VOLUME 13 - SUMMER 2022

SILICON STARTUP SOLUTIONS

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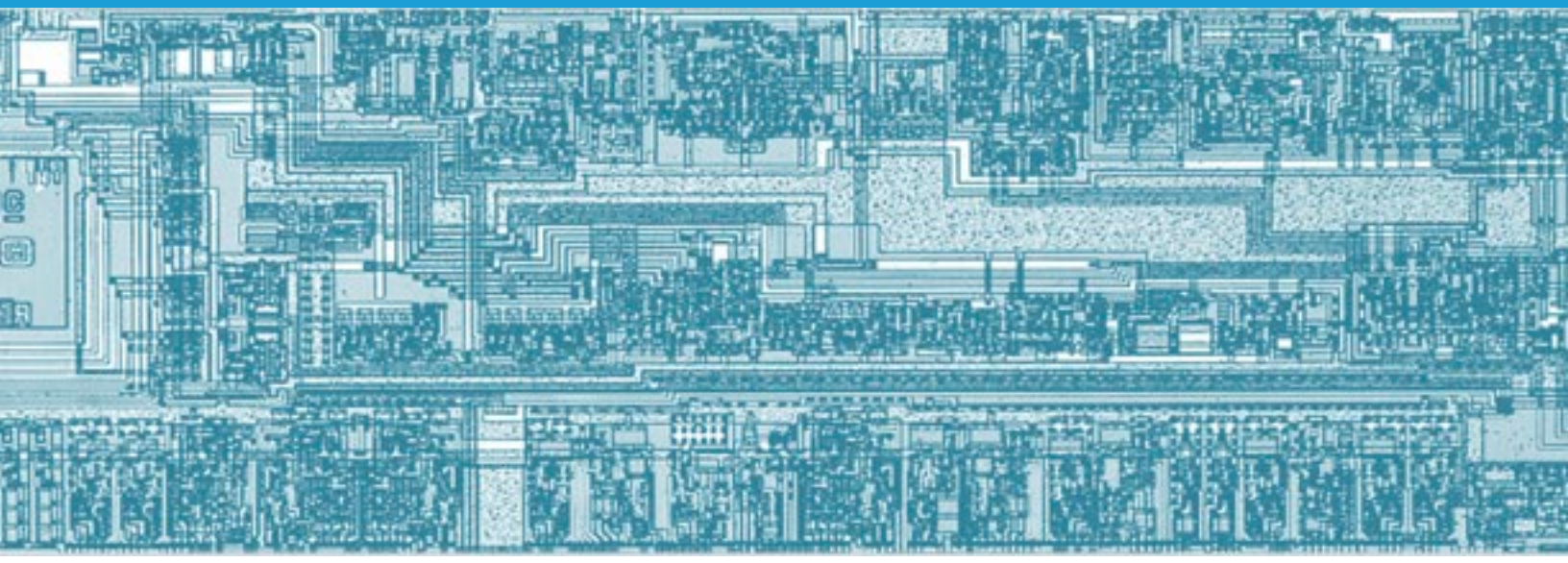
A SILICON CATALYST JOURNAL

A VALUABLE RESOURCE FOR THE SEMICONDUCTOR STARTUP COMMUNITY



www.siliconcatalyst.com

VOLUME 13

IN THIS ISSUE

Dr. Jalal Bagherli
SiliconCatalyst.UK Advisor

Interview

Lance Bell - Partner / Publisher

The Value of an Idea

Some eight plus years ago, Silicon Catalyst was merely an idea. The brainchild of founders, Rick Lazansky, Dan Armbrust and Mike Noonen, they collectively identified a pain point and sought to cure it. At issue was understanding why the deal makers on Sand Hill Road had more or less lost their appetite for investing in semiconductor startups. With the desire to put the silicon back in Silicon Valley, they concluded that what was missing were 4 fundamental elements. #1. An incubator comprised of seasoned semiconductor veterans with a passion for startups, a wealth of knowledge and experience, a desire to give back and the wherewithal to focus on outcome not income. #2. A vibrant ecosystem of in-kind partners to offer free or discounted services along with Strategic Partners in search of their next customer. #3. A group of world class advisors interested in making a difference to enable next generation semiconductor startup solutions, aided by their previous mistakes and triumphs. #4 Access to Capital. The net-net of this is to de-risk the equation for both Startup and Investor alike.

The Silicon Catalyst launch event in April of 2015, billed as The Silicon Sunrise, validated the founders vision that a new model was necessary. The near 900 people in attendance at the Avaya soccer stadium that day still talk about and reminisce about the event as though they were remembering seeing Hendricks at Woodstock. Having attended Woodstock at age 10 with my older brother, I can tell you that The Silicon Sunrise Event *was* the Woodstock for semiconductor startups Rick, Dan and Mike's audacity and insights did not go unnoticed, as **Silicon Catalyst was named Startup Company of the Year in 2015**.

The following is a story I have told on many an occasion so spare me if I bore you. Co-Founder Dan Armbrust and I were invited to Singapore in October of 2015. He was a panelist at their SSIA Event. When asked, 'what would you see if presented with a crystal ball to identify what kind of startup would be most likely to succeed?' Dan, with his signature Steve McQueen cool, simply said, 'I would see a crystal ball'. How prescient was that? The over 600 startup applications we've reviewed and the 44 startups we've admitted reveal the wisdom of his statement. From San Francisco to Singapore, from Korea to Canada, our Portfolio Companies are emergent leaders in 5G, AI, Biotech, Energy Harvesting, Thermal Imaging, Memory, Photonics, AR, Edge Computing, and much more. I am happy to announce our first exit to a FAANG company. And as you read on, you will learn that in the past month, Ayar Labs closed on a $130M Series C, Eridan on a $46M Series B, SigmaSense on a $45M Series B, Quadric on a $21M Series B, Alpha ICs on an $8M Series B, Owl on a $15M Series A, Salience Labs on $11.5 M in a Seed Round, and Llantos on a Seed Round. This post-money funding has our Startup Portfolio a few nanometers shy of $1.5B. As we said in a recent ad in the Times of London, against the backdrop of geopolitical tensions, global supply chain challenges and a likely recession on the horizon, let it be known that 'When the Chips are Down, The World Turns to Startups.'

We've come a long way, Baby.

Pete Rodriguez - CEO
Silicon Catalyst

WELCOME

IT TRULY IS "ABOUT WHAT'S NEXT"

As Silicon Catalyst starts its 8th year of operation, I look back at when I joined in late 2017 and have just completed my fourth year as CEO. It has been a lot of fun and very personally rewarding.

I like to joke that we are doing God's work in the semiconductor industry, but in reality, to a great extent we are! There are startups we have helped a bit; some we have helped a lot and some that would not have gotten out of the university halls nor be vying for greatness, ramping production and negotiating with TSMC for thousands of wafers.

I am pleased to announce that the collective market cap of our portfolio companies is fast approaching

$1.5B

based on recent post-money fundings!

Every startup that does not make it or does not reach their potential causes us sadness, we often dig into our own pockets to keep them going. Our partners have been amazing on this journey.

I could spend several pages on the explosive ecosystem growth we have seen in the past four years.

A 400% increase in strategic partners, 300% in In-Kind Partners, 500% in world-class advisors, 1000% increase in the number of investors and most importantly a 500% increase in the number of portfolio companies! We should end 2022 at ~97 startups Worldwide.

Internationally we have grown first to China, then Israel and most recently the UK. We are considering expansion to several additional locations. To put our global reach into perspective, we recently announced the acceptance of:

6 new startups into our Portfolio which hail from 6 different countries from around the globe.

The Angel group has been a huge success with a dozen investments and welcome syndication with leading investment groups. The results are 7-8 figure checks and a lot of expert guidance.

Our university program will connect 50 universities worldwide this year.

We have four major regional accelerators as partners, work with several others and will continue to expand relationships that benefit our portfolio companies.

Our industry partnerships continue and to a great extent we are the startup arm of the GSA, SIA and SEMI. We enjoy great support from their leadership.

In the early days we went to potential partners and nearly begged for assistance, today we have public companies reaching out and wanting to join our ever-expanding ecosystem.

It was a humbling experience when earlier this year, I was asked to join the semiconductor working group of the President's Council of Advisors in Science and Technology **(PCAST)** led by Lisa Su and Bill Dally. The eleven of us have worked really hard to provide an actionable set of recommendations to improve the U.S. semiconductor industry. While we expect to continue Silicon Catalyst's success driven growth, I really wish the U.S. government would figure this out as they could further accelerate our progress. In a little over 3 years, our joint ventures in China have received nearly $20M in government aid, in 8 years we are still looking for a penny in the U.S.

Finally, my heartfelt thanks to the Silicon Catalyst teams worldwide who are helping startups each day.

Best to you and yours, thanks to all of you for your support and contributions.

Portfolio Companies

CURRENT

cellsemi
KURA
Siloxit
Lemurian Labs
RAAAM — The Highest Density On-Chip Memory in Standard CMOS
Aplife BIOTECH
NanoHydroChem — Energy Storage Solutions
PHINOMICS
ALPHA ICs — ADVANCING AI COMPUTE
Lelantos
oculi
SALIENCE LABS
SONICAL
MultiFractal SEMICONDUCTORS
MMTRON — MOST INNOVATIVE MMWAVE PRODUCTS
MEMTECH
beam
SigmaSense
Smarter EH PMICs — Trameto
quadric
ESPRE TECHNOLOGIES
MENTIUM TECHNOLOGIES
GEEGAH

SILICON CATALYST NEWS
SONY SEMICONDUCTOR SOLUTIONS

Sony Semiconductor Solutions

Silicon Catalyst Partners with Sony Semiconductor Solutions to Accelerate Semiconductor Startups

Silicon Valley, CA November 29, 2021

Partnership will focus on innovations beyond image sensors

Silicon Catalyst, the world's only incubator focused exclusively on accelerating solutions in silicon, announces that Sony Semiconductor Solutions Corporation ("Sony"), the global leader in image sensors, has become its ninth Strategic Partner. The partnership will expand Sony's access to new innovations in sensing solutions development and facilitate Sony's ability to create strategic relationships with pioneering young companies that are developing technologies complementary to Sony's internal innovation. In addition, the partnership further strengthens Silicon Catalyst's leading role in helping new semiconductor companies address the challenges in moving from idea to realization.

"Sony is always open to collaborating with outstanding entrepreneurs, young technology companies and industry experts. This partnership is another example of our approach," said Yasuhiro Kono, Corporate Executive, CFO of Sony Semiconductor Solutions Corporation. "We look forward to working with Silicon Catalyst's community, and through this partnership establishing better and more open strategies in the design and development of next generation sensing platforms."

Silicon Catalyst has created a unique ecosystem to provide critical support to semiconductor hardware startups as they move from idea through prototype to initial product. In its seventh year of operation, Silicon Catalyst has reviewed over 400 early-stage companies and has admitted 48 startups into the incubator. These Portfolio Companies have access to tools and services from a comprehensive network of In-Kind Partners (IKPs) -- including design tools, simulation software, design services, foundry PDK access and MPW runs, test program development and tester access -- that dramatically reduce the cost of chip development. Additionally, the startups tap into the world-class Silicon Catalyst network of advisors and investors.

"Sony Semiconductor Solutions is the world's leading image sensor company, and we are delighted to have them join the Silicon Catalyst ecosystem as our first Asian Strategic Partner," said Nick Kepler, COO of Silicon Catalyst. "Sony has developed and deployed many generations of technical invention in image sensors, and we are excited to explore the next generations with them as image sensors evolve to include memory and AI while supporting always-on systems that bring greater convenience and possibilities to our world. Our partnership connects Sony with Silicon Catalyst's curated portfolio of some of the most interesting semiconductor hardware startups; it also makes Sony more accessible to these startups, which reap tremendous benefits from deep, long-term engagements with industry leaders like Sony who can provide guidance and relationships with experts."

Device business by the Sony Semiconductor Solutions Group is focused on image sensors, and includes a variety of other parts including microdisplays, LSIs, and laser diodes. In image sensors, where we command the top share of the global market, mobile applications are central, with growth expected in new areas such as automotive cameras, security cameras, and factory automation. One use of image sensors is in viewing applications for conventional digital cameras or mobile devices, where they make devices more convenient or enjoyable for individual users. Another use is in recognition, where they bring greater convenience, safety, and security to society. We have positioned this use in sensing as our next pillar of growth, and our long-term vision calls on us to fulfill essential roles in society as a leader in this field. To date, the Sony Semiconductor Solutions Group has created new markets for image sensors through innovation, and looking ahead, we will continue to take on challenges for further growth. www.sony-semicon.co.jp/e/

STRATEGIC ECOSYSTEM PARTNER

PROFILE

Sony Semiconductor Solutions

In November 2021 Sony Semiconductor Solutions (SSS) joined the Silicon Catalyst ecosystem as a Strategic Partner. Today, we would like to explain our business environment and strategic direction within this journal. Also, we are sharing our corporate slogan that we have established this year to help our stakeholders understand the SSS Group's goals and business activities. We hope to deliver our message to partners whom cooperate and co-create our goals.

OUR MARKET POSITION AND DIRECTION

Sony Semiconductor Solutions Corporation is a wholly owned subsidiary of Sony Group Corporation and the global leader in image sensors. In FY21, SSS had image sensor sales of 947.3 billion yen and 43%* value share of the market. We divide our business domain into three areas, "Mobile Imaging", "Sensing", and "AV". As to mobile imaging, we believe that it will continue to account for the majority even in 2030. In terms of sensing, the ADAS area in automotive is expected to expand. The market for industrial applications is growing due to continued labor savings and automation needs. On top of these areas, we expect market growth within our solution business, which we are currently working on.

We strive to continue to maintain our No.1 position in the share for the worldwide CMOS image sensor market and provide advanced imaging technologies that bring greater convenience and joy to people's lives. We also work to develop and bring to market new kinds of sensing technologies with the aim of offering various solutions that will take the visual and recognition capabilities of both human and machines to greater heights.

MOBILE IMAGING INITIATIVES

In mobile imaging, image sensors for high-end smartphones are expected to grow significantly through 2030. When it comes to high-end models, smartphone makers continue to position cameras as an important differentiating factor and are pursuing high-performance camera systems. Smartphone makers who have their own Application Processors are doing this, so too are makers who utilize general-purpose Application Processors. They are trying to realize a new imaging experience by developing their own Image Signal Processors. What is required here is large pixels and large-sized image sensors. We will continue to focus the most on high-end models and develop high-value-added image sensors that contribute to high image quality and multi-functionality. As one of the technological developments for high added value, we announced the world's first pixel structure called stacked CMOS image sensor technology with 2-Layer Transistor Pixel.

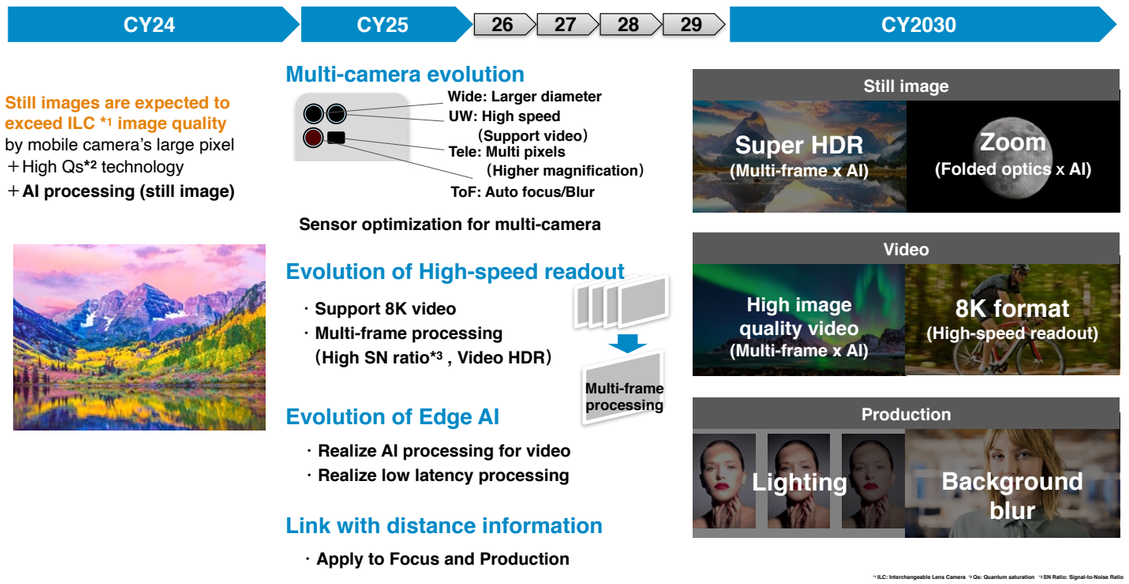
https://www.sony-semicon.co.jp/e/news/2021/2021121601.html

Based on the technological development we have underway and looking to 2030, we think that technological evolution will progress on the axes of still images, videos, and production. In the still images space, super HDR and zoom functions can be realized, and for video, high image quality and high-speed reading at 8K can be realized. Furthermore, it is expected that production functionality, like getting directions on how to take a good picture, will evolve.

Evolution of multi-camera systems, evolution of high-speed readout, evolution of Edge AI, and coordination of distance information with production are all possibilities. As such, mobile imaging remains a technology driver and an area with great room for technological evolution.

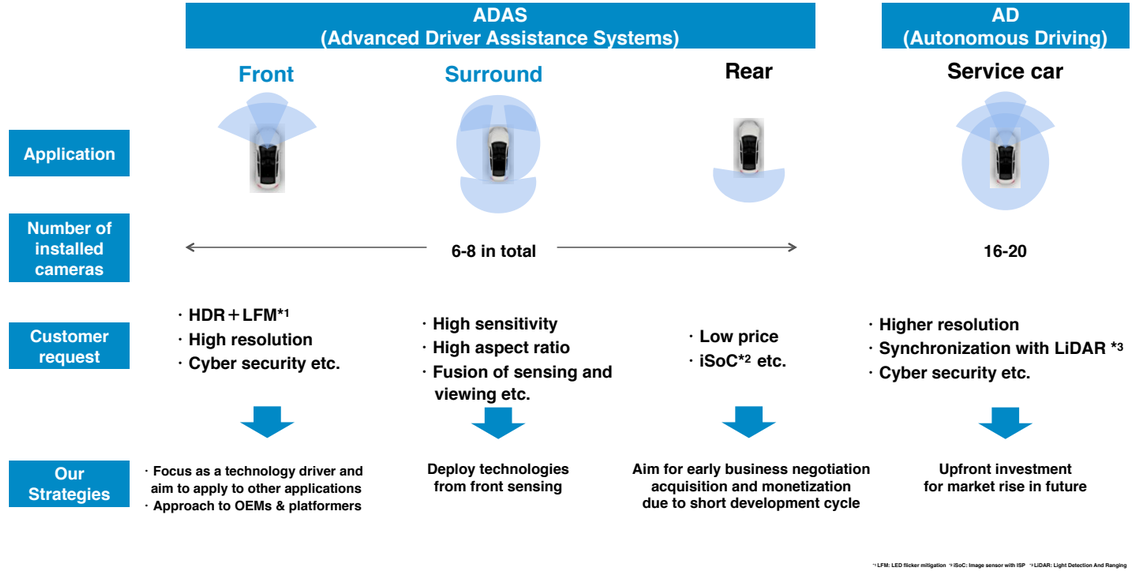
*Source Sony

DIRECTION OF MOBILE IMAGING TECHNOLOGICAL EVOLUTION



*1 ILC: Interchangeable Lens Camera *2 Qs: Quantum saturation *3 SN Ratio: Signal-to-Noise Ratio

DIRECTION OF AUTOMOTIVE AREA



*1 LFM: LED flicker mitigation *2 iSoC: Image sensor with ISP *3 LiDAR: Light Detection And Ranging

SENSING INITIATIVES

Next is the sensing area. In the future, we believe that the era of the “Sensing Society” will come with sensing technology and become an important foundation of society as a whole. The potential of the image sensor, which captures a lot of information, is particularly large. Here we would like to explain more on the automotive, industry, and solutions areas.

AUTOMOTIVE AREA

First is the automotive area. In automotive cameras, there are two major areas, ADAS and Autonomous Driving. The ADAS area is further divided into three areas: front, surround, and rear. By focusing on the front, we will build a competitive advantage and leverage that advantage in other applications. Surround is also an important area where we aim to win business in this area by leveraging the technology we will develop in the frontal area. In terms of product other than the CMOS image sensor, we have developed and announced a stacked single-photon avalanche diode (SPAD) depth sensor for automotive LiDAR. By employing SPAD pixels as the detector in a direct Time-of-Flight (dToF) sensor, it is possible to accomplish long-distance, high-precision distance measuring.

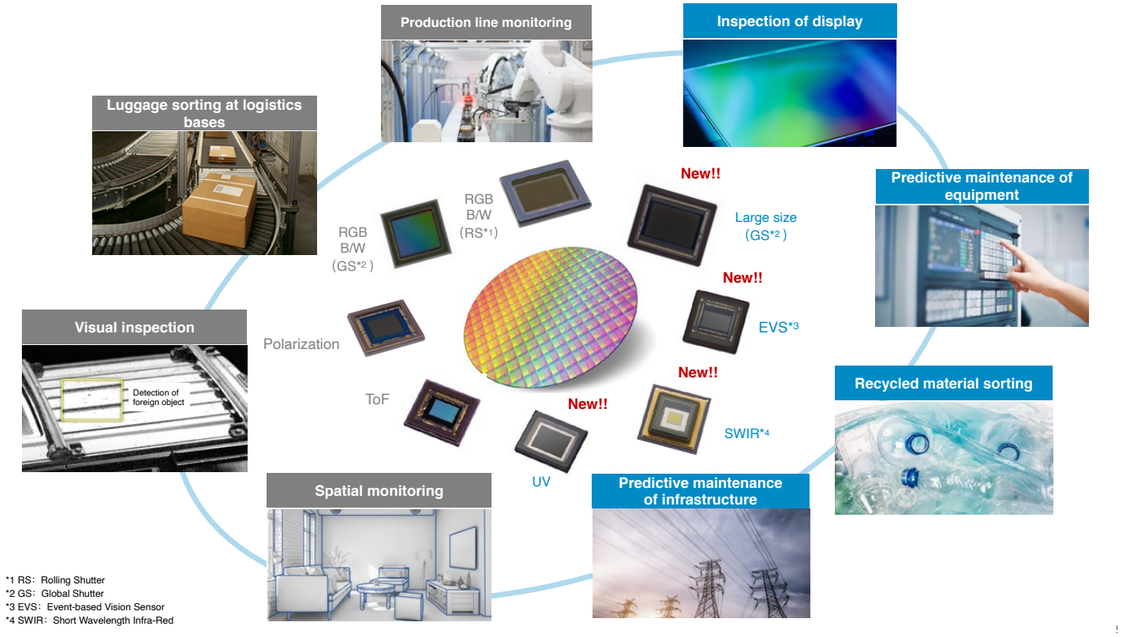
https://www.sony-semicon.co.jp/e/products/IS/automotive/technology.html

INDUSTRY AREA

In the industry area, in addition to global shutters, polarization, and Time-of-Flight, mainly for factory automation, we have released many sensors, such as large format image sensors with global shutter, event-based vision sensors, SWIR sensors, and UV sensors. We believe that these diverse sensor models are our greatest strength.

