Taiwan Tech Arena (TTA) is a flagship startup ecosystem building program launched by the National Science and Technology Council. Through integration of various resources, TTA strives to transform Taiwan into a vibrant international startup ecosystem by supporting startups through our networks of partner accelerators, mentors, investors, and corporate members while expanding their global reach to create more business opportunities.

The Development of the European Semiconductor Industry

Challenges and Policy Responses to Double Global Market Share by 2030

TTA x Viva Technology 2024

TTA and 40+ Startups Head to Viva Technology 2024 to Showcase Taiwan Innovation on World Stage

TAIWAN TECH ARENA

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Taiwan - Beyond Semiconductor Superpower

Taiwan Chip-based Industrial Innovation Program laying the groundwork for the tech industry of tomorrow

Taiwan is Considered a Global Semiconductor Powerhouse, yet there is more to Taiwan than Meets the Eye.

Taiwan has become synonymous with semiconductors after the global chip shortage from 2020 to 2023. As countries around the world began to realize that semiconductor chips are the foundation of the modern world, Taiwan has taken the next step to ensure our nation's continual growth in the global semiconductor industry for the next 10 years by launching the Taiwan Chip-based Industrial Innovation Program (Taiwan CbI). Playing a crucial role in the program, Taiwan Tech Arena (TTA), with full backing from the National Science and Technology Council (NSTC) sets out to draw international chip startups to Taiwan to propel breakthroughs and diversify innovations so as to solidify Taiwan's position as a semiconductor powerhouse for years to come.

In the meantime, TTA continues to support Taiwan startups to gain access to the global markets. In May, we are leading 40+ startups in Chip Innovation, Sports Tech, Digital Health, Sustainability and more to VivaTech 2024 in France! There, we will announce the IC Taiwan Grand Challenge, a competition hosted by NSTC, open to IC design and application startups from around the world. The finalists will have the opportunity to gain access to Taiwan semiconductor supply chain which will help them realize their visions, and at the same time, reinvigorate Taiwan semiconductor industry.

For this issue, we were very privileged to have the chance to interview Kris Peng, the President of UMC Capital, for his insights on the development of Taiwan semiconductor industry, future opportunities, challenges and more. We are also thrilled to share two inspiring stories of our Black Card members – Paul Chen and Phil Chen. Though both are from prominent families, both choose to work tirelessly to become successful in their own right. Last but not least, this issue features our partner accelerators' eight rising-star startups in the fields of AI, software, health tech and lifestyle. The achievement of these startups goes to show that Taiwan is more than just semiconductors.

Taiwan is developing into a truly robust startup ecosystem, and TTA is proud to play its role in serving as the platform connecting tech, talent, market and capital to empower local and international startups. We are committed and will continue to promote entrepreneurship and be the voice of Taiwan – a high tech island nation of innovation.

Andrea Hsu

Andrea Hsu

Director General, Department of Academia-Industry Collaboration and Science Park Affairs, National Science and Technology Council

CONTENT

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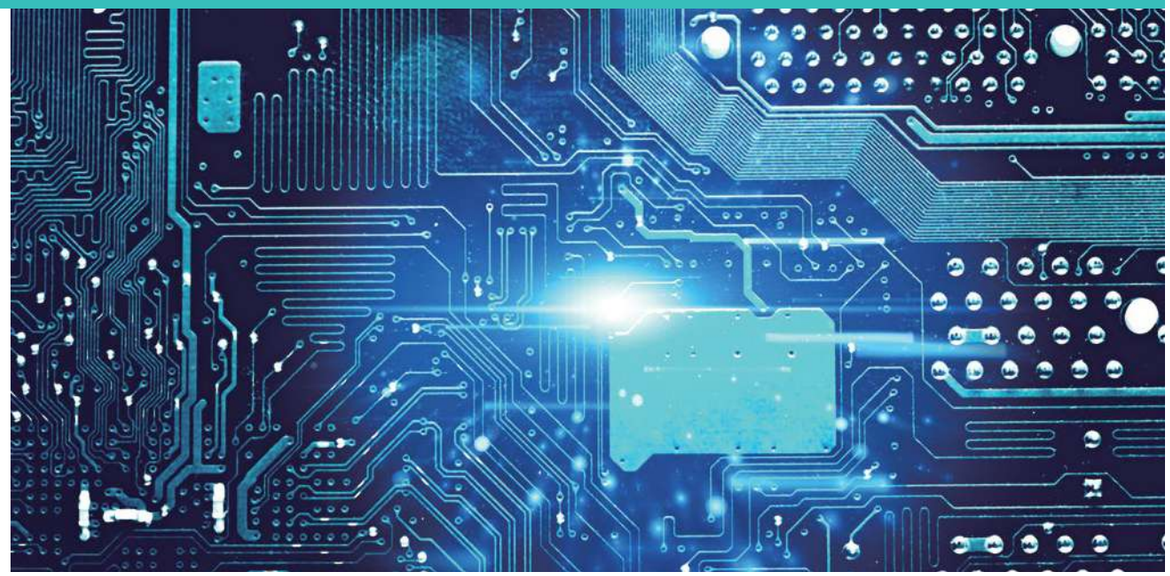
Challenges and Policy Responses in the Development of the European Semiconductor Industry

IEK Consulting
Yi-Chun Tsai, Lauren Chung



I. European Semiconductor Industry: Ecosystem, Strengths and Weaknesses

(1) Supply: Lagging Behind the US and Asia despite ownership of key technologies

While Europe holds control over key technologies in advanced manufacturing equipment, its overall market share at different stages of the value chain lags behind that of the US and Asia, with interdependence among global regions. According to the "Strategic Dependencies and Capacities" working document issued by the European Commission, Europe's advantages in the semiconductor value chain primarily lie in equipment and materials (excluding silicon wafers). Major players include ASML (Netherlands), the exclusive global supplier of the extreme ultraviolet (EUV) lithography equipment crucial for advanced semiconductor processes; ASM (Netherlands) and Aixtron (Germany) specializing in thin film deposition equipment; BASF (Germany) providing semiconductor chemicals; Merck (Germany), Linde (Ireland), Air Liquide (France) supplying speciality gases; Siltronic (Germany) and Soitec (France) producing silicon wafers; and IQE (UK) manufacturing compound semiconductor epiwafer and substrate, from among others.

However, Europe lacks world-leading fabless IC design companies and relies on the Asian region for foundry and packaging/testing services. During the investigation of the working document on Strategic Dependencies and Capacities by the European Commission, Europe accounted for only 10% of the global chip manufacturing output (including IDMs and foundries) with no foundries capable of advanced manufacturing of components with feature sizes below 22nm. The EU's assessment suggests that Europe's share in chip manufacturing will fall below 5% by 2030 unless measures are taken.

(2) Demand: European automotive/industrial OEMs as exporters of semiconductors and electronic devices

From the perspective of semiconductor demand, research and analysis[1] indicate that Europe holds a share of 20% of the global output of electronic devices in terms of sales locations and 10% in terms of the registration locations of electronic device manufacturers. The former represents the semiconductor demand from end users and is influenced by factors such as consumer spending power and the penetration rates of electronic products in the European regional market. The latter comes from the purchasers of semiconductor chips, reflecting demand based on their functions and applications, and mirrors the demand from European electronic device OEMs. Europe boasts strong brands in automotive, medical, industrial machinery, aerospace and defense, etc. However, it lacks leading brands in consumer electronics such as computers and smartphones, as well as in cloud and digital services.

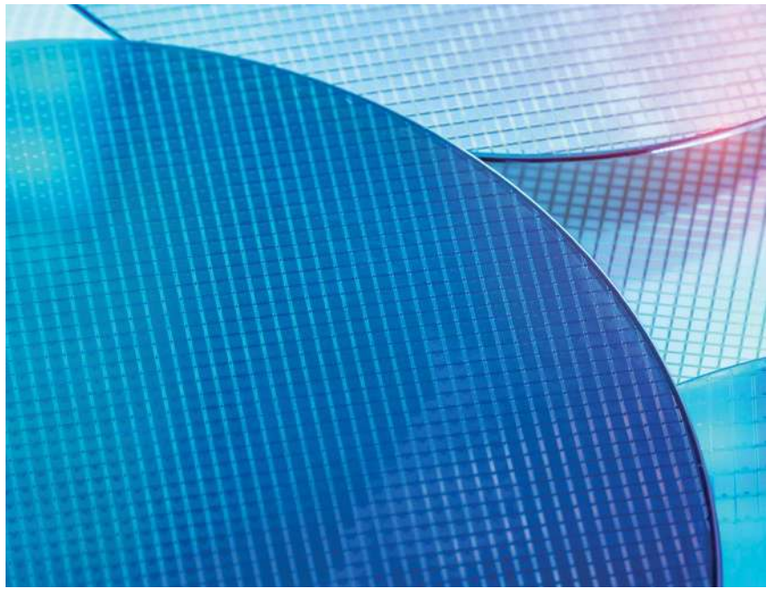
Electronic device OEMs also drive the demand for IC design. European IDMs such as NXP, STMicroelectronics, Infineon, and Bosch are recognized as global leaders in automotive and industrial semiconductors, benefiting from their strong connections with automotive Tier 1 suppliers and industrial equipment brands in Europe. In the plan to establish the European Semiconductor Manufacturing Company (ESMC) in Germany, TSMC announced a joint investment with three European companies (Bosch, Infineon and NXP, each holding a 10% stake). This initiative aims to introduce 22/28nm CMOS and 12/16nm FinFET processes to meet the demand for automotive and industrial innovation in Europe. However, due to the absence of leading companies in the fields of computers, smartphones or cloud service in Europe, there has been limited demand for advanced manufacturing or packaging, resulting in less emphasis on chips for high-performance computing.

II. Challenges for European semiconductor development

Amidst numerous discussions on advancing European semiconductor development, much emphasis has been placed on ramping up wafer fabrication capacity to address chip shortages. One of the primary objectives of the European Chips Act is to bolster the security and resilience of European supplies, permitting EU member states to subsidize integrated production facilities and open EU foundries. However, in the current landscape of European semiconductor development, challenges extend across the entire value chain. It is imperative to not only address the shortfall in chip manufacturing but also to tackle challenges in R&D and innovation, design, packaging, testing, and application domains.

(1) Challenge 1: Despite strengths in semiconductor R&D, there is a gap in converting research output into business value and the scale of corporate R&D in Europe is relatively small

R&D expenditure is indeed a crucial indicator of industrial innovation, future growth and competitiveness, particularly within the semiconductor industry. It allows us to gauge, to some extent, the technological strength and growth potential of different countries in the semiconductor field based on



their current R&D efforts, innovation strategies and semiconductor-specific R&D expenditure.

The German think tank Stiftung Neue Verantwortung tracked the contribution share (including academia, research institutions and companies) of different countries in the representative semiconductor conference papers [2] over the period from 1995 to 2020. The United States continued to maintain a high level of over 40% contribution, while Europe's (including the EU and the UK) contribution share rose from 12.6% to 24.9%, with six countries - Belgium, France, Germany, the Netherlands, Italy and the UK accounting for over 80% of Europe's contribution share. It is noteworthy that the gap between the number of papers published by European academic/research institutions and industry players has widened since 2007, with the share of papers from European companies falling below 20% after 2015. This phenomenon is markedly different from other leading semiconductor countries such as the United States, South Korea, Taiwan, and Japan, where academia/research institutions and industry players publish similar numbers of papers.

The total number of papers from the two major European research institutions IMEC (Belgium) and CEA-Leti (France) accounts for 24.6% of the total number of publications in the EU, with the gap between them and the number of publications from the EU industry narrowing year by year. IMEC closely cooperates with semiconductor manufacturers such as Intel, Samsung, and TSMC on forward-looking R&D. CEA-Leti, on the other hand, continues to lead in the development of Fully Depleted Silicon on Insulator (FD-SOI) by collaborating with Soitec and STMicroelectronics to industrialize the technology, and by transferring the FD-SOI manufacturing technology to foreign companies such as Samsung and Global foundries.

