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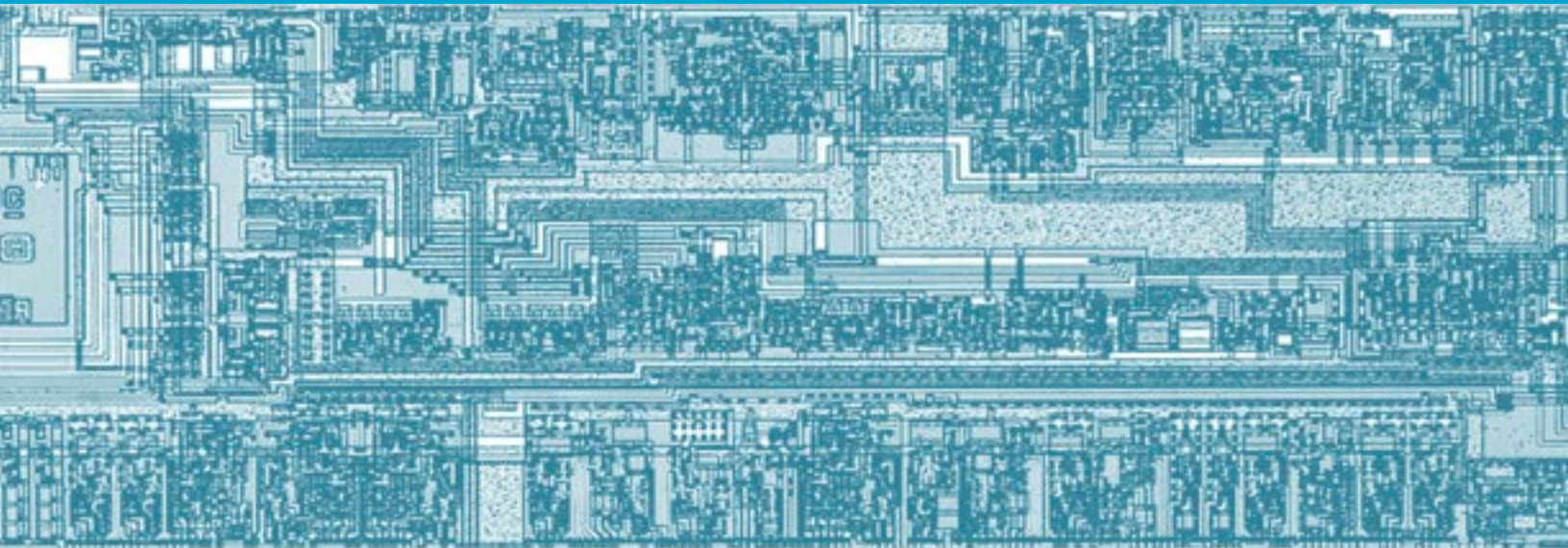
# SILICON STARTUP SOLUTIONS

it's about what's next.®

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A SILICON CATALYST NEWSLETTER

A VALUABLE RESOURCE FOR THE SEMICONDUCTOR STARTUP COMMUNITY



[www.siliconcatalyst.com](http://www.siliconcatalyst.com)

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Hard to imagine

It's hard to imagine that 6 years ago this April we held the Silicon Catalyst launch event at the Avaya soccer stadium in San Jose. Fast forward to today and we have reviewed north of 400 startup applications, admitted 37 Portfolio Companies and have built a vibrant ecosystem of darn near every important name in semiconductors. This current 42 page issue of Silicon Solutions is reflective of the size, scope, and significance of how far Silicon Catalyst has come in establishing itself as the most significant voice for semiconductor startup innovation. You will notice on page 10 that we have engaged with **over 300 investors** some of whom have participated in funding rounds of **5 of our Portfolio Companies who have collectively raised nearly \$100M** (pages 11-15).

From partner Paul Pickering's insights into MEMS, to MaryAnn Maher's musings from SoftMEMS, to the profiles on new In-Kind Partners Tessolve and OnScale there are so many positive developments surrounding our incubator, I'm reminded of my father's three words of inspiration - Up, Up, Up.

