個去敲門。」AI 正在成長的勢頭上，只有產官學一起合作，臺灣才能在智慧城市取得領先地位。

future, whereas ELAN provides image processing IC as support. In addition to traffic signal monitoring and control, the company plans to explore more variety of applications involving this technology, such as: blind spot detection for large vehicles that warns the driver when it detects any object approaching; use of facial recognition to determine whether a driver is in the suitable condition to drive, and use of image recognition for detecting illegal parking, collection of parking fees etc. The above uses of AI will improve a city's traffic condition.

With regard to the "Digital Nation - Innovative Economy Program" introduced by the Executive Yuan, Yi Hao Yeh believes that it is important for the government to align its southbound expansion policies with the interests of the technology industry. Smart City, in particular, requires large volume of data and usage scenarios, and Taiwan has the suitable environment to develop applications that can be adopted by other Asian countries. Taiwan is no short of talented people and teams, whereas the government is in control of many spaces and usage scenarios such as healthcare, agriculture and animal husbandry. It is time to think about how data can be generated from these spaces and how regulatory sandbox can be executed for the benefit of the tech industry.

AI requires space to experiment, but businesses may encounter several problems under prevailing laws. Yi Hao Yeh said, "Previously, we did not have to deal with government agencies, but where infrastructure is involved, we have to undergo a public tender process. If government officials draft their tender requirements based on the advanced and exclusive specifications we offer, they risk being accused of favoring one particular supplier; but if they wait for other competitors to surface, we lose our precious lead in the market." There are also problems associated with accountability; take intelligent transport, for example, it is unclear whether the project falls under the supervision of the Ministry of Transportation and Communication, the Ministry of Science and Technology, or the Ministry of Economic Affairs. "The government must be able to coordinate across different departments, and their coordination efforts will impact the future of Taiwan's industries. The last thing businesses want to see is to have their requests going back and forth between government departments." AI presents a world of opportunities, and only when the industry, the government and the academia collaborate seamlessly together may Taiwan develop its leading position in Smart City.

尼采實業創新轉型 Big data+AI 發威 傳產智能大躍進

Nietzsche Enterprise's innovative transformation Big data + AI = great leap forward for traditional industries

經營超越 40 年的企業，如何擺脫傳產、老字號、參與智慧城市的商機呢？尼采實業提供了最佳範例！除了善用物聯網與人工智慧，精進軟硬體產品，尼采實業更致力於蹲點接地氣，深入產業痛點與需求，針對農業、漁業、交通、消防、智慧家庭等應用領域，提供 total solution(整體解決方案)，打造多贏局面。

How can a 40-year-old company shake off being an old player in the traditional industry and jump on business opportunities brought by smart cities? Nietzsche Enterprise shows the best example! In addition to leveraging Internet of Things (IoT), artificial intelligence (AI), and polishing its software and hardware products, Nietzsche Enterprise has dedicated its resources by stationing staff at client sites to truly understand industry pain points and needs, then subsequently offers total solutions for agricultural, fishery, transportation, fire protection, and smart homes to create win-wins.

尼采實業副總經理 張世模 Johnson Chang, NHR's Executive Vice President

尼采實業 (以下簡稱尼采) 創立於 1978 年，從製造開關、按鈕等零組件起家，再延伸到製造有線、無線感測器，最後一路往上斥資數千萬開發大數據雲端監控平臺，不僅產品與服務持續增加，在物聯網通訊協議的訂定與應用上也不斷精進，但基本上還是不脫為客戶持續創造價值的初心。

Nietzsche Enterprise (NHR) was founded in 1978. Starting off as a manufacturer of switches, buttons and other components, it later diversified into manufacturing wired and wireless sensors. More recently, millions of dollars have been invested in the development of a big data cloud monitoring platform. Not only is it expanding its products and services, it\s constantly enhancing its IoT communication protocols and applications. But at its very heart, the creation of value for clients is what matters.

▲ 透過 NB-IoT 感測器，可以大規模解決植栽環境條件不易均質的問題，為農場節省植栽成本。NB-IoT sensors enable overcoming the problem of environmental heterogeneity in large-scale plantations to help save farms considerable costs.

從單品代工到提供整體方案

經營超過 40 個年頭，身為傳產老字號，尼采實業積極升級轉型。2008 年，尼采實業副總經理張世模到華盛頓參加一場能源主題的展覽，遇到客戶詢問，希望將尼采的溫度感測器應用在溫室，開啟了產品應用在農業領域的可能性。

尼采積極與臺灣、荷蘭、美國的農夫合作，不斷優化產品的性能，增加防水的功能、電池壽命、設備外殼的無毒化……等，2011 年正式推出整個農業的套裝方案；2015 年又推出了整套的冷鏈物流監控方案，從此正式從單品代工製造、系統設計，轉型成一個方案商，善用物聯網與人工智慧，提供 total solution(整體解決方案)，現已成為世界級無線感測設備領導廠，九成產品外銷海外市場。