That said, the 2023 Factbook released by SIA (the Semiconductor Industry Association) indicates that the European semiconductor industry spent 15% of revenue on R&D expenditures in 2022, higher than the 11% in Taiwan, 9.1% in South Korea and second only to the 18.75% spent by the United States. However, the total corporate R&D spending in Europe lagged significantly behind that of the United States due to the much smaller revenue base of European semiconductor companies as a whole. Among the top 2,500 global companies tracked by the 2022 EU Industrial R&D Investment Scoreboard, the total R&D expenditure of European semiconductor companies was only 1/6 of that of the United States, and also lagged behind that of South Korea and Taiwan. Despite a strong presence in the number of semiconductor technology papers and high corporate R&D spending as a percentage of revenues in Europe, the number of European companies among the current global top 100 measured by revenues reveals a value gap from innovation and R&D to industrialization, implying that value has not been meaningfully translated across the value chain into revenue contributions to the European semiconductor industry.

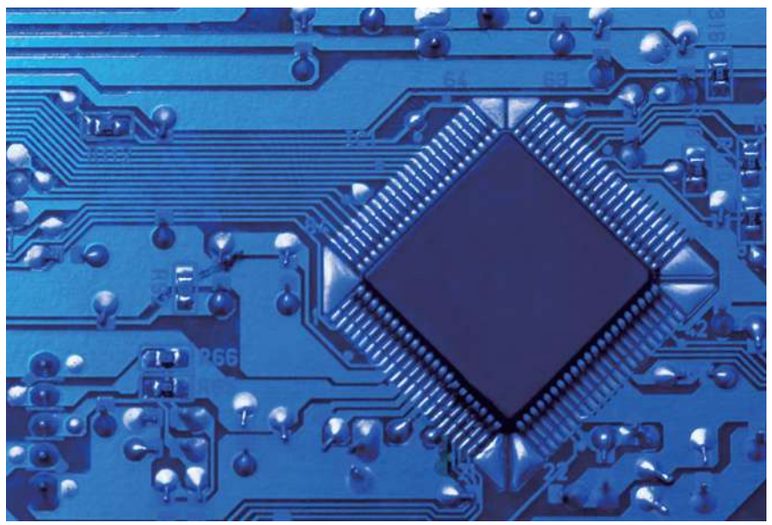
(2) Challenge 2: IC design in Europe is dominated by IDMs and the scale of fabless design houses is small

The flourishing development of the U.S. semiconductor industry is built on strong chip design capabilities, especially fabless IC design houses. American companies Qualcomm, Broadcom, Nvidia, and AMD are among the top ten global semiconductor design companies. The focus of resources on chip design and the generous spending on R&D, supported by a large revenue base, continue to enhance and expand their competitive edges against their peers.

In contrast, in Europe, IC design for consumer electronics such as smartphones has fallen behind or been eliminated by American and Asian competition over the past two decades. As a result, the European semiconductor ecosystem is now centered on automotive and industrial applications for exports, and is dominated by IDMs e.g., Infineon, NXP, STMicroelectronics, and Bosch. According to the most recent list of global top 100 semiconductor companies by revenue from CompaniesMarketCap[3], the only European fabless companies in this list are Melexis (ranked 57th), U-blox (ranked 75th), and Nordic Semiconductor (ranked 82nd). Meanwhile, the combined revenue of these three companies was only 5% and 6.4% of the annual revenues of the leading American IC design companies Nvidia and Qualcomm, respectively, and in fact lower than the R&D expenditures of these two American companies during the same period. This is also reflected by the aforementioned smaller R&D spending of European companies compared to their American peers.

Amid the European Union's discussions on the promotion of its semiconductor development, there were internal debates about whether large-scale public subsidies should be granted to attract foundry capacities for advanced processes. European research institutions and semiconductor companies argued that without substantial demand from local IC design houses, any advanced foundries built in Europe with subsidies would suffer low capacity utilization and financial unsustainability. Therefore, the most reasonable path would be to foster the development of European IC design companies in terms of scale and applications, so that the demand can be expanded to support manufacturing and packaging/testing capabilities. For example, TSMC's choices of overseas fab locations are demand-driven decisions - the US fab will support customers like Apple, Nvidia, Qualcomm and AMD, who require advanced process capabilities; whilst the Japan and Germany fabs involve joint investment with customers.

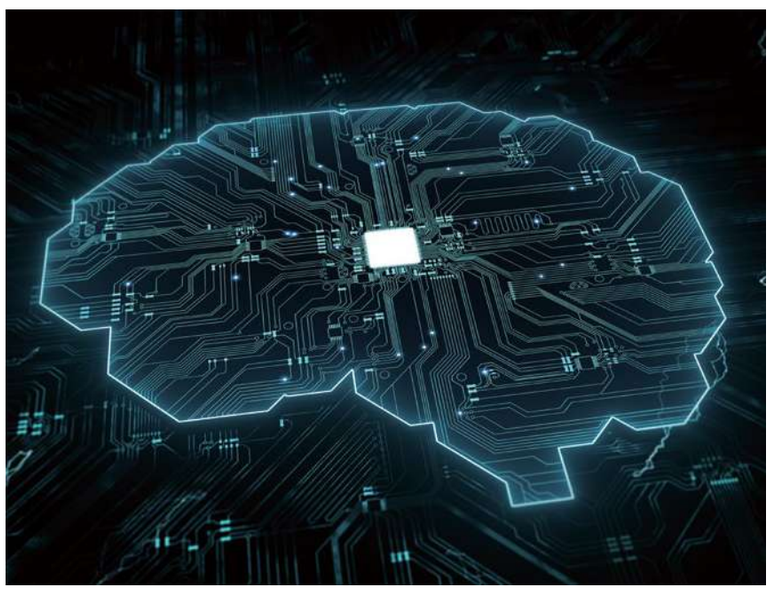
(3) Challenge 3: Europe's IDMs stalled at 22/28nm process nodes and established packaging capacities in Southeast Asia



The European semiconductor industry is known for its strengths in automotive and industrial applications, largely for power devices, analog and mixed-signal chips and sensor chips. Hence its technological development is not driven by process scaling for higher computing power. Rather, breakthroughs in new materials are the key to achieving higher efficiencies or energy savings for these types of semiconductors. The in-house manufacturing process nodes of European IDMs are as follows [4]: STMicroelectronics on 28nm FD-SOI, Bosch ≥65nm, Infineon ≥90nm, NXP ≥140nm. These IDMs outsource foundries, instead of building their own capacities, for advanced process manufacturing. According to publicly available information from STMicroelectronics, around 20% of its wafer fabrication is outsourced to foundries. Infineon's in-house capacity focuses on power devices and sensors, with outsourcing accounting for 30% in 2021, and an estimated 40% by 2025. In 2023, Infineon signed a long-term supply agreement with UMC for automo-

tive microcontrollers (MCUs). That said, European IDMs have made significant investments at home in silicon carbide (SiC) or gallium nitride (GaN) in recent years. This shows that the strategy of stalling at mature nodes and outsourcing the manufacturing of advanced logic chips is based on demand and economic considerations.

Given the relatively low automation, high labor-intensiveness and low gross profit compared to wafer fabrication, the establishment of chip packaging capacities outside Europe has its economic benefits. European semiconductor heavyweights such as Bosch, Infineon, Nexperia, NXP, and STMicroelectronics have established packaging & testing plants in Malaysia or outsourced the process to international OSAT (outsourced semiconductor assembly and test) companies. For example, STMicroelectronics outsources 35% of its packaging and testing, mainly for BGA (ball grid array) and WLCSP (wafer-level chip-scale packages). However, regardless of whether the future development of semiconductors follows Moore's Law of process scaling or moves towards heterogeneous chip integration, advanced packaging will play an increasingly critical role. Therefore, the lack of packaging & testing capacity in Europe may become another looming concern for the resilience of the European semiconductor supply chain.



(4) Challenge 4: Europe's IC industry is focused on auto and industrial applications. What is the next big thing?

According to the financial reports of Europe's top three semiconductor IDMs - Infineon, NXP, and STMicroelectronics, a high proportion of their revenues comes from automotive and industrial products. These financial reports indicate that future growth will continue to be driven by factors such as electrification, driving safety and intelligence, industrial Internet of Things (IoT), energy management, and further incorporation of AI into sensors, processors, and other products.

In recent years, the semiconductor content in vehicles has gradually increased due to the trend for vehicle sensing and control electronification, but vehicle sales volume is far lower than that of smartphones. In addition, the development of automotive semiconductors takes 1-3 years due to the lifecycle of vehicles and the stringent safety requirements. In comparison, the development lead time is much shorter for consumer electronics, such as smartphones, which are updated each year. In the future, the demand (quantity) and value (price) of auto semiconductors are expected to increase significantly, driven by megatrends such as intelligent cockpits, Software Defined Vehicles (SDVs), connected cars and autonomous driving. These are also the verticals where logic IC and ASIC design powerhouses from the U.S. and Asia are seeking to establish a foothold. Whether European IDMs or IC design companies can continue to ride the trend will be one of the keys to the future development of the European semiconductor industry.

The development of new applications in cloud, Internet of Things (IoT), cyber-physical systems (CPS) and personal devices will boost the demand for high-performance computing, AI, physical system simulation, product security, video encoding/decoding, as well as the underlying technologies e.g., machine learning and IoT, all of which will further drive the growth of the semiconductor demand. This will also test whether European semiconductor companies can seize the opportunities in these emerging applications and establish another growth driver beyond automotive and industrial semiconductors.

III. Are the EU's semiconductor policy measures really addressing the pain points?

A review of the EU's policy measures to promote the semiconductor industry shows internal multi-year cross-national R&D innovation initiatives such as the Chips Joint Undertaking, the Eureka Cluster Xecs, two Important Projects of Common European Interest (IPCEI) in microelectronics, and the European Chips Act. External measures involve the semiconductor alert mechanism and R&D cooperation with the United States, India, Japan, South Korea, and Singapore.

(1)Europe invests resources in semiconductors

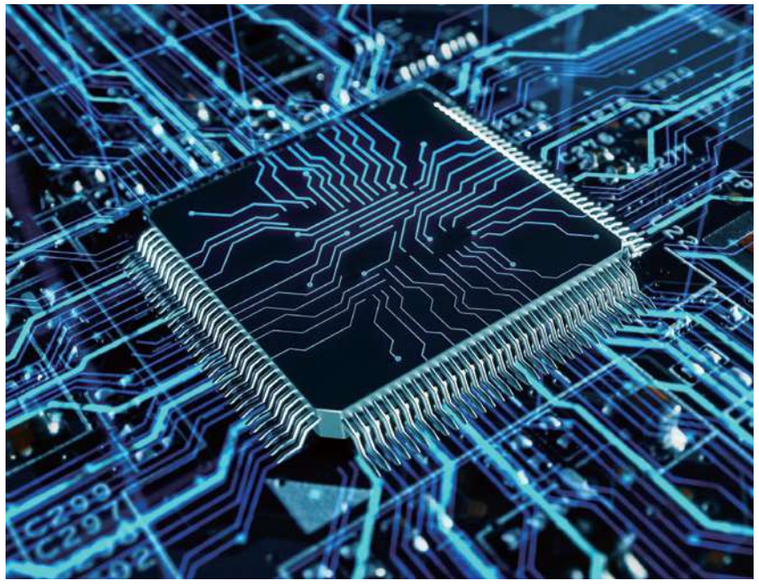
A closer look at the resources and investments in semiconductors within the European Union shows a heavy reliance on public subsidies from individual member states and the expectation of ensuing private investment. For example, the IPCEI I project on Microelectronics involves the governments of Austria, France, Germany, Italy and the UK investing a total of €1.9 billion, and is expected to attract €6.5 billion in private sector investment. The IPCEI II project on Microelectronics envisions €8.1 billion in public subsidies from 14 member states to drive €13.7 billion in private sector investment. In the Chips for Europe Initiative under the European Chips Act, the EU is contributing €4.2 billion, aiming to drive a total investment of €11 billion from member states and private enterprises. In total, the European Chips Act aims to attract €43 billion in public funding and private investment.