Strategic and In-Kind partner's ST's proclamation in their article that *"In joining Silicon Catalyst, ST is expanding its extensive efforts to innovate."*, is high praise from truly a titan of tech. We've added another leg to the ecosystem stool with the official announcement of our university initiative. In addition, our global expansion into Israel is bearing fruit at this time of Passover.

It's hard to imagine that co-habiting with fellow human beings would be incompatible in the presence of a microscopic microorganism such as COVID-19. The global pandemic has likely landed us squarely in the digital era, which we all saw coming, perhaps, maybe not this fast. The virus reminded us that change equals survival. In the words of Mike Tyson, 'everyone has a plan until they get hit in the mouth.' Knowing how to pivot, re-invent, or re-imagine is what makes the difference. At Silicon Catalyst, we are agents of change, as our names implies. We are a catalyst for creative thinkers who see the world through different eyes. We look to understand their vision, help them bring it into focus, and hopefully, if they're right, and we are too, together we can change the world. As our slogan says: It's about what's next.®

And who could imagine we'd be mourning the loss of Jim Hogan. RIP.

## WELCOME

CHAIRMAN'S CORNER  
RICK LAZANSKYChairman and Co-Founder,  
Silicon Catalyst  
serial entrepreneur  
and incubator fanatic

I read this last week on the website of KdT Ventures. "We also know that social capital compounds faster than cash, so we seek out long-term, deep relationships with our partners. At the end of the day, we are humans helping other humans change the world." I'm on the lookout for venture capitalists who have a fresh way of looking at the world, who are more than a source of dollars, and who want to be partners with their startups. These are the VCs who understand the importance of social capital, and who demonstrate their ability to form those relationships. Social Capital is on the other end of the scale with a very large fund and seems to me to embrace the same principles. It isn't uncommon in the venture world – perhaps a bit less among corporate VC, and a bit more among angel groups. Aspiring entrepreneurs should keep it in the foreground when seeking investors. And they should keep it equally in mind when they are not looking for investors. It's a lot like fiat currency which isn't backed by tangible assets. It's backed by the things we hopefully learn young and remain true to – integrity, honesty, compassion.

I'm writing about this primarily for the entrepreneurs. Social capital should be the foundation that reliably raises your odds of success, not just in funding, but in every aspect of your startup. It's also the foundation for Silicon Catalyst. We rely heavily on our ability to ask a lot from our partners, our advisors, and our network of investors. We are striving to build a reputation based on our ability to move early stage startups forward and being counted

upon, that no matter how early our companies are, that they're worth your time and your social capital nonetheless. It's all about trust, not only in those colleagues whom you know personally and closely, but also in those whom you don't know, but that those colleagues know, and are willing to lend a bit of their own.

"Social capital has been used to explain the improved performance of diverse groups, the growth of entrepreneurial firms, superior managerial performance, enhanced supply chain relations, the value derived from strategic alliances, and the evolution of communities." That's straight from Wikipedia, and captures what it's use. For the academics reading this, there's a lot written about the subject, and you might want to wander off and read about it at [Social Capital Research](#). Please do come back when you're done wandering.

My hypothesis is simple. You can use social capital more easily, more powerfully, and more of it than you can money in building your startup. As I'm weary of hearing why startups fail, which is usually some version of a CB Insights survey, I'll go with Wilbur Lab's survey of how founders suggest others might avoid failure.

## Founder's recommendations for Preventing Startup Failure

1. Stronger business plan
2. More financial backing/investors
3. Better marketing
4. Better Product
5. Successful pivot
6. Better team
7. Other

source: Wilbur Labs survey of 156 startup founders, December 2020

Let's look at this list as a challenge – how do you use social capital to act on these recommendations?

How do I build a stronger business plan? How about finding someone who left one of your would-be competitors and reach out to them for a conversation. Last year I was

working with some GSB students and tried exactly that. We scored 5 out of 5 great interviews on what they'd found easy, hard, and worried about the most.