智慧感測 + 遠端監控 延伸產業應用

透過智慧感測、遠端監控的方案，尼采的產品廣泛應用在農業、漁業、交通、消防、智慧家庭等產業，例如經由 NB-IoT 感測器，將光照、土壤溫溼度、空氣溫溼度等植栽數據直接傳送至 4G 網路，即時監控全區栽培環境，解決大規模植栽環境條件不易均質的問題，每年為歐洲 Venlo 型農場撙節 20% 植栽成本！

除了 IOT 技術的優勢，尼采也發揮整合能力，在全球幫助連鎖飯店業者，將飯店內部的裝潢、管線配置模組化與無線化，整合、串聯包括燈具、

From single-product OEM to total solutions

With more than 40 years as an established brand in the traditional industry, NHR is actively upgrading and transforming its operations. In 2008, Johnson Chang, NHR's Executive Vice President, visited Washington to participate in an energy trade show. He met a client who asked NHR to apply its temperature sensors in greenhouses—this ultimately opened a new door for NHR's foray into agriculture.

NHR continues to collaborate with farmers in Taiwan, the Netherlands and the United States, optimizing the performance of its products: adding waterproof function, longer battery life, or toxic-free casing. In 2011, it launched a total solution package for agriculture. Later in 2015, it launched a total cold chain logistics monitoring solution, and transformed itself from an OEM manufacturer and system design supplier to a solutions provider, harnessing the power of IoT and AI. Now, it has become a powerhouse offering world-class wireless sensor equipment, where 90% of its products are exported to overseas markets.

Smart sensing + remote monitoring means real-world applications

Building on its smart sensing and remote monitoring solutions, NHR's products are widely used in an array of industries. Its NB-IoT sensors directly transmit data—lighting, and temperature and humidity of soil and air—to a 4G network to facilitate real-time monitoring of an entire plantation area. This solves the problem of homogenizing environmental conditions in large-scale farms and has helped Venlo-type greenhouses in Europe save up to 20% on cost!

In addition to taking advantages of IoT, NHR is exercising its ability of integration to help hotel chains around the world modularize and wirelessize their interior decoration, piping and wiring. This integrates lamps, electric window openers, door locks, etc. that would normally be handled by various vendors to significantly reduce the time from planning to operation: from 36 months down to just 18.

Chang stresses that since the company's products are widely used in diverse industries, they ask their engineers to get out of the labs and offices and spend time at clients' work sites to discover what is needed and identify the real pain points. Only this can they offer bespoke solutions tailored to real needs.

▲「LPWAN 智慧停車格在席偵測計時器」已經應用在臺灣北部都會區數千個公有路邊停車位，降低都會區一位難求的交通痛點。The LPWAN Smart Parking Space Detection Timer has been applied to thousands of roadside parking spaces in northern Taiwan metropolitan areas, reducing the pain point of finding a parking spot in urban cities.

推窗機、門鎖…等不同廠商，大幅降低從規劃到營運的時程，由原本的 36 個月縮短為 18 個月。

張世模強調，公司的產品廣泛應用在多元產業領域，因應各產業的專業需求，要求工程師走出研究室與辦公室，長期蹲點在客戶的案場現場，找到產業的痛點，量身打造最佳的解決方案。

鎖定停車產業 實現智慧交通

近三年來，尼采更鎖定停車產業，發展「智慧停車．在席雙鑑偵測系統 (NB-IoT / LoRa Dual-detection Car Park Occupancy System)」，降低都會區一位難求的交通痛點，其中的「LPWAN 智慧停車格在席偵測計時器」獲得創新智慧應用大賽企業卓越創慧獎以及 2019 年臺灣精品獎肯定，已經應用在臺灣北部都會區數千個公有路邊停車位，以及新加坡與馬來西亞…等國。

張世模以在臺北市運行的現況舉例說明，車主只要下載「北市好停車」App，就可以知道目的地周邊的停車狀態，哪一些已經停有車輛、哪一些車位可以停放、哪一些是殘障專屬車位。一旦車輛停妥，停車開單人員能夠透過其自主開單 App 即時掌控有車輛停入、加以開單計費，停車業者也可以即時定位開單人員，在忙碌的尖峰時段迅速進行調度，實現停車產業數位轉型。

大數據資料庫 提升經營管理

透過偵測計時器的資訊，匯聚成大數據資料庫，更能夠幫助用戶進一步經營管理。以停車業者為例，透過大數據分析，就能歸納出停車的熱門與

Targeting the parking industry to realize smart transportation

For the past 3 years, Nietzsche has zeroed in on the parking industry and developed the NB-IoT / LoRa Dual-detection Car Park Occupancy System to help ease the pain point of hunting a parking spot in cities. The system's LPWAN Smart Parking Space Detection Timer has been recognized by an Enterprise Excellence Award and the 2019 Taiwan Excellence Award. The system is being used in thousands of street parking spots in metro areas in northern Taiwan, as well as in Singapore and Malaysia.

Another example: car owners in Taipei City can download the iTaipei Parking app to access real-time information on parking spots near their destination—they can see which ones are occupied, which are vacant, and which are for handicap use. Once a vehicle is parked in place, parking attendants can automatically be notified and bill the car owner by issuing an invoice. Parking operators can also locate the attendants in real time to fine-tune staff scheduling during rush hours, thus facilitating the parking industry digital transformation.