(2) The European Chips Act focuses on the first pillar of pre-competitive research and cooperation to advance Europe's semiconductor capabilities

The European Chips Act indicates that the European Commission is devoting its own resources to Pillar 1 initiatives, in order to establish Europe's overall semiconductor capabilities and promote R&D cooperation in the pre-competitive stage. The goal is to link Europe's scientific research strengths to industrial commercialization capabilities to expand value creation. The main efforts include the solicitation of proposals under the Horizon Europe-Chips Joint Undertaking for research across a diverse range of technologies and applications; the advancement of semiconductor design platforms and pilot production lines under the Chips for Europe Initiative to strengthen Europe's semiconductor technology development; the establishment of competence centers; and the creation of a Chips Fund to support semiconductor startups and SMEs, among other measures.

The design platforms under the Chips for Europe Initiative will provide the entire EU with access to silicon intellectual property (SIP) design libraries and electronic design automation (EDA) tools, and will integrate end-user applications and verticals. The pilot production lines aim to bridge the gap between labs and factories. Four directions have been mapped out during the first stage:

1. **Advanced sub 2nm leading-edge system on chip technology**
2. **Advanced FD-SOI technologies targeting 7nm**
3. **Advanced packaging and heterogeneous integration**
4. **Advanced semiconductor devices based on wide bandgap materials**



The goal is to drive Europe's capabilities in advanced process technologies and packaging.

Meanwhile, the long-running EUROPRACTICE alliance [5] and its RETICLES (Research, Entrepreneurship, Training, IP-exchange & Chip pLatform of EUROPRACTICE Services) continue to receive support from EU initiatives. This program provides support services at different stages from design, manufacturing, packaging and testing to microelectronic circuit integration for eligible European academic/research institutions and their spinoff startups. Computer-aided IC design tools and multi-project wafer (MPW) manufacturing services are offered at discounted prices. Academic/research institutions and startups have a selection of foundries to choose from for prototype manufacturing, based on the different types of semiconductors. Participating foundry service providers include X-FAB, UMS, UMC, TSMC, GlobalFoundries, STMicroelectronics, Pragmatic Semiconductor etc., each of which specializes in their own specific technologies of wafer fabrication. Under this program, TSMC provides 16nm and 7nm MPW services for universities with EUROPRACTICE membership for research and teaching purposes. Both programs help European academia, research and startups realize chip design and validation, especially for chip designs on advanced manufacturing.

In terms of R&D and innovation cooperation, the EU has set out a wide range of technologies and applications from which to solicit research proposals in 2023-2024, such as 6G RF front ends for terahertz communications; trusted edge AI for heterogeneous components and system integration; electronic control systems for distributed energy management and storage; and high-performance RISC-V automotive processors for supporting software-defined vehicles. This will expand vertical cooperation across the semiconductor supply chain and application domains from upstream to downstream.

Going forward, how successfully programs such as the Chips for Europe Initiative and the Chips Joint Undertaking can effectively foster the development of semiconductor talent development or attract institutional investment, strengthen industry-academia research collaboration to drive technology transfer and commercialization will be crucial to narrowing the innovation-industrialization gap from academia to industry, promoting the IC design sector and broadening the application domains for the European semiconductor industry.

(3) Member states inject capital into their own national semiconductor industry ecosystem and capacity building

With regard to the establishment of semiconductor manufacturing capacities, the main support comes from the IPCEIs on Microelectronics for First Industrial Deployment (FID), and Pillar 2 of the European Chips Act to support "integrated production facilities" and "open EU foundries". The European Chips Act relaxes regulatory restrictions on member states in terms of industry subsidies, and accelerate the review/approval processes. In fact, the subsidies for the semiconductor industry still rely on the fiscal resources of each member state.

For example, the German government provided nearly €1 billion in subsidies under the IPCEI I on Microelectronics in 2018, followed by plans to invest €4 billion in 31 companies under IPCEI II on Microelectronics in 2023. Under the European Chips Act, Germany also plans to provide €10 billion in public subsidies to Intel and €5 billion to the European Semiconductor Manufacturing Company. Whilst this reflects Germany's existing strength of the semiconductor ecosystem and the semiconductor demand from downstream automobile, industrial equipment and other industries.

IEKView

In the context of the current state and challenges facing Europe's semiconductor development, the focus on local semiconductor manufacturing capacities is just one aspect. Other hurdles to overcome include the gap between academic research and industrial commercialization; the insufficient scale of IC design companies; lagging corporate investment in advanced manufacturing and packaging technologies, as well as the need to expand the end user application domains for semiconductors.

The existing strengths in fundamental research and innovation at European academic/research institutions will benefit from continued support from Horizon Europe and the Chips Joint Undertaking. The newly established Chips for Europe Initiative aims to bridge the gap between research strengths and industrialization, enhance IC design capabilities and connect with end application demands. Pilot lines will assist the progress towards advanced processes and packaging. European companies will receive support in R&D and initial production ramp-up from the IPCEIs. Additionally, "integrated production facilities" and "open EU foundries" will seek to strengthen local manufacturing capabilities in advanced processes, where Europe is lacking. The EU aims to use public subsidies and investment at the policy level to address common development challenges across different stages and attract corresponding private corporate investment to drive the development of Europe's semiconductor ecosystem.

Over the years, the global semiconductor industry has developed into an intricate network of vertical and horizontal division of labor across different regions of unique strengths and characteristics - not something that can be achieved overnight. For Europe to catch up in specific fields or develop a comprehensive and self-sufficient semiconductor industry, massive, sustained and strategic investment will be necessary to disrupt the current equilibrium of globalized division of labor driven by economic efficiency. At this juncture, all the measures and investments by the European Union and member states are just the start and a call to action. It remains uncertain whether they can successfully stimulate investments in the European semiconductor industry and expand Europe's market share to meet the EU's target. In addition to efforts by academia/research institutions and industry players, Europe needs to compete on a global scale. Continued observation is in order to see how Europe's ambitions in semiconductors play out.

[1] SIA/BCG Report, Strengthening the Global Semiconductor Supply Chain In An Uncertain Era, (2021) https://www.semiconductors.org/strengthening-the-global-semiconductor-supply-chain-in-an-uncertain-era/

[2] Tracking of semiconductor conference papers based on International Electron Devices Meeting(IEDM), International Solid-State Circuits Conference(ISSCC), Symposia on VLSI Technology and Circuits(VLSI)

[3] https://companiesmarketcap.com/semiconductors/largest-semiconductor-companies-by-revenue/ dated January 3, 2024

[4] Stiftung Neue Verantwortung, The lack of semiconductor manufacturing in Europe, Jan-Peter Kleinhans, 2021/04

[5] EUROPRACTICE members are Interuniversity Microelectronics Centre (IMEC) in Belgium, Science and Technology Facilities Council (STFC) as part of the UK Research and Innovation (UKRI) in the UK, the Fraunhofer Institute for Integrated Circuits (IIS) in Germany, CIME-P in France and Tyndall National Institute in Ireland. The academic/research institutions eligible for EUROPRACTICE memberships are from the EU member states, European countries and certain countries in the Middle East and Africa that could participate in the Horizon Europe Key Digital Technologies Joint Undertaking

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Semiconductor Giant's VC Arm Devoted to Supercharge Innovation for Startups

An Interview with President of UMC Capital, Kris Peng

Despite a downturn in the global semiconductor industry in 2023, most market research firms estimate that the industry will continue to experience stable growth in 2024 and beyond. As Kris Peng, President of UMC Capital, mentioned, "It's a mature industry with a long history, experiencing normal cyclical fluctuations. Moreover, given that various applications in our daily life rely on semiconductors, the industry is at the core of innovation."

Founded in 2001, UMC Capital is the Corporate Venture Capital arm of UMC Corp., one of the leading global semiconductor foundry companies that spearheaded Taiwan's semiconductor industry. The evergreen fund manager's investment objectives encompass global markets, through various VC methods such as strategic partnership or M&A, not limited to any rounds or stage. In addition to offering long-term capital to their portfolio companies, UMC Capital also provides management consulting and other services wherever needed by businesses.

Although UMC Capital's parent company is a semiconductor giant, the companies invested in by this VC are not limited to the semiconductor technology field. "The barriers for startups in the IC industry are increasingly high as the costs of semiconductor manufacturing continue to rise and complexity of IC designs escalates. It's a high-risk business and not easy to get funds successfully," Kris said. UMC Capital's recent investment targets have expanded beyond the IC industry to include sectors such as optical communications, aerospace, new materials, medical and healthcare, digital services, transportation, software, and more.

However, due to the increasingly significant strategic importance of semiconductor technologies and geopolitical factors, major countries around the world are looking at building independent supply chains to mitigate risks. Additionally, with global efforts to achieve carbon reduction goals, Kris still sees potential new opportunities emerging for startups to explore. "Semiconductor manufacturing is a strength of Taiwan with a complete local supply chain for electronics and ICs on top of an abundance of talent pool with relevant expertise. There are still many advantages and resources for local startups to gain."

Pursuing Higher Added Value

According to Kris' observations, the opportunities from silicon

IPs and ASIC design services, which have lower hardware cost burdens, are suitable fields for entrepreneurial teams with related expertise to explore. He also suggests that entrepreneurial teams aiming to make their mark in the semiconductor or electronics industry should ponder on how to develop technologies or products that can attain higher added value.

In the realm of electronic products, the lowest added value typically lies in individual components. However, by moving towards modular and systemic product development approaches, there's a chance to achieve higher added value. " We've seen some startups from Israel succeed with this approach," on the other hand, local startups in Taiwan tend to have more restricted thinking. Kris advises entrepreneurs to open their minds, broaden their horizons, look toward the global market, and try boldly with new business models, "Building a proprietary brand, for example, is a business model that can create great added value. Taiwan's disadvantage lies in its small home market, but this isn't an unsolvable problem; having a global view is crucial."

Be Passionate and Thoroughly Prepared

Over the years, UMC Capital has worked hand in hand with startups and accumulated rich experience in assisting entrepreneurs navigating various markets to launch businesses and get growth momentum. So, from the VC's perspective, what kind of startup has the best chance of success and gaining a foothold in the market? Kris' opinion was, "For entrepreneurs, keeping their passion is crucial and often a key factor in achieving success." Chih-Han Yu, the co-founder and CEO of Appier, Taiwan's first unicorn specializing in software-as-a-service leveraging AI tech, is one of the impressive examples Kris raised.

"We've also seen some teams with unique technology; their solutions are indeed good and demanded by the market however too niche to scale," Kris mentioned. The scalability of a startup's business is critical for investors – a fact that entrepreneurs aiming for market traction and success cannot ignore.

From the perspective of UMC Capital, startups with greater chances of securing investment are the teams that already possess fundraising capabilities. "Differ from those deep-pocketed investors in the United States, we place greater emphasis on risk," Kris explained. As a publicly listed company, UMC has a responsibility to its shareholders, and UMC Capital takes a more cautious approach to investment.

Need More Foreign Investment

In recent years, Taiwan has been actively creating a conducive ecosystem for startups, including TTA launched in 2018. Serving as the platform connecting technology, talent, market, and capital, TTA's goal is to foster entrepreneurship and innovation. And Taiwan boasts a significant advantage in the electronics and semiconductor industry supply chain. Such an environment is indeed a major asset for startups. Kris suggested that Taiwan should highlight these advantages to attract more foreign investment into the startup ecosystem. "Relying solely on local venture capitalists in Taiwan is not sufficient. What's more, the local investment regulations should also be adjusted to create a more liberal environment for foreign investment to flow in." He raised the examples of the U.S. and Iseral markets emphasizing that having such investment friendly environments can attract not only foreign capitals but also encourage more international startups to use Taiwan as a base, stimulating the local market with global mindset and cultural diversity.