More financial backing/investors? I have a decent LinkedIn profile, a couple of thousand folks most of whom I've actually met. Searching that list for "venture OR investor" resulted in 939,000 level 2 hits. That means I know at least one person who knows one of those 939,000. Typically, we share a half dozen or so. Will they invest? It doesn't matter because I don't care – what I want to do is have a handful of knowledgeable investors shoot holes in my business plan. With a carefully written, personal warm introduction by one of those common connections I typically can get an in-person meeting, and usually a good cup of coffee. And when I do want to raise money in six months, I'll come back and ask if I can pitch, with a great business plan, and the MVP we'd discussed over that coffee.

And so on for those other 5 recommendations. It did cost me – ethically I now owe some folks reciprocal help, and I'll make it the best help that I can provide, and if any of those VCs need help on something, hopefully they'll remember that I offered any favor that I can repay. I left their office a bit richer in social capital.

If you take the same approach, please remember to write a note of thanks, with specifics about what they shared. And remember to take the time to help the next entrepreneur who needs your help and comes with a warm introduction.

Looking back, there is one person to whom I'm most in debt. He was on our board at Silicon Catalyst, and he gave freely of his time whenever I asked for over twenty years. He passed away recently. He'll be missed by uncountable entrepreneurs, students and colleagues.

Rest in peace, Jim Hogan. We owe you everything.





## IN MEMORIAM

Jim Hogan: November 25, 1951 - February 27, 2021

Jim was a man who genuinely cared about many individuals and humankind. He touched many lives on a day to day basis, from his international business colleagues to the people he worked shoulder to shoulder with on personal projects. To say that Jim loved his family is a great understatement. He showed his love to them in so many ways. Jim knew that his success in life is rare and made sure that he did what he could to allow others to reach their full potential. Jim was a person of incredible character with the intricacies and complexities of any human being, but it is safe to say that care for his personal and greater community was his purpose.

Jim graduated from WC Overfelt high school in 1969. His professional life started with humble beginnings. He lived and worked in East San Jose and was employed at United Auto Stores on the corner of Story & King Road where he worked in the machine shop and at the sales counter.

Jim was a proud graduate of San Jose State University. He graduated with a Bachelor of Science degree in Computer Science/Mathematics and later earned an MBA, but his career had taken him beyond the confines of any degree. Jim's involvement with San Jose State University went far beyond his graduation. He donated and participated in the progression of the engineering department, even being chosen as the keynote speaker at an engineering graduation ceremony.

Jim had traveled all over the world as part of business, love of adventure, and appreciation of other cultures. At home he spent time with his three dogs, three cats and turtle. He was an animal lover his whole life. He also loved caring for the beautiful land which he lived on. Jim loved modern and classic cars, collecting and fixing them as much as he could. Jim also loved music. Throughout his life he was a member of many different bands. In his home he dedicated a room to playing music and his collection of instruments. He had played several notable venues including House of Blues and The Fillmore. Some of his closest bonds were made through the comradery of musicianship and they lasted a lifetime.



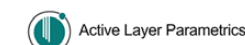
**JIM HOGAN**

Jim meant so many things to so many people. On the same day he could be in a meeting as a Fortune 500 board member, then later be riding a tractor wearing a tie dye T-shirt. To summarize Jim is an oxymoron. He loved his life and had achieved true happiness. Jim had curated experiences that not many have yet found a way to relate to every person he met. Jim's absence leaves a space that no one else can fill. His loss is tremendous which can only be expected given his presence in this lifetime. We miss and love you Jim, forever.

The family of Jim Hogan are raising donations for CASA (Court Appointed Special Advocates) in lieu of receiving any flowers. Please donate at <https://gofund.me/30213bf6> or [casaofsantacruz.org](https://casaofsantacruz.org). A memorial service for Jim will be held on September 18, 2021 COVID permitting. Details to come.



## ALUMNI



# Startups start here.

it's about what's next.®



it starts with startups.



## APPLY NOW FOR OUR "FAST TRACK" PATH

### Silicon Catalyst's Incubator Application Deadline - May 30, 2021

Silicon Catalyst is the world's only incubator focused exclusively on semiconductor solutions (incl. IP, MEMs and Sensors). We accelerate our startups from idea to prototype, and then onto a path to volume production.