The introduction of NB-IoT / LoRa Dual-detection Car Park Occupancy System creates a quadruple-win. For car owners, it can help them save time and gas, reduce emissions and achieve safe parking. For parking attendants, it helps them issue invoices more accurately and efficiently, and possibly get more commission. For parking operators, it allows more efficient management, increasing overall revenue while reducing personnel expenses: a parking attendant in the past could only be in charge of 100 parking spaces, but now one can handle 200 with ease. For the government, it helps to increase fiscal income, while reducing the risk of accidents when a car owner is looking for a parking space, minimizing illegal parking and lowering air pollution.

Big data database enhances business management

The data collected from the detection timer can be aggregated into a big data database to help users further manage their operations. For parking operators, it's possible to pinpoint peak, off-peak hours and popular or less popular locations through big data analysis. Then, with the help of AI, parking discounts can be offered to direct vehicles to less popular spots, thereby improving the utilization rate and revenue. A related system is being used in many college campuses. Through analyzing parking hotspots, peak time is observed to be around 7 am and 4 pm, so schools can optimize the traffic flow accordingly.

冷門時段及區位，利用人工智慧 AI 即時提供停車優惠等方式，引導車輛前往促銷的車位停靠，增進車位的利用率與停車營收。相關系統也已經在多所大學校園中使用，透過停車熱點分析，發現上午七點與下午四點為停車高峰期，校方可以進一步調控車流等。

憑藉著這套偵測系統，並且結合其他停車方案廠商，尼采籌建智慧交通臺灣隊，進軍國際市場，首先聚焦在交通繁忙的亞洲都會城市，例如香港、新加坡等地。由於在智慧交通的創新實力，尼采獲邀參加 2018 年於雅加達會展中心登場的智慧城市應用主題論壇，尼采實業副總經理張世模擔任主講嘉賓，分享在停車智慧管理的解決方案與成功經驗。

展望智慧臺灣 產業商機無限

未來智慧停車與智慧交通的商機無限，因為車輛就代表人潮，人潮就會進行購物、餐飲等消費行動，張世模預期，透過停車格的分眾市場，未來可望發展出全新的消費模型，例如停放在嬰幼兒專屬車位的車輛，就能導購到嬰幼兒與親子相關產品，停在身障停車位的車輛，則引導無障礙設施等資訊。在訊息技術方面，5G 與無人駕駛車的方興未艾當然也會進一步形塑未來的城市交通風景。

我國政府積極推動 DIGI^{+} 方案，對於智慧臺灣的未來發展，張世模建議，由政府提供案場與初期資金，慎選潛力產業，投資於具有維運經驗的物聯網方案商，透過整合大量試驗場域，實踐人力數位化等產業數位轉型的方案，並且進而複製到海外賺取外匯。

此外，張世模認為，智慧臺灣應該從算法、算力 (computing power) 與大數據蒐集三管齊下。在算法的部分，我國政府在國研院國網中心設立 AI 創新研究中心，將以 5 年為期，每年預計投入 10 億元，透過國網中心的應用，就能讓更多民眾與創業家享受便宜的高階運算；在算力的方面，應與學校及學術單位結合，共同研發創新；在大數據蒐集的部分，則應更看重資料收集商的角色，匯聚發揮更大的功能與效益！

Armed with this detection system, combined with collaborating parking solutions providers, NHR is assembling a smart transportation team in Taiwan ready to hit the international market, with its sight set on Asian metropolises like Hong Kong and Singapore. Thanks to its innovative solutions in smart transportation, NHR was invited to participate in the smart city application forum held at the Jakarta Convention and Exhibition Center in 2018. Johnson Chang was one of the keynote speakers, as he shared their success story and solutions in smart parking management.

A smart Taiwan means unlimited business opportunities

There are endless business opportunities for smart parking and smart transportation in the future. Cars represent people, and people are consumers who shop and dine. Chang anticipates that there will be niche markets derived from parking and new consumer models are expected to emerge. For instance, shoppable contents on baby products or parent-child activities can be pushed to vehicles parked in dedicated parent-child parking spaces; meanwhile, guide information to barrier-free facilities can be provided to vehicles parked in handicap spots. The emerging 5G and driverless cars will definitely further shape the future urban traffic landscape.

The Digi^{+} Initiative launched by the government precisely targets the future development of a smart Taiwan. Chang suggests that the government should offer trial sites and initial funding to promising industries and invest in IoT solution providers with ample maintenance and operation experience. Through the integration of a large number of test sites, coupled with HR digital transformation for industry upgrade, successful projects can be then copied overseas to earn foreign exchange.

Moreover, Chang believes that a smart Taiwan should be pursued from a three-pronged approach: algorithm, computing power and big data collection. In terms of algorithm, the government has set up an AI Research Center under the National Center for High-performance Computing (NCHC). In the first 5 years, an annual investment of NT$ 1 billion (approx. US$ 32.37 million) is expected to give companies and entrepreneurs access to affordable advanced computing. In terms of computing power, the government should partner with schools and the academia in joint development and innovation. As for big data collection, the role of data collectors should be more valued to bring forth greater functions and benefits!