Bridging Innovation from Taiwan to the World: Crave Robotics

Paul Chen, a seasoned entrepreneur, is making waves in the tech world with his innovative ventures that bridge the gap between Taiwan's expertise and global markets.

Paul Chen

https://www.linkedin.com/in/pchen408

Born in Oakland, California and raised in Boston, Massachusetts, Paul's journey reflects a fusion of Eastern heritage and Western innovation, culminating in his mission to leverage Taiwan's strengths for international success. His trajectory was heavily influenced by his family's entrepreneurial spirit, particularly that of his father, Wu-fu Chen, a prominent figure in Taiwan's startup scene.

Paul studied computer science at Brown, MSEE at Columbia University and has an MBA in Entrepreneurship from MIT Sloan School of Management. He later migrated from the East Coast to Silicon Valley for his career in high-tech. His key achievements to-date include US$100M+ raised from venture firms and strategic corporates such as Jollibee, LaKaffa, Middleby, and Sony Ventures, largest food robotic deployment in the US (700+ locations), and team of 150 across Taiwan and the US.

Paul's decision to apply for TTA Black Card Membership and relocate to Taiwan wasn't merely a return to his ancestral homeland and raising four kids, but a strategic move to capitalize on Taiwan's robust tech ecosystem. With firsthand experience managing a software team in Taipei during his previous startup, Paul recognized the value of Taiwan's R&D capabilities and manufacturing prowess, especially in the realm of hardware.

Tapping food automation demand with Taiwanese partner

His current project, Crave Robotics, epitomizes this synergy between Taiwan and the US, offering hot food vending machines designed for quick and convenient meal solutions. Leveraging Taiwanese partnerships for R&D and manufacturing, Paul aims to introduce high-quality, ready-to-eat meals to the US market, tapping into the growing demand for automation in the food industry.

Paul's previous startup – Botrista, a beverage automation solution which was a precursor to this full automation solution utilizes a similar model. It conducts R&D and manufacturing in Taiwan to keep costs low, imports finished goods to the US, and targets the US market. Its US team is focused on sales, marketing, and operations (both ingredient supply chain and machine installation, service, and maintenance). "Crave also has these 3 functions in the US, but instead of selling to fast-casual chains, we sell to hotel chains. Instead of e-commerce third party logistics, we do cold chain. Instead of sourcing syrups

"A key aspect highlighted by Paul is the need for CEOs with a deep understanding of global markets, particularly the US and China."

and concentrated tea/coffee, we source and produce frozen meals," explained Paul.

His partner company, Converge, operates in the Taiwan market, serving premises such as Hsinchu Science Park and almost every single office parks in Taiwan right now. They also focus on military bases, and camping sites which are hard to get delivery and where there's no convenience store around.

Seeing that even Taiwan now is having a hard time finding labor in a place where labor is relatively cheap compared to the US, Paul said labor shortage will continue to be a problem even in Asia. Yet he will stick to the US market first to build up an automation and distribution solution.

"I think the US market is big enough that we could build a billion-dollar business just on targeting limited-service hotel chains," Paul explained why focus is key for most startups. "You only have so many resources. You don't want to spread yourself too thin."

And what they are setting up are not just the sales, but also a cold chain logistics. Paul thinks the most valuable part of it is they are essentially a distribution channel solution for consumer-packaged goods (CPG) food brands, restaurant brands or even beverage brands.

Advice for Taiwan's startup ecosystem

Drawing from his background as an ASIC designer and deep knowledge in Taiwan's semiconductor industry, Paul emphasizes the need for Taiwanese companies to evolve beyond traditional mindsets and embrace risk-taking to create more value. He highlights the historical success of Taiwanese brands like HTC, Acer, and Asus in the PC era but notes a lack of continuation in building global brands afterward.

Beyond business, Paul envisions a broader ecosystem that nurtures collaboration between Taiwanese companies and global talent. By establishing a distribution channel for food automation solutions, Paul seeks to empower local startups while providing a gateway to international markets. Reflecting on Taiwan's strengths, Paul emphasizes the need for the country to evolve from its traditional focus on contract manufacturing and embrace innovation-driven strategies. He advocates for strategic investments, industry-specific policies, and corporate partnerships to propel Taiwan's tech ecosystem to new heights.

Acknowledging the commendable efforts of organizations like the National Science and Technology Council and the National Development Council in fostering Taiwan's tech ecosystem, Paul emphasized the need for a strategic approach to resource allocation. While Taiwan boasts exceptional electronic manufacturing service (EMS) capabilities with giants like Foxconn and Pegatron, Paul believes that the optimal utilization of resources remains a challenge.

Paul hinted at the role of government initiatives in driving innovation but cautioned against a one-size-fits-all approach. Instead, he advocated for industry-specific policies and partnerships that align with the diverse needs of startups. By leveraging corporate sponsors and manufacturing partnerships, startups can mitigate initial capital requirements and accelerate their growth trajectory by getting their supports for initial trials of their products.

Drawing parallels with successful models like Plug and Play, Paul stressed the importance of early customer engagement through corporate partnerships. These collaborations not only provide crucial funding but also offer invaluable market validation, essential for startups navigating the competitive landscape.

A key aspect highlighted by Paul is the need for CEOs with a deep understanding of global markets, particularly the US and China. Recognizing the challenges faced by Taiwanese founders in accessing international markets, Paul underscored the importance of attracting global talent to Taiwan. However, he acknowledged the salary gap as a deterrent and emphasized the need for closer collaboration with local companies to bridge this divide.

Leveraging Taiwan as R&D hub

In Paul's vision, Taiwan's strengths lie in its R&D and precision manufacturing capabilities, particularly in the hardware sector, such as robotics and medical devices. While sales and marketing operations may need to be geographically aligned with target markets, Paul believes that locating R&D and software teams in Taiwan offers cost advantages and fosters innovation.

Looking ahead, Paul envisions a collaborative ecosystem where Taiwanese companies, startups, and global talent converge to drive technological advancement. Paul sees himself and his company at the forefront of this transformation, driving growth and innovation through a blend of Taiwanese ingenuity and global ambition. He advocates for a full-scale immersion approach, urging entrepreneurs to invest time and resources in understanding and penetrating international markets, particularly the US, given the current political environment.

Paul Chen's journey embodies the spirit of innovation and collaboration, showcasing Taiwan's potential as a global tech powerhouse. He remains committed to bridging the gap between Taiwan's innovation ecosystem and the world stage, ushering in a new era of growth and opportunity for all.

Build Good Teams and Believe in What Truly Matters

Phil Chen, the CEO of Cold Electric and the New Taipei Kings Basketball Team, possesses a keen eye for discerning the true value in endeavors. For him, realizing value requires patience, and the foundational step towards it is assembling strong teams, whether in business, basketball, or family. “Get that right, and everything else becomes considerably easier,” he emphasizes.

Phil Chen
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In his view, success unfolds over time, often exceeding our expectations in the long run. Reflecting on his experience in the tech industry, Phil notes a common saying: while we tend to overestimate what can be achieved in a year, we consistently underestimate what we can do over a 10-year timespan.

This perspective underscores the importance of sustained effort and strategic team-building for enduring success. Phil exemplifies this principle in his endeavors, notably in the formation of the New Taipei Kings Basketball Team.

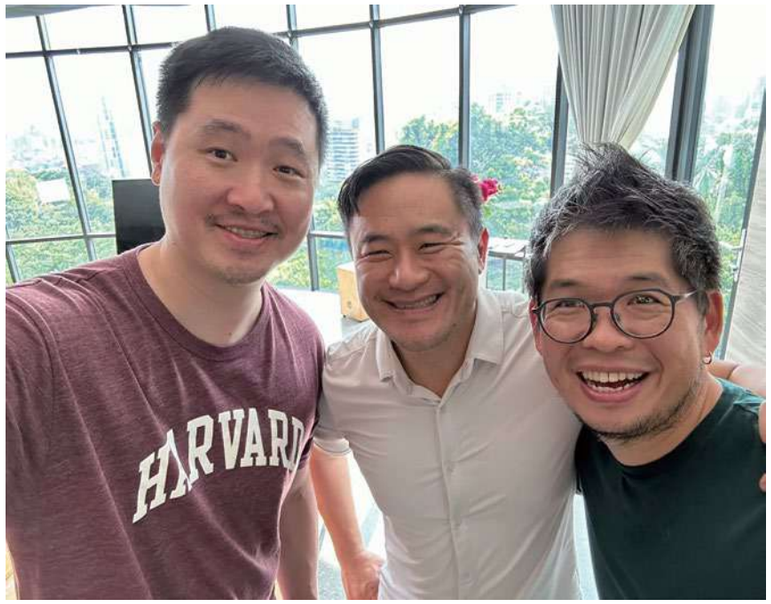
Despite being established only in 2021, the team’s journey, marked by meticulous talent acquisition including Quincy Davis, Joe and Jeremy Lin as well as former NBA coach Ryan Marchand, led to unprecedented achievements recognized by international news outlets such as CNN and Forbes as it made history by being the first professional team in Taiwan to beat the best professional teams in Japan, Korea, and the Philippines.

Past to Present

Although he spent his early years in Texas, Phil mainly grew up in Taiwan until high school. Following high school, he pursued his education and career primarily in California, spanning from the late 1990s to around 2020.

For the first decade of his career, he was involved in building mobile phones with HTC and later transitioned into venture capital, establishing a corporate venture for HTC and acquiring companies like Beats which was later sold to Apple. The next 10 years, he joined Li Ka-Shing’s venture fund in Hong Kong before starting his own Race Capital.

“while we tend to overestimate what can be achieved in a year, we consistently underestimate what we can do over a 10-year timespan.”



And when the pandemic hit, everything stopped. That was when he decided to move his family back to Taiwan. He started to get interested in the energy sector when he started invested in Bitcoin back in 2015 and saw the importance of clean and renewable energy for the exponential growth of computing. He took over Cold Electric, a battery project spinoff of the Formosa Group, to harness the intermittence of solar and wind energy whenever power is needed.

Capital is just commodity

When he was asked what he would advise TTA and Taiwan's startup ecosystem on building a more friendly environment, Phil took Israel for example. "Any fund that was approved by the Israeli officials, for every dollar the fund put in, they will put in $6. I would ask the officials like, what if you lose this money? Their response was – we're investing in our people."

Phil highlighted the stark contrast in the approach towards failure between Taiwan and Israel. In Taiwan, failure often leads to a stigma that hinders future opportunities for entrepreneurs, whereas in Israel, failure is seen as a vital part of the learning process. Israeli entrepreneurs frequently embark on multiple startup ventures, viewing each failure as a steppingstone towards eventual success. This mindset is reflected in the Israeli entrepreneurial ecosystem, where investors are more willing to support individuals who have experienced setbacks and learned from them.

"There's an over indexing on capital in the Taiwanese culture. People attach too much importance on money and capital, rather than the talents in which you're investing in," said Phil.

"Capital is a commodity, it's not what's scarce. What will make a difference is the talent." Phil said, "That's how I still approach things, whether it's basketball or business or even raising my kids right."

In discussing failure, Phil acknowledges Silicon Valley's ethos of "fail fast, fail often" but delves deeper into the psychological dimensions of resilience. Beyond mere acceptance of failure, he underscores the importance of sustaining belief and confidence in the face of adversity. Whether on the basketball court or in the boardroom, Phil emphasizes that cessation of belief spells defeat, regardless of one's prowess or potential.

Embrace a mindset of audacity and conviction!

"Do you believe that if you keep working, someday you'll get it right?" he questions. For him, failures are not setbacks but rather steppingstones in the journey of growth, also with resilience and perseverance.