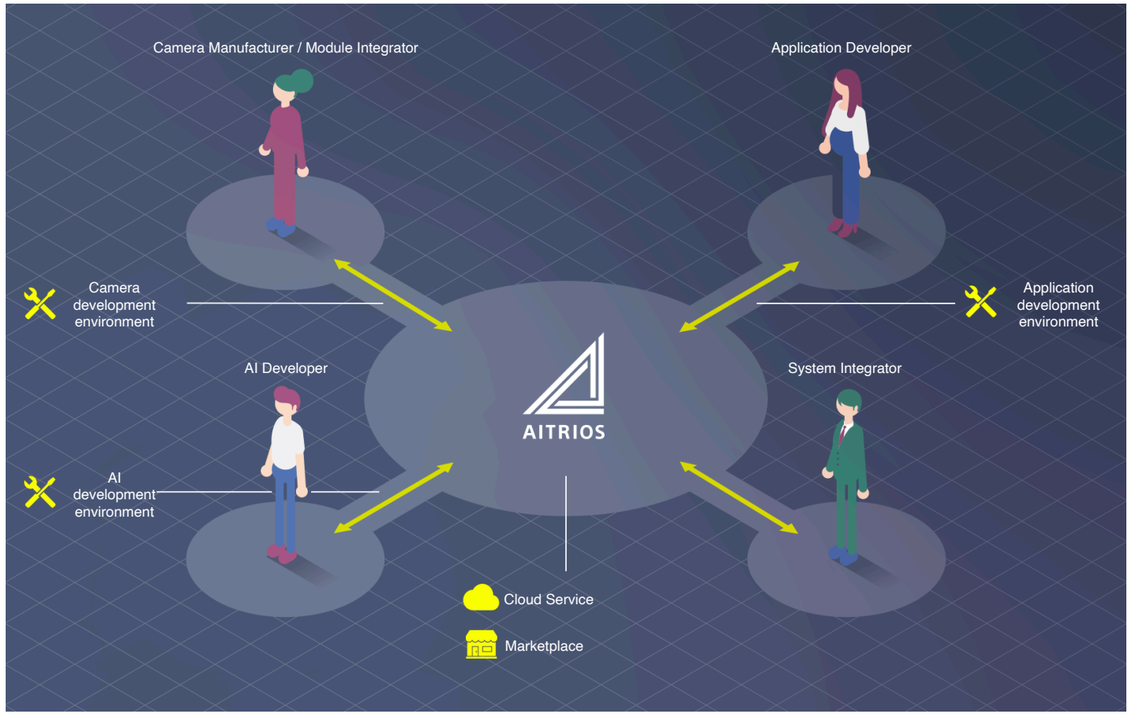
https://www.sony-semicon.co.jp/e/products/IS/industry/

INDUSTRIAL APPLICATIONS



SILICON STARTUP SOLUTIONS

SOLUTION BUSINESS



SOLUTION BUSINESS

In the solutions business which we are continuing to pursue, we announced the edge AI sensing platform “AITRIOS™” last October for further expansion of our solutions business. With AITRIOS, we also aim to take on the challenge of our recurring business in addition to our sensor business.

https://www.aitrios.sony-semicon.co.jp/en

“SENSE THE WONDER”

“Sense the Wonder” is a corporate message from us to encourage society to “feel more curiosity” and “make the world more full of surprises and excitement.” We believe that new encounters with people who respond favorably to the idea contained in this slogan will lead to creation of new value.

https://www.sony-semicon.co.jp/e/company/vision/

Visit us at: https://www.sony-semicon.co.jp/e/

WALLY'S WORDS

DR. WALDEN C. "WALLY" RHINES

CORNAMI® Intelligent Computing

IS IT REALLY DIFFERENT THIS TIME?

Dr. "Wally" C. Rhines - President and CEO of Cornami, Inc, GSA Dr. Morris Chang Exemplary Leadership Award Winner

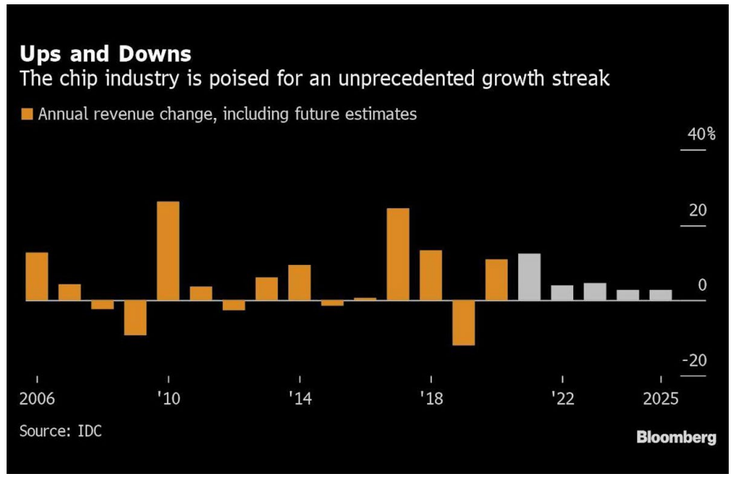
One of the benefits of being deeply involved in the semiconductor industry for decades is that you get to see history repeat itself, each time with a slightly different twist. There have been fifteen boom and bust cycles in semiconductor history according to Malcolm Penn, Founder and CEO of Future Horizons, who has been through almost all of those cycles. I haven't experienced as many as Malcolm, but I've seen enough to be confident that we are approaching another bust. Fortunately, there are many things that small companies can do to minimize the negative impact.

Malcolm's numbers tell the story. We are currently building 1.5 billion more semiconductor units per month than the long-term trend says we should and the long-term trend in units is a very stable, predictable one. Spending for semiconductor wafer fab capital equipment is about 16% of semiconductor revenue versus an enduring average of 10%. We will almost undoubtedly overshoot the capacity requirement, resulting in significant excess capacity. We have spent almost four years above the long-term learning curve for memory price per bit and the learning curve for price per bit and price per transistor has been obeyed rigorously since 1954. Whenever you spend time above the learning curve in terms of price per transistor, you are destined to sell future transistors for prices below the learning curve until the previous unit price differential is offset. Boom and bust cycles are a natural result of the fact that there is a long lead time to add semiconductor manufacturing capacity as well as a long lead time from when an order is placed until the units can be manufactured and shipped. Supply and demand therefore become unbalanced and the shortages, or excess supply, cause large swings in pricing. Normally, the bust part of the semiconductor cycle doesn't coincide with a worldwide economic recession but, when it does, the impact on the semiconductor industry is much greater with declines of revenue exceeding 20%. This time, there's a significant risk that the semiconductor cycle and the world economic cycle will overlap.

WALLY RHINES

WHAT ABOUT THE CURRENT SHORTAGES OF SEMICONDUCTOR COMPONENTS?

Wait a minute. Aren't we at the height of a period of drastic semiconductor shortages? Many experts predict this condition will last well into 2024, if not longer, or at least forecasting a slowing in the growth rate, as shown in the IDC/Bloomberg figure, rather than a negative growth outlook. We are indeed in a period of almost unprecedented shortages. This situation was aggravated by a low level of capital spending, especially in the early stages of COVID, and cancellation of backlogs (particularly by the automotive industry) in early 2020. This was followed up by an inability to catch up with an inventory void, especially for products produced on older technology nodes. As customers realized that the fear of a COVID recession was overblown, they rushed to place increased orders. When the lead times stretched out, they exaggerated their orders, or double ordered, presumably thinking that suppliers would allocate them a percentage of their requested need. As the shortage became worse, major commitments for new wafer fabs and assembly capacity were made. In some cases, these were accompanied by "take or pay" contracts with foundry customers committing to pay for projected output from the new capacity. As orders for semiconductor manufacturing equipment increased, the lead times for that equipment increased, making the shortage crises appear even worse. The unfortunate characteristic of the semiconductor industry is that it only takes a small amount of excess capacity to cause a large drop in prices. The only order worse than a low-priced order is no order at all. The enormous cost of semiconductor fabs creates a huge depreciation cost so the fabs try to continue to produce wafers even after the backlog of demand is exhausted. Customers who signed "take or pay" contracts will find themselves building large inventories that must be sold (at any price) or written down to zero. Foundries offer special deals to fill their fabs. This sequence is repeated in every semiconductor cycle.



BUT IT'S DIFFERENT THIS TIME, ISN'T IT?

We have growing demand for AI and machine learning applications. IoT offers huge potential. The automotive industry will rebound as soon as parts are available and will ship record numbers of cars to refill their inventories. New applications such as augmented reality (AR) and virtual reality (VR) promise to generate large and growing demand for semiconductors. And the growing demand of the cloud is stimulating a need for servers and memory that is unprecedented. All of this is probably true. Each cycle, we tell ourselves that "this time is different". In the year 2000, the unlimited growth of demand for internet capacity seemed to be insatiable. I remember a major semiconductor CEO announcing that "Even if we build new wafer fabs as rapidly as we can, we will never catch up with the demand". When I heard that, I knew that the end of the boom was near. Recently, I heard a similar statement from the CEO of significant semiconductor company. My conclusion is that it may take until 2023, but the crossover in supply and demand will come. Each major generation of semiconductor growth requires a driver application. Our most recent one was wireless communications. Before that, it was laptop computers and previous waves for desktop computers, for minicomputers and for mainframe computers. Currently, AI related semiconductor demand is driving chip demand of nearly $20 billion per year which is a small percentage of our $550 billion market. AR and VR are still somewhat distant. Automobiles only account for a little over 10% of semiconductor usage and, despite the increasing semiconductor share of the bill of materials for cars, are destined to grow slowly as we cost reduce and integrate designs. Over 550 companies are planning to produce electric cars and light trucks. Most of these companies are requesting capacity from semiconductor suppliers. It's unlikely, however, that the world needs 550 companies for this purpose. As they terminate their plans, their forecasted demand disappears along with all the double ordering.

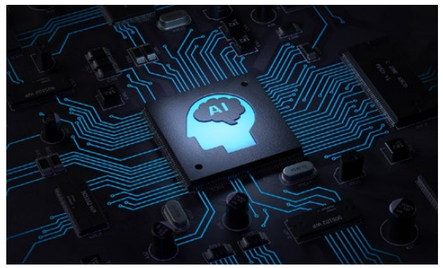
IS THERE ANY PLACE TO HIDE?

On a relative basis, the design and development part of the semiconductor industry feels the impact of a supply-driven downturn the least. While semiconductor revenue falls sharply, companies know that the correction lasts for a limited amount of time and they must continue to develop new products to be ready for the upturn. That's why electronic design automation (EDA) companies experience only a modest downturn when the semiconductor industry is declining 20% or more. That's also a reason that supply corrections can be an opportunity for small semiconductor companies. Typically, startups and small companies have very little revenue to lose. Meanwhile, their potential customers are becoming increasingly desperate for new, innovative products to reduce costs or provide revenue. Manufacturing capacity becomes readily available for these new products at bargain prices because of the need to fill the fab. The challenge is to be sure the startup doesn't run out of cash.

WALLY'S WORDS

DR. WALDEN C. "WALLY" RHINES

IS IT REALLY DIFFERENT THIS TIME? (cont. from pg. 11)



That's quite a challenge after the boom of easy access to venture capital begins to wane.

WHAT CAN WE DO IF WE'RE RUNNING A SEMICONDUCTOR SMALL COMPANY OR STARTUP?

I say "we" because, after a long career at Texas Instruments, followed by an even longer one as CEO of Mentor Graphics, I'm now part of the startup world. Cornami (named for a "tsunami of cores") has, over a period of many years, developed compiler software to vectorize (or parallelize) existing customer code for fully homomorphic encryption, or FHE. We're now implementing that software in a chip that will provide the basis for a compute fabric where performance will be directly proportional to number of cores and will therefore linearly scale with the number of chips, printed circuit boards or servers. FHE promises to revolutionize cybersecurity by assuring that data remains encrypted at all times, even when computation on that data is being performed. Because FHE requires performance near one million times that of an Intel or nVidia based server, there isn't much competition. As quantum computers reach 1000 qubits, most of the existing security on the internet will break. FHE is the hands down favorite to replace other modes of cybersecurity as its performance improves. If you're going to do a startup, you might as well do one that has major impact on the world. Fortunately, Cornami just completed a $68 million round of funding, led by SoftBank, that will take us to revenue. Even if your timing wasn't so fortunate, there's some reason to believe that a big shift in the semiconductor industry isn't the death knell for startups. Consider the following:

1. Many of the most successful startups began one or two years before semiconductor crashes. Google was founded two years before the Dot Com Crash of 2000. Intel, AMD, Mostek and many more semiconductor companies were formed shortly before the record semiconductor crash of 1970. In that year, established large companies like Fairchild struggled and never really recovered their momentum. Meanwhile the startups were introducing new, innovative products and didn't have to worry about getting rid of excess capacity and people.

2. Desperation drives innovation. Customer companies with established revenue become complacent during good times and don't feel obligated to evaluate innovative new suppliers. When the revenue of established companies starts to fall and price competition increases, they become more receptive to change and new suppliers.

3. Availability of skilled employees improves during a semiconductor downturn.

4. If you're fortunate enough to be selected by Silicon Catalyst, the cost of design tools and prototyping can be very modest compared to other startups, thus stretching out the time provided by existing funding of the venture.

LOOKING BACK

The semiconductor industry is never in balance. We are either being pressured by our customers for more product output or hearing that our customers want to return their excess inventory and receive additional price concessions on future purchases. It's never easy. But, after many years, I've found that it's probably the most exciting industry in the world. We enable amazing new capabilities. We re-invent ourselves every one or two decades when a totally new (and usually unanticipated) application drives massive growth in demand. I can't imagine a better place to have spent my career and that career is far from over. The fun of a startup is even better than the time I spent running large semiconductor and software businesses. Every day is a new challenge!

SILICON CATALYST ADVISOR PROFILE

DR. JALAL BAGHERLI

SiliconCatalyst.UK Advisor Dr. Jalal Bagherli shares some enlightening insights on his storied career.

We recently sat down with SiliconCatalyst.UK advisor Dr. Jalal Bagherli to discuss his journey in the semiconductor industry.

From an early age Dr. Bagherli has been fascinated with how things work, in particular with electronics and miniaturization. His curiosity as a boy had him wondering how a TV works and how a digital clock calculates time and how cameras function.

This curiosity and search for knowledge led him on a pioneering path to a PhD in chip design in the United Kingdom at a time when IC design firms became a force in the early 1980s, with fabless companies emerging. A true believer that the only constant in life is change, Jalal views every day as an exciting challenge and opportunity to see things differently and perhaps make a difference through the discovery of a better way. Delighted to have chosen a career in semiconductors, he is quick to offer, "I have never gotten bored in this industry."

The CEO of both the successful semiconductor startup Alphamosaic and the hugely successful global industry leader Dialog Semiconductors, he began his career with two Silicon Catalyst Strategic Partners, namely, Texas Instruments and Sony. Bagherli speaks very highly of his 9 years at TI or 'Training Institute' as he and many others have called it. He described his time there as having laid the foundation and appreciation of strong corporate governance and culture. It is with gratitude that he discusses what he learned about project management, customer engagement, and both industry ethics and ethos. His work in both the UK and France exposed him to an international operating environment. He found the opportunity to engage with people from Europe, Asia and the US to be quite stimulating and unique to the semiconductor industry at the time.

He described his time at Sony to be less top down than TI and more entrepreneurial from a product creation point of view. At Sony he learned the discipline to handle hard-to-manage consumer electronics which have their own unique challenges, rhythm, and culture. A key takeaway was understanding the importance of budget in a consumer spending environment, namely what impact does a new innovation or approach have within the confines of an existing budget vis-a-vis what it is replacing. Whereas TI offered key B2B insights, his time at Sony enlightened him to the decision-making ramifications in a B2C environment. And, of course, he learned the importance of Christmas which put a capital C in Consumer electronics. Sony was management by consensus, management by teams, without having the power of 'hire and fire'. The understanding of soft power was essential. The collaborative culture was conducive to deploying indirect influences to persuade, inspire, and encourage outcomes. Dr. Bagherli described it as motivational management.

DR. JALAL BAGHERLI
SILICONCATALYST.UK ADVISOR

The lessons learned earlier in his career served him well as the first and last CEO of the successful startup Alphamosaic. Though not a founder, he sold the company to Broadcomm after only three and a half years. The lessons learned from Alphamosaic included understanding the value of

SILICON STARTUP SOLUTIONS

SILICON CATALYST ADVISOR PROFILE

DR. JALAL BAGHERLI

A conversation with a SiliconCatalyst.UK Advisor

money. The constraints of money in a startup force one to prioritize what is most important at a given moment in time. One dollar in a startup is more valuable than 10 dollars in a big company because you have to be frugal and focus on what really matters. In addition, the Esprit de Corps within a team of startup entrepreneurs fosters an energy, enthusiasm, and dedication founded not only on the technology but on the sense of ownership and being a part of something special. When someone feels they can make a difference in a company, they are more empowered to do so.

My journey as a startup CEO afforded me observations and leadership skills that I brought to my next endeavor at Dialog which was a turnaround story. Dialog was a publicly listed company that was in trouble and had lost its way. My mission there was to find a way to right the ship. Borrowing from my startup experience, I tried to inject energy, inject ownership, and inject enthusiasm back into the company. My goal was to put a focus on what mattered. I looked to set ambitious yet achievable goals for my teams and the company. I made clear what my expectations were then got out of the way and left them to execute. Each team was left to define their own goals which gave them ownership of their outcomes. It was almost a scrum-like management style before scrum was even a thing. My objective was to only intervene when necessary. I didn't want to take the fun out of their jobs. I believe people should chart their own course by taking responsibility and ownership of a function, project or product. There were no assistant manager titles to make sure managers were more hands on with the function and make better decisions.

At Dialog, I insisted on regular company-wide communication, usually monthly or bi-monthly, worldwide. I would be on every one of those calls and accessible to everyone for any question, without a filter. I believe in full transparency. By being accessible and therefore accountable to anyone in the company, I was walking the walk I wanted the employees to walk. It turned out to be a good motivator. I think that's the best way to carry people with you, especially if the company is in trouble. I had no tolerance for either Mañana (I'll do it later) or politics. I tried reducing layers in order to improve critical change communications to employees.

Something else I can share which may be helpful to those reading this is that early on at Dialog, I tended to overthink things. I went in with the idea that I'd be out in three to five years with everything fixed. Meanwhile, I was there for sixteen years. So clearly, I should have done a lot of things faster. I should have brought better people on faster. I didn't want to upset the ecosystem, my thought initially was to move gradually, when in fact I should have moved faster. Having said that, there truly are no easy answers.

I'm impressed with the Silicon Catalyst model and believe it was sorely needed in the UK. I am equally impressed with the companies that you are incubating. In fact, I have invested in Salience Labs and have joined their board. Some advice I can share with startup CEO's is to believe in your innovation but be humble. You must be willing to listen and seek knowledge and wisdom from those who can help you. You will make yourself a lot more attractive to investors and advisors if you follow this advice.

SiliconCatalyst.UK:
it all happens here®

Forming, Storming, Norming and Performing

A Silicon Catalyst event hosted by **Arm in Cambridge**

With the enthusiasm for semiconductor startups firmly re-established in the UK, we conceived a “Forming, Storming, Norming and Performing” theme for a series of events to tease out those founders that have gone before to share their learnings with new startup teams. The event was kindly hosted by Arm (a Silicon Catalyst strategic partner and In Kind Partner) at the address of legends, 110 Fulbourn Road, Cambridge. We had one of SiliconCatalyst.UK advisors, the great Malcolm Penn, take us through the concept that no company is an island when testing their value proposition.

We then kicked off with Phillip Burr describing the hugely generous Arm Flexible Access program that releases the potential of semiconductor startup designers to get market leading design IP. Two legends of our UK semiconductor startups Phil O'Donovan co-founder CSR Plc and Jerry Loraine talked about "how bad things happen to good people" with stories about patent trolls and go to market challenges. This led naturally into "the importance of the team" with a single person invention idea from Bruno Johnson. Where Cascoda invented a radio architecture to increase range by 3x for Thread Group #iotdevices and is now shipping Arm based products into #smartcities #smartbuildings all around the world. This section concluded with a compelling presentation from the illustrious Jim Nicholas walking us through the inventive team idea from Uniphy Ltd

The last session before the break had the wonderful Vaysh Kewada from Salience Labs (a Silicon Catalyst portfolio company) share her deep insights into "creating relentlessly repeatable processes from day 1" of your startup journey. Followed by a hugely insightful deep dive by Pete Hughes the foremost semiconductor product operations executive in the UK on how to ship high volume semiconductor products with the level of quality that your market leading customers will demand. Back from the break where the Arm catering team laid on a spread that would not look out of place at the Ritz, we leapt into "what problem are you solving?" Patrick Camilleri shared his learnings on how to build semiconductor design IP combined SaaS product offerings and then Gary Spittle founder of Sonical Inc (A Silicon Catalyst portfolio company) projected the huge opportunity in their end to end system play to command the compute in the ear application space. We concluded the presentations with the eternal "how much money will you need?" The marvellous Tony Milbourn who leads u-blox corporate venturing shared in detail how they look for the secret sauce of semiconductor startup success. Then Owen Metters Foresight Group Williams, the leading semiconductor VC investor in the UK took us through three compelling case studies. The final panel session lead us into a lively debate into what we need to do to make UK Semiconductor great again and make sure we create an open and inclusive industry where everybody can thrive.