畜牧廢水變沼氣 循環經濟新星

Universe Circular Technology converts animal waste to biogas: a rising star in circular economy

臺灣以農立國，但是近年來農牧產業因為廢棄物與污染等問題，經常被視為環保公害，宇陽能源科技本著愛鄉土、護環境的熱情，將養豬場的糞尿化為沼氣，發展臺灣最完整的循環科技商務實踐計畫，幫助農牧產業升級，落實循環經濟願景！

As a country founded on farming, Taiwan was born and raised in agriculture. In recent years, however, agriculture and animal husbandry are often regarded as a culprit for environmental pollution and waste. Universe Circular Technology is a company that loves the land and cares for the environment—it is turning hog wastes into biogas, developing Taiwan's most complete circular technology business practice in hopes of upgrading the agriculture and animal husbandry industry and realizing the vision of a circular economy!

宇陽能源科技 (以下簡稱宇陽) 建立於 2017 年，是一個相當年輕的企業，創辦人、公司總經理方耀華過往服務於美國 Nasdaq 上市公司美國國家儀器十多年，擁有財務規劃、營運策略、風險管理等專業。另一位團隊重要夥伴許又仁為「元沛農坊」創辦人，專精生物感測器。

解決養豬場困境 擁抱循環經濟

由於國人食用豬肉量大，又偏好溫體豬，因此一向傾向在地飼養。方耀華強調，因為環保等因

Founded in 2017, Universe Circular Technology (UCT) is a fairly young company. Nelson Fang, founder and general manager of UCT, worked at National Instruments, a Nasdaq-listed company, for over 10 years, with experience in financial planning, operation strategies and risk management. Hsu You-Ren, founder of Agriforward, which specializes in biosensors, is another important member of the team.

Tackling hog farm challenges by embracing circular economy

Taiwanese consume a lot of pork. And since most prefer non-frozen pork, hogs tend to be raised locally. Fang explains that many hog farms have been

素，許多養豬場因為稽查不合格而被勒令停業，105 年底養豬總場數 7,609 場，較 104 年底減少 237 場（3.0%），養總頭數為 544 萬。臺灣的養豬場面臨規模太小、專業技術不夠深入、效率低落、環保要求日益增高等痛點與挑戰，宇陽提供涵蓋牧場、發電、排水，維運完整的全場規劃方案，幫助養豬場進行專業化管理、大幅度降低處理成本，擁抱循環經濟商機。

宇陽將新式科技的觀念與技術帶入農業，方耀華獨家創新研究開發循環經濟模組，於 2017 年榮獲 APEC-ACABT 全球能源及環保競賽第二名，並且已在臺灣南部創造多個成功的案例。許又仁則利用蚯蚓及微生物發酵技術，在屏東萬丹設置蚯蚓場，將沼渣及農業廢棄物轉換為生物多樣性堆肥，不僅兼顧環保，更滋養農作物的生長。

零廢棄全回收 創造綠能商機

「零廢棄，全回收！」是宇陽提供的循環經濟方案，「為臺灣留塊淨土，為後代留條生路！」則是宇陽創業的初衷。方耀華回想，幾年前帶著女兒遊歷臺灣南部時，眼見曾經優美、乾淨、生機盎然的東港溪溪流，被豬糞尿覆蓋，決定結合農業、環保與綠能，實現永續的夢想，專注於環境污染防治上，期待重現溪流曾經的美好。

宇陽打破傳統「使用後即廢棄」的模式，將養豬場產生的糞尿轉變為「使用後循環利用」的概念，透過水資源循環再利用，衍生電能、熱能、肥料及甲烷氣等附加產物，「轉廢為寶」、提升綠能商機，增加經濟收益。

無人化 AI 設計 人工智能操作

目前透過環保署「畜牧糞尿集中處理中心計畫」，宇陽的沼氣發電案場包括屏東縣的政治畜牧場、大豐畜牧場與潮州鄉畜牧糞尿集中處理中心，以及桃園市弘智畜牧場。在桃園市弘智畜牧場更結合臺大與屏科大的技術，以無人化 AI 人工智能操作取代人力操作，採行全自動化作業，僅需於機件故障時出動人力維修，提升畜牧場引進系統的意願。

ordered to shut down because of failure to meet environmental requirements. At a total of 5.44 million hogs, the number of hog farms in 2016 was 7,609, down 237 from 2015 (3% drop). Taiwan's hog farms face the pain points and challenges of small scale, inadequate professional expertise and low efficiency, not to mention the inability to meet the increasing environmental protection requirements. UCT offers a comprehensive solution to cover the hog pens, power generation, drainage, maintenance and operation to help hog farms establish professional management that greatly reduces processing costs to embrace business opportunities driven by circular economy.

UCT brings the concept and application of new technology to agriculture. Fang's proprietary innovative circular economy module won second place in the 2017 APEC-ACABT YES Challenge and has already given birth to multiple successful projects in southern Taiwan. Hsu, on the other hand, uses earthworms and microbial fermentation to set up an earthworm farm in Wandan, Pingtung, to convert digestate and agricultural waste into biofertilizers, which not only are eco-friendly but also can nourish the growth of local crops.