Drawing an analogy from a recent basketball tournament experience in the Philippines, Phil highlights the story of Yuki Togashi, a Japanese player whose towering confidence transcended his physical stature. Despite standing at a modest 167 centimeters, Takashi emerged as the tournament's MVP, leaving a lasting impression on Phil and his team. This anecdote underscores the power of unwavering self-belief, a quality he wishes to see more prevalent among Taiwanese entrepreneurs.

Taiwan, a semiconductor manufacturing hub, boasts remarkable achievements despite its diminutive size and population. Phil advocates for a cultural shift, urging entrepreneurs to embrace a mindset of audacity and conviction. "We need to believe that we can make the next tough shot," he asserts, emphasizing the importance of confidence in overcoming challenges and seizing opportunities.

Reflecting on the success of Taiwanese entrepreneurs in Silicon Valley, Phil explores the unique attributes that foster their growth. He questions the role of risk-taking culture, abundant capital, and supportive environment in nurturing entrepreneurial endeavors. The Taiwanese diaspora's remarkable presence in Silicon Valley underscores the significance of self-belief and resilience in navigating uncertain terrains.

Family influence

Phil may have inherited that business acumen and audacity from his family.

His mother is the eldest daughter of Wang Yung-ching, the Taiwanese legendary petrochemical tycoon, who was among the first batch of investors of Taiwan Semiconductor Manufacturing Company (TSMC). Phil grew up in that family of strong bonding, entrepreneurial spirit and Christian faith.

Phil happened to be akin to the tech side of the family, as opposed to the petrochemical or bio-pharmaceutical side. His aunt (Cher Wang, co-founder and chairperson of HTC and VIA Technologies) and uncle (Winston Wang, founder of Grace T.H.W. Group) started different tech businesses. "Everything from motherboards to chips, and of course, later mobile phones, … I grew up being exposed to that supply chain, and I've been very lucky to learn from that."

Rooted in his upbringing in a Christian family, Phil attributes his belief and confidence to faith. He draws parallels between religious faith and entrepreneurial resilience, highlighting the role of unwavering conviction in driving success. "Believing in yourself and your abilities," he notes, "is akin to a profound act of faith."

In essence, Phil's narrative serves as a poignant reminder of the transformative power of belief and confidence. Beyond mere ambition or talent, it is the unwavering faith in oneself and one's journey that propels individuals towards greatness. As Taiwan continues to navigate the ever-evolving landscape of innovation and entrepreneurship, Phil's words echo as a beacon of inspiration, urging all to embrace belief as the cornerstone of success.

STARTUP STORY

Get ready to be inspired by eight rising-star startups from eight TTA accelerator partners: BE Accelerator, flyingVest ventures, Foodland Ventures, IAPS, Mosaic Ventures, Orbit Startups, SparkLabs Taiwan, and Startup 101!

ELSA

ELSA Provides 24/7 Personal English AI Tutor for Millions of Learners Over the World

As the global lingua franca, English communication skills are crucial for anyone looking to succeed in academics and the workplace. However, improving English proficiency typically requires a lot of effort for non-native speakers, especially in listening and speaking. Immersing in an all-English environment and having a 24/7 personal tutor who converses exclusively in English would be immensely beneficial for any learner, but not everyone can afford it, finding the right teacher is another challenge.

This was also the challenge faced by Vu Van, who was born and raised in Vietnam. She initially thought her English level was good enough, and she got many opportunities in the local job market to work for international companies because of her language proficiency. It was not until Vu went to study at Stanford University, where she pursued an MBA and a Master's in Education that she realized her non-native accent prevented her from freely expressing herself and communicating smoothly with professors and classmates. The situation left her feeling frustrated so she started to look for a speech coach to improve her pronunciation. But it turned out extremely expensive, the hourly rate could be as high as $200. All these became the driving force behind her founding ELSA eight years ago.

Aimed to create an affordable personal English tutor available 24/7, Vu collaborated with a speech technologist, Dr. Xavier Anguera, to form a company and officially launched ELSA Speak in 2016. According to Michael Ngo, ELSA's General Manager of SEA Cluster and Taiwan, leveraging AI technologies and a self-built large database for non-native English speakers, the ELSA Speak smartphone app is not only a personal English tutor right in learners' pockets, but also a unique learning tool that can pinpoint pronunciation mistakes in every sound of a word and sentence then provide real-time, accurate feedback to guide users on how to improve.

8 years ago, AI was not such a hot topic as today, "there were existing models that were available, but none of them were good enough for what we want," Michael said. So the ELSA team built their own AI model and introduced generative AI technology to their solutions, to enable a unique personalized English learning tool.

"Recently, we've successfully developed & released two more powerful AI tools that bring users' English to the next level. One is ELSA AI, which lets users practice real-world roleplay conversations and Speech Analyzer, which provides detailed feedback for any free-formed speeches." These tools are not only capable of engaging in ongoing conversations with users, but also simulate specific scenarios, such as job interviews allowing users to practice before entering the actual events, enhancing their confidence.

ELSA's uniqueness and advantages have gained favor from numerous investors, including leading venture capital firms in Silicon Valley, Southeast Asia, and Japan. So far ELSA has successfully raised $50 million in capital and got over 50 million downloads globally, their subscribers across more than 195 countries worldwide.

Since its launch, ELSA has also won many prestigious awards and recognitions, including "Best Digital Learning App" by Reimagine Education, winner of SXSWEdu Launch Competition, Top 5 Artificial Intelligence Applications by Research Snipers, and a world-changing AI product mentioned by Forbes. Recently, ELSA has secured Series C funding, including the participation of UniPresident Taiwan. ELSA will use the funding "to support, grow the platform and expand further in Taiwan with our new investors," Vu said.

With its semiconductor and electronics industry supply chain, Taiwan plays an increasingly significant role in the global market. More and more international companies have come for investment, increasing the need for local employees with bilingual skills. ELSA recognizes the growth potential of the Taiwan market and considers it one of the key focuses for future operations.

"And we see Taiwan has set a goal of becoming bilingual in Chinese and English by 2030. To achieve that goal, the Taiwanese government also urged educators and learners to leverage technology and AI for people to practice English with more effective, personalized, and engaging methodologies." Michael added that, in addition to subscription service for individual users, collaborating with schools and businesses to provide English training solutions has always been one of the business models that ELSA values greatly.

As a successful startup, ELSA also shared its tips for operating a business with other entrepreneurs. " First, start with the big problem, because if the problem you try to solve is too small or too niche, you won't be able to scale up," Michael said. Second, stay agile, "As technology advances rapidly, it's crucial to constantly assess the market's response to your products and services, swiftly determine the necessary changes and what's your next step." Last but not least, "Always focus on end user's experience. Building a cool product is good, but if nobody uses it or has no value, it's probably not going to be a viable business."

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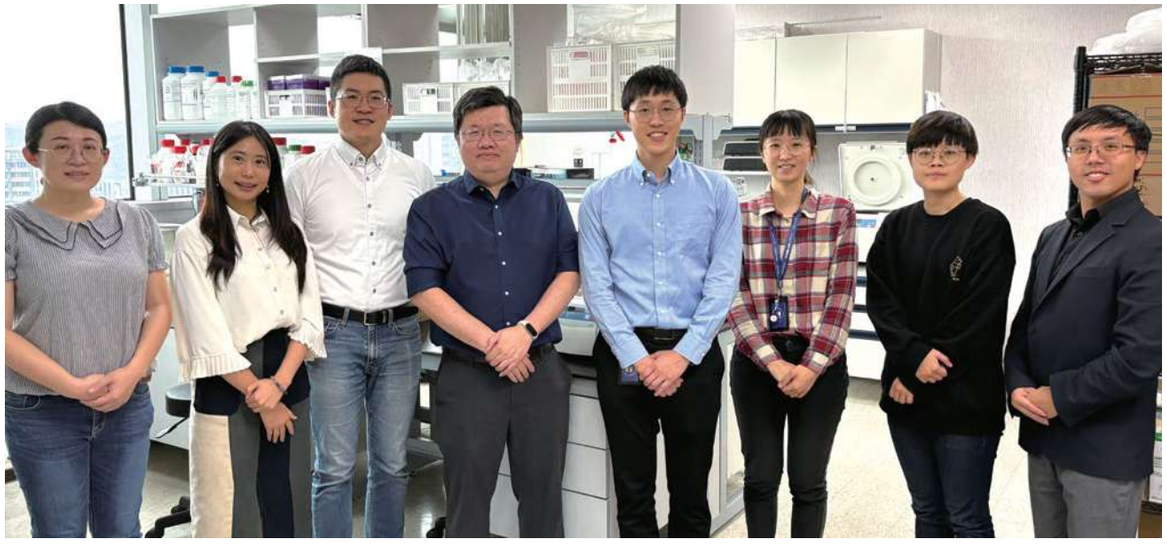

CytoArm

A Powerful Weapon against Cancer, CytoArm's Innovative Armed-T Technology Received Worldwide Attention

The global healthcare sector was amazed when a little girl with B-cell acute lymphoblastic leukemia was cured after being treated with chimeric antigen receptor (CAR) T-cell therapies (CAR-T) in 2012. Dr. Kuo-Hsiang Chuang, who just started his job at Graduate Institute of Pharmacognosy, Taipei Medical University (TMU) at that time, thought CAR-T would help doctors and patients successfully fight cancer. CAR-T, mostly based on retrovirus gene delivery, however, leaves a lot of room for improvement. Dr. Chuang therefore began to develop the unique "Armed-T" technology and founded CytoArm in 2020, which now offers five T cell products against different cancers based on the Armed-T cell platform.

CAR-T delivers effective results but has room for improvement

According to a WHO report released on February 1, 2024, there were close to 20 million new cases of cancer in the year 2022 alongside 9.7 million deaths from the disease. It is not an exaggeration to call cancer the biggest threat to human health. This is also why the world including the healthcare sector is paying attention to CAR-T following the successful treatment of the little girl with leukemia in 2012.

According to Dr. Chuang, CAR-T makes use of genetic engineering technologies to change the patient's immune cells called T cells and enable them to effectively attack the cancer. T cells are collected from the patient and reengineered in the laboratory to produce proteins on their surface called chimeric antigen receptors (CAR) using retrovirus gene delivery. The genetically reengineered CAR-T cells can precisely identify tumor-specific antigen. When deployed back in the patient's body where CAR-T cells can specifically bind to cancer cells and destroy them.

FDA approved the first CAR-T therapy in 2017, which has been proven to deliver promising results for blood cancers and impressive survival outcomes. However, Dr. Chuang pointed out the risks of CAR-T. First of all, it uses retrovirus vectors for gene delivery into T cells, which might elicit an unexpected immune response or cause T cell mutation.

Furthermore, CAR-T costs will remain high as the processes of collecting, reengineering and readministering T cells require a highly specialized team of professionals and expensive lab equipment. The gene (or virus) reengineering and cell culturing processes are also very challenging. Finally, CAR-T patents are owned by a small group of big pharma players, barring the entry of newcomers with formidable licensing fees or potential infringement lawsuits.

Armed-T fights cancer even more effectively

CytoArm's Armed-T technology addresses all of the above issues. According to Dr. Chuang, with the Armed-T therapy, specific molecules are attached to the surface of the patient's T cell, much like putting armor on the T cell like the Iron Man, described Dr. Chuang. The armed T cells are then equipped to identify and destroy cancer cells. As opposed to CAR-T therapies that need 30 days for virus culture or reengineering, it only takes 10 days to produce high purity cancer fighting Armed-T cells and the therapeutic results are significantly more promising. To top it off, as no retrovirus gene delivery or genome editing technique is used, Armed-T cells are free of cancerization or mutation risks, making Armed-T a safer treatment choice for patients.