BUILDING ON SUCCESS

Following the launch of SiliconCatalyst.UK in summer ’21 we have focused on increasing awareness and understanding of the semiconductor community here to the benefits of our startup accelerator.

To connect the UK semiconductor startup community, we continued to build on the success of our physical launch event at the historic Bletchley Park, home of Alan Turings code breakers. We hosted a leadership dinner at the 5-star Whatley Manor Cotswold resort. Our startup CEO’s, including Vaysh Kewada of Salience Labs and Huw Davies of Trameto, were engaged with great insights from industry luminaries such as Jalal Bagherli, ex-CEO Dialog Semiconductor, Ray Bingham, Executive Chairman of Imagination Technologies and Owen Metters of Foresight Williams one of the leading Semiconductor early-stage VC’s.

We gathered again at the Annual General Meeting of our UK partner Techworks NMI, where we hosted a table for our Portfolio Companies, Advisors, Strategic Partners and In Kind Partners. Sean Redmond contributed to a lively panel discussion, providing insights on how Silicon Catalyst helps semiconductor startup to de-risk access to foundry, design automation, IP and investment.

The day was topped off with a VIP wine tasting at Hotel Du Vin in Cambridge to thank all those that contributed to the hugely successful event. The guests were treated to our very own Lance Bell telling the fascinating story of a horse called “Never Say Die” which has been used for the branding of the very first UK bourbon. Amongst the wines in the “bake-off” between American and Italian red wines was Castello Redmond, the organic red made by our UK managing partner Sean.

Silicon Catalyst continued to build mutual respect and trust with the UK government team working on Semiconductor policy interventions. We accompanied the UK government team over to the Tyndall National Institute in Ireland to help demonstrate the art of the possible with respect to national semiconductor research institutes. We met with the Rt hon Chris Philp, the minister of technology twice and hosted meetings with both Jodi Shelton, CEO of GSA and Mark Edelstone from Morgan Stanley to help provide a global perspective to their semiconductor deep dive.

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Forming, Storming, Norming and Performing

A Silicon Catalyst event hosted at **Heriot-Watt University in Edinburgh**

Silicon Catalyst and Heriot-Watt University GRID delivered the second in the series of the forming storming norming and then performing of UK semiconductor startup companies in Edinburgh yesterday to a sold-out event!

These events have been conceived to help new semiconductor founders learn from the legends of our UK semiconductor industry.

Steve McLaughlin kicked us off with a wonderful insight into the strengths of Heriot-Watt University semiconductor research, entrepreneurship and startup commercialisation

The legend Jed Hurwitz Fellow from Analog Devices took us through how bad things "nearly" happen to good people with a deep insight into how he achieved three successful semiconductor start-up exits. Just fantastic.

Then it was all about the team from a very thought provoking Keith Muir Founder and CEO of the brilliant Cytomos backed up by the gregarious Richard Ord from hot new startup Quantum Power Transformation Ltd explaining how their tiny packed revolution in power drive semiconductors is born from years of ingenuity and unique experiences gained by its founder Rob Gwynne

After a well received break of refreshments, with opportunity to see our exhibitors Synopsys Inc., Imagination Technologies, 360WORK, IC Resources, TechWorks, NMI, and IoTSF, we were given a great introduction to the hugely generous Arm University and Flexible Access program by the very knowledgeable Andrew Pickard and Nivetha Sundararajan

We then dived into "What problem are you solving" with the legend Donald McClymont who with the spectacular indie Semiconductor has achieved the holy grail of semiconductor startups by floating on Nasdaq. Wow! This talk makes the hairs on the back of your neck stand up on end. Don't miss the video.

Our Silicon Catalyst advisor and In Kind Partner Asen Asenov stormed through how he performed with perfection to create the world leading GSS ltd as a part-time CEO whilst still working as professor University of Glasgow He was followed by the fascinating technology from Brian Gerardot CEO of Atomic Architects on the Heriot-Watt University campus that has the potential to transform feature rich semiconductor manufacturing

We concluded the presentations with the legend Pete Hutton Chairman of our In Kind Partner Agile Analog and Cambridge GaN Devices Ltd providing the gold-dust of advice for raising semiconductor startup funding from Angel or VC investors backed up by an early stage and very exciting Heriot-Watt University semiconductor startup @Infinect and the passionate Samuel Rotenberg delivering the first hybrid flat panel antenna for broadband satellite technology

A huge thank you to all those that attended, contributed and most importantly not forgetting the hard work from Leanne Gunn and the fantastic team at Heriot-Watt University GRID. Great to see David Richardson the instigator of our fruitful collaboration with Heriot-Watt University to help create more exciting semiconductor startups in Scotland.

SILICON STARTUP SOLUTIONS

SILICON CATALYST NEWS
IMAGINATION TECHNOLOGIES

Silicon Catalyst welcomes Imagination Technologies as an In-Kind Partner

Silicon Valley, CA and London, UK, - 14th February 2022

Silicon Catalyst, the world's only incubator focused exclusively on accelerating semiconductor solutions, and Imagination Technologies, a leading supplier of cutting-edge, power-efficient and flexible graphics processors (GPU) and neural network accelerator (NNA) IP, today announced joining the Silicon Catalyst In-Kind Partner (IKP) program.

Imagination Technologies has over 20 years of experience in designing and licensing market-leading and proven IP processor solutions. The compute, graphics and AI intellectual property (IP) from Imagination delivers security, high-performance and low power consumption in the smallest silicon area. By joining as an IKP, Imagination Technologies will enable Silicon Catalyst Portfolio Companies to gain access to high-value PowerVR GPU and AI accelerator design Intellectual Property (IP), by waiving the license fee for their System on Chip prototyping needs.

Christ Porthouse, Chief Product Officer, Imagination Technologies said "We are proud to join Silicon Catalyst as part of the In-Kind Partner program, aiming to reduce the barrier to entry for startups and scale-ups. The cost-effective IMG 8XE GPU and NNA IPs, unlock visualisation and recognition features in a wide range of industrial, consumer and healthcare use cases – including EV charge points, visual recognition, and HMI applications. As a leading GPU and AI provider for the program, Imagination is focused on offering startups ease of access to area-effective and high-performing solutions. Our industry-proven IP and software can help accelerate the time to market for innovation-driven scale-ups, while giving them enhanced differentiation points."

Silicon Catalyst has a created network that lowers the capital expenses associated with the design and fabrication of silicon-based IC's, sensors, and MEMS devices. With this announcement, the number of Silicon Catalyst IKPs totals 55 companies, offering advanced design tools and services from a comprehensive network of In-Kind Partners (IKPs).

The startups in the Silicon Catalyst Incubator utilize IKP tools and services including design tools, simulation software, design services, foundry PDK access and MPW runs, test program development, tester access, along with banking and legal services.

Pete Rodriguez, CEO, Silicon Catalyst said "As we build on the success of having admitted in excess of 80 semiconductor startups from around the globe, we are continuing to expand our ecosystem for what many are calling the golden age of semiconductors. During our most recent application cycle, we received a record number of applicants to our program, including SoC start-ups with applications ranging from automotive, gaming, virtual and augmented reality, mobile and IoT devices. We are delighted to welcome Imagination Technologies to our In-Kind Partner program, enhancing our ability to provide flexible and scalable design IP solutions to support the IP needs of the innovative companies in our Incubator."

PORTFOLIO COMPANY NEWS
SALIENCE LABS

CEO Interview: Vaysh Kewada

by Daniel Nenni I May 20, 2022

Vaysh Kewada is cofounder and CEO at Salience Labs, a company developing an ultra high-speed multi-chip processor that packages a photonics chip together with standard electronics to enable exascale AI. Salience is funded by Oxford Sciences Enterprise, Cambridge Innovation Capital, Arm-backed Deeptech Labs, former Dialog Semiconductor CEO Jalal Bagherli and former Temasek board member Yew Lin Goh. Prior to launching Salience Labs, Vaysh worked at Oxford Sciences Enterprises, a $745M VC fund focused on deep-tech investments. Prior to that, she was a management consultant at McKinsey & Company. Vaysh holds an undergraduate and Masters degree in Physics from Imperial College London, where her thesis focussed on genetic algorithms.

TELL US ABOUT SALIENCE LABS?

Salience Labs was spun out of Oxford and Münster universities in 2021 to commercialise an ultra-high-speed multi-chip processor that packages a photonics chip together with standard electronics. By using light to execute operations, we can deliver massively parallel processing performance – bringing ultra-high speed compute to a wide array of new and existing AI processes and applications.

The compute requirements of AI double every 3-4 months, as the world needs ever-faster chips to grow AI capability. The current semiconductor industry can't keep pace with this demand. What's required now is not further incremental innovations on transistor technology. If we are to realise the tremendous potential of AI, nothing short of a paradigm shift in the way we compute will do. One that delivers an immediate step change in performance and speed, while also offering a long-term future roadmap of scaling improvements.

Multi-chip processors – ones that package together several platform technologies – is that step-change, allowing us to package electronics together with silicon photonics, and to move compute from electronics to the realm of light. By using light to execute operations, it's possible to achieve massively parallel performance and deliver high throughput, low latency matrix maths – at the root of almost all AI applications. And it's possible to do this with clocking speeds in the 10s of GHz – where currently the limitation of even the most cutting-edge chips is just 2-3 GHz.

WHY WAS SALIENCE LABS FOUNDED?

Salience was founded with the vision of creating an exa-scale processor, by packaging a photonics chip together with standard electronics. The technology is based on decades of research at University of Oxford and Münster University in Germany.

The key inventors and researchers of the technology: Professor Wolfram Pernice, Professor Harish Bhaskaran and Dr. Johannes Feldmann, are co-founders in the company, giving Salience Labs significant depth of knowledge in this field.

WHAT MAKES SALIENCE LABS TECHNOLOGY UNIQUE?

While other photonic chip companies execute operations in the phase of light, we use a proprietary amplitude-based approach to photonics, resulting in modular, dense computing chips clocking at 10's of GHz. It also allows for high levels of parallelization, by using different wavelengths of light to send many calculations through the chip. Salience uses a multi-chip design, with the photonic processing mapping directly on top of the Static Random Access Memory (SRAM). This novel 'on-memory compute' architecture allows for the fast compute in the photonic domain to be fully utilized, delivering an exceedingly dense computing chip without having to scale the photonics chip to large sizes. This architecture can be adapted to the application-specific requirements of different market verticals,

VAYSH KEWADA
CEO AND CO-FOUNDER

making it ideal for realising AI inference use-cases in communications, robotics, vision systems, healthcare and other data workloads.

HOW HAS THE COMPANY EVOLVED SINCE YOU FOUNDED IT?

We originally spun-out of the University of Oxford and the University of Münster in 2021 and have just closed our seed round of $11.5 million from a number of leading VCs including Cambridge Innovation Capital, Oxford Science Enterprises and Arm-backed Deeptech Labs participating, plus some leading names in the semiconductor industry including former CEO of Dialog Semiconductor Jalal Bagherli and Yew Lin Goh. Since closing our seed round, our focus has been on the tape out of our next test chip, developing our software models and packaging solutions. We are also building relationships with customers across a range of market verticals.

YOU ARE PARTICIPATING IN THE SILICON CATALYST INCUBATOR PROGRAMME. WHAT HAS BEEN THE IMPACT ON THE BUSINESS?

We joined the Silicon Catalyst programme

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PORTFOLIO COMPANY NEWS
SALIENCE LABS

in 2021, right after spinning out from Münster and Oxford Universities. The greatest benefit is the access it gives us to advisors – individuals who have made a significant impact on the global semiconductor industry. In fact, we met our chairman Dan Armburst through the programme, who is a Silicon Catalyst Co-founder and Board Director. Through those advisors, we gained highly valuable commercial introductions to foundries, IP providers, and EDA providers at a very early-stage of the company. It has given Salience Labs' a commercial jump start. For example, we've just closed our seed round but we're already working with production level foundries on the fabrication of our next test chip. Silicon Catalyst has been a tremendous accelerator for our business.

WHAT CAN WE HOPE TO SEE FROM SALIENCE LABS IN THE FUTURE?

We're at a very interesting point in time where the industry is recognising the potential of multi-chip processors to solve the tremendous processing bottleneck currently hampering AI growth. Salience Labs' technology has the potential for breakthrough performance and power capability beyond what the established CMOS roadmap offers. We're talking to customers across a range of market verticals who are excited about the performance improvements silicon photonics will offer and the new AI processes and applications this will enable. We welcome any additional approaches from potential customers who are interested in understanding the capabilities of silicon photonics.

The Münster and Oxford start-up Salience Labs rakes USD 11.5 million for the development of ultra-fast AI chips

by ET Bureau I May 18, 2022

Salience Labs has closed a first round of funding of $11.5 million to develop an ultra-fast multi-chip processor that combines photonics and electronics, enabling the exponential advances in... to advance artificial intelligence (AI) . The round was led by Cambridge Innovation Capital and Oxford Science Enterprises , with participation from Oxford Investment Consultants , former CEO of Dialog Semiconductor Jalal Bagherli, Silicon Catalyst, the Goh Family Office in Singapore and Arm – backedDeeptech Labs.

Demands on the speed of AI calculations are doubling every 3.4 months , pushing conventional semiconductor technologies to their limits. Now the market for AI devices is evolving from universal applications to solving specific tasks. Significantly accelerating progress in AI across all industries requires a whole new approach to computing. This approach must be both more scalable and highly application-oriented.

The start-up Salience Labs was spun off from the WWU Münster and the University of Oxford in 2021 to develop an ultra-fast multi-chip processor that combines photonics with standard electronics. Salience Labs' scalable technology delivers highly parallel and efficient data processing, utilizing up to 64 vectors simultaneously in a light beam by exploiting a wide color gamut.

Salience Labs uses a proprietary, amplitude-based approach to photonics that delivers extremely high computing density at clock rates of tens of GHz. Together with the simultaneous execution of many computing operations, it enables performance in the ExaOp area. This opens up possibilities for a variety of new and existing AI processes and applications.

The company uses a multi-chip design in which the photonic processing is performed directly on top of the electronic chip's Static Random Access Memory (SRAM). This new "On-Memory Compute" architecture minimizes data transfer and is therefore fundamentally faster. It can be adapted to the application-specific requirements of different market segments and is therefore ideally suited for data-intensive AI tasks such as those found in communications, robotics, image processing and healthcare.

Salience Labs' AI accelerator, designed from the ground up for mass production , is currently manufactured in production-level manufacturing facilities using standard CMOS processes.

Johannes Feldmann, CTO and co-founder of Salience Labs, did his PhD at the Institute for Physics at the University of Münster in the group of Prof. Dr. Wolfram Pernice (also co-founder) before working as a post-doctoral fellow at Oxford University. He explained: "Based on our research at the Universities of Munster and Oxford, we have taken a radically new approach to photonics computing and developed a new multi-chip architecture for photonics 'on-memory computing'. Our unique approach delivers an extremely powerful processor chip that, compared to conventional electronic chips, achieves many times the performance in a smaller area without having to scale the photonics to large dimensions."

Jalal Bagherli, investor in Salience Labs and former CEO of Dialog Semiconductor (acquired by Renesas Electronics Corporation in 2021; $5.7 billion), says: "Salience Labs' excellent team combines commercial and technical acumen with a revolutionary market vision. The unique 'on-memory compute' architecture is game-changing and has the potential for game-changing performance and power efficiency beyond what established CMOS architectures offer."

Vaysh Kewada, CEO and co-founder of Salience Labs, states: "The world needs faster chips to increase AI capabilities, but the semiconductor industry cannot keep up with the high demand. We solve the problem with our proprietary 'On-Memory-Compute' architecture that combines the ultra-fast speed of photonics, the flexibility of electronics and the established fabrication of CMOS . With this, we are ushering in a new era of computing where supercomputer AI is truly ubiquitous."

AMERICA'S BIG SEMICONDUCTOR OPPORTUNITY

SIA Chips Act Update

John Neuffer – President and CEO of the Semiconductor Industry Association (SIA) in Washington, DC.

JOHN NEUFFER
PRESIDENT AND CEO, SIA

America has a semiconductor problem - and a big opportunity to solve it is within its grasp.

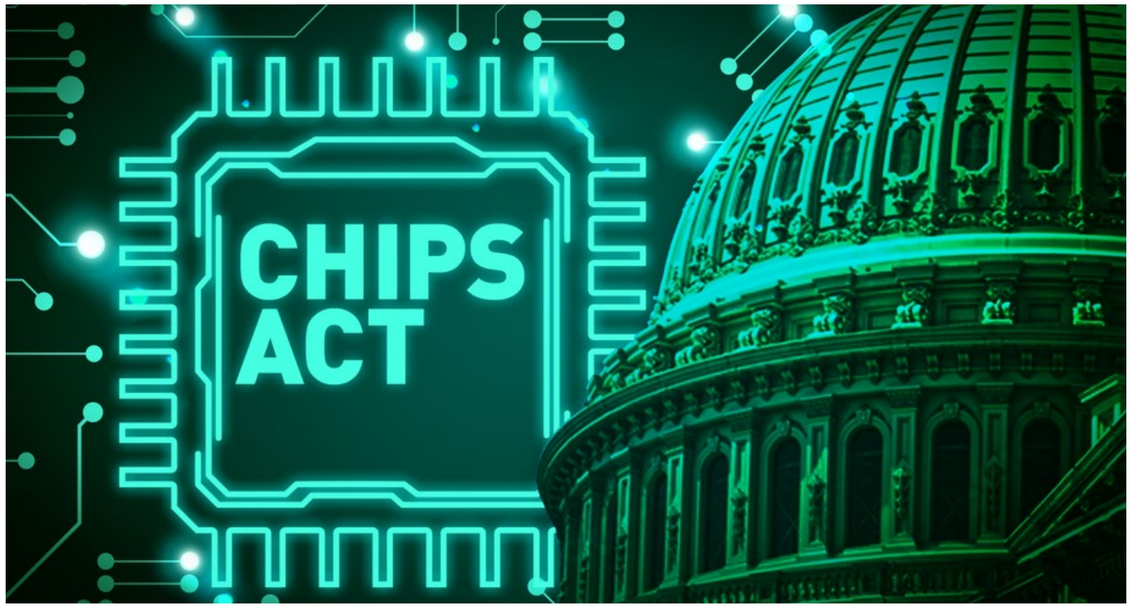
The problem is threefold: While the U.S. is home to some of the world's most innovative and vibrant chip companies that, in total, account for nearly half the world's total semiconductor sales, we no longer make enough chips in America. That's because the cost to build and operate a U.S.-based chip manufacturing facility, or fab, is 20% to 40% more than in markets overseas. Government incentives offered by other countries are the biggest contributor to this cost disparity.

Further, although the U.S. chip industry invests one-fifth of its revenue in R&D to advance chip innovation, U.S. government investments in semiconductor research have stagnated.

And while U.S. companies lead the world in semiconductor design – the complex mapping of a chip's intricate circuitry – our lead is narrowing and not guaranteed.

The good news is U.S. policymakers have a golden opportunity to reverse these trends set in motion a resurgence of chip production and innovation in the U.S.

The stakes are high, and time is short. Semiconductors are powering a digital revolution the world over, and they are at the heart of the technologies that will determine



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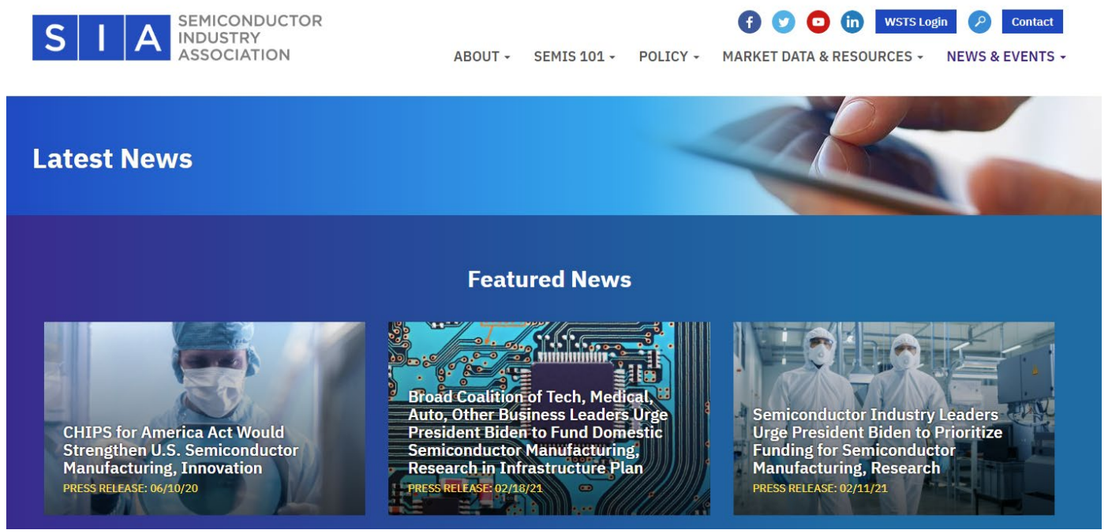

our future. The country that leads in semiconductors will have a clear competitive edge economically, militarily, and technologically for many decades to come.

Recognizing this, governments from around the world are investing ambitiously in incentives to lure chip manufacturing to their shores and plowing funding into research to promote semiconductor innovation and design within their borders.