Zero waste & full recycling creates green business opportunities

Zero waste and full recycling is UCT's circular economy model. Leaving a pristine land for Taiwan and for future generations is UCT's primary intent. Fang recalls the time when he traveled to southern Taiwan with his daughter a few years ago—he was saddened by the sight of hog waste contaminating the once beautiful and clean Donggang River. It was then he decided to integrate agriculture, environmental protection and green energy to achieve sustainability, pouring his focus on pollution prevention and control with a view to restoring the former vibrancy of rivers.

UCT breaks the convention of disposal after use by recycling and reusing hog wastes, turning them into electricity, heat, fertilizer and methane. This literally turns waste into treasure and generates green business opportunities and economic benefits in the process.

Autonomous AI operation

Through the Animal Waste Processing Center Project, UCT-supported biogas power generation sites now include the Zenzhi Hog Farm, Dafeng Hog Farm, and the Animal Wastewater Treatment Center in Chaozhou, Pintung and the Hongzhi Hog Farm in Taoyuan. The Hongzhi Hog Farm further extracts know-hows from National Taiwan University and National

方耀華以屏東大豐畜牧場為例，說明宇陽在臺灣沼氣發電改善水質的做法，「結合微軟與電信業者等夥伴，將電信業者的 SIM 卡模組置入智慧水表中，結合水質監測感應器，上傳到微軟 Azure 雲端平臺，建構雲端 AI 污水處理系統，就能即時進行環境監控。」

豬糞尿大變身 沼氣沼渣沼液

養豬場有源源不絕的糞尿廢棄物，透過宇陽的高速產氣、高效淨水厭氧發酵系統，豬糞尿可以變身為沼氣發電，產生沼渣與沼液等副產品，其中沼渣經由「元沛農坊」的處理，產生有機肥料，沼液則經由淨化技術，變身成為適用於病蟲害防治的生物農藥，幫助農作物生長更豐美、健康，真正實現「廢棄物變黃金」的願景。

以沼液的應用為例，在案場屏東大豐畜牧場所在地屏東縣，種植大量香蕉與檸檬，在高雄農業改良場林永鴻博士指導下，宇陽團隊將沼液噴灑在果樹的葉子上，明顯比對照組的葉子翠綠有生氣，證實防治病蟲害的效益。而應用在稻作上，搭配光合菌的使用，以菌液澆灌於稻作，可以在不使用農藥的情形下，使稻米生長較不易倒伏，且提高每分地產量 25% 以上，不僅稻葉挺拔、茂密，在出穗期的高度更抽高到 93 公分，大勝對照組的 81 公分！

依據工研院監測半年的平均值，應用宇陽的臺灣專利「高速產氣， 高效淨水的厭氧發酵系統 」，可以產出世界最高的畜牧污水甲烷濃度 75%，比業界平均水準高出 30%~40% ！這套系統已獲得臺灣專利，同步申請德國、美國專利。

三段式廢水處理 翻轉農村經濟

透過宇陽的方案，改善畜牧場傳統三段式廢水處理問題，提升廢水處理效能，得以符合放流水澆灌農地，降低行政裁罰的風險。宇陽也協助農牧業者爭取政府機關補助的躉售費率、低利貸款、沼氣設備設置的補助，降低業者的建置投資成本，包括經濟部「沼氣發電系統推廣計畫補助」、環保署「補助地方政府推動設置厭氧發酵及沼氣

Pingtung University of Science and Technology to replace manpower with autonomous AI, enabling fully automated operations. Since only manpower is needed when a failed machine requires maintenance or repair, this greatly improves a farm's willingness to introduce AI system into its operation.

Fang uses the Dafeng Hog Farm in Pintung to illustrate UCT's practice of utilizing biogas power generation to improve water quality. Collaborating with partners, such as Microsoft and telecom operators, SIM card modules are placed in smart water meters that are connected to water quality sensors. Data are uploaded to the Microsoft Azure cloud platform in creating a cloud AI wastewater treatment system for real-time environmental monitoring.

Hog waste gets Midas touch: biogas and digestate

A hog farm produces an endless supply of wastes. Through UCT's anaerobic fermentation system that allows high-speed gas production and efficient water purification, these wastes can be turned into biogas for power generation, which in turn produces digestate by-products. Then, with the help of AgriForward, solid digestates are processed to produce organic fertilizers, while liquid digestates are purified to become bio-pesticides that can be used for pest control. This helps crops grow more beautifully and healthily, and truly realizes the vision of "waste turned gold".

Since there are many banana and lemon farms in Pintung, UCT applies the liquid digestates by spraying them on the leaves. Performed under the guidance of Dr. Lin Yong-hung at the Kaohsiung District Agricultural Research and Extension Station, the results showed that the leaves in the experimental group are significantly greener and fresher than that of the control group, confirming the benefits of pest control. On the other hand, when applied to rice crops with the combined use of photosynthetic bacteria, it can reduce lodging while increase yield per 0.1 ha by over 25%. The rice crops are denser and more upright, and their mean height during the heading period is higher at 93 cm, compared to the control group at 81 cm.

According to tests conducted by the Industrial Technology Research Institute (ITRI) for half a year, UCT's patented Anaerobic Fermentation System of High-speed Gas Production and High-efficiency Water Purification can produce a mean methane concentration of 75%, the world's highest from livestock waste, and 30%~40% higher than industry average! This system is already patented in Taiwan and is applying for patents in Germany and US.