In general, it is not easy for genetic reengineering techniques to achieve a high purity. CytoArm's Armed-T technology generates cancer-fighting cells at an impressive 90%+ purity. As to costs, without the need for retrovirus gene delivery, CytoArm is able to offer Armed-T technology at more affordable prices, allowing more patients to receive the treatment. Armed-T technology has another advantage, noted Dr. Chuang. The molecules that are attached onto the surface of the T cell can be customized to allow the T cell to target and kill a specific type of cancer cells. CytoArm has developed five Armed-T products — CTA-01, CTA-02, CTA-03, CTA-04 and CTA-06. Experiments on lab mice with human B-cell leukemia indicate that CTA-01 can rapidly target and effectively destroy cancer cells with no obvious signs of recurrence. CytoArm's first Armed-T product, CTA-02, is for treating incurable colorectal cancer associated with mutations in the epidermal growth factor receptor (EGFR) gene or its downstream effectors. CTA-03 is for treating prostate cancer and CTA-04 is for treating metastatic breast carcinoma.

CytoArm is set to submit applications for CTA-02 clinical trials in Taiwan, Singapore and the U.S. in the first half of 2024. It has also reached out to a U.S. IP firm to ensure that Armed-T does not infringe upon big pharma players' CAR-T patents, allowing the company to steer clear of obstacles that might hinder its research and growth.

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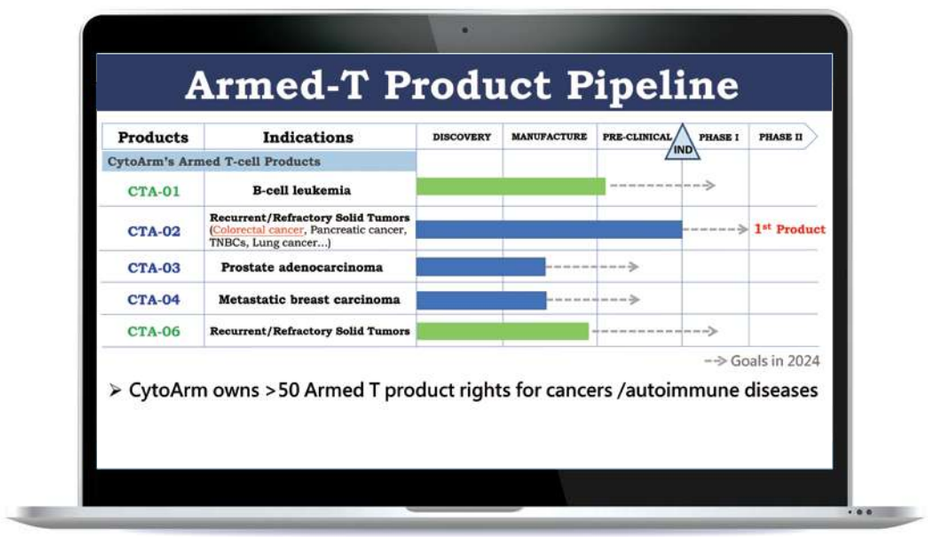

EndoSemio

EndoSemio's Innovative Single-Use Endoscope Solves Clinical Pain Points while Safeguarding Patient Health

Endoscopes play an instrumental role in minimally invasive surgeries. They allow doctors to perform inspection and treatment procedures inside the body using smaller surgical cuts or even without cuts while increasing surgical precision. EndoSemio's single-use endoscope developed on the foundation of miniature imaging devices and high biocompatibility tubing materials boosts surgical safety and improve patient experience.

Leveraging technological and medical strengths, EndoSemio overcomes the shortcomings of traditional endoscopes

Ting-Xuan Chen and Chih-Peng Lin co-founded EndoSemio. Chen worked for the Industrial Technology Research Institute (ITRI) in charge of helping medical research organizations turn clinical needs into products. Lin is an attending physician and director of Division of Pain Management, Department of Anesthesiology, National Taiwan University Hospital. Their decade-long partnership has brought multiple healthcare products into reality. Following his return to Taiwan after completing advanced study at Stanford University, Lin found Taiwan's healthcare sector still has needs that were not addressed due to the lack of cross-industry collaborations. This prompted Chen and Lin to establish EndoSemio, focusing on special-purpose single-use endoscopes to solve the many pain points of traditional endoscopes.

According to Chen, an endoscope reprocessing guide contains more than 150 steps. However, as high as 45% of the important cleaning steps are skipped as they are too complicated. Not only is reprocessing costly and labor intensive, improper cleaning can also lead to cross infections. All the time and efforts hinder patient flow and undermine hospital operation efficiency.

The slew of limitations with traditional endoscopes give rise to tremendous opportunities for single-use endoscopes. As opposed to traditional endoscopes with a long history, single-use endoscopes are still in early-stage development. Those currently available on the market generally target large usage applications, rather than special-purpose small-quantity needs. In view of this, EndoSemio decided to start with tracheostomy endoscopes, neonatal catheters and flexible ureteroscopes.

EndoSemio introduces three single-use endoscope products to meet clinical needs

According to Lin, a traditional tracheostomy requires two teams of medical professionals, one monitoring the bronchoscopy while the other performing the tracheostomy. Things could go wrong when surgeons have to perform tracheostomy without bronchoscopic images. Without an imaging system on the tracheal tube, surgeons can only rely on experience and feel their way through. Now with EndoSemio's innovative endoscope imaging tracheostomy kit, featuring the world's first tracheal tubes integrated with endoscopes, medical professionals can avoid complications and mitigate the risk of incorrect placement in false lumen, improving tracheostomy efficiency and ensuring patient safety. The product has won the 20th National Innovation Award.

Neonatal respiratory imaging devices are generally miniaturized. Their level of precision is critical to neonatal respiratory care. EndoSemio's neonatal and pediatric respiratory imaging catheters help physicians correctly identify delicate infant airways and examine the conditions therein to effectively lower the risks of hypoxia or complications. The flexible ureteroscopes that EndoSemio provides combines miniature imaging modules with tubes made of advanced materials to enable visibility. The solution reduces chances of infection and cross infection and therefore is an ideal choice for stone removal in a laser lithotripsy.

Lin pointed out EndoSemio's advantages in a few aspects. First, since EndoSemio's products are designed based on physicians' actual comments and feedback to ensure their needs are addressed, the resulting products feature user-friendly interface and require no learning curve to operate. Second, the EndoSemio engineering team has a decade-long experience developing endoscopes. Integrated with patented designs including medical-grade high-resolution miniature CMOS image sensors, color calibration and silicon endoscope tubing, EndoSemio's products boast superior performance and reliability. Last but not least, EndoSemio has grasped critical manufacturing know-how for miniature front-end camera modules and tubing so it has full control over its product quality and performance. It is also able to keep costs at bay through vertical integration efforts.

EndoSemio expects to obtain FDA approval by year-end 2024, allowing it to launch the products in 2025. Everything is proceeding according to schedule, noted Chen. For the smooth progress, EndoSemio gives credit to not only team efforts but also Taiwan's startup environment fostered by industry-government-academia-research collaborations. Going forward, EndoSemio has set goals for each development stage and will continue to endeavor on medical imaging solutions for special-purpose applications so as to help medical institutions create premium patient experience.

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Point Robotics MedTech

Point Robotics' Surgical Robot Enhances Spine Surgeries with Expanded Functionality

Targeting one of the most complex and sensitive parts of the human body, any minor error during the spinal surgery could lead to severe consequences such as infection, nerve damage, or spinal cord injury. This makes the spinal surgery a high-risk surgical procedure.

To overcome the challenges, Point Robotics MedTech has created a minimally invasive spine surgery robot platform combining medical expertise and state-of-the-art technologies such as robotic arms, optical positioning, and algorithms. The platform can help surgeons perform complex spinal surgeries with high precision while reducing risks.

Point Robotics' surgical robotics technology is inherited from a professor at Imperial College London with over 30 years of experience. The company was founded in 2016 with support from the National Science and Technology Council's Germination Program. The company aims to leverage the prowess of Taiwan's medical and mechanical industries to develop world-class spinal surgery robots.

Minimally invasive spine surgical robot with precision and reliability

According to Brad Lin, Point Robotics' Chief Marketing Officer, there are two main challenges in spine surgeries. The first is the increasing precision requirements of minimally invasive surgeries. Traditional surgeries rely on surgeons' experience and tactile sensation, but this approach has limitations particularly in tasks like bone grinding where achieving high precision is challenging. Moreover, surgeons performing spine surgeries over a long period are prone to wrist and eye fatigue which can adversely affect surgical quality and career longevity. The second challenge lies in the increasing expectation of patients regarding surgical outcome and post-operative recovery period. It has become an important mission for medical institutions to not only increase precision but also minimize incisions as well as recovery time.

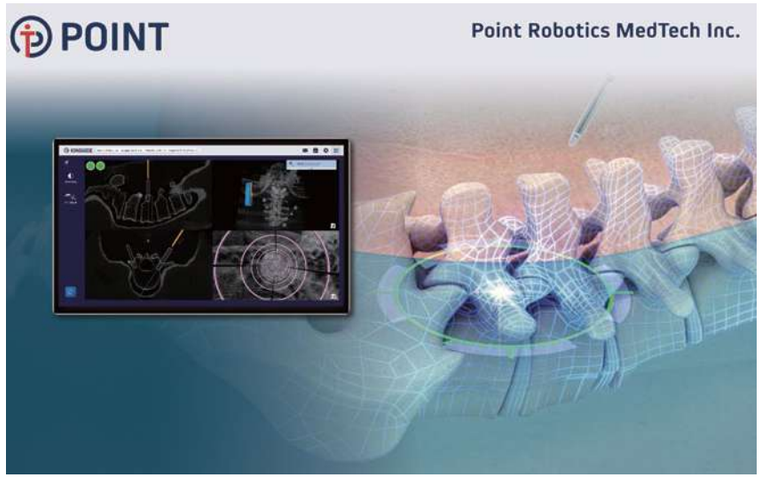
While technologies and equipment for spinal surgery have advanced rapidly, there is still room for improvement particularly in the realm of robotic surgery equipment. Existing systems are mostly focused on soft tissue surgeries with fewer applications for hard tissue surgeries. Point Robotics' minimally invasive spine surgery robot and navigation system are perfect for addressing clinical needs today.

Michael Lo, Point Robotics' Head of Corporate Strategy, explained the architecture of their product which integrates a six-motored robotic end-effector with navigation systems and control technology to combine precision and flexibility. The surgical robot uses a robotic end-effector to compensate for deviations from the planned path, enabling real-time tracking of patient movement during surgery.

With the ability to precisely control the robotic end-effector, the surgical robot can expand its functionality to decompression capabilities. The precision of bone grinding can reach paper-thin thickness. During surgery, the force feedback system detects changes in bone density and dynamically adjusts grinding force, depth, and path accordingly to ensure surgical precision and safety.

Point Robotics' detail-focused product development recognized by the industry

According to Michael, for a medical device to gain industry recognition and successfully commercialize, it needs to overcome countless technical challenges. Every prototype must undergo rigorous and lengthy clinical validation. Through continuous communication, Point Robotics' products have undergone iterative modifications to achieve the clinical benefits physicians expect.



Point Robotics' navigation system has been in clinical use since 2023. As of now, it has been utilized in 150 surgeries. The first-generation navigation system and robotic-assisted surgical system were cleared by the U.S. FDA and certificated by Taiwan FDA between 2022 and 2023. Going forward, the company will develop a decompression surgery robot capable of performing various functions such as bone grinding, assisting surgeons in conducting more spine surgeries and enhancing surgical efficiency.

According to Michael and Brad, the success of Point Robotics' technology in transforming concept to product is due not only to the full commitment of the team members but also to the progression of Taiwan startup ecosystem. For example, while Point Robotics was looking for clinical resources, BE Accelerator – a TTA accelerator partner, helped the company connect with suitable physicians, enabled product testing for user feedback, and more.