Fortunately, the U.S. government has taken notice and is on the cusp of enacting bipartisan innovation and competitiveness legislation that would help to level the global playing field and strengthen domestic chip research, design, and manufacturing.

Such legislation should: 1) provide $52 billion in funding for the semiconductor manufacturing incentives and research investments in the CHIPS for America Act; and 2) include a 25% investment tax credit for semiconductor manufacturing and design (as called for in the House version of the FABS Act). These initiatives are part of a holistic, integrated strategy for U.S. semiconductor leadership.

> Our lead is narrowing and not guaranteed

The CHIPS Act and FABS Act complement and reinforce each other. The grants in the CHIPS Act offer targeted, one-time incentives for manufacturing. A grant program would also allow targeted funding to address key gaps and vulnerabilities in the semiconductor supply chain. The tax credits in the FABS Act would allow for more streamlined implementation and can assist companies and regions that do not receive a grant. Tax credits for manufacturing and design also offer ongoing, predictable incentives to continue ongoing investments to construct, upgrade, and expand new and existing facilities, and to conduct advanced chip design.

Funding the CHIPS Act and enacting the FABS Act are vital to our economic future, technology leadership, and national security. Federal investments in the U.S. semiconductor ecosystem will spur hundreds of billions of dollars in private investments, create hundreds of thousands of American jobs, and strengthen our economy and supply chains for the long term. That's why the CHIPS Act and FABS Act enjoy broad-based support from bipartisan leaders in government, national security, and business.

Demand for semiconductors is on the rise. Other countries' governments are investing aggressively to lure chip research, design, and manufacturing to their shores. It's time for leaders in Washington to get these initiatives across the finish line. The clock is ticking.

www.semiconductors.org

WANTED: A NEW ORDER IN THE AUTO SUPPLY CHAIN

Players in the automotive supply chains -- now increasingly divided, not united -- no longer know where they stand in relation to each other.

By Junko Yoshida

WHAT'S AT STAKE?

The automotive industry is grappling with unprecedented supply-chain uncertainties brought on by severe constraints in parts and components. But a closer look at the chip shortage reveals that relationships among carmakers, Tier Ones and Tier Twos were already beginning to rupture before the pandemic made matters worse.

The automotive semiconductor shortage has been attributed to many factors, ranging from Covid-19 and geopolitics to a huge uptick in demand for PCs, smartphones and just-in-time systems.

But becoming increasingly clear is a broken automotive supply chain where trust has eroded among OEMs, Tier Ones and Tier Twos. Tier Ones in the automotive supply chain are companies like Robert Bosch, Continental, Denso and Magma that develop "functions" in a box and supply them to carmakers. Tier Twos are typically semiconductor companies who supply their ICs to Tier Ones.

In short, players in the automotive supply chains are increasingly divided — not united — as they aim to minimize their exposure to supply disruptions.

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A rapid transition to electric and autonomous vehicles (EVs and AVs) has also fueled shifts in the balance of power and responsibilities among different players in the supply chain.

During a recent webinar, "The Five Lasting Impacts of the Semiconductor Crisis," organized by AutoSens, one running theme was "the reordering of the supply chain."

Panelist Patrick Denny, a professor at the University of Limerick, called this reordering "absolutely vital," because "the companies literally don't know where they stand in relation to each other" anymore.

In some cases, Tier Ones and Tier Twos that used to collaborate are now pitted against one another on the same projects. In Denny's opinion, OEMs must take charge to prevent Tier Ones from forming strong logistic alliances that could threaten them.

But views on how a new reordering should look might widely vary depending on a company's position in the supply chain. The last thing OEMs want to see is suppliers gaining the upper hand. But in the midst of a semiconductor crisis, OEMs are already losing leverage, observed Denny.

The AutoSens webinar elicited candid assessments on the state of the automotive supply chain from three executives. Besides Denny, the panel included Juergen Hoellisch, a consultant with extended industry experience in automotive and semiconductors, and Bolaji Ojo, managing editor and publisher of the Ojo-Yoshida Report.

Hoellisch took the first shot, rattling off the adverse market conditions the automotive industry must wrestle with today. Some examples follow.

DOUBLE ORDERING

Many semiconductor companies are getting orders for the same ICs from two or three different Tier Ones, or likewise from carmakers supporting two or three Tier Ones. By the time chip suppliers receive such orders, they have no idea who had originally placed them, while Tier Ones don't know if OEMs are pitting them against another Tier One for the same end product.

LEAD TIME

Carmakers are seeing forecasts that semiconductor suppliers will no longer accept orders for 2022. Most chip vendors, especially for analog and mixed-signal semiconductors, now mandate that 80

WANTED: A NEW ORDER IN THE AUTO SUPPLY CHAIN

(cont. from pg. 25)

percent of orders for 2023 – which have to be firm orders – must be placed within the next one or two months: essentially by the end of May.

CHINA EV UPTICK

China's EV market is growing at 600 percent a year, said Hoellisch. "We have some of those Chinese EV companies growing by 100 to 200 percent per month." When one OEM needs to increase production from 1,000 to 3,000 cars every month, the demand for so many more parts and components ripples all the way through the supply chain. Nobody can supply so much so fast.

MORE CONFERENCE CALLS, MORE REPORTS

A Tier One's next move is to bring consultants and suppliers of parts and components into a conference call. They say, "OK, let's try to solve the problem. But if you don't get into position to fix this, we can bring car manufacturers into the call." Hoellisch, who has dialed into many such calls (he had eight that day), said, "It's just incredibly time-consuming to have these calls because you basically spend 70 to 80 percent of the time just explaining the situation instead of solving the problem. And you are asked to generate another report and another report and another report."

"I, too, have been in so many meetings where you have OEMs sweating and shouting as they try to get these semiconductors into their products," said Denny. Denny comes from long experience at Tier One Valeo as an R&D engineer. Recently he served as adjunct professor of automotive electronics at the National University of Ireland, Galway.

Denny sees one big shift in the automotive supply chain: the role of hardware.

HARDWARE NOW HOLDS ALL THE KEYS

"Something that has really changed over the years is the degree of OEMs' involvement [in the supply chain]," said Denny. Previously for OEMs, "hardware was purely a function that enables a vehicle." But now that software — over half the value of the vehicle — sits on top of hardware, "OEMs suddenly realize that without the hardware, they can't run the software."

In short, "The hardware is moving right up the value chain," Denny noted.

Since automotive no longer resides exclusively in the mechanical world, "You're getting to a stage now where the hardware really holds all the keys," he explained. This prompts heavier OEM involvement.

OEMS MOVE IN, BUT DO THEY TAKE RESPONSIBILITY?

There is significant skepticism about why OEMs are more interested in the supply chain. Are OEMs simply dictating their wish lists, thus meddling with the supply chain without fixing it? Hoellisch noted that this sort of pressure will allow OEMs more influence over Tier Ones. He then asked whether an OEM would be willing to take on component liability after dictating its preferred semiconductor suppliers and how it wants to use them.

Answering his own question, Hoellisch said, "My short answer is, no, OEMs do not take any liability." OEMs, he said, see it as a Tier One responsibility to audit suppliers. Tier Ones slide their responsibility to semiconductor suppliers, which are expected to conduct audits and manage all subsuppliers, he explained.

YOU DESIGN IT, YOU OWN IT

"The fundamental question comes to this," said Ojo of the Ojo-Yoshida Report: "Who is in charge of the supply chain, or rather, whose supply chain is it?"

Until now, OEMs simply shifted responsibility and said, "Just give us what we need to get our equipment to the market," explained Ojo. Now OEMs are involved in designing the chips that go into their vehicles. "So if you design it, you own it," Ojo said. "That liability will not and cannot be spread around." This logic evokes Apple's practice of designing its own processors. "Apple didn't make it, but Apple designed it. Its reliability goes to Apple."

In Ojo's view, "OEMs need to understand now that the moment they start prescribing, designing and going straight to foundries, they own the liability. You can't just slip out."

OEMS HAVE A FALLBACK POSITION

While agreeing with Ojo, Denny pointed out that OEMs will always have a fallback position. "They claim what they're buying from you is a function. They're not buying hardware or software, but they're buying a function. That function enables them to make a profit."

If a problem occurs after a function is provided, that means the function has failed. Whether it's hardware or software, the failed function is the supplier's fault, Denny explained.

If a large-scale systemic failure occurs, the OEM will come back and sue the Tier One. Subsequently, the Tier One figures out what's going on at the Tier Two company and sues them. The game continues.

One thing OEMs will do, because they have power to do so, said Denny, is to always say, "Well, you know, we're making these designs. We're making these suggestions, but it's up to you, the Tier One, to validate."

MAINTAINING INVENTORY IS COSTLY

At a time when foundries are running at 90 percent utilization, "everything is balanced on knife's edge," said Denny. Natural instincts inevitably kick in among Tier Ones and OEMs, which are tempted to explore a just-in-case model, instead of just-in-time.

Denny strongly cautioned against this approach. Holding inventory not only takes up space but adds enormous costs for maintaining temperature, security and moisture protection for stock.

MORE GLOBALIZATION, STANDARDIZATION, INVESTMENT NEEDED

Hoellisch suggested that OEM involvement in the semiconductor supply chain can only worsen the current dilemma.

Even though big-brand OEMs are talking about designing their own chips — differentiated microprocessors and SoCs fabricated at finer nodes — the result will be a costly proposition that nobody can really afford, said Hoellisch. Further, he added, such an effort does nothing to ease today's supply chain problems.

"I think the right approach is a little bit more standardization, globalization and joint investment in some areas," he concluded.

BOTTOM LINE

As Ojo noted during the webinar, OEMs, Tier Ones and Tier Twos all "have to work on relationships. If you physically run your supplier into the ground, or even semiconductor suppliers are taking advantage of the situation to push up their own profit margin at the expense of OEMs, they're going to pay the price."

Junko Yoshida is the editor in chief of The Ojo-Yoshida Report. She can be reached at junko@ojoyoshidareport.com.

TRENDS AND NEWS
ISRAEL'S SEMICONDUCTOR INDUSTRY

Silicon Catalyst Partner Danny Biran Appointed Senior Policy Fellow at Israel's Startup Nation Policy Institute (SNPI)

Silicon Valley, CA and Tel Aviv, Israel – January 17, 2022 Silicon Catalyst, the world's only incubator focused exclusively on accelerating semiconductor solutions announced today that Danny Biran, Managing Partner based in Israel, has been appointed as a Senior Policy Fellow at Israel's Startup Nation Policy Institute, (SNPI). SNPI is an independent think-tank focusing on Israeli innovation policy. Danny will deal mostly with technological aspects of public policy, working alongside economic and government relations SNPI team members.

Biran is a Managing Partner for Silicon Catalyst in Israel and before that was a Senior Vice President of Altera Corporation until its acquisition by Intel in 2016. Prior to that he held senior leadership positions at Silverback Systems, LSI Logic, and National Semiconductor. In addition, he served as the VP of the Israel Innovation Authority's International Division and as a member of the board of directors of the Global Semiconductor Alliance (GSA).

DANNY BIRAN
SILICON CATALYST ADVISOR

DANNY BIRAN – SILICON CATALYST ISRAEL MANAGING PARTNER
"I am excited to join SNPI. This is a chance to make a real difference and to impact government policy. SNPI is a unique think tank with top researchers focusing on Israeli high-tech and the perfect place to do so. I look forward to contributing from my experience to its efforts."

SNPI's goal is to strengthen the Israeli innovation economy while maximizing the socio-economic value captured in Israel, through promoting data and research-based policies while stimulating open discourse on innovation-related issues.

URI GABAI - CEO OF SNPI
"With years of experience both in senior positions in the high-tech industry and the Israeli government, Danny is uniquely positioned to think long-term about the challenges facing Israel's tech sector and lead ambitious innovation-driven research and policy initiatives as a senior policy fellow at SNPI."

DANNY BIRAN BIO

Danny Biran is an experienced business and technology leader. He now serves as an advisor to several private companies.

Recently Danny served as Vice President, International Division of the Israel Innovation Authority, responsible for R&D partnerships with governments, multinational corporations, and other entities world-wide.

Danny had a long career in the semiconductor industry. Between 2005 –2016 he served as Senior VP of Marketing and Strategy, and a member of the executive staff at Altera, where he led all business units, marketing, technical services, and corporate development.

For several years during his tenure with Altera Biran served as a member of the board of directors of the Global Semiconductor Alliance (GSA).

Prior to Altera Danny was CEO of Silverback Systems, a privately-held company, and before that he held various leadership positions at LSI Logic and National Semiconductor.

Danny has a BSEE and an MBA from the Tel Aviv University in Israel.

CHINA REGION
NEWSLETTER

Silicon Power Technology – *Update*

Silicon Power Technology has graduated four startup companies in the first half of 2022. Graduation from SPT's incubator is defined as a company reaching a level where the company has raised enough capital and is mature enough to operate as an independent company.

Our recent graduates include DANXI Technology, a developer of GaN-related chip and module solutions; BEIDAO Semiconductor, a developer of IGBT chip solutions, NOVUSEM, a developer of SiC MOSFET and other power semiconductor IC solutions, WenHai Semiconductor, a developer of PMIC chips and power modules and PSTI, developer of power semiconductor solutions and startup companies.

With the successful incubation and graduation of these five companies, SPT has launched companies with a combined valuation of more than 700 million RMB. We fully expect that these five companies will continue to develop their products and make significant contributions to the development of the power semiconductor industry in China.

SILICON POWER TECHNOLOGY – INTERNATIONAL STARTUP INCUBATION MODEL

In addition to incubating domestic Chinese startup companies, SPT has begun to attract international startup teams who have an interest in expanding their business model into the Chinese marketplace.

We welcome Silicon Catalyst incubated companies to work with us to develop and implement China market access business models. Many non-Chinese semiconductor companies have an interest in entering the Chinese market – the world's largest consumer of semiconductor chips. Entering the China market as a startup can be extremely complex, expensive and challenging. SPT's network of supply chain partners and customers plus our years of experience supporting startups in China can be an important asset for startup companies wishing to enter the China market.

We provide a trusted, experienced team that can assist companies in developing their China business plans, contacting supply chain partners and navigating the complexity of operating in China.

CHENGDU POWER SEMICONDUCTOR INSTITUTE (PSTI) - UPDATE

Established in August, 2021, PSTI's mandate is to develop the leading Power Semiconductor Research and Incubation platform in China. PSTI combines three primary functions into one integrated platform: Power Semiconductor IC/Device and Application Research and Development; Startup Incubation services similar to those of Silicon Catalyst; and early stage startup investment.

Over the past six months, PSTI has recruited 30 power semiconductor engineers to join its R&D team. The team's expertise ranges from power device design to PMIC design to module and application design. PSTI plans to increase the number of design engineers to more than 60 in the first half of 2023.

PSTI's R&D team has two main objectives: 1) develop power semiconductor intellectual property (patents and know-how) that can form the nucleus of new startup companies incubated on PSTI's incubation platform and 2) provide power semiconductor technical design services for customers across China. PSTI has already secured more than 15 patents and accumulated significant design know-how. We have also secured the first two design services contracts with local Chinese customers.

In addition to a focus on design, PSTI has also started operating two Labs: the first is a Wafer Dicing Lab that provides wafer dicing services for 4", 6" and 8" silicon, GaS, SiC and GaN wafers. This lab supports PSTI's R&D team as well as external customers. The PSTI Lab is operated in cooperation with ADT, China's leading domestic manufacturer of dicing equipment.

The second Lab that has begun operations is the Reliability and Failure Analysis Lab. This Lab is designed to provide customers with a platform to test their ICs, modules and other components. The Lab supports customers from not only the power semiconductor sector but other segments as well.

PSTI's multi-year vision is to build an integrated power semiconductor cluster in Chengdu that covers design, manufacturing, testing, packaging and power module development.

As a shareholder and operating partner, Silicon Power Technology continues to play a crucial role in supporting PSTI's rapid development. PSTI welcomes international partners who are interested in joining our power semiconductor industry cluster.

Interested companies should contact Jesse Parker, General Manager of Silicon Power Technology at jesse@sipowervalley.com.

Silicon Catalyst Announces Six Newly Admitted Companies to Semiconductor Incubator

Silicon Valley, CA., February 7, 2022

Silicon Catalyst, the world's only incubator focused exclusively on accelerating semiconductor solutions, announces the admission of six companies into the semiconductor industry's highly acclaimed incubation program.

THE NEWLY ADMITTED COMPANIES INCLUDE:

ApLife Biotech
- Argentina - "Becoming World Leaders in Discovery for Biosensors"

Lemurian Labs
- Canada - "Building a next-gen AI Accelerator to enable deep learning on the edge"

NanoHydro Chem
- USA - "Energy Storage Solutions"

RAAAM
- Israel - "Providing the highest-density embedded memory in any standard CMOS technology"

Siloxit
- Singapore - "Zero-touch security that works"

Synthara.AI
- Switzerland - "Delivering server-class, rapidly-customizable AI accelerators for the next-generation of edge inference applications"

The mission of Silicon Catalyst is to help semiconductor startups succeed. The ecosystem that Silicon Catalyst has created lowers the capital expenses associated with the design and fabrication of silicon-based IC's, Sensors, and MEMS devices by providing tools and services from a comprehensive network of In-Kind Partners (IKPs). The Portfolio Companies in the incubator utilize IKP tools and services including design tools, simulation software, design services, foundry PDK access and MPW runs, test program development, tester access, and banking and legal services. The world-class Silicon Catalyst network of advisors and investors further facilitates their journey from idea through prototype toward volume production.

"This is a very exciting time to be in the semiconductor industry on a world-wide basis, especially as demonstrated by the innovative products being developed by these newly admitted companies to our incubator. We look forward to providing the support and expertise to enable their success in the market," stated Pete Rodriguez, Silicon Catalyst CEO.

Aplife Biotech
Pablo Baron - CEO
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"Becoming World Leaders in Discovery for Biosensors"

Aplife Biotech manufactures synthetic DNA-derived molecules and large combinatorial libraries in predefined locations for mass-screening of important biological molecules. Utilizing CMOS technology, we can unleash the full potential of digital diagnostic assays and transform molecular interactions into measurable signals. We offer APTIVEX, our high-throughput technology for the discovery of novel biosensing molecules for electrochemical devices.

Lemurian Labs
Jay Dawani - CEO
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"Building a next-gen AI Accelerator to enable deep learning on the edge"

SILICON STARTUP SOLUTIONS

At **Lemurian**, our goal is to make deep learning affordable and available for everyone, from the individual researcher to industry. The Lemurian SPU (Spatial Processing Unit) is more than an order of magnitude more efficient in terms of memory and power in comparison with legacy processors, whilst also being faster in inference. Our processor makes use of a novel digital arithmetic which has been designed specifically in order to speed up matrix-vector multiplications which largely make up modern deep neural networks, whilst also reducing hardware complexity. Our arithmetic and processor architecture results in tremendous power and memory savings, thereby making our processor more affordable and well suited to inference at the edge.

NanoHydroChem
Parham Rohani, PhD - CEO
parham.rohani@
nanohyrdrochem.com

NanoHydroChem is an advanced materials company developing and commercializing nanomaterials for energy storage applications. The company is focused on silicon-dominant anode materials and Cobalt-free cathode materials leading to energy densities higher than 350 Wh/kg. The battery materials are highly scalable and drop-in, which accelerates the commercialization and adoption in the electric vehicle and other high-demand markets.

RAAAM
Robert Giterman – CEO
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RAAAM offers the highest-density embedded memory in any standard CMOS process, requiring no additional process steps or cost. Our technology provides up-to 50% smaller memory footprint compared to the highest-density commercial solutions based on 6T SRAM. The RAAAM memory IP, offering a significant cost reduction, improved bandwidth, and reduced power consumption. Our patented technology has already been proven in silicon with multiple test-chips of leading semiconductor foundries (e.g.TSMC, Samsung, ST Micro) in a broad range of process nodes.

Siloxit
Harry Peterson - CEO
siloxit.com
hpeterson@siloxit.com

"Zero-touch security that works"

Siloxit was founded in 2020, focused on delivering IoT devices and systems for secure high-value, high-volume infrastructure applications. The company is developing the TingVet electrical grid-monitoring system and will deliver field-test units in the first half of 2022. These systems, which are powered by application-specific harvesters capturing ambient energy, are the first systems to offer no-touch configuration that includes both initialization and communication. These systems offer novel hardware support and communication protocols that implement unassailable security that does not require trusting third parties.

Synthara.ai
Manu V Nair, PhD - CEO
www.synthara.ai
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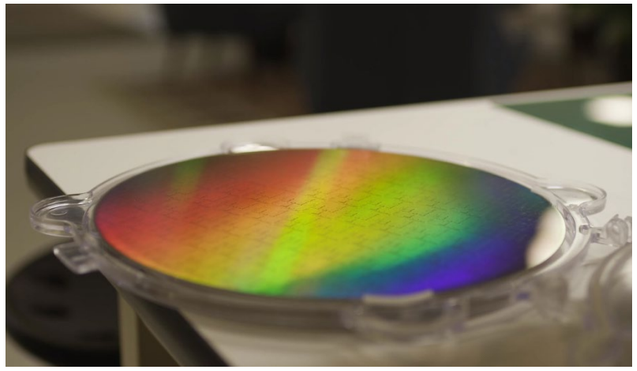
Synthara offers highly scalable and rapidly customizable energy-efficient AI accelerators for the extreme edge applications such hearing aids, wearables, bio-medical monitoring, AR/VR and others. Our goal is to enable the next generation of edge devices that are an order of magnitude smarter than they are today. Our Adaptiva product is a neural network accelerator that delivers between 10 to 100 TOp/s/W of energy efficiency. We seek to enable the next generations of smart edge devices.

PORTFOLIO COMPANY NEWS
AYAR LABS

Nvidia teams up with optical chip startup Ayar Labs to advance AI hardware

By Maria Deutscher



Nvidia Corp. has inked a technology partnership with Ayar Labs Inc., a startup developing optical chips that promise to increase the speed and efficiency of data center infrastructure.