▲ 宇陽的沼氣發電以無人化 AI 人工智能操作取代人力操作，採行全自動化作業。UCT's biogas power generation uses AI in place of human operators to enable fully-automated operation.

發電設備處理小型牧場畜牧糞尿計畫」等，

方耀華分享，農委會設立沼氣發電推動計畫辦公室，不僅提供「養豬場沼氣發電獎勵及補助」、「農業節能減碳貸款要點」等補助，工研院中分院沼氣發電推動計畫辦公室主任李志杰更是一路相助。宇陽第一個案場屏東大豐畜牧場就爭取到農委會專案款項，補助初期建置費用。

屏東大豐畜牧場飼養豬隻，所產生的糞尿，使用厭氧發酵的技術，產生沼氣發電， 而處理過程中所產生的沼渣，以蚯蚓和微生物的技術，製造有機肥，而有機肥可以 提供給屏東當地的農民，耕種作物這樣的模式不但翻轉了農村經濟，處理了水污染 及空氣污染的問題，更對社會造成了許多正面的影響。

我國政府積極發展「數位國家·創新經濟發展方案」(2017-2025 年)，對於智慧臺灣的未來發展，方耀華解讀，「創新」就代表著過往不曾發生，因此人才、場域、政策都尚未成形，建議應該設置一個層級夠高的專責辦公室，負責引領實驗性質的創新方案，就如同國外「沙盒」（Sandbox）的運作模式與概念，突破現行法規的限制，在其中嘗試各種可能性！

Three-stage wastewater treatment flips the script on rural economy

UCT's solution tackles the conventional three-stage wastewater treatment problem of hog farms by improving wastewater treatment efficiency to comply with the regulations of using discharge for irrigation, thereby reducing the risk of administrative penalties. UCT is also assisting hog farmers obtain feed-in-tariff from the government, as well as low-interest-rate loans and subsidies for biogas equipment procurement, to lower the investment costs. These include the Biogas Power Generation System Promotion Subsidy from the Ministry of Economic Affairs and the Environmental Protection Administration's project of subsidizing local governments in promoting the establishment of anaerobic fermentation and biogas power generation facilities to process wastes in small-scale livestock farms.

Fang shares how they have received subsidies from the Hog Farm Biogas Power Incentive and Subsidy and Rules Governing Loans for Energy-saving Agriculture Practice from the Office for Biogas Power Promotion established by the Council of Agriculture (COA). Li Chih-Chieh, chief of the Biogas Power Promotion Office at the ITRI Central Region Campus, has also been the most helpful in the entire process. UCT's first case site—Pingtung's Dafeng Hog Farm—was fortunate enough to receive subsidies for the initial construction costs from the COA.

The wastes produced at the Dafeng Hog Farm are converted by anaerobic fermentation to produce biogas to generate electricity. The solid digestates are further processed using earthworm and microbiological technology to produce organic fertilizers, which can be made available to local farmers in Pingtung to grow crops. This basically flips the script on rural economy by tackling the problems of water and air pollution to make positive impacts on the community.

The Digital Innovation & Governance Initiative (Digi^{+} Initiative) launched by the government is actively engaged in shaping a smart Taiwan. In Fang's point of view, the word "innovation" refers to something that has never been done before, which means resources like talents, sites or policies have not yet taken their final shape. Therefore, he suggests the establishment of a dedicated office at a high enough level to take charge of leading experimental and innovative solutions. Sandbox experiments that have been trending in recent years may offer a way to work around existing regulations and try out different possibilities in an isolated environment!

推動智慧城市建設有成，台灣實力國際發光

Smart city accomplishments that put Taiwan on the map

皇輝科技執行長 張智強 Chih-Chiang Chang, CEO of Glory Technology

2011 年創立的皇輝科技，是國內少見擁有完整規劃、設計能力的專業系統整合服務廠商。多年來憑藉著與芬蘭 Nokia、法國 Alcatel-Lucent Enterprise 阿爾卡特朗訊、美國 Motorola Solutions、日本 NEC、三菱電機集團、三菱重工業集團等眾多國際大廠間的緊密合作，讓皇輝擁有多國智慧城市建設經驗，同時也訓練出一批堅強的專業團隊，不僅接軌海外先進技術，與政府齊力打造台灣智慧家園；更進一步整合國內優秀資通訊廠商，將台灣科技實力帶向國際市場，一起在全球智慧城市建設領域中發光發熱。

Founded in 2011, Glory Technology is one of the few system integration service providers with complete design capabilities in Taiwan. After many years working closely alongside international partners, such as Alcatel-Lucent, NEC and Mitsubishi, Glory Technology has accumulated smart city experience and trained a solid team of professionals capable of adopting advanced technologies from overseas to help realize the government's vision of a smart homestead. Glory Technology also managed to coordinate with local ICT companies and apply Taiwan's technological strengths in smart city solutions around the world.