The invigorating startup atmosphere and policy support have also attracted many young Taiwanese entrepreneurs overseas to return home. These entrepreneurs bring back global perspectives and innovative thinking. When combined with Taiwan's technology, medical and manufacturing industries, a virtuous cycle begins. As Taiwan startup ecosystem further matures and becomes even more internationalized, Point Robotics looks forward to interacting and collaborating with other companies to expand Taiwan's influence on the global medical technology field.

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Pulxion Medical Technology

Pulxion Paves a Quick and Easy Way to Assess Stroke Risk

Cerebrovascular accident (CVA), or stroke, is the number one cause of disability and the second leading cause of death worldwide. Unfortunately, many individuals become aware of their condition only after experiencing a stroke, missing the optimal window for early intervention and treatment.

Carotid artery stenosis (CAS) has been identified as the key factor contributing to strokes. Therefore, early detection and treatment of CAS are vital measures for stroke prevention. However, traditional detection methods are limited by expensive equipment, heavy reliance on specialized medical personnel for operation and interpretation, lengthy testing procedures, and high costs.

Through collaboration with a team of professionals from National Taiwan University (NTU), Pulxion Medical Technology has developed a non-invasive, non-contact AI imaging technology for CAS rapid screening – PulStroke® which breaks through traditional testing limitations. With rapidity, standardization, and high cost-effectiveness features, the technology can significantly reduce the need for medical manpower and resources.

The limitations of traditional methods make early stroke detection challenging

Pulxion was founded in 2020 by Professor Hao-Ming Hsiao from the Department of Mechanical Engineering at NTU and co-founder Dr. Hsien-Li Kao, an NTU Medicine School professor who is also Chairman of Cardiology Division at National Taiwan University Hospital. The two professors have been collaborating since 2014 with the aim to address numerous challenges in early stroke detection.

With over 12 million new cases worldwide every year, it is estimated that by 2030, the global economic burden of stroke, including post-care, will exceed one trillion US dollars. Current common diagnostic methods for CAS include carotid artery ultrasound, computed tomography angiography (CTA), and magnetic resonance angiography (MRA). However, due to issues such as expensive equipment and operation complexity, it is challenging to widely implement early screening.

Unique screening method: rapid, accurate, and easy-to-use

The carotid artery is the closest blood vessel to the body's surface making its pulsation characteristics easier to observe. By analyzing subtle pulsation variations on the subject's skin surface, Pulxion's PulStroke® can differentiate between the pulsation patterns of normal individuals and those with CAS. The device projects visible light onto the subject's neck and performs the video motion analysis with AI algorithms to highlight skin surface pulsations. By comparing these pulsations with features associated with CAS, an assessment report is generated to evaluate the subject's risk. The entire process is completed within 1 minute with reports available within 5 minutes.

PulStroke® possesses several key advantages. First, compared to traditional methods like carotid artery ultrasound, CTA, and MRA, the technology is non-invasive and radiation-free. Second, the device's compact size and ease of use make it suitable for small to medium-sized clinics, health examination centers, and potentially community service centers or even homes in the future. Third, clinical trials have shown PulStroke® AI algorithms and big data analysis to have an accuracy of nearly 90%.

Joy Chen, CEO of Pulxion, said that PulStroke® includes both hardware device and cloud platform. The hardware device can be set up in medical facilities with buyout or leasing options while the cloud platform generated analysis reports which also come in various options are billed separately, bringing recurring revenue to the company.

In the initial stage, Pulxion will work with health examination centers and large hospitals with plans to participate in government disease prevention programs. The next step is to enter community clinics. Its end goal is to make the technology accessible to the general public, integrating it into home healthcare and nationwide health services to increase screening rates and ultimately reduce stroke incidence.

Pulxion has completed its angel round funding and plans to sign MOU with internationally renowned medical device companies this year. The company also intends to file the medical device regulatory submission to the Taiwan FDA this year and is preparing to apply for the Breakthrough Devices Program of the U.S. FDA.

Professor Hsiao, founder of Pulxion, believes that the key driving force behind the successful commercialization of Pulxion technology is the Startup Value Creation Program promoted by the National Science and Technology Council. He mentioned how the program activates the value of academic research by providing resources, regulatory ease, and policy support which enable professors to play significant roles in startups. It also encourages various forms of innovation matchmaking; the acceleration program of Mosaic Venture Lab which Pulxion participated in, for example, has given the company valuable opportunities to interact with investors as well as increased visibility in the market. The company hopes to broaden the applications of its technology to other diseases, creating a healthy society in the future and fulfilling its vision of preventive medicine and home healthcare.

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baby baby cool

Combining Organic Cotton and Chic Style, baby baby cool Successfully Expands into Japan

According to market research reports, the global organic cotton children's apparel market is set to grow at a CAGR of 9.4% from US$4.4 billion in 2022 to US$8.8 billion in 2030. For its outstanding quality, Taiwan-based fashion startup baby baby cool's products are carried in French department store Printemps. It is also the only local brand available at Bellavita Shopping Center, a high-end department store in Taiwan. Better yet, it has signed agreements with Japan's Hankyu Department Store and Isetan Department Store to sell its apparel in their stores starting Q2 of 2024.

Erin Wei, founder and director of baby baby cool (bbc), remarked that she established the company with a goal to help children develop a sense of taste and style at a young age by providing chic fashion as opposed to common kids' wear with cartoon illustrations on the market. When selecting fabrics with manufacturers, Erin found most fabrics are produced using chemicals which children could absorb through their skin, harming not only their heath but also the environment. Erin hence decided to use organic cotton to make safe and stylish fashion for children.

Premium organic cotton combined with fashion design and craftsmanship

Founded in 2016 on the core concept of love and aesthetics, bbc aims to foster children's sense of taste and style through fashion design while safeguarding their health starting with the clothes they wear every day. The company insists on using GOTS certified premium organic cotton and proven non-toxic metal accessories to produce pure, soft and comfortable clothes that children can feel confidently wearing.

Applying the techniques and craftsmanship used for adult fashion to design children's wear featuring originality, the bbc team comprises professional stylists, prominent fashion designers, skilled pattern makers and experienced seamstresses that work together to produce clothing entirely in-house. Making use of proportions, structures, cuttings, simple yet vivid colors and patching techniques to create interesting and innovative aesthetics, the team makes children's clothing featuring sleek lines, chic style and simple colors.

Erin noted that there are kids' fashion brands that highlight the use of organic cotton but they often lack design elements. Despite being a startup, bbc uses special 3D tailoring generally used only for luxury fashion to deliver a more three-dimensional look through cutting, folding, shrinking, grabbing and pinning techniques. Although everything about 3D tailoring is more costly and challenging from design to manufacturing, it makes clothes that better fit the body contour and structure. This is why bbc is enthusiastically embraced by the market.

Leveraging TTA's diverse services, bbc forays into worldwide markets

After a bbc store opened at Bellavita in Taipei in 2017 and at Printemps in France in 2018, it began to expand into other markets including Hong Kong and China in 2019. However, after COVID-19 hit, bbc shifted its focus back home and started to make efforts toward e-commerce and other channels. After it was introduced to Sparklabs Taiwan, a TTA accelerator partner, it received guidance that significantly helped it improve operation efficiency and rethink its management and marketing strategies.

According to Erin, it took a while to get in touch with Bellavita but bbc was able to prove that its product quality is on par with that of hundred-year-old brands. From the first presentation to the final product introduction conducted in a way similar to museum exhibits, bbc successfully convinced Bellavita to carry its brand. This helped considerably in bbc's subsequent business development.

The startup faced the same challenge in 2023 again when it engaged in talks with Japan's Hankyu Department Store and Isetan Department Store. Erin was happy to win recognition from the two Japanese department stores. The availability of bbc clothes at their stores will allow more visibility on Taiwan-based brands.

Undertaking all-out efforts toward international expansion starting this year, aside from Japan, bbc will shift focus back to France again in 2025. As part of the efforts, it will more actively participate in TTA's events in hopes of leveraging TTA's global visibility and network to find more partners and investors that will enable Taiwan-based brands like bbc to keep shining on the global stage.

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Kabob Cloud

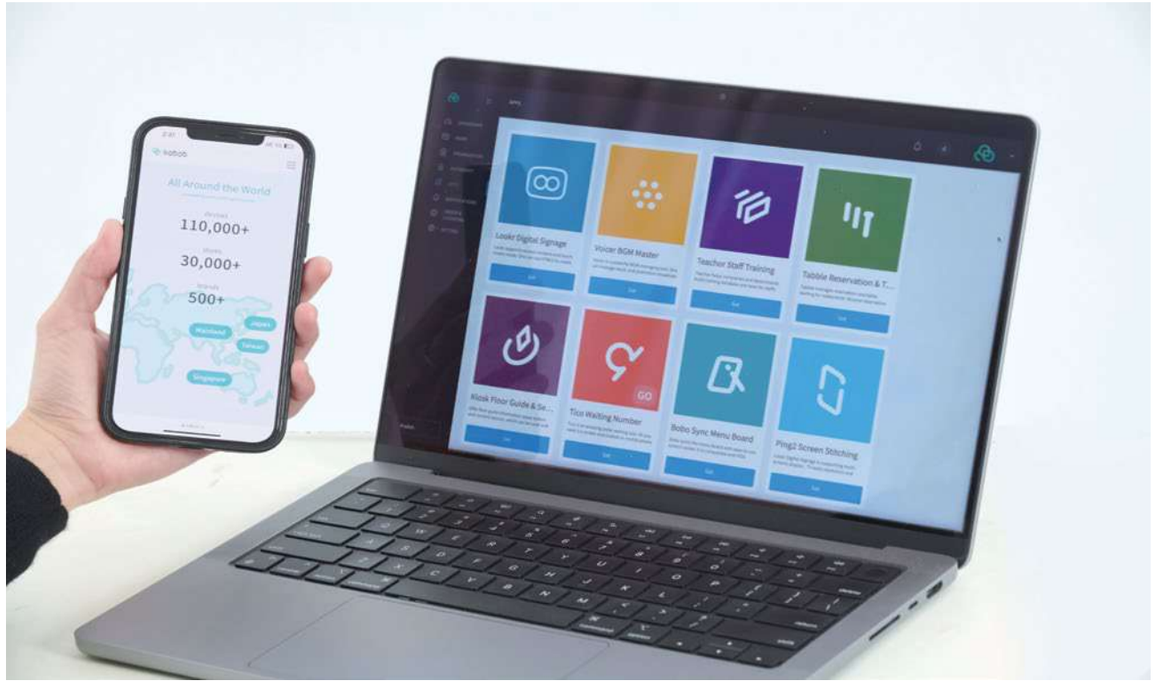
Kabob Cloud's All-in-One Management Solution Earns Acclaim from 500 Global Retail and Food Brands

The advent of burgeoning public cloud services has not only revolutionized personal digital experiences but has also significantly enhanced operational efficiencies and reduced management costs for corporations worldwide. Traditionally, retail and food franchises faced substantial expenditures on diverse devices and IT infrastructure optimization to oversee branch operations and devise unified marketing strategies. This often entailed establishing a central management platform in home office data centers, necessitating costly periodic visits by IT engineers—an expense beyond the means of many small and medium-scale retail chains.

Founder and CEO of Kabob Cloud, Steve Tsai, emphasizes the proliferation of digital signage, kiosks, and smart devices over the past decade. An increasing number of retailers are leveraging these tools to streamline branch operations and minimize management expenses. Today, retail and food franchises can install Android TVs at their branch stores, enabling managers to oversee operations and gather data via public cloud platforms, thereby obviating the need for costly traditional systems. This innovation not only slashes management costs but also empowers franchise operators to swiftly adapt to market changes through diverse marketing campaigns, facilitating the growth of small and medium-scale franchises.