The partnership was announced today, just a few weeks after Nvidia backed a $130 million funding round for the startup. The chipmaker was joined in the round by several other tech giants, including Intel Corp., which participated through its Intel Capital investment arm. Ayar Labs has raised a total of $194.7 million since launch.

Nvidia will work with Ayar Labs to develop new artificial intelligence infrastructure offerings based on the startup's optical chip technology. In particular, the companies are hoping to build "scale-out architectures enabled by high-bandwidth, low-latency and ultra-low-power optical-based interconnects." An interconnect is a technology that links together multiple separate chips.

Linking together chips is essential for many enterprise AI use cases. With the help of an interconnect, a company can connect multiple graphics cards with one another and use them to run its AI software faster than would be possible using a single processor.

The speed of an interconnect directly influences the performance of the AI hardware that it powers. The faster data can travel between the chips in an AI environment, the faster processing is carried out.

Ayar Labs has developed a new interconnect technology that it says is significantly faster than existing products. Usually, an interconnect transmits data between the chips that it links together in the form of electricity. Ayar Labs' technology transmits data in the form of light to increase performance.

The startup provides its technology in the form of a module called TeraPHY that can be built into processors such as graphics cards. A single TeraPHY module is capable of transmitting 2 terabits of data per second, according to Ayar Labs. The startup says that its technology can provide up to 1,000 times more bandwidth than traditional interconnects using one tenth the power.

"Over the past decade, Nvidia-accelerated computing has delivered a million-X speedup in AI," said Rob Ober, the chief platform architect for data center products at Nvidia. "The next million-X will require new, advanced technologies like optical I/O to support the bandwidth, power and scale requirements of future AI and ML workloads and system architectures."

As part of the partnership, the companies plan not only to collaborate on product development but also to accelerate adoption of optical chip technology. The AI infrastructure market is only one of several areas where Nvidia could potentially apply optical interconnects. Ayar Labs says that its TeraPHY module can help improve performance in cloud data centers and supercomputing environments, which both represent major focus areas for Nvidia.

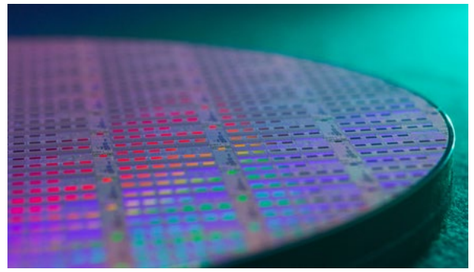
SILICON STARTUP SOLUTIONS

PORTFOLIO COMPANY NEWS
AYAR LABS

Ayar Labs Raises $130 Million in Series C Funding, Accelerating Commercialization of Industry's First In-Package Optical I/O Products

April 26, 2022 06:00 AM Eastern Daylight Time

Boardman Bay Capital Management leads round joined by strategic investments from industry bellwethers Hewlett Packard Enterprise and NVIDIA, fast-tracking Ayar Labs' transformational technology for AI, HPC, cloud, and telecom applications



SANTA CLARA, Calif.(BUSINESS WIRE) – Ayar Labs, the leader in chip-to-chip optical connectivity, today announced that the company has secured $130 million in additional financing led by Boardman Bay Capital Management to drive the commercialization of its breakthrough optical I/O solution. Hewlett Packard Enterprise (HPE) and NVIDIA entered this investment round, joining existing strategic investors Applied Ventures LLC, GlobalFoundries, Intel Capital, and Lockheed Martin Ventures. Other new strategic and financial investors participating in the round include Agave SPV, Atreides Capital, Berkeley Frontier Fund, IAG Capital Partners, Infinitum Capital, Nautilus Venture Partners, and Tyche Partners. They join existing investors such as BlueSky Capital, Founders Fund, Playground Global, and TechU Venture Partners.

"This financing allows us to fully qualify our solution against industry standards for quality and reliability and scale production starting this year."

"As a successful technology-focused crossover fund operating for over a decade, Ayar Labs represents our largest private investment to date," said Will Graves, Chief Investment Officer at Boardman Bay Capital Management. "We believe that silicon photonics-based optical interconnects in the data center and telecommunications markets represent a massive new opportunity and that Ayar Labs is the leader in this emerging space with proven technology, a fantastic team, and the right ecosystem partners and strategy."

"Optical connectivity will be important to scale accelerated computing clusters to meet the fast-growing demands of AI and HPC workloads," said Bill Dally, Chief Scientist and Senior Vice President of Research at NVIDIA. "Ayar Labs has unique optical I/O technology that meets the needs of scaling next-generation silicon photonics-based architectures for AI."

Ayar Labs' optical I/O solution eliminates the bottlenecks associated with system bandwidth, power consumption, latency, and reach, dramatically improving existing system architectures and enabling new, previously unrealizable solutions for artificial intelligence (AI), high performance computing (HPC), cloud, telecommunications, aerospace, and remote sensing applications. With the new investment, Ayar Labs is ramping production and securing supply chain partners, as signaled by previously announced multi-year strategic collaborations with Lumentum and Macom, both leaders in optical and photonic products, as well as GlobalFoundries on its new GF Fotonix™ platform.

"Ayar Labs' highly differentiated technology is crucial to supporting the high-performance computing architectures of the future," said Paul Glaser, Vice President and Head of Hewlett Packard Pathfinder, HPE's venture arm. "Ayar Labs represents a strategic investment opportunity for HPE to help our customers more efficiently derive greater insights and value from their data."

PORTFOLIO COMPANY NEWS
KURA

Kura's AR Glasses are Meta-Droolworthy!

April 28, 2022 by Max Maxfield | EEJournal

I was recently introduced to what may be the future (or one future in this slice of the multiverse) of mixed-reality headsets. As a result, I'm currently squirming in my seat squealing in excitement. Now that I come to think about it, this is my usual modus operandi, so I just dispatched the butler to retrieve an appropriate pair of trousers.

If I've said it once, I've said it a thousand times (but I don't mind saying it again): I think that the combination of augmented reality (AR) and artificial intelligence (AI) are going to radically change the way in which we communicate and interact with our systems, the world writ large, and each other.

As I've also mentioned on occasion, AR is just one aspect of the reality-virtuality continuum. At one end of the continuum (the boring end or the exciting end, depending on your point of view) we have the unadorned real world, which we might call physical reality (PT). At the other end of the continuum, we have the virtual world and virtual reality (VR) in which everything is computer generated.

AR refers to an interactive experience of a real-world environment in which the objects that reside in the real world are enhanced by computer-generated perceptual information, sometimes across multiple sensory modalities, including visual (text and graphics), auditory, haptic, somatosensory, and olfactory.

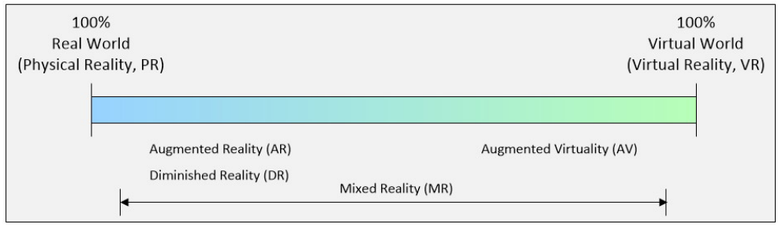
It's unfortunate that the general public has picked up the AR term and is running with it, because AR is only a piece of the puzzle. Its counterpart is diminished reality (DR) in which elements are reduced or removed from the real-world scene. In some cases, this could be beneficial, such as fading down background noise and clarifying the words of the person with whom you are conversing at a cocktail party, for example. Another possibility is converting most of the scene you are looking at into grayscale (or blurring it) leaving only objects of interest in color (or in sharp focus), thereby helping you to spot your family and friends in a crowd, for example. Of course, there could be a downside, like removing homeless people from the scene you are seeing (or changing them into pots of colorful plants). And then there's the possibility of hackers taking control of your reality such that you don't perceive things like posts or buildings or holes in the ground until… you do.

There is also something called augmented virtuality (AV). As I wrote in my What the FAQ are VR, MR, AR, DR, AV, and HR? blog, "As opposed to AR, in which objects and scenes in the real world are augmented with computer-generated information, AV refers to augmenting virtual environments with real-world objects or people."

The term mixed reality (MR) is used as an umbrella term to embrace AR, DR, AV, and VR. An alternative term used by some is extended reality (XR). The scary cumulation of all this is the potential for a future full of hyper reality (HR), which — as we see in this video — may be thought of as MR/XR on steroids.

This is well worth watching multiple times. Every time I watch it, I see something new. One of the more poignant scenes to me is when the lead character is strolling through a colorful, brightly lit supermarket when her HR system is attacked and forced to reboot, and we get to see what her surroundings really look like.

As an aside, did you ever read The Joy Makers by James Gunn? This was published originally in magazine form in 1955, and then gathered into a novel in 1961. Reading it now, it's amazing how prescient Mr. Gunn was with respect to where we are today and where we may be heading in the future. Part III, for example, is reminiscent of The Matrix, with most people locked in cells floating in amniotic fluids living in a virtual reality generated by a central computer that's indistinguishable from the real thing (the reality, not the computer). We think our hero, D'glas, triumphs over the central computer, all the way up to the point where he himself starts

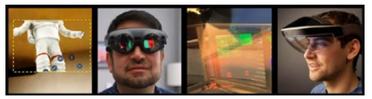


SILICON STARTUP SOLUTIONS

to wonder if he's still in the real world, or if he's in a virtual world that's been created to make him think he won (my head hurts), but we digress…

One of the things we are going to need to fully appreciate the wonders of MR is an appropriate viewing apparatus. Unfortunately, existing offerings typically suffer from a combination of negative factors as illustrated below:

Problems with existing headsets include (from left to right) small field-of-view, low transparency, low brightness, and being huge and heavy.



These negative factors include offering only a small field-of-view (which results in unnatural clipping, limits use for large models, and causes eyestrain and brain-strain), low transparency (which is unsafe because it limits the wearer's awareness of their surroundings and degrades their use in social situations because it means no eye contact), low brightness (which causes color artifacting, makes them unusable outdoors, and also limits their use in many indoor situations), and the fact that they are huge and heavy (which causes neck strain and renders them unusable after 30+ minutes).

To be honest, for quite some time I thought we would be obliged to wander our way through the world sporting clunky Oculus Quest-esque headsets.

Now, your knee-jerk reaction may be something along the lines of, "You'd never catch me strutting the supermarket aisles wearing one of these!" And, once again, as I've said before, I'm going to opine that the first time you see someone wearing something like this in public you'll say "they look silly" to yourself, but should it come to pass that 80% of the people you see ambling around are wearing this type of headset, it wouldn't take long before you start thinking "I wonder what wonders they are seeing that I'm not?"

On the other hand… given a choice, I'm sure we would all like something smaller, lighter, less obtrusive, and — dare I say it? (yes I do) — more stylish. All of which leads me to the fact that I was just talking to the amazing guys and gals at Kura Technologies. These folks are poised to drive the next wave of innovation for the meta-sphere with AR glasses that are truly meta-droolworthy.

They may not be the world's first, but they may well be the world's best AR glasses

The first surprising thing about these little beauties is that they are not dissimilar to the glasses I'm currently wearing, proving once again (as if we needed proof) that I'm a trend-setter and leader of fashion.

So, what sets these glasses apart from their peers and lets them stand proud in the crowd? Well, in addition to being light-weight and presented in an eyeglass formfactor, they offer a 150° field-of-view with 95% transparency. Moreover, the real clincher is that they provide high-brightness, high-contrast, 8K x 6K per eye resolution with an unlimited depth of field. (Stop! Re-read that last sentence. 8K x 6K PER EYE! That's true 8K, which is about 50M pixels per eye! Now you know why I'm drooling! It's also why I'm using so many exclamation marks!)

Just today, if everything was up and running the way we would like it to be, AR could satisfy humongous market needs, like telepresence ($500 billion), training ($200 billion), entertainment ($20 billion), logistics ($15 billion), medical ($10 billion), and service ($10 billion), to name but a few. What we're talking about here is a total market of around $1.5 trillion just to cover the stuff we are thinking of today. Goodness only knows what additional applications and markets and use cases will emerge once we actually have this technology at our fingertips.

The folks at Kura say they are on a mission to enable a broad adoption of wearable AR with superior technology that will change the way we all work, play, learn, and connect with each other. But these awesome AR glasses — which will work with other companies' technologies in the AR ecosphere — are only the first step. Kura's long-term goal (if they don't get snapped up by a larger company in the meta-meantime) is to build a platform for both consumers and enterprises that includes sensors, AI chips and algorithms, operating systems… all the way to brain-machine interfaces.

The chaps and chapesses at Kura have just received their first silicon samples and are about to launch a broad push to enter the market. I don't know about you, but I for one cannot wait to take a peek at the world through my own pair of Kura AR glasses. What say you? Do you have any thoughts you'd care to share?

PORTFOLIO COMPANY NEWS

KURA

From TSMC's Invited Company Profile 2022 Open Innovation Summit

TECHNOLOGY

Kura AR's glasses and telepresence and remote collaboration platform, feature a 150° field of view (9x that of existing AR), 95% transparency (4x existing), 8K resolution (4x existing), high brightness, wide range of depth for variable focus, and a compact form factor. This performance solves the bottlenecks that prevent the adoption of AR, and is made possible by an advanced display optical system architecture. Kura's customized micro-display, based on robust micro-inorganic-LED technology, leverages its proprietary in-display processing and the world's smallest process node. Kura has 7 patents filed and more than a dozen in process.

PRODUCTS

Kura's combines the best performance AR glasses GalliumTM with an advanced SaaS-model spatial computing and AI platform and a ready-to-use global telepresence platform. GalliumTM provides head tracking, eye-tracking, gesture-based inputs, automatic interpupillary distance adjustment, and compatibility with Unity, Unreal, and other software, in a less than 80-gram glasses form factor.

MARKETS

The total AR market is more than $1.3 trillion. Kura AR initially is focused on B2B and B2B2C, and will expand to B2C later with future products, Kura's initial markets consist of enterprise productivity markets, such as collaboration ($500 billion) and training ($200 billion), with additional markets such as entertainment ($20 billion), logistics ($15 billion).

Kura has over 300 paid customers and reservations most of them are Fortune 100 and 500 companies in diverse sectors, such as computer, smart phone, automotive, telecom, enterprise software, entertainment, film production, training, design, e-commerce, real estates and tourism.

HIGHLIGHT:

Kura is the only AR startup company being invited and featured by TSMC in both their Technology Symposiums in 2022.

Kura's ultra-high performance is enabled by its unique and patented display/optical architecture, including fully customized optics and displays (micro-LED display), custom ICs and silicon devices, and in-house, proprietary optical design and optimization software.

Kura, working with and partnered with TSMC, has successfully taped out their micro-LED display driver IC, which is the world's fastest micro-display driver.

Kura is manufactured on TSMC's matured and high volume ready process node for our customzied micro-LED driver IC. And this ensured us an easy scale-up to volume for the product and being highly cost-effective.

DEFINING THE INDUSTRY STANDARD

FIELD OF VIEW	DEPTH OF FIELD	RESOLUTION	TRANSPARENCY	FORM FACTOR	BRIGHTNESS
150°	UNLIMITED	8K / EYE	95%	80g	HIGH

SILICON STARTUP SOLUTIONS

"... this startup will have created a product with specifications years ahead of all known public competitors, including Microsoft, Magic Leap, and Nreal."

- David Heaney,

uploadvr.com

Another good news is we have also received Kura's customized micro-LED wafers of multiple colors of uLEDs in the past month, and we successfully lit them up and are integrating those and working with partners and manufacturers for scaling to volume in the future.

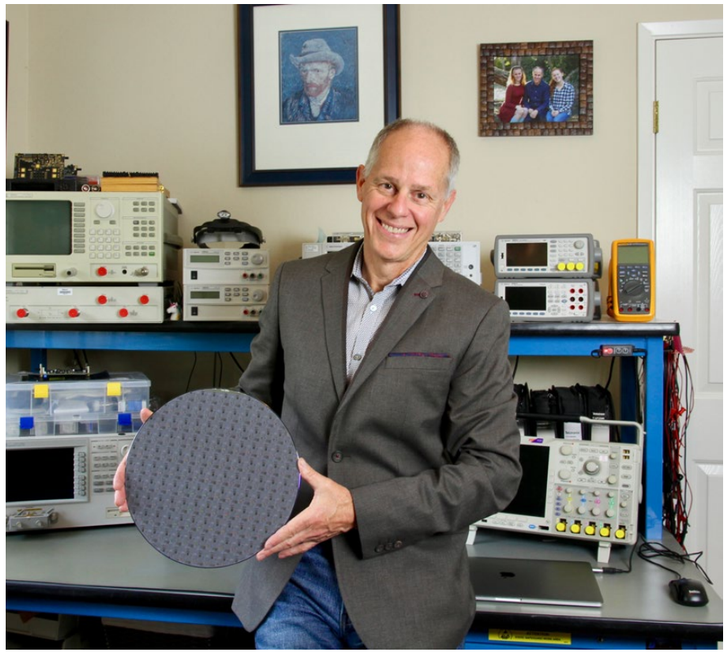
Kura is building the best performing augmented reality glasses and global telepresence and remote collaboration platform, with a performance of 150° field of view (9x of existing), 95% transparency (4x of existing), 8K resolution, high brightness, and in a compact form factor. Kura is solving the biggest industry bottleneck on AR glasses and platform adoption and tackling a $1.3 trillion market opportunity. Our business model includes both hardware sales and SaaS recurrent revenues from software sales (telepresence platform, computer vision/AI SDK, and AR data platform).

Kura already has 350+ companies as paid customers, all clients are 100% inbound, among which 50+ are Fortune 500 companies, with order requests of 100K+ units. One of the largest automotive companies is one of their recent investors.

50%+ of Kura's founding and leadership team are from MIT. Kura is being led by a team of industry veterans including the founding CTO of Leapfrog ($1B+ IPO), inventor of DSL (acquired by TI), inventor of the deep UV and extreme UV lithography process (200+ patents), head of supply chain and manufacturing who was the previous head of supply chain at Intels for 28 years at both the chip and PC group, started Intel's factories in Malaysia, Taiwan, Suzhou, and also being the director of supply chain on Microsoft Hololens and Surface, MIT Ph.D. in computer system and language design, Thiel Fellow, SaaS (hardware + software platform) experts with decades experience at Microsoft and Dell, and more.

Current investors include HTC, Silicon Catalyst, ex-head of Google Glass, UC Berkeley Skydeck, Invariantes Fund, The House Fund, 500 Startups, one of the world's biggest automotive companies, one of the world's leading optical factories, industry tech leaders, client/strategic partner (Fortune 500s), and more.

www.kura.tech



MARK FLOWERS
DIRECTOR OF TECHNOLOGY - KURA

PORTFOLIO COMPANY NEWS
RAAAM MEMORY TECHNOLOGIES

The Highest Density On-Chip Memory in Standard CMOS

CEO Interview: Dr. Robert Giterman

by Daniel Nenni I April 29, 2022

Dr. Robert Giterman is Co-Founder and CEO of RAAAM Memory Technologies Ltd, and has over nine-years of experience with the research and development of GCRAM technology, which is being commercialized by RAAAM. Dr. Giterman obtained his PhD from the Emerging Nanoscaled Circuits and Systems Labs Research Center inBar-Ilan University. Following the completion of his PhD in 2018, he joined the Telecommunications Circuits Laboratory in the Ecole Polytechnique Federale de Lausanne, Switzerland, as a post-doctoral researcher. As part of his research, he has led the front-end and physical implementations of multiple ASICs, and mentored numerous PhD thesis and MSc projects in the field of VLSI embedded memories. Dr. Giterman has authored over 40 scientific papers and holds 10 patents.

FIRST, PLEASE TELL ME ABOUT RAAAM?

RAAAM Memory Technologies Ltd. is an innovative embedded memory solutions provider, that delivers the most cost-effective on-chip memory technology in the semiconductor industry. RAAAM's silicon-proven Gain-Cell RAM (GCRAM) technology combines the density advantages of embedded DRAM with SRAM performance, without any modifications to the standard CMOS process available from multiple foundries.

RAAAM's patented GCRAM technology can be used by semiconductor companies as a drop-in replacement for SRAM in their SoCs, allowing to significantly reduce fabrication costs through a significant die size reduction. Alternatively, increasing the on-chip memory capacity in the same die size enables a dramatic reduction in the off-chip data movement to resolve the memory bottleneck. This increase in on-chip memory capacity will enable additional features that can enable industry growth for applications in the areas of AR/VR, Machine Learning (ML), Internet-of-Things (IoT), and Automotive.

WHAT PROBLEM ARE YOU SOLVING?

Important industry growth drivers, such as ML, IoT, Automotive and AR/VR, operate on ever-growing amounts of data that is typically stored off-chip in an external DRAM. Unfortunately, off-chip memory accesses are up-to 1000x more costly in latency and power compared to on-chip data movement. This limits the bandwidth and power efficiency of modern systems. In order to reduce these off-chip data movements, almost all SoCs incorporate large amounts of on-chip embedded memory caches that are typically implemented with SRAM and often constitute over 50% of the silicon area. This memory bottleneck is further aggravated since SRAM scaling has been increasingly difficult in recent nodes, shrinking only at a rate of 20%-25% compared to almost 50% scaling for logic.

CAN YOU TELL US MORE ABOUT GCRAM TECHNOLOGY?

GCRAM technology relies on a high-density bitcell that requires only 2-3 transistors (depending on priorities on area or performance). This structure offers up-to 2X area reduction over high-density 6T SRAM designs. The bitcell is composed of decoupled write and read ports, providing native two ported operation, with a parasitic storage node capacitor keeping the data. Unlike conventional 1T-1C eDRAM, GCRAM does not rely on delicate charge sharing to read the data. Instead, our GCRAM provides an active read transistor that provides an amplified bit-line current, offering low-latency non-destructive readout without the need for large storage capacitors. As a result, GCRAM does not require any changes or additional costs to the standard CMOS fabrication process and scales with technology when properly designed.