智慧城市建設風起雲湧，各國無不積極投入規劃，為了就是帶給民眾更美好的生活應用場景，並提升競爭力。在其中，通訊網路技術基礎設施的完善、順暢，是智慧科技能否順利導入生活的重要關鍵。有著多年國內外跨領域合作經驗的皇輝科技，以不斷創新、學習與跨領域整合的心態，成為了在光纖網路、智慧交控、軌道通訊、智慧電網到都市防災等智慧城市基礎建設領域的佼佼者。

Prospects of a smart city and its promises for better lifestyle and greater competitiveness have attracted active investments from around the world. Amongst the many factors to consider, having a robust communication and network infrastructure is key to incorporating smart technologies into daily life. Glory Technology, a company backed with many years of cross-border project experience and motivated by innovation and learning, has emerged to become the elite player in smart city infrastructure from optic fiber network, smart traffic control, rail communication, smart meter to disaster prevention.

培育專業技術人才，成就皇輝核心價值

皇輝科技以代理經銷、系統規劃設計、採購施工及系統整合起家，主要經銷合作的對象包括法國 Alcatel-Lucent、芬蘭 Nokia、美國 Motorola Solutions 以及日本 NEC 與三菱電機等，皆是擁有最前端、紮實技術的國際業界大廠。2011 年皇輝參與台北市政府 FTTH 光纖到府專案，以政府提供公共設施空間，由民間提供資金與技術的 PPP (Public–Private Partnership) 創新商業模式，成功打開皇輝邁向國際的重要第一步里程碑。皇輝科技執行長張智強博士表示，「這是我們正式踏入智慧城市的第一個案子，」張智強繼續 到，「因為皇輝參與智慧城市標案，並且與包括日本住友 Sumitomo, NTT 集團、法國 Alcatel-Lucent 等國外優秀團隊合作，透過此政府民間合作平台，加上成功的經驗與技術交流，讓我們想把這樣的創新商業模式繼續帶到國外去。」

這幾年皇輝在國內外各項智慧城市基礎建設工作上不遺餘力且表現亮眼。透過實際參與、解決智慧城市建設所積累出的國際跨領域合作經驗，讓張智強帶領團隊一邊學習，一邊也更加積極地向海外發展。「我們去參與泰國捷運紅線、新加坡電信的標案，去緬甸、越南做規劃提案與技術簡報。還因為成功參與國內台電的 AMI 智慧電網計畫，進而順利結合日本三菱電機的技術，前往香港參與香港智慧電網計畫，」張智強 。

談起皇輝在海外成功的秘訣，張智強自信地表示：「因為我們擁有一群專業的技術人才。」他說明到，「皇輝能夠真正走出國際，是因為我們將國外大廠的 know-how 成功技轉到皇輝員工身上。」對此，每年皇輝都會提撥大筆的教育訓練經費，張智強認為這是一項很重要的投資，「因為皇輝的核心價值就是我們的員工，反而不是代理的產品。」注重與國外合作廠商之間的合作與技術轉移，加上不斷增強自主設計規劃的能力，皇輝才能成功地利用台灣的發展時機與產業優勢，帶著國內上下游各廠商，跟著國際大廠走出去。

Training of technical talent that define Glory Technology

Glory Technology started its business as a system distributor, designer and installer working alongside supply partners including Alcatel-Lucent, Nokia, Motorola Solutions, NEC and Mitsubishi Electric; all of which are the world's most renowned and technologically advanced companies. In 2011, Glory Technology joined the public-private partnership (PPP; an innovative model of combining resources from the public sector and funding and technology from the private sector) for Taipei City Government's FTTH project, which opened its door to international markets for years to come. Chih-Chiang Chang, CEO of Glory Technology, said: "Our involvement in smart city solutions started with this project. This PPP platform was what enabled Glory Technology to collaborate and exchange knowledge and experience with elite partners such as Sumitomo, NTT and Alcatel, and we wanted to continue this new business model in our foreign businesses in the future."

Glory Technology has been active and successful in smart city infrastructure in recent years, both local and abroad. By practically engaging in smart city solutions, Chang and his team can develop the multinational experience needed to expand further overseas. "We've tendered for the MRT Red Line in Thailand and Singtel's project, and conducted briefings in Myanmar and Vietnam. Our involvement in Taipower's AMI project has even enabled us to incorporate technologies from Mitsubishi Electric and present our solutions for Hong Kong's smart grid project." said Chang.

When asked about the secret to Glory Technology's success overseas, Chang said with confidence: "It is because of our professional talent." He then added: "What makes Glory Technology successful overseas is the fact that our employees are able to adopt the know-how of foreign partners we work with." To ensure this outcome, Glory Technology spends a significant amount each year on education and training, which Chang considers to be a very important investment, simply because "Glory Technology is defined by its employees, and not by the products it distributes." This attention to transferring knowledge from foreign partners and constant improvement of proprietary design capabilities is what enabled Glory Technology to leverage Taiwan's industrial strength and coordinate with local partners on a global venture.