Having established a robust presence in Taiwan, Kabob Cloud has successfully expanded its operations into Asia and North America. Anticipating the trend towards smaller displays and the rising popularity of Android TVs equipped with versatile apps, Kabob Cloud, founded in 2016, developed a suite of management tools tailored for food chains and retail brands. With enthusiastic reception in Asian markets, including China, Japan, and Singapore, Kabob Cloud has recently established branch offices in North America, and partnered with distributors in Korea and Australia to further expand its footprint.

To cater to evolving market demands, Kabob Cloud offers



a comprehensive suite of 20 diverse service apps, including digital signage management (Lookr), audio management (Voicer), advertisement integration (Adder), omnichannel content marketing (Fafa), queue management (Tico), staff training (Teachor), and floor guidance (Kiosk). Business owners can seamlessly deploy these service apps onto various devices at their stores via Kabob Cloud's platform, which boasts an intuitive management interface and hassle-free configuration. As a result, Kabob Cloud's solutions have garnered adoption by over 500 franchise brands, including industry giants such as McDonald's, SEPHORA, Burger King, MeetFresh, and Ganso, spanning over 110,000 connected devices across 30,000 stores.

Steve highlights that while Kabob Cloud initially targeted food and retail chains, its smart remote management and facial recognition solutions are also suitable for AIoT applications. Consequently, these solutions find applications in diverse sectors, including manufacturing, real estate, and telecommunications. Kabob Cloud's participation in CES 2023, led by TTA, proved instrumental in bolstering its presence in North American markets, attracting significant attention from industry professionals and generating numerous inquiries.

With subscription-based services becoming increasingly prevalent, Kabob Cloud recognizes the proliferation of similar offerings in the market. However, unlike many solution providers offering bundled software and hardware packages, Kabob Cloud's solutions seamlessly operate across various devices and brands used at franchise stores, supporting multiple platforms such as Android, Linux, Windows, and iOS. This flexibility allows business owners to choose devices based on their preferences, budgets, and store characteristics, while managing and maintaining all devices effortlessly via a centralized platform, thereby maximizing operational efficiency.

In response to intensifying market competition and evolving application scenarios, Kabob Cloud is committed to ongoing app development and collaboration with third-party software developers to expand its offerings. By establishing a software marketplace, Kabob Cloud aims to foster mutually beneficial partnerships with customers and partners, ensuring its continued leadership in the industry.

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Millilab

Millilab Eyes the Global Smart Vehicle Sensor Opportunities with its Proprietary Algorithm

Passive infrared (PIR) sensors have been around for years and are widely used in various devices including smart lamps, automotive radar and monitoring systems. However, PIR sensors' lower sensitivity and smaller range limit the capability of the smart devices that use them.

According to Millilab's founder and CEO - Bibben Lin, mmWaves are shorter in wavelengths. Sensors based on mmWave radar technology provide higher resolution and accuracy so they are embraced by smart cars with high safety standards. The mmWave radar chips used to be expensive, but when Texas Instruments (TI) introduced low-cost chips, it spurred a rapid increase of adoptions in non-automotive applications. Today, almost all mid-range and high-end monitoring systems use mmWave radar sensors.

Recognized by Japan-based Socionext, Millilab targets the global market with technological strength

Eyeing mmWave radar sensors' high accuracy and high resolution characteristics and the opportunities arising from decreasing costs, Bibben with abundant experiences in developing communication devices decided to found Millilab with his business partners in 2019. Millilab's mmWave radar solutions are being used in monitoring systems for infants and seniors, child presence detection (CPD) systems and driver monitoring systems (DMS).

When the company was first founded, the Millilab team focused on developing algorithms based on TI mmWave radar sensors. Millilab soon caught the attention of Socionext, a Japan-based mmWave radar chip supplier. Each boasting unique technologies in their own field, the two companies decided to join forces and have together developed total solutions and designs for a diverse application. Millilab has become one of the most trusted partners of Socionext and now independently develops algorithms based on Socionext chips. It is also the company that many global brands turn to for mmWave radar solutions.

Bibben noted that during the company's early development, almost every monitoring system was based on the PIR technology. And this presented tremendous opportunities for Millilab. The company was able to secure a deal with Europe's largest car seat brand Maxi-Cosi to jointly develop a crib (baby) monitoring system. The result impressed Maxi-Cosi and more importantly gave Millilab global visibility.

Millilab and partners expand into the smart cockpit market with authorities mandating CPD starting 2025

With the assistance from TTA and flyingVest Ventures, Millilab attended CES in 2023 and 2024 as well as London Tech Week in the U.K. and VivaTech in France. The participation at these events helped Millilab reach customers from different corners of the world resulting in partnerships with, for example, a Europe-based automatic door manufacturer and multiple Asia-based corporations. These projects significantly fueled Millilab's revenue growth. Having also raised NT$50 million in March 2024, the company aims to capture the immense opportunities in the global smart vehicle market.

Going forward, Millilab will undertake a three-way strategy, said Bibben. First, it will continue to attend tech exhibitions and work with TTA and flyingVest Ventures to increase its global visibility. Second, in an effort to win more customers across different sectors, Millilab plans to implement the algorithm developed for Socionext chips on TI chips, ensuring the same level of performance and reliability. Last, the EU mandating CPD starting 2025 is set to spur the demand for CPD systems so Millilab will work with partners to capture preemptive opportunities in this market segment.

On average, about 40 children die each year in Europe after being left alone in a car. To address this problem, Euro NCAP will award safety rating points for CPD in new passenger vehicle designs from 2025 onwards. In response, manufacturers are actively developing smart cockpit solutions. This presents a great opportunity for Millilab to penetrate the market segment. It plans to introduce a standard smart cockpit solution in April 2024 for automakers' PoC testing, followed by customized designs according to their requirements. Millilab expects this to contribute to strong revenue growth in the coming years.

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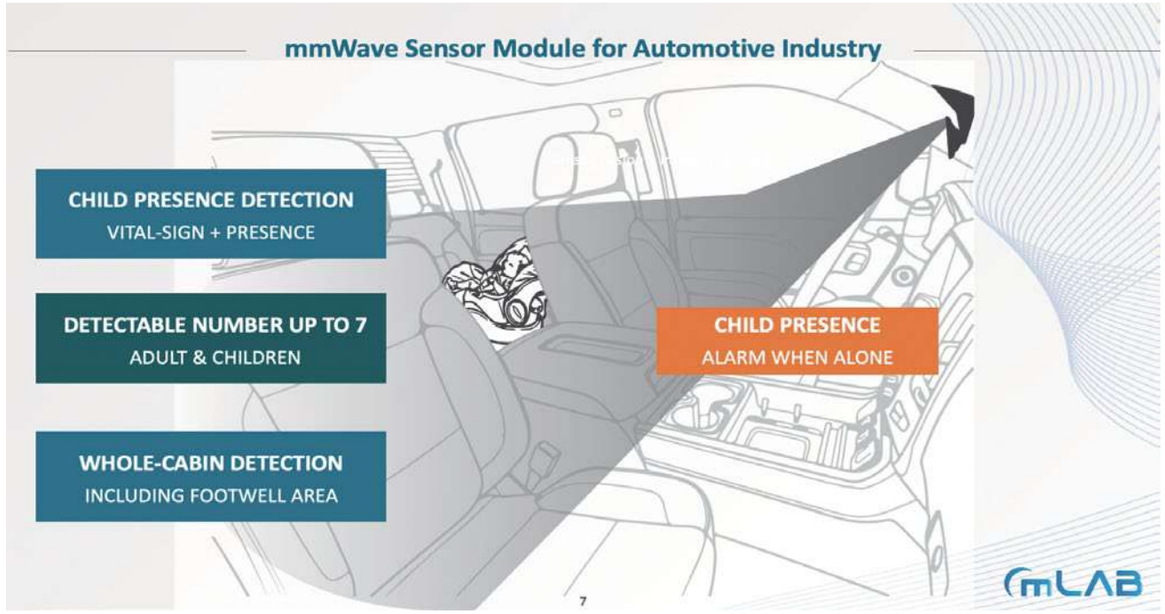
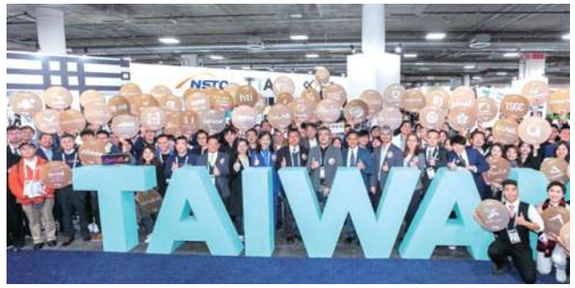


TAIWAN TECH ARENA Event Summary
From Jan. - Apr. 2024

TTA Pavilion Showcased 96 Taiwan Startups at CES 2024, January 9 – 12!

For the 7th year, TTA led Taiwan startups to seize global market opportunities at CES, the most powerful tech event in the world. This year, 96 Taiwan startups showcased their innovation at TTA Pavilion under 6 key verticals including AI / Robotics, Digital Health, Smart Home, Smart Cities & Sustainability, Sport Tech, and Vehicle Tech & Advanced Mobility.

Two TTA alumni won the prestigious CES Innovation Award this year! FaceHeart Corporation was named a CES 2024 Innovation Awards Honoree in the digital health category, while TSGC Technologies was named an honoree for its comprehensive PV Panel Recycling Solution.



TTA Talk at NTHU: Stay Hungry, Stay Foolish!

TTA TALK has been inspiring university students since 2021. On April 1, TTA invited Freeza Huang, a distinguished alumnus of National Tsing Hua University (NTHU) and the cofounder of Accupass to share the extraordinary experience from his entrepreneurial journey. Also invited was Min-Chu Hu, a professor at NTHU Department of Computer Science and the Chief Technology Consultant of NeuinX, who shared her valuable insights on entrepreneurship from an academic perspective. As a special bonus, John Sie, the founder of Accupass joined the talk as well! What all the speakers shared reminded us how we should always stay hungry, stay foolish and that entrepreneurship is a path worth pursuing at least once in our lives.

Lunar New Year Greetings at TTA

On Feb 19, NSTC Minister Tsung-Tsong Wu came to TTA to pay Lunar New Year greetings to resident accelerators and startups. Minister Wu gave words of encouragement to all as he gave out lucky red envelopes for the Year of the Dragon and wished everyone a prosperous year and successful career.

Lantern Festival Community Event at TTA South

TTA South invited its resident entrepreneurs for a special get together to celebrate the Lantern Festival on February 26 by hand making yummy sweet dumplings! Andrea Hsu, Director General of NSTC, also joined the event to applaud everyone for their hard work which resulted in a fruitful year and wish all a continued success in 2024! The event wrapped up with a networking session, and everyone went home with a smile, a full tummy and a lucky red envelope.

Young Women in Tech Bootcamp 2024

WEpreneur's Young Women in Tech Bootcamp 2024 kicked off on March 7. Exceptional female entrepreneurs collaborated, learned, and witnessed the fusion of creativity and intellect over the 3-day bootcamp which concluded with Women in Tech Forum where 17 inspiring women came together to discuss various topics. Together, they paved the way for a brighter, more inclusive tech landscape!

TTA x Viva Technology 2024

TTA heads to Viva Technology in Paris with 40+ Taiwan startups in chip innovation, sports tech, digital health, sustainability, and more! Viva Technology: 2024 Edition, held on 22 – 25 May, is Europe's biggest startup and tech event where leading entrepreneurs, investors, executives, and media from 174 countries come together for 4 days of business acceleration, networking, and inspiration!

Earth Day for Sweden + Taiwan

On April 19, TTA and the Swedish Chamber of Commerce Taipei (SCCT) commemorated Earth Day by cohosting a B2B matchmaking event for companies advancing in sustainability. Nine SCCT corporate members including Ericsson, IKEA, Atlas Copco and more delivered short presentations about their company's sustainability solutions with the goal to identify the type of partners they're looking to work with to scale up the impact and help Taiwan reach its carbon reduction goals.

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