While the concept of 2T/3T memory cells has been tried in the past, reduction of the parasitic storage capacitor and concerns about increasing leakage currents has so far discouraged its application beyond 65nm. RAAAM's patented innovations comprise clever circuit design at both memory bitcell and periphery levels, resulting in significantly reduced bitcell leakage and enhanced data retention times, as well as specialized refresh algorithms optimized for various applications, ensuring very high memory availability even under the most extreme operating conditions. In fact, we had demonstrated the successful scaling of GCRAM technology across process nodes of various foundries (e.g., TSMC, ST, Samsung, UMC), including recent silicon demonstrators in 28nm (Bulk and FD-SOI) and 16nm FinFET technologies implementing up-to 1Mbit of GCRAM memory macros.

CAN YOU SHARE DETAILS ABOUT YOUR TEAM AT RAAAM AND WHAT HAS BEEN DONE TO VALIDATE THE GCRAM TECHNOLOGY?

RAAAM founders, including Robert Giterman, Andreas Burg, Alexander Fish, Adam Teman and Danny Biran, bring over 100+ combined years of semiconductor experience. In fact, RAAAM is built on a decade of world-leading research in the area of embedded memories, and GCRAM in particular. Our work on GCRAM technology has been demonstrated on 10 silicon prototypes of leading semiconductor foundries in a wide range of process nodes ranging from 16nm to 180nm, including bulk CMOS, FD-SOI and FinFET processes. Our work on GCRAM is documented by more than 30 peer-reviewed scientific publications in books, journals, and conference proceedings, and is protected by 10 patents.

WHO IS GOING TO USE RAAAM'S TECHNOLOGY AND WHAT WILL THEY GAIN?

RAAAM's GCRAM technology enables a significant chip fabrication cost reduction or highly improved performance, resolving the memory bottleneck for semiconductor companies in various application fields. Since GCRAM is directly compatible with any standard CMOS process and uses an SRAM-like interface, it can easily be integrated into existing SoC designs.

As an example for potential system benefits, we can look at the Machine Learning accelerators domain using a 7nm AI processor integrating 900MB of SRAM on a single die. In this case, the SRAM area constitutes over 50% of the overall die size. Replacing SRAM with RAAAM's GCRAM technology can provide a reduction of up-to 25% of the overall die size, resulting in up-to $35 savings per die.

Alternatively, for memory-bandwidth limited systems, increasing the on-chip memory capacity can bring substantial performance and power improvements. In fact, the required DRAM bandwidth is often inversely proportional to the on-chip memory capacity. With off-chip memory accesses being up-to 1000x more costly in power and latency compared to on-chip data movement, replacing SRAM with 2X more GCRAM capacity at the same area footprint significantly reduces the off-chip bandwidth requirements and enables RAAAM's customers to gain a competitive advantage in the power consumption of their chip.

WHAT IS RAAAM'S ENGAGEMENT MODEL?

RAAAM follows an IP vendor licensing model. Semiconductor companies can license RAAAM's GCRAM technology for a fee and production unit royalties RAAAM implements the front-end memory controller and GCRAM-based hard memory macros according to the customer specifications and delivers a soft RTL wrapper (using a standard SRAM interface), which instantiates the GCRAM hard macros (GDS) and the soft refresh control (RTL). Additionally, the customer receives a characterization report of the hard memory macro and a behavioral model for system-level verification. At present, RAAAM is working on the implementation and qualification of a GCRAM-based memory compiler, which will enable RAAAM's customers to automatically generate the complete front and back-end views of GCRAM IP and corresponding characterization reports according to customer specifications.

CAN YOU TELL US ABOUT YOUR RECENT ACHIEVEMENTS?

RAAAM has made very exciting progress recently. First, we have been evaluating the benefits of our technology for leading semiconductor companies, which has confirmed our projected substantial improvements from a performance and cost perspective over existing solutions based on SRAM. In fact, we have recently engaged with a very large semiconductor company on a long-term, co-development project and we continue running customer evaluations for various application fields and process nodes. We see growing interest in our technology in a variety of applications, both in very advanced process (7nm and beyond) nodes and in less advanced ones (16nm and higher). Finally, we are extremely pleased to have joined the Silicon Catalyst Incubator, allowing us to gain access to their comprehensive ecosystem of In-Kind Partners, Advisors, and Corporate VC and institutional investor network.

WHAT IS ON THE HORIZON FOR RAAAM?

Our product development roadmap includes full memory qualification in selected nodes of leading semiconductor foundries, based on customer demand. In addition, we have on-going discussions with numerous foundries for further technology migration to their next generation process nodes. Furthermore, we are looking to expand our embedded memory platform and introduce design flow automation based on our memory compiler development efforts. To this end, we are in the process of raising Seed funding to fully qualify our GCRAM technology and to accelerate our company's overall business growth.

7nm AI Processor	Reference design	Replacing SRAM with GCRAM
Actual die size	800 mm2	600 mm2
Net Dies / wafer	68	91
Wafer cost (7nm, 300mm)	$9500	
Cost per die	$140	$104
Customer savings per die	**$36**	
Average savings per product (18 Months of Life, 500k ICs/Month)	**$324,000,000**	

A preliminary GCRAM product brief is available upon request, please send an email to info@raaam-tech.com.
Additional information can be found at: https://raaam-tech.com/technology or https://www.linkedin.com/company/raaam.

PORTFOLIO COMPANY NEWS
OWL AUTONOMOUS IMAGING

OWL AI secures $15 million in funding

by The Brake Report I January 27, 2022

SAN FRANCISCO - Owl Autonomous Imaging (Owl AI), a developer of patented monocular 3D thermal imaging and ranging solutions for automotive active safety systems, announced $15 million in Series A funding led by State Farm Ventures®. Additional participation in the round included Excell Partners, Luminate NY Accelerator, Empire State Development, MHNW Consortium, Dr. Sanjay Jha, (former CEO of both GlobalFoundries and Motorola Mobility), as well as others.

The foundation of Owl's patented technology is an adaptation of a thermal ranging solution developed under a challenge grant from the U.S. Air Force to track missiles in flight traveling at more than 1,000 miles per hour. The solution to Advanced Driver Assistance Systems (ADAS) and Autonomous Vehicles (AV) requires redundancy and diversity, maximized across a 3D image map. Owl has developed a patented 3D Thermal Ranging™ camera, the world's only solid-state camera delivering HD thermal video with high precision ranging for safe autonomous vehicle operation.

"Of the 1.35-million people killed worldwide in car accidents every year, more than half were outside of the vehicle (pedestrians, cyclists, or motorcyclists)," said Owl CEO Chuck Gershman. "At Owl, we are all about safety, especially pedestrian safety, Owl's 3D thermal ranging solutions enable the identification of pedestrians, animals, and cyclists far sooner than any other system on the road today, and we do it day or night, and in foul weather. Simply stated, we save lives; we save lots of lives."

The current de-facto ADAS sensor suites typically comprise mutually dependent visible-light cameras and radar, but when one of these sensors becomes ineffective, so too does the entire sensor suite. This scenario happens often, especially when it comes to pedestrians, cyclists, and animals at night or in inclement weather.

Owl has created a new modality known as monocular 3D thermal ranging that dramatically improves pedestrian safety. The system is based on specialty HD thermal imaging and innovative computer vision algorithms. Operating in the thermal spectrum these algorithms exploit angular, temporal and intensity data to produce ultra-dense point clouds and highly refined object classification.

"Preventing car accidents of any kind is of critical concern," said Michael Remmes, Vice President, State Farm Ventures, "Owl's technology is a potential compelling advancement in active safety detection and avoidance of collisions. We are excited to support Owl's efforts to bring these advancements to the automotive community."

"Luminate Accelerator is excited to support Class of 2021 Owl Autonomous Imaging. Harnessing integrated photonics, Owl represents the future of transportation," said Sujatha Ramanujan, Managing Director, Luminate Accelerator.

To view the entire announcement, click HERE.

CEO Interview: Chuck Gershman of Owl AI

by Daniel Nenni I May 13, 2022

Chuck Gershman CEO is the co-founder of Owl Autonomous Imaging, Inc. Chuck is a Drexel University College of Engineering inductee into the Alumni Circle of Distinction, the highest honor bestowed upon alumni. He has been honored as a finalist for CMP publications (EE Times) prestigious ACE award as High Technology Executive of the Year and was previously named a Top 40 Healthcare Transformer by Medical Marketing & Media for his work on Clinical AI Decision Support for cancer patients. Chuck holds three US patents for his contributions to Microprocessor Architecture.

Chuck brings over 30 years of technology and semiconductor industry experience in executive management, marketing, engineering, business development, sales, consulting, and executive advising. Including Owl Autonomous Imaging, Mr. Gershman has served as CEO/COO and a Board Director for three companies, he knows what it takes to lead a vision to reality – having led successful exits with acquisitions by Intel and PMC-Sierra.

WHAT IS THE BACKSTORY OF OWL AI?

The foundation of Owl's technology was created under a challenge grant from the US Air Force to track ballistic missiles in flight. Leveraging this technology and the associated patent portfolio, Owl has developed a monocular Thermal Ranging™ camera that provides HD Thermal video with precision ranging that delivers a 150x better spatial resolution than LIDAR (500x that of Radar). A number of our team members come from Kodak where they helped to develop the first commercial digital cameras and first optical scanner. With regards to thermal imaging our team has developed two thermal cameras that are currently deployed in space. The team also recently competed a military uncooled thermal design for one of the most advanced military grade thermal cameras developed to date.

WHAT PROBLEMS/CHALLENGES ARE YOU SOLVING?

We are basically improving sensing and perception of living things such as humans and animals with our 3D dense range map regardless of time of day and regardless of visual impairments such as fog, rain, sleet, snow, exhaust, glare and speed to name some.

WHAT MARKETS DOES OWL ADDRESS TODAY?

Owl addresses automotive safety markets such as ADAS and AV's, industrial off-road markets that require robotic mobility and select military applications. With regards to automotive safety. automatic emergency braking (AEB) has quickly evolved as a must have feature. This capability has now moved from not just automated braking of large objects like cars, busses or trucks but braking for pedestrians and animals. This is known as Pedestrain AEB. Though these systems have been shown to dramatically reduce accidents the current class of systems completely fail when operating at night. Testing completed earlier this year by the Insurance Institute of Highway Safety (IIHS) reported a 32% reduction in pedestrian crashes for systems enabled with PAEB versus those without during the day. However, they also found absolutely no difference in crash rate when operating at night. A complete fail. That is where Owl AI comes in.

WHAT MAKES OWL AI AND OWL AI'S PRODUCTS UNIQUE?

Owl's new monocular ranging sensor system, called the Thermal Ranger, outputs a megapixel (MP) of thermal (night vision) video in parallel with optically fused, 3D range-maps that are similar in appearance to LiDAR and radar range map formats, but delivering orders of magnitude more data points per second. Owl's solution is analogous to recent announcements of 3D single camera computer vision systems operating in the visual domain; however, Owl's Thermal Ranger is unique as it delivers rich detail and 3D response day or night, including operation in extreme visually impaired environments known as DVE.

CHUCK GERSHMAN
CEO AND CO-FOUNDER

The Thermal Ranger is composed of a first of its kind Megapixel Digital Focal Plane Array (MP-DFPA) semiconductor chip producing nearly four times the resolution of today's analog-based VGA thermal cameras. The Thermal Ranger also includes a multi-aperture optical component (MLA), and a suite of Convolutional Neural Network (CNN) ranging software for true thermal computer vision. The sensor operates in the thermal spectrum (longwave Infrared) allowing it to see the world clearly, in high-resolution, through adverse DVE and any lighting condition for instant classification and 3D location of pedestrians, cyclists, animals, vehicles, and other objects of interest. This is a true no light system, not to be misconstrued with a low light camera (NIR or SWIR).

This low cost, compact, single lens (monocular) system outputs megapixel HD thermal video producing vivid clarity, while simultaneously generating 3D range maps of up to 90 million points per second, which is orders of magnitude more angular and spatial resolution than LiDAR or radar sensors. For PAEB systems, the novel MLA enables simultaneous capture of both wide angle and telephoto fields of view (FOV) through a single main lens providing wide angle curb to curb response (100 degrees) while enhancing 2D long-range response to well beyond 300 meters and delivering high accuracy 3D range response at distances of over 185 meters. Removal of the MLA along with installation of a telephoto lens with a FOV idealized for long haul highway scenes results in the system being idealized for long haul AV trucking applications with object detection response up to 400m well beyond any other sensor available today including LiDAR.

WHAT'S NEXT FOR OWL AI? OR WHAT IS OWL AI'S FUTURE DIRECTION?

Owl currently has paying customers. Owl recently completed a Series A financing round of $15M to help us accelerate our development and we are focused on executing on our technology roadmap and expanding our go-to-market resources. We are starting to engage higher volume opportunity customers as well as identify and plan for future optimizations of our roadmap with key customer input. We believe our solution is cost effective today and we will continue to align our products with a strong value proposition over the long term.

ADDITIONAL THOUGHTS?

We believe that today's ADAS, AV and Robotic Mobility systems will be improved through the sensor diversity achieved by adding this fourth sensor modality. Lastly, our solutions are being designed with automotive quality standards in mind and we intend to meet the needs of the massive opportunity in this market.

PORTFOLIO COMPANY NEWS
ERIDAN COMMUNICATIONS, INC.

O'Melveny Represents Eridan Communications, Inc. in US$46 Million Series B Funding

May 16, 2022

SILICON VALLEY - May 16, 2022 - O'Melveny represented Eridan Communications, Inc., a 5G radio manufacturer that specializes in wireless connectivity infrastructure development, in its US$46 million Series B funding round.
The funding round was announced on May 12 and led by Capricorn's Technology Impact Fund and Monta Vista Capital, along with Social Capital, Diamond Edge Ventures, and Pilot Grove Management.

Based in Mountain View, California, Eridan is reimagining the world of wireless transmission by enabling fast, reliable, and affordable connectivity across the globe. With 28 U.S. patents issued and pending, Eridan is the first and only company to build a direct polar transmitter in gallium nitride and silicon.

The O'Melveny team advising Eridan was led by partner Warren Lazarow, counsel Melissa Wright, and associate Amanda Estep.

About O'Melveny
It's more than what you do: it's how you do it. Across sectors and borders, in board rooms and courtrooms, we measure our success by yours. And in our interactions, we commit to making your O'Melveny experience as satisfying as the outcomes we help you achieve. Our greatest accomplishment is ensuring that you never have to choose between premier lawyering and exceptional service. So, tell us. What do you want to achieve? Visit us at www.omm.com, hear what our lawyers, staff, and clients have to say in Our DNA video series, or learn more in our firm at-a-glance, annual report, and on LinkedIn, Twitter, Facebook, Instagram, and YouTube. Visit The Boardroom for our insights on pressing issues facing global corporations.

PORTFOLIO COMPANY NEWS
AlphaICs

AlphaICs raises $8 million in funding led by Endiya Partners, Emerald Technology Ventures

January 20, 2021

AlphaICs, a startup that designs and develops chipsets for processing artificial intelligence workloads, has raised $8 million in Series B funding led by Endiya Partners and Emerald Technology Ventures.

Cofounded by former Intel executive Vinod Dham, AlphaICs has developed its proprietary modular and scalable architecture Real AI Processor (RAP) which is targeted at AI processing at the edge.

Edge computing refers to a system design where processing and data storage is brought closer to the location where it is needed in order to reduce bandwidth use and improve response times.

The company said it will utilise the capital to use the funds to get its Gluon AI chip into the fabrication stage, to develop its software stack and to build solutions for its target markets.

"This funding will help us bring our first inference co-processor to the market for vision applications with low latency requirements. We are also working with strategic partners to bring innovative solutions to the Industrial, Automotive, and Surveillance markets," said Pradeep Vajram, chairman and CEO at AlphaICs.

The round also saw participation from AlphaICs' existing investors ReBright Partners and 3One4 Capital, and also Aaruha Technology Fund, IREON Ventures, Canal Ventures, JSR Corporation, CBC Co ltd and Whiteboard Capital.

AlphaICs cited analyst Omdia has forecasted that global AI edge chipset revenue will grow from $7.7 billion in 2019 to $51.9 billion by 2025 at a CAGR of 37.5%.

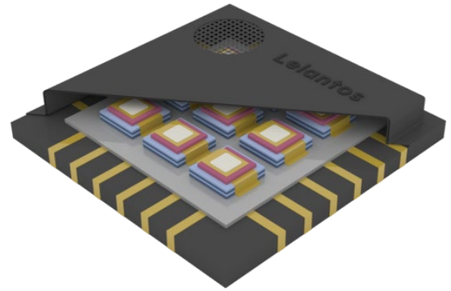
"Edge AI applications in consumer markets like high-end smartphones, wearables as well as enterprise markets like robots, cameras, and sensors will be pervasive in the next few years," said Sateesh Andra, Managing Director at Endiya Partners. "While NVidia, Google, and startups like Graphcore are poised to dominate DataCenter AI, AlphaICs has the opportunity to be a market leader in enabling AI at the Edge," Andra added.

PORTFOLIO COMPANY NEWS
LELANTOS

Lelantos Raises Seed Funds for New Era of Gas Sensing

New York, NY and Silicon Valley, CA – October 11th 2021

Lelantos, a developer of semiconductor gas sensors for Internet of Things (IoT) monitoring applications targeted to the oil and gas industry as well as heating, ventilation, air-conditioning and refrigeration market (HVACR), has raised seed funding to further develop and commercialize its patented gas sensing technology. Lelantos was recently awarded a National Science Foundation SBIR Phase II grant. Concurrently, Lelantos has also received funding from the Silicon Catalyst Angels, a group of early-stage angel investors based in Silicon Valley. The combination of the SBIR grant and the equity investment enables Lelantos to expand the team and move forward with their product development plan.



"Securing this initial funding is a very important step forward for the company," said Dr. Stylianos Siontas, CEO and co-founder of Lelantos. "Our vision is to provide pervasive environmental monitoring and safe working conditions in the oil and gas, and HVACR market. We appreciate the shared commitment from these early investment groups to enable this vision."

Lelantos was founded in 2019 by Columbia University professor, Dr. Ioannis Kymissis and Dr. Jose Bajamonde, CTO, alongside Dr. Stylianos Siontas. The foundational technology was developed in Dr. Kymissis's lab over the last 5 years. Lelantos implements a novel approach to sense the presence and identity of the target gas molecules by leveraging functionalized piezoelectric films that can be fabricated on conventional silicon microchips. This approach enables a single sensing device able to identify a myriad of target gasses while offering an unparalleled combination of size, power, and cost, enabling widespread adoption in Internet of Things (IoT) applications. The opportunity to commercialize the technology was initially enabled with the award of an NSF STTR Phase I grant in 2020.

"We are pleased to witness the strong investment support in Lelantos combined with the SBIR II grant. We have been extremely impressed by the team and their continued advancement of a technology that could have a material impact on addressing leak detection applications in the oil and gas industry. Aegex is strongly invested in this space and continually seeks innovative sensor technologies that we can support in integrating into our IoT solutions. With this milestone, we will be expanding our support and continue to commit resources to accelerate the Lelantos technical development and path to commercialization.'' said Thomas Ventulett, CEO of Aegex Technologies, LLC a global provider of certified intrinsically safe solutions targeted to the industrial market.

In April 2021, Lelantos joined the Silicon Catalyst incubator to take advantage of the expanded design and manufacturing ecosystem. The mission of Silicon Catalyst is to lower the capital expenses associated with the design and fabrication of silicon-based IC's, sensors, and MEMS devices. For over seven years, the Silicon Catalyst partner ecosystem has enabled early-stage companies to build complex silicon chips at a fraction of the typical cost. Additionally, the startups can tap into the world-class Silicon Catalyst advisor and investor network.

"Lelantos' gas sensor technology addresses a critical market that is already very large and will grow dramatically in the coming years. As a Portfolio Company in our incubator, we are pleased to see that they are making great progress in executing on their commercialization plans," said Pete Rodriguez, CEO, Silicon Catalyst.

PORTFOLIO COMPANY NEWS
SIGMASENSE

SigmaSense Closes $24M Series B Funding Round

October 6, 2021

SigmaSense LLC, an Austin, Texas-based global leader in touch sensing performance, closed a $24m Series B funding.

The company intends to use the funds to expand its reach in the touch and HMI (Human Machine Interface) markets. As part of the capital raise, Aurelio Fernandez joined SigmaSense's Board of Managers.

SigmaSense is advancing SigmaVision®, digital transformation sensing technology that provides a touchless experience for devices that uses touch sensors, from mobile phones and laptops to large monitors and digital signage.

Fernandez' experience will help support the rapid scaling of SigmaSense over the next 18 months as the company deploys its semiconductor and software solutions across a wide range of sensing applications spanning automotive, mobile phones, and laptops to digital signage and kiosks.

Fernandez has been active in the semiconductor industry, most recently as a startup investor. Earlier in his career, he helped establish Broadcom as its first VP of Worldwide Sales, the period in which Broadcom expanded from $35 million to over $1 billion in sales in three years. Prior to Broadcom, Fernandez held sales roles at Exar Corporation, IC Works, VLSI Technology and Intel. He holds a Master of Business Administration from Florida Atlantic University and a Bachelor of Science in Electrical Engineering from the University of Florida.

SigmaSense Showcases Industry First Interactive Experiences at SID Display Week 2022

May 9, 2022

San Jose, CA - SigmaSense® today announced plans for public demonstration of previously impossible touch sensing functionality at SID Display Week 2022, Booth #1140, San Jose, CA. SigmaSense patented invention uses current and frequency-based sensing to radically redefine interactive displays, continuously capturing insights that transforms how the physical world interacts with digital systems.

SigmaSense will showcase a range of breakthrough sensing features that enable previously unimaginable user experiences for mobile devices, digital signage, AV, automotive cockpit, POV, and industrial applications where the company has been engaged with early adopter customers and partners during the last 12 months.

Featured Demos: Previously Impossible Experiences
The SigmaSense booth will feature demonstrations that open doors to a new universe of design choices for display product creators innovating creative options for new user experiences.