Safety - the critical foundation to building smart city

Through Glory Technology's multinational exposure,

▲ 泰國鐵路紅線施工狀況 SRT Red Line in Thailand

安全是建設智慧城市最重要的基礎

而皇輝在多年海內外智慧城市的建設經驗裡，張智強還發現到「安全」的重要性，尤其是各項通訊、基礎設施的穩定性，才是智慧城市發展與延伸的基石。以參與國內智慧交通到防災型城市的規劃為例，張智強 「安全」所體現的，就是無論在交通控制、通訊技術上，都必須時時保持「什麼都不能斷。」他補充到，救火救人都有黃金時間，所以要很快讓現場人員掌握到所有訊息，彼此溝通也必須是順暢無礙的，「這就是皇輝在做的事，讓通訊無縫接軌。所以當災難發生時，我們員工都會是第一個到現場，因為這樣才能提供最好的通訊技術支援與保證。」

對此，張智強再次強調皇輝對於安全的堅持。他指出，皇輝參與的工作大多是 Mission Critical

Chang recognizes "safety," particularly the stability of communication infrastructure, as the foundation upon which smart cities may grow and expand. Take intelligent transport and disaster prevention projects for example, Chang's notion of "safety" means "uninterrupted connection at all times," whether for traffic control or communication. He added that there is a critical window to rescue and firefighting, which is why people in the frontline must be fully informed and be able to communicate without disruption. "This is what Glory Technology has been doing, ensuring seamless communication. Therefore, we dispatch our employees on-site whenever a disaster occurs so that we can provide the best communication support and assurance."

Chang once again emphasized Glory Technology's persistence on safety and said: "We adopt the mission Critical concept, meaning that our communication infrastructure has to be 100% stable and safe, and is considered failed at 99.99%. We never trade 0.01% safety for convenience, especially for intelligent transport where the most important requirement is to carry passengers safely from point A to point B." As IoT, Industry 4.0 and artificial intelligence

的國家型計劃或標案，其中通訊建設的穩定性與安全性一定要做到 100% 才行，「就算已經達到 99.99% 都還不滿意，不能因為貪圖便利而犧牲了那 0.01%。例如像智慧交通的建置，它還是要回歸到能把人物平安順利從甲地送到乙地，解決問題才是智慧化的初衷。」隨著 IoT 物聯網、工業 4.0 及人工智慧的發展與建置，在充分想像各種智慧科技應用之虞，皇輝也用實際經驗提醒自己，不應忽略最重要的安全因素。

政府打造跨領域整合平台，輸出台灣智慧能量

「立足台灣、放眼國際。」從台北市 FTTH 光纖到府，國內高速公路、機場、捷運和高鐵的通訊系統，以及每個救防災現場；從新加坡電信 SingTel 的光纖網路，到泰國捷運工程紅線等眾多先進國際工程，皇輝專業的身影，總不斷穿梭在國內外智慧城市建設的每個角落。透過「國內練兵，輸出國際」的方式，皇輝在拓展智慧城市建設與提升台灣產業競爭力上擁有許多豐碩成果，更讓他們獲頒了 2017 智慧城市系統整合輸出獎，值得學習借鑒。

於此，張智強特別感謝政府跨領域整合平台的媒合與協助，「我們能跟國外大廠合作，有些都是透過諸如工業局的產創平台計畫、網通產業推動辦公室的數位寬頻計畫；還有經濟部的臺歐盟產業聚落等政府平台媒合找到的夥伴。」對於未來，張智強透露目前皇輝正積極投入澳門、馬尼拉的輕軌，以及杜拜國際機場等相關資通訊建置標案，也希望政府能立於目前成功的基礎上，持續推動和建立智慧城市建設的跨領域合作平台，讓產業界不僅能學習國外的技術，也能深化自主設計規劃的能力，打造出堅強的智慧城市整合團隊。「以喝咖啡來說，不是只有咖啡整合糖、奶精就好，你還要想著去整合哪一塊蛋糕，搭配哪一個起司，這就是跨領域整合，也正是我們國內最需要的部分；而其中最關鍵的還是要持續培養專業領域的知識技術，才能真正讀懂客戶的語言，進而有效發揮整合的力量，」張智強說。

emerge, Glory Technology constantly reminds itself not to lose sight of safety while people indulge in their imagination of how smart technologies can be applied.

Government-initiated platform that outputs Taiwan's brightest minds

To date, Glory Technology has contributed expertise to many smart city projects, from domestic projects such as Taipei City Government's FTTH, domestic highway/MRT/high speed rail communication, disaster prevention system etc. to overseas projects including SingTel's fiber optic network and MRT Red Line in Thailand. By "replicating local success overseas," Glory Technology has been fruitful in building smart cities and improving the competitiveness of Taiwan's industries, an accomplishment that won them the 2017 Smart City System Integration Award.

Chang was especially grateful for the government's assistance in matching businesses with overseas partners. "Our collaboration with major foreign companies was made possible through government agencies such as IDB's France-Taiwan Relations Task Force and MOEA's EU-Taiwan Cluster." As for future projects, Chang revealed that Glory Technology is currently involved in light rail systems in Macao and Manila, and is tendering for ICT constructions at Dubai International Airport. Chang hopes that the government may build on top of its current success and continue to develop a collaborative platform where industry participants may learn from overseas partners and build their own team of integrated smart city solution designers. "It is like drinking coffee, we have to think not only about how much sugar and milk to add, but what type of cake or cheese to go with to enhance the overall experience. This is the type of integration our nation desperately needs." said Chang.

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