- Redefined sensor fusion and channel sharing with a single controller. Enables simultaneous operation of touch display area, buttons, sliders and/or dials, replacing mechanical switches with functions on the edge, top or backside of a device. Sensors can now share multiple channels, and reuse of channels, with software definition of multiple sensing functions via a programmable touch controller.
- Unprecedented edge sensing for edge-based buttons, eliminating bezels. Bezel-less solution for touch panels using PEDOT sensors with SigmaSense touch control delivering reliable high performance touch edge to edge, and over the edge. Enables accurate sensing over curved and rounded edges for OLEDs, and ideal for laptops, tablets, and phones.
- Impossible accuracy for physical buttons, sliders, and dials on touch surfaces. Add actuators/buttons with perfect operation of the touch surface using a single touch controller. Ideal to customize user experience where physical touch feedback is key.
- Redefined thin for foldable OLED designs with durable PEDOT high optical quality solution. Reliable touch operation on a flexible sensor that is foldable. Touch operation without degradation at the folding point (crease) while in folded position, as well as when the touch sensor is folded.
- Inventive multi-user touch ID with independent interactions for touch, hover, and presence operation. Industry first for user differentiation on a touch panel, ideal for applications such as identifying drivers vs. passengers in the automotive cockpit or players on a multiplayer gameboard.

SigmaSense Innovations
SigmaSense is redefining sensing with a programmable and adaptive approach that provides a more responsive and accurate link between digital systems and the dynamically changing physical world. AI based systems that focus on user experience require more sensing data with better accuracy. SigmaSense is leading the industry with faster, more efficient solutions. In 2021, SigmaSense was awarded SID Display Week Display Component of the Year Award for its first product, an innovative large screen touch controller, the SDC100.

SILICON STARTUP SOLUTIONS

PORTFOLIO COMPANY NEWS
SIGMASENSE

About SigmaSense
SigmaSense leads a fundamental technology transformation of the interaction between digital systems and the physical world, ushering in a new era of radically enhanced digital sensing. SigmaSense software defined sensing achieves breakthrough levels of speed, accuracy, resolution, and noise immunity previously deemed impossible. Sensing through the noise, SigmaSense increases the depth and quantity of data and insights that can be captured from the physical world to enable exciting new experiences and capabilities in a wide range of devices including automotive, mobile, and industrial IoT touch displays. SigmaSense is funded by strategic investors including Foxconn, LG-MRI, E ink, Corning, and GIS. SigmaSense is headquartered in Austin, TX, with offices in Boise, Idaho and Taipei, Taiwan.

Interactive Scape and SigmaSense to Showcase the Future of Interactive Experiences at ISE 2022

May 3, 2022

BARCELONA, Spain – 3rd May 2022 – Interactive Scape and SigmaSense® today announced plans to showcase revolutionary interactive multi-touch digital experiences at Integrated Systems Europe 2022, Booth 2K85, May 10-13, Barcelona. Together the companies will demonstrate Interactive Scape's tangible AI technology based on SigmaSense enabled high-fidelity multi-touch sensing, a world first high-performance interactive tabletop with smartphone recognition, object detection and an extra-sensitive multi-touch surface.

"Interactive Scape's game-changing neural sensing technology leverages the revolutionary impact of SigmaSense software-defined sensing with the speed, accuracy and noise immunity to enable previously impossible experiences on large screens with object detection and identification," says Rick Seger, CEO of SigmaSense. "SigmaSense captures high-speed, high-resolution data from the physical world to support AI, object recognition, and machine learning algorithms for new HMI sensations and exciting new interactive experiences."

Hauke Helmer, CEO and founder of Interactive Scape, says: "The fundamental sensing technology breakthroughs achieved by SigmaSense support us in getting more out of technologies we have been using for over a decade. With new levels of high-fidelity data, we can finally make the most of Interactive Scape's AI-based neural sensing technology to create incredibly responsive applications and world-class object recognition. We look forward to presenting future proof interfaces and connecting the digital with the tangible in exciting new ways."

SigmaSense sensing technology captures multi-touch sensor data and drastically improves the speed of data transfer up to 300 hertz. This enables Interactive Scape to dive deeper into the research and development of new solutions, fully utilizing the capabilities of artificial intelligence to create state-of-the-art applications and use cases. Using machine learning with neural networks, technological experts from both companies are working to adapt machines to human interaction, not the other way around. The result is groundbreaking innovations, including Scape X® Mobile smartphone recognition and extra-sensitive multi-touch surfaces. The high-performance sensing and noise reduction also make touch and object recognition on LCD and bonded OLED and QLED displays possible, for even more immersive user experiences and a perfect view of content from any angle.

About Interactive Scape
Interactive Scape researches and develops innovative hardware and software that seamlessly combines physical objects with the unlimited possibilities of the digital world. As digital pioneers and world leaders in object recognition technology, the Berlin-based company provides unique, tangible data visualization and software solutions for exceptional user experiences and intuitive human-machine interaction.

PORTFOLIO COMPANY NEWS

QUADRIC

Quadric Announces $21M to Advance Its Disruptive Edge AI Platform

Burlingame, CA, March 16, 2022

Series B Funding Expands Quadric's Product Roadmap and Scope of Product Capabilities

Quadric, the company building the industry's most advanced high-performance edge processing platform optimized for on-device AI at the network edge, announced today a $21M Series B funding round. NSITEXE, Inc., a group company of a leading mobility supplier DENSO, led the round with major investment from MegaChips. Existing investors Leawood VC, Pear VC, Uncork Capital, and Cota Capital also participated in the round.

Quadric's unique ability to handle both neural backbones and classical dynamic data-parallel algorithms in a unified architecture is helping to create AI for everyone, everywhere. Most other solutions combine high-power CPU clusters with application specific NPUs. Quadric's unified architecture is flexible enough to accelerate the entire application pipeline without the need for a powerful CPU.

"It's an exciting time to be able to partner with industry powerhouses in semiconductors and AI to bring accelerated computing to the Edge," said Veerbhan Kheterpal, Co-founder and CEO of Quadric. "The market is saturated with rigid accelerators. Our product fills the void with a fully programmable multi-kernel processing architecture."
The investment will enable the company to release the next version of their novel processor architecture, improve quadric SDK performance, and roll out Intellectual Property (IP) products for integration in System on Chips (SoCs). Quadric's second-generation architecture will improve topline performance, consume less power, and maintain the familiar m.2 form factor for developer use and deployments. Samples of second-generation silicon products will be available at the end of this year. Quadric will expand the team and hire in these key product areas. Visit quadric.io/team to learn more.

"As the AI market matures, businesses are under pressure to accelerate machine learning initiatives and need production-ready, easy-to-deploy AI solutions that don't require building from the ground up," said Tony Cannestra, director of Corporate Ventures at DENSO. "Having evaluated Quadric's q16 processor, its ability to run many types of algorithms efficiently and flexibly allows Quadric's platform to enable AI in new services and products. We look forward to continuing to work closely with Quadric and plan to integrate their IP into DENSO's SoC products."

"Our continued investment into an Edge AI leader like Quadric reflects our commitment to supporting disruptive AI-based on-device edge computing solutions," said Douglas Fairbairn, Director of Business Development at MegaChips. "Their stellar team, market traction with important customers and innovative edge AI solution all contributed to our decision to invest in Quadric. We are proud to work with Quadric to bring its end-to-end architecture products to our mutual customers in the form of customized silicon."

About Quadric
Quadric is building a unified, end-to-end hardware and software architecture optimized for on-device AI computing at the network edge. Quadric offers an integrated full-stack software and hardware platform with optimized algorithms and next-generation processor technology that delivers unmatched capabilities and efficiency across applications for high-performance edge computing. With AI becoming a business necessity in the global economy, customers need complete AI solutions deployed at scale. Leveraging an integrated full-stack platform, including best-in-class AI models, software and hardware, Quadric enables the deployment of the most impactful AI applications in the world. Quadric's unique ability to handle both neural backbones and classical dynamic data-parallel algorithms in a unified architecture is helping to create AI for everyone, everywhere. Learn more at quadric.io.

PORTFOLIO COMPANY NEWS

QUADRIC

Quadric Appoints Former ARM Vice President Steve Roddy as Chief Marketing Officer and Accelerates the Licensing of Its GPNPU Architecture

May 5, 2022

Quadric, a leading processor technology intellectual property (IP) licensor, today announced that Steve Roddy, a former vice president with Arm's machine learning group, has joined the company's executive team as chief marketing officer (CMO). Coinciding with this executive appointment, Quadric also announced that it is bringing its edge AI processor architecture to market as a licensable intellectual property (IP) product.

STEVE RODDY
CMO - QUADRIC

Roddy brings more than 30 years of marketing and product management expertise across the machine learning (ML), neural network processor (NPU), microprocessor, digital signal processor (DSP) and semiconductor IP industries. He joined ARM in 2018 as vice president in the Machine Learning Group. Prior to Arm, Roddy served in VP roles in IP licensing businesses at Tensilica (Cadence Design Systems) and Amphion Semiconductor, as well as earlier product management roles at Synopsys, LSI Logic and AMCC. Roddy holds a Bachelor of Science degree in electrical engineering from the University of California, Berkeley, and an MBA from UCLA.

"Steve's exceptional IP product knowledge and licensing go-to-market vision will strengthen our continued momentum in becoming one of the world's leading processor architectures for on-device ML inference," said Veerbhan Kheterpal, co-founder and CEO of Quadric. "As Quadric launches the availability of its processor architecture as a licensable IP product and expands its reach across global markets, Steve's expertise and leadership will be vital to take the company to the next level."

"Joining Quadric presents a tremendous opportunity to apply my NPU and DSP expertise to what lies ahead for both Quadric and the overall industry," said Steve Roddy. "Quadric's architecture—already proven in silicon—is the only new processor that can efficiently run both DSP code and machine learning graph inference on the same core. The massive increase in software developer productivity gained by having only one toolchain and one core to program, manage and debug is market changing. I am excited to join the highly accomplished and committed Quadric team at a time when on-device AI computing is catapulting the processor market forward."

GPNPU – A New Category of Processor IP
The Quadric architecture is the industry's first general-purpose neural processing unit (GPNPU). Quadric's architecture delivers high ML inference performance but—unlike other neural network accelerators that support a limited number of ML graph operators—the Quadric solution also has a general-purpose control and signal processing capability, blending the best attributes of NPU accelerators with DSPs. Quadric GPNPUs can run both neural net graphs and C++ code for signal pre-processing and post-processing.

"In embedded applications, neural networks are usually found alongside classical computer vision, image processing and signal processing algorithms," said Jeff Bier, founder of the Edge AI and Vision Alliance. "Quadric's approach of addressing both neural network and other types of algorithms with one processor is quite interesting. I look forward to hearing more about the GPNPU from Quadric in their presentation later this week at the Embedded Vision Summit."

Quadric's unique ability to handle both neural backbones and classical dynamic, data-parallel algorithms in a unified architecture will help create AI for everyone, everywhere. Quadric's unified architecture is flexible enough to accelerate the entire data pipeline without the need for complex multicore subsystems and multiple toolchains.

Future Proof SoC Designs
The Quadric GPNPU offers an unmatched degree of flexibility for semiconductor companies selecting processor IP for their new system-on-chip (SoC) developments. Silicon vendors today have to select and license processor engines that will ship in devices sold years from now and be programmed by developers for years after. As machine learning algorithms evolve, Quadric's GPNPU delivers future-proof programmability to run new neural net operators or new C++ code to match the future needs of both data scientists and embedded developers.

PORTFOLIO COMPANY NEWS
SPARK MICROSYSTEMS

SPARK Microsystems Announces CDN$7.1 Million Funding From Sustainable Development Technology Canada for Improved Energy Efficiency In Wireless Devices

Montreal, Canada, March 31, 2022

SPARK Microsystems' UWB short-range wireless technology dramatically reduces energy consumption for connected devices, enabling longer battery lifecycles and reduced waste

SPARK Microsystems, a Canadian fabless semiconductor company specializing in next-generation ultra-wideband (UWB), today announced its receipt of CDN$7.1 million in funding from Sustainable Development Technology Canada (SDTC) designated for the advancement of clean technology innovations. Proceeds will be used to drive the development and commercialization of SPARK Microsystems' extreme low power, low latency, high data rate wireless UWB transceivers, targeting a host of wireless connectivity and mobile applications spanning IoT sensing, gaming, audio, AR/VR/XR and metaverse-enabling technologies. SDTC also issued a related announcement.

SPARK Microsystems' UWB technology delivers orders of magnitude performance advantages compared to legacy short-range wireless connectivity platforms, providing 10X more data throughput, 60X lower latency, and 40X lower power consumption than Bluetooth/BLE. These performance attributes are essential for enabling the next generation of wireless connected mobile devices optimized for extreme energy efficiency, driving a significant reduction in battery usage and replacement that ultimately reduces landfill waste, CO2 emissions and other toxic environmental contamination.

Leah Lawrence, CEO of SDTC said, "As the number of wireless devices we use in our daily lives continues to rise, so does the energy needed to charge them. SPARK Microsystems' high-performance transceivers promise to reduce the power consumption of wireless devices, saving energy and reducing emissions. With this investment, SDTC is proud to support SPARK Microsystems as they continue to innovate their third-generation product."

"The accelerating proliferation of IoT sensors and personal connected devices requires a new approach to wireless connectivity that maximizes energy efficiency and reduces environmental impact, while simultaneously providing a huge leap forward in throughput and latency performance," said Fares Mubarak, CEO, SPARK Microsystems. "This new funding and the previous SDTC funding in 2017 acknowledges SPARK's steadfast commitment to sustainability and sets the stage for our world class team based in Quebec, Canada, to develop innovative solutions for future battery-less devices powered by energy harvesting technologies."

SDTC helps Canadian companies develop and deploy competitive, clean technology solutions to help solve some of the world's most pressing environmental challenges: climate change, clean air, clean water and clean soil. Since its inception, SDTC has invested over $1.38B in leading innovative companies, helping to reduce greenhouse gas emissions by an estimated 22.4 megatonnes annually – the equivalent to taking almost 7 million cars off the roads every year.

About SPARK Microsystems
SPARK Microsystems is a fabless semiconductor company that is leading the way toward ultra-low power wireless communications for high-performance personal area networks and IoT-connected devices. With its patented technologies, SPARK Microsystems is bringing to market a next-generation ultra-wideband wireless transceiver that allows for orders of magnitude improved power consumption, latency and more accurate ranging and positioning, while providing higher data rates than competing technologies. For more information, please visit sparkmicro.com.

PORTFOLIO COMPANY NEWS
SPARK MICROSYSTEMS

WPG Americas Inc. Expands Wireless Communication Solutions with SPARK Microsystems Next-Gen Ultra-Low Power Ultra-Wideband Products

SAN JOSE, Calif., May 12, 2022 /PRNewswire/

WPG Americas Inc. (WPGA) a subsidiary of WPG Holdings, the largest global electronic components distributor, announced today it has signed a new sales distribution agreement with SPARK Microsystems, a fabless semiconductor company leading the way towards ultra-low power, ultra-low latency wireless communications.

With its patented technologies, SPARK Microsystems delivers orders of magnitude improved bandwidth, latency and power consumption compared to legacy wireless protocols.

"SPARK Microsystems strengthens our total IoT solutions for our customers with the addition of their highly competitive ultra-low power and low-latency wireless communications products for connected devices," said Chris Miller, President of WPGA.

"We are very excited to have WPG as a sales partner for SPARK Microsystems in the North America region," said Tom Spade, Chief Revenue Officer of SPARK Microsystems. "WPGA is an excellent addition to our sales channel and represents a great opportunity for SPARK Microsystems to extend adoption of our UWB products in AR/VR, audio and IoT Sensor markets."

The SPARK Microsystems SR1000 series is comprised of two UWB wireless transceiver ICs, the SR1010 and SR1020. Both take full advantage of Ultra-Wide Band (UWB) technology to simultaneously deliver industry-leading energy efficiency, latency, and bandwidth:

- Data rates of up to 10 Mbps @ 1.5 nJ/bit energy efficiency
- 2 mW power consumption while transmitting and receiving 1 Mbps, scaling to 6 uW at 1 kbps
- Ultra-short wireless latency (50 µs for 1 kb)
- Time-of-flight positioning at 30 cm accuracy

To showcase the transceiver's capabilities and speed the prototyping of an initial design, SPARK Microsystems provides a range of demonstration boards, evaluation kits and reference designs. The evaluation boards provide a means of measuring many of the key operating parameters, such as link margin, latency, and power consumption.

About WPG Americas Inc.
Headquartered in San Jose, CA, WPG Americas Inc. is a member of WPG Holdings, a $27.8B worldwide distributor of semiconductors, passive, electro-mechanical and display products. Founded in November 2007, WPGA is a franchised partner for leading technology suppliers. As a member of WPG Holdings, WPGA is uniquely positioned to offer total solutions to its diverse customer base. WPGA continues to introduce new leading-edge technologies, quality service and design-in focus through its superior engineering programs. For more information, visit www.wpgamericas.com.

PORTFOLIO COMPANY NEWS
OCULI

Edge AI and Vision Alliance Announces 2022 Vision Tank Winners

NEWS PROVIDED BY Edge AI and Vision Alliance May 18, 2022

Hummingbirds AI and Oculi Recognized for Innovation and Excellence in Edge AI and Computer Vision

The Edge AI and Vision Alliance today announced the winners of the 2022 Vision Tank competition at the Embedded Vision Summit. The annual start-up competition, which showcases the best new ventures using visual AI and computer vision in their products, invited five finalist companies to pitch their company and product to judges in front of the Summit audience.

JUDGES' AWARD: Hummingbirds AI

Hummingbirds AI is an award-winning computer vision hub, creating privacy-first solutions for security and efficiency of enterprises, including GuacamoleID, a "FaceID for computers." As a cloud-independent app, it's an on-device authentication tool using video-based biometrics for authenticating workers or customers. https://hummingbirds.ai

AUDIENCE CHOICE AWARD: Oculi

Oculi is putting the "human eye" in AI. After decades of limited evolution, Oculi has charted the path to optimal machine vision starting with the OCULI SPU, the only Software-Defined Vision Sensor on a single chip that delivers actionable data with up to 30x improvement in the fundamental power-latency trade off. https://www.oculi.ai

We received numerous outstanding Vision Tank entrants this year! Our judging panel and our audience had the tough task of selecting the winners. "We are pleased to recognize and congratulate Hummingbirds AI and Oculi for their achievements," said Jeff Bier, Founder of the Edge AI and Vision Alliance and General Chairman of the Embedded Vision Summit. "These winners reflect the growing pace of innovation fueled by edge AI, deep learning and computer vision. Hummingbirds AI and Oculi clearly stood out for their technical innovation, as well as excellence in their business plans, teams and market potential."

The winner of the Vision Tank Judges' Award will receive a $5,000 cash prize, and both winners will receive a one-year membership in the Edge AI and Vision Alliance. In addition, the companies received valuable introductions to potential investors, customers, employees and suppliers.

Finalist video pitches are available at https://embeddedvisionsummit.com/vision-tank.

The Embedded Vision Summit, which was held this year May 16-19, is operated by the Edge AI and Vision Alliance, a worldwide industry partnership bringing together technology providers and end-product companies to accelerate the adoption of edge AI and vision in products. More at https://edge-ai-vision.com.

Putting the 'Human Eye' in AI

PORTFOLIO COMPANY NEWS
TRAMETO

Trameto secures second round funding from Development Bank of Wales and u-blox AG

Chepstow, UK, 9 May 2022

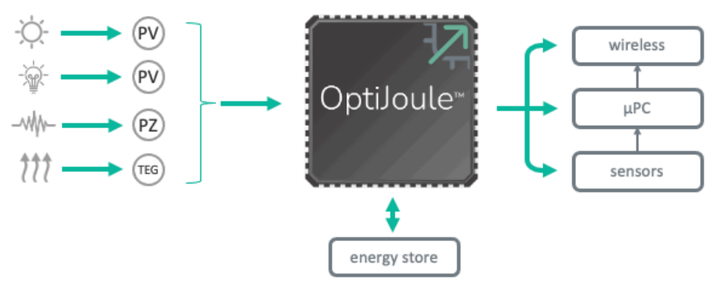
Trameto, the innovator of smarter energy harvesting power management ICs (EH PMIC), announced today it has successfully closed the second round of seed funding with investment partners the Development Bank of Wales and u-blox AG (SIX:UBXN), a leading global provider of positioning and wireless communication technologies and services. Development Bank of Wales is an existing equity investor and board observer, and u-blox AG will also join the board as an observer.

Commenting on the investment, Huw Davies, CEO and co-founder, says, "This funding round enables us to embark on the next part of our journey to engage more widely with the market to complete and promote our OptiJoule® energy harvesting PMIC solutions. Meeting the demand to remove or reduce the reliance on batteries used in wireless IoT devices is one of the initial application markets we are addressing. OptiJoule's harvester-agnostic and autonomous approach offers considerable design flexibility and BOM cost savings for IoT device manufacturers."

Trameto previously received investment from the EU Horizon 2020 research and innovation programme, believed to be the first Welsh company to benefit from the SME Instrument Phase 2 grant initiative. Trameto is also the first European company to be accepted into the Californian-based Silicon Catalyst, the world's only incubator programme focused exclusively on accelerating semiconductor startups. Trameto's energy harvesting technology recently gained further industry recognition by winning the Elektra 2021 Power Product of the Year award.

"We're delighted to participate in Trameto's second round of seed funding," states Dr. Richard Thompson, Senior Investment Executive, Development Bank of Wales. "Incorporating batteries in an industrial sensor effectively locks in the need to regularly replace them, disrupting production and contributing to high through-life operating and maintenance costs. Trameto's OptiJoule EH PMICs offer the simplest, most effective, and economical way to create self-sustaining wireless IoT solutions. Huw and the team have made exceptional progress and we look forward to working with Trameto, Silicon Catalyst and now u-blox as our new corporate co-investor."

Tony Milbourn, Corporate Strategy, u-blox AG comments, "Trameto has a clear vision to help manufacturers adopt an alternative approach to powering IoT devices. Unlike existing energy harvesting techniques that require significant design effort for different harvester types, OptiJoule autonomously adapts to any, many, and multiple harvester technologies."



Silicon Catalyst Expands Ecosystem with 5 New IKPs

Silicon Valley, California - March 28, 2022

Silicon Catalyst welcomes newest In-Kind Partners: 360Work, CentralApp, Cliosoft, HDL Design House and InteliSpark

Silicon Catalyst, the world's only incubator focused exclusively on accelerating semiconductor solutions, announced the addition of 5 companies to the comprehensive In-Kind Partner program, including 360Work, CentralApp, Cliosoft, HDL Design House and InteliSpark.

Silicon Catalyst has a created a network of In-Kind Partners (IKP) that lowers the capital expenses associated with the design and fabrication of silicon-based ICs, sensors, and MEMS devices. With this announcement, the number of Silicon Catalyst IKPs totals 55 companies, offering advanced design tools and services from a comprehensive network of In-Kind Partners (IKPs). The startups in the Silicon Catalyst Incubator utilize IKP tools and services including design tools, simulation software, design services, foundry PDK access and MPW runs, test program development, tester access, along with banking and legal services.

"Since our launch in 2015, Silicon Catalyst has equipped startup companies in the semiconductor industry with tools and services to launch new, innovative technologies. Having these companies join our IKP ecosystem further enables Silicon Catalyst's mission to empower new semiconductor companies and assist them in delivering solutions to tackle the industry's greatest challenges," stated Tarun Verma, Managing Partner at Silicon Catalyst.

360WORK is a modern AI-powered recruitment platform for hiring top-quality tech talents. The platform combines machine learning and human intelligence to offer an efficient and cost-effective hiring solution across semiconductor, deep-tech, software, data-science and a few other business sectors. We are passionate about startups and know how critical it is for them to hire the right people and put together the ideal team early on in their journey. 360Work understands that startups don't have time to go through hundreds of CVs or conduct ineffective interviews, and they can't afford to recruit the wrong person. 360WORK was created to provide the most efficient and cost-effective employment solution in the tech sector.
www.360WORK.com

SILICON STARTUP SOLUTIONS

CentralApp is a West Virginia-based firm connecting companies with certified, affordable tech workers in Appalachia. Founded by West Virginians with deep roots in the tech world, CentralApp offers a network of onshore certified technology professionals to offer expert - and affordable - assistance in developing and configuring enterprise level platforms and tools including Salesforce and Hubspot.
www.centralapp.us

HDL Design House was founded in 2001 to address the challenges in SoC implementation that our customers face, empowering their overall experience and allowing them to be confident that the various system components have been fully and reliably engineered and tested. HDL Design House provides products and services in the area of digital design and verification, analog design, back end, IP/VIP development. The company has significant experience with ARM based SoC and was recognized as an ARM Approved Design Partner.
www.hdl-dh.com

Cliosoft software helps deliver quality products to market faster by enabling collaborative design data management, IP management, and IP reuse. Cliosoft enables semiconductor companies, universities, and institutions to create innovative products that are shaping today's digital and analog world. Used by 400+ customers worldwide, Cliosoft software helps deliver quality products to market faster by enabling collaborative design data management, IP management, and IP reuse. Cliosoft customers include the top 20 semiconductor companies worldwide.
www.cliosoft.com

InteliSpark helps the innovative companies of tomorrow grow.

InteliSpark specializes in securing non-dilutive funding for start-ups through the Small Business Innovative Research (SBIR), Small Business Technology Transfer (STTR), and other government research funding programs. The company was formed in 2016 with the mission of providing assistance to include universities, venture capital firms, and economic development programs.
www.intelispark.com

SILICON CATALYST NEWS
FLEX LOGIX

Silicon Catalyst welcomes Flex Logix as an In-Kind Partner

Silicon Valley, CA May 20, 2022

Silicon Catalyst, the world's only incubator focused exclusively on accelerating semiconductor solutions, is pleased to announce that Flex Logix® has joined as the newest member of its In-Kind Partner program (IKP). Portfolio companies in the Silicon Catalyst Incubator will have access to Flex Logix's innovative embedded FPGA (eFPGA) IP and software, enabling silicon reconfigurability for use in their chip designs.

Flex Logix's eFPGA allows chips to flexibly handle changing protocols, standards, algorithms, and customer needs and to implement reconfigurable accelerators that speed key workloads 30-100x compared to processors. The Flex Logix InferX™ AI acceleration technology is designed to provide acceleration of AI applications at the Edge of the Internet. Edge devices typically have stringent power dissipation, size and cost requirements. The InferX technology is able to compress the trillions of operations required for performing AI inferencing into a very compact and efficient AI accelerator.

> designed to provide acceleration of AI applications at the Edge of the Internet

"Silicon reconfigurability provides any chip designer flexibility to support changing system requirements whether it's for proprietary encryption algorithms, unique interfaces or accelerators tailored for specific, individual workloads," said Andy Jaros, VP IP Sales and Marketing for Flex Logix. "We're excited to provide Silicon Catalyst Portfolio companies the ability to leverage RTL flexibility to get to market faster. Using our eFPGA, they can tape out their chips while key algorithms are still in development as well as broaden their chip's addressable market through chip customization for unique end application requirements."

Silicon Catalyst has a created a network of In-Kind Partners (IKP) that lowers the capital expenses associated with the design and fabrication of silicon-based ICs, sensors and MEMS devices. With this announcement, the number of Silicon Catalyst IKPs totals 56 companies, offering advanced design tools and services from a comprehensive network of In-Kind Partners (IKPs). The start-ups in the Silicon Catalyst Incubator utilize IKP tools and services including design tools, simulation software, design services, foundry PDK access and MPW runs, test program development, tester access, along with banking and legal services.

"We're excited to have Flex Logix join our IKP ecosystem, as the opportunities for advanced solutions targeting IoT, wireless, AI / ML, and the metaverse require high-performance and on-chip adaptability to meet the changing market needs. Their embedded FPGA technology will enable a new class of solutions for companies in our incubator," stated Pete Rodriguez, CEO at Silicon Catalyst.

Flex Logix is a reconfigurable computing company providing AI inference and eFPGA solutions based on software, systems and silicon. Its InferX X1 is the industry's most-efficient AI edge inference accelerator that will bring AI to the masses in high-volume applications by providing much higher inference throughput per dollar and per watt. Flex Logix's eFPGA platform enables chips to flexibly handle changing protocols, standards, algorithms, and customer needs and to implement reconfigurable accelerators that speed key workloads 30-100x compared to processors. Flex Logix is headquartered in Mountain View, California and also has offices in Austin, Texas and Vancouver, Canada. For more information, visit https://flex-logix.com.

SILICON STARTUP SOLUTIONS

SILICON CATALYST NEWS
NI

NI and Silicon Catalyst Partner to Empower Startup Company Innovations

Silicon Valley, CA and Austin, TX, December 8, 2021

Silicon Catalyst, the world's only incubator focused exclusively on accelerating semiconductor solutions announced today that NI is now a member of its In-Kind Partner (IKP) ecosystem. NI (NASDAQ: NATI) is a leading provider of software-centric automated semiconductor test solutions.

With over 40 years of experience developing automated test and measurement systems, NI's goal has always been to help engineers solve the world's toughest challenges. Within the semiconductor community, NI offers industry-leading, software-centric solutions for RFIC and mixed signal testing, from the lab to manufacturing. Companies in the Silicon Catalyst Incubator will gain unique access to NI's high-performance test hardware, software, and expertise.

"At NI, we're passionate about helping engineering teams innovate on technology while reducing time to market", said Ritu Favre, Executive Vice President and General Manager of NI. "We're excited to partner with Silicon catalyst's innovative community to tackle new measurement challenges created by cutting-edge technologies."

Silicon Catalyst has created a unique ecosystem to provide critical support to semiconductor hardware startups as they move from idea through prototype to initial product. In its seventh year of operation, Silicon Catalyst has reviewed over 600 early-stage companies and has admitted 42 startups into the incubator with an additional 29 startups in Silicon Power Technology it's Chengdu Joint Venture. These Portfolio Companies have access to tools and services from a comprehensive network of In-Kind Partners (IKPs) including design tools, simulation software, design services, foundry PDK access and MPW runs, test program development and tester access, dramatically reducing the cost of chip development. Additionally, the startups tap into the world-class Silicon Catalyst network of advisors and investors.

"For over six years, Silicon Catalyst has equipped startup companies in the semiconductor industry with tools and services to launch new, innovative technologies. Having NI join our comprehensive ecosystem of In-Kind Partners further enables Silicon Catalyst's mission to empower new semiconductor companies and find creative solutions to tackle industry challenges," stated Tarun Verma, Managing Partner at Silicon Catalyst.

About NI
At NI, we bring together the people, ideas and technology so forward thinkers and creative problem solvers can take on humanity's biggest challenges. From data and automation to research and validation, we provide the tailored, software-connected systems engineers and enterprises need to Engineer Ambitiously™ every day. More information at www.ni.com

SILICON CATALYST NEWS
VIDATRONIC

Vidatronic Joins the Silicon Catalyst Semiconductor Ecosystem as an In-Kind Partner

Austin, TX, and Silicon Valley, CA October 22, 2021

Vidatronic, Inc., a leading provider of power management, analog, and security intellectual property (IP) licenses and platform solutions, announces that it is now a member of Silicon Catalyst's In-Kind Partner (IKP) ecosystem. Through this collaboration, Vidatronic is offering companies in the Silicon Catalyst Incubator their low-power FlexGUARD™ integrated power management and analog IP platform, which includes access to Vidatronic's full silicon-proven IP portfolio.

Vidatronic's FlexGUARD™ integrated power management and analog IP platform simplifies the design process with customizable analog IP for easier and more cost-effective integration. Leveraging Vidatronic's silicon-proven IP will enable the portfolio companies to achieve unparalleled levels of performance, security, and reliability while minimizing cost.

"With nearly a decade of experience delivering advanced analog and power management IP solutions globally, we are excited for the opportunity to lend a hand to these new semiconductor start-ups and support them in achieving their innovative visions," said Moises Robinson, Vidatronic President and Co-Founder. "Our FLEXGUARD™ Platform is ideal for semiconductor start-ups because it will allow them to very quickly generate the necessary analog and power management functions within their designs, getting them to market faster and with a degree of certainty in the quality of the circuitry they might not have otherwise, since this IP is already silicon-proven."

The mission of Silicon Catalyst is to lower the capital expenses associated with the design and fabrication of silicon-based IC's, sensors, and MEMS devices. For over seven years, the Silicon Catalyst partner ecosystem has enabled early-stage companies to build complex silicon chips at a fraction of the typical cost. Silicon Catalyst has created a unique ecosystem to provide critical support to semiconductor hardware start-ups, including tools and services from a comprehensive network of In-Kind Partners (IKPs). The Portfolio Companies in the incubator utilize IKP tools and services including design tools, simulation software, design services, foundry PDK access and MPW runs, test program development, tester access, and banking and legal services. Additionally, the startups can tap into the world-class Silicon Catalyst network of advisors and investors.

"We are thrilled to welcome Vidatronic to our partner ecosystem," said Paul Pickering, Silicon Catalyst Managing Partner. "Their wealth of experience and IP portfolio, spanning many different foundries and process nodes, all the way down to advanced FinFET technologies, has them well-poised to bring immense value to our portfolio companies. We look forward to seeing Vidatronic's IP help our start-ups achieve silicon success and market growth in their target markets."

About Vidatronic, Inc.
Vidatronic, founded in 2010, provides power management, analog, and security intellectual property (IP) licenses and platform solutions for integration into customers' systems-on-a-chip (SoCs). Their patented technology enables high-performing SoCs to achieve ultra-low-power and highly efficient operation without needing external components, which lowers cost, reduces size, extends the life of the device, and improves reliability of the system while also increasing hardware security.

Vidatronic's FlexGUARD™ Platform IP portfolio includes low dropout (LDO) voltage regulators, DC-DC converters, ultra-low-power/high-accuracy voltage references, data converters, PMUs for Augmented/Virtual Reality and security applications, LED drivers, and associated circuitry for a variety of applications from consumer devices, including IoT, to enterprise markets, including servers. Vidatronic has experience in a wide variety of foundries and silicon processes from 180 nm down to 3 nm, with a history of first-pass silicon success. Licensing Vidatronic IP will get your company to market faster with lower overall cost. For more information visit www.vidatronic.com.

SILICON STARTUP SOLUTIONS

SILICON CATALYST ANGELS
INVESTING IN THE INNOVATION

Funding and Fostering the Innovations, Technologies, and Companies that will Improve our Lives

Silicon Catalyst Angels was spawned from Silicon Catalyst, the world's only incubator focused exclusively on accelerating solutions in silicon.

What makes Silicon Catalyst Angels unique is not only our visibility into an exclusive deal flow pipeline, but our membership is comprised of seasoned semiconductor veterans who bring with them a wealth of knowledge along with their ability to invest. Driven by passion and a desire to 'give back', our members understand the hardware space thanks to a lifetime of engagement in the industry. When you couple our members enthusiasm, knowledge, and broad network of connections with companies that have been vetted and admitted to Silicon Catalyst, you have a formula that is to date, non-existent within the investment community.

After launching our group in July 2019, we're pleased to announce that our members have made investments in 12 companies, 11 of which are from the Silicon Catalyst Incubator/Accelerator. The total investment amount by the members now stands at ~$2million.

Interested in joining?
Interested in pitching?

Please contact Laura Swan, VP of Business Operations.
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Board members, Raul Camposano, Amos Ben-Meir and Michael Joehren

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SILICON CATALYST ADVISOR PROFILE
DR. ATIYE BAYMAN

A conversation with a Silicon Catalyst Triple Threat as advisor, member of the Silicon Catalyst Angels investment group and as one of our University Ambassadors

One of the many remarkable assets offered by Silicon Catalyst is our extensive advisor ecosystem. Over 220 seasoned semiconductor industry veterans are available to advise portfolio companies on a range of topics, from technology, manufacturing, business development, sales, staffing, finance, as well as for corporate legal matters and intellectual property / patents.

In this piece, we spotlight Dr. Atiye Bayman. Atiye is something of a renaissance person in solid state physics. She began her career as a process engineer at AMD and then focused on yield enhancement and technology development at Synergy Semiconductor and Novellus. She then moved to solar energy, where she was CTO at MiaSolé and a fellow at MiaSole's parent company Hanergy.

Atiye has been a member of the Silicon Catalyst Advisor Network for the past 4 ½ years. She is unique in her role as Silicon Catalyst's first "Triple Crown winner"" member of its ecosystem – as an advisor, a member of the Silicon Catalyst Angels investment group and one of our University ambassadors for her alma mater, UC Santa Barbara.

Recently, Laura Swan and Paul Pickering, both Managing Partners at Silicon Catalyst, had an opportunity to conduct a "fireside chat" with Atiye. What follows is a summary of their discussion.

DR. ATIYE BAYMAN
SILICON CATALYST ADVISOR

TELL US ABOUT HOW YOU CAME TO BE INVOLVED IN THE SEMICONDUCTOR INDUSTRY, MAYBE STARTING WITH YOUR ACADEMIC YEARS WHEN YOU FINISHED UP YOUR PHD AT UCSB.

Atiye began with a discussion of her interest in physics. She grew up in Turkey. She owes her passion in technology to a talented teacher in middle school who first got her interested in science and technology. Atiye reasoned that if she studied physics she would "be able to explain everything in the world". While Atiye admits the statement is a bit naïve, it served as her motivation to study physics with the goal of becoming a university professor. After studying at an international school in Turkey, she came to the United States and received her PhD in Physics at UC Santa Barbara.

At UCSB, she became interested in quantum mechanics, with a specific focus on tunneling effects. Her PhD dissertation combined many aspects of physics and chemistry to enhance her understanding of solid-state devices. This passion led Atiye to Silicon Valley and her first position as a process engineer at AMD, focusing on bipolar technology development. While a career as a professor was still on her mind, Atiye was getting more involved with industry.

SILICON STARTUP SOLUTIONS

SILICON CATALYST ADVISOR PROFILE
DR. ATIYE BAYMAN

A conversation with a Silicon Catalyst Triple Threat

> Never assume "everyone will love your technology" just because you love it.

After AMD, she joined a startup that was largely spun out of AMD (Synergy Semiconductor) and then Novellus, where she had a broader technology development responsibility. It was time to do something else. After looking at a few options, such as LED lighting, solar technology development became her next passion. Atiye brought all her accumulated experience to this new and emerging industry.

Here, she was able to build her own team and work on highly complex technology and bring it to manufacturing through a worldwide supply chain.

HOW WOULD YOU CHARACTERIZE YOUR KEY PERSONAL AND PROFESSIONAL TAKE-AWAYS FROM THE POSITIONS YOU'VE HELD IN THE INDUSTRY?

First of all, having good technology and even a good product are not enough. Timing and overall strategy play a key role as well. Subtle interactions between parts of the supply chain and shifts in market conditions can have a big impact on success. There is always a need to focus on the "big picture" and ensure there is tight coordination between marketing and sales.

FROM YOUR EXPERIENCES WITH BOTH LARGE AND SMALL "NEW TECHNOLOGY" COMPANIES, WHAT SUGGESTIONS DO YOU HAVE FOR STARTUP TEAMS?

Going from a prototype to a product requires the ability to navigate many substantial transitions. Planning is crucial here – spend time on this and add a buffer in the schedule for unexpected events. The process of enumerating all possible challenges is quite useful. A worldwide supply chain is quite complex and can be quite unpredictable.

Never assume "everyone will love your technology" just because you love it. Listen to your customers objectively to understand what motivates them. Solar is a good example. Even though the application of technology is compelling, what are the reasons consumers will invest in it for their home?

YOU'RE NOW SILICON CATALYST'S FIRST "TRIPLE CROWN WINNER," AS ADVISOR, MEMBER OF THE SILICON CATALYST ANGELS INVESTMENT GROUP AND AS ONE OF OUR UNIVERSITY AMBASSADORS. TELL US ABOUT YOUR UCSB AMBASSADOR POSITION.

My role as an ambassador is in an early stage. I still have a good connection to my thesis advisor. He has moved from semiconductor device tunneling to medical technology. He is building sophisticated measurement technology to assess health and possible disease. I look forward to connecting Silicon Catalyst with new ventures in this area. It has great implications for our society.

The Silicon Catalyst University Program connects the world's leading universities with the Silicon Catalyst Semiconductor Startup Ecosystem. The Program pairs our alumni, advisors, ambassadors and industry partners with research professors and their students considering building a company. The result is a clear path for transforming research into startups ready to change the world.

For universities, Silicon Catalyst will provide speakers, moderators and panel experts, judges for pitch competitions, mentoring, internships via our portfolio companies, teach special subject classes, and serious entrepreneurial advice and help on starting a semiconductor company.

SILICON CATALYST NEWS

Silicon Catalyst Named a Top Ten Semiconductor Manufacturing Solution Company by Semiconductor Review

FROM SEMICONDUCTOR REVIEW OCTOBER ISSUE:

The semiconductor industry is in the midst of technological disruption highlighting the significance of reinventing chip manufacturing methods, as such forward-looking chip manufacturers are increasingly relying on leveraging the advancements in technology to realize unparalleled manufacturing efficiency, and save time.

As such, the technological transitions in the arena open up a universe of new possibilities for semiconductor manufacturing solution providers to develop and improve innovative solutions. This implies that chip manufacturers looking for competent solutions have to choose from a plethora of options.

To make this task easier and assist companies in identifying the right semiconductor manufacturing solution providers, semiconductor review presents to you, "Top 10 Semiconductor Manufacturing Solutions Providers 2021".

A distinguish panel comprising CEOs, CIOs VCs, Analysts and the Semiconductor Review editorial board has selected the most promising semiconductor manufacturing solution providers. In our selection process, we looked at the companies offerings, core competency, new/press releases, client testimonials, milestones, and other recognition.

Semiconductor Review TOP 10 SEMICONDUCTOR MANUFACTURING SOLUTION PROVIDERS - 2021

About Us

Silicon Catalyst is the world's only incubator focused on semiconductor solutions, including MEMS, sensors and intellectual property. We accelerate startups from idea through prototype, and onto a path to volume production.

We have evaluated over 600 startups worldwide and have admitted 44 exciting companies. Silicon Power Technology, our Chengdu Joint Venture, has admitted 35 additional startups in China.

Our companies participate in a 24-month customized incubation program. Each is guided closely by a Silicon Catalyst partner. This includes a semiconductor focused curriculum and over 45 events worldwide each year.

Silicon Catalyst's ecosystem provides everything our startups need to design, fabricate, and market semiconductor solutions:

• **In-Kind Partners** (TSMC, Synopsys, Advantest, Mathworks and over 50 more) – provide each startup several millions of dollars' worth of goods and services including EDA tools, IP, PDKs, prototypes, design and test services, packaging and business solutions.

• **Strategic Partners** (TI, Soitec, Bosch, Cirrus Logic, Arm, ST and Sony) – participate in the selection process and actively look for opportunities to partner with our startups.

• **Investors** – A large group of over 300 VCs, Angels, Angel groups, Corporate VCs, and Family Offices fund each journey. Silicon Catalyst Angels, created from our ecosystem also funds our companies.

• **Advisors** – A valuable network of over 200 industry experts that we match to the specific needs of each startup.

• **Universities, Industry Organizations, Incubators, and Government Agencies** – We nurture dozens of key relationships for the benefit of our portfolio companies.

Silicon Catalyst's mission is to help semiconductor startups succeed. Join us in driving innovation!

Silicon Catalyst Angels was formed to foster the startup companies admitted into the Silicon Catalyst incubator. Comprised of seasoned semiconductor veterans who bring with them a wealth of knowledge along with their ability to invest they are driven by passion and a desire to 'give back'. Our members understand the hardware space thanks to a lifetime of engagement in the industry. When you couple our members enthusiasm, knowledge, and broad network of connections with companies that have been vetted and admitted to Silicon Catalyst, you have a formula that is to date, non existent within the investment community.

A VALUABLE RESOURCE FOR THE SEMICONDUCTOR STARTUP COMMUNITY

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