We have engaged with over 400 startups worldwide since April 2015 and have admitted 37 exciting companies. Silicon Power Technology, our Chengdu Joint Venture, has accepted 21 startups in China since January 2019. Our companies participate in a 24-month incubation program; a Silicon Catalyst partner is assigned to each company to advise and advocate for them during this period.

Silicon Catalyst has created a unique and growing ecosystem which provides our startups with everything they need to design, fabricate and market semiconductor solutions.

- **In-Kind Partners** (TSMC, Synopsys, ARM, ST Micro and over 40 more) – provide each startup several millions of dollars worth of goods and services including EDA tools, IP, PDKs, prototypes, test equipment, design services, packaging and business solutions.
- **Strategic Partners** (TI, ON Semi, SOITEC, Bosch, Cirrus Logic, ARM and ST Micro) – participate in the selection process and actively look for opportunities to partner with our startups.
- **Investors** – a path to funding through a large group of VCs, Angels and Angel groups, Corporate VCs, and Family Offices. Silicon Catalyst Angels, an angel group created from our ecosystem, launched July 2019.
- **Advisors** – a valuable network of industry experts that we match to the specific needs of each startup.
- **Universities, Industry Orgs., Incubators, Government Agencies** – we nurture dozens of key relationships for the benefit of our portfolio companies and the industry.

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



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# Si SILICON STARTUP SOLUTIONS

## BUILDING A MEMS ECOSYSTEM SENSOR SIXTH SENSE



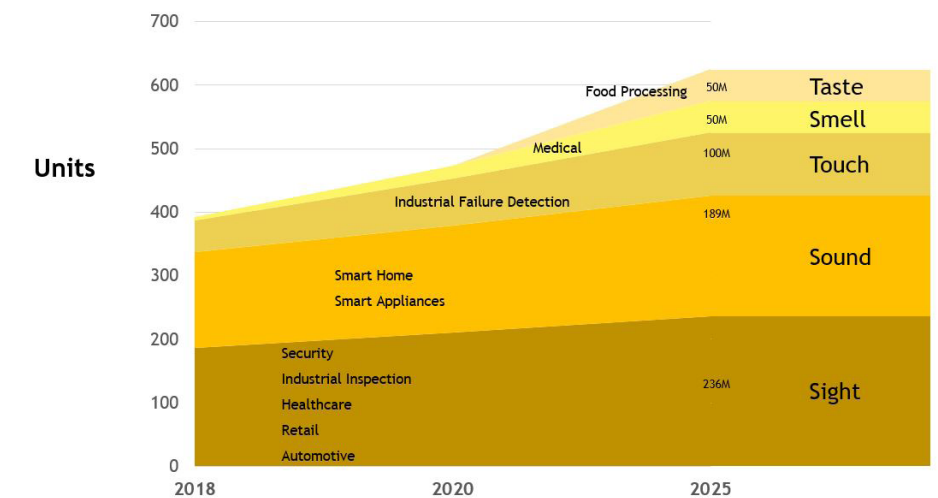
A range of new technologies that are fusing the physical, digital and biological worlds

By Paul Pickering,  
Silicon Catalyst Managing Partner

**Sensor technology has been a force in advancing industrial markets for over one hundred and fifty years.** The first sensors made of copper coils emerged in the 1860s to provide temperature stimulus for power switches on sensitive instruments and machinery. These switches provided automated protection against damage caused by excessive heat and cold. The progression from that point has been steady and extremely broad. Today, one can find sensor technology deployed in every industry and touching our lives in thousands of ways daily.

The broad adoption and widespread application of sensor technologies have benefited humanity and increased industrial efficiency so much so that it has become a major contributor to the "Fourth Industrial Revolution" as coined by world-renowned economist Klaus Schwab, Founder and Executive Chairman of the World Economic Forum. Schwab elaborated on this point in his book, The Fourth Industrial Revolution by describing the current age as being "characterized by a range of new technologies that are fusing the physical, digital and biological worlds, the developments are affecting all disciplines, economies, industries and

### Edge Intelligence Enabling Sensing



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governments, and even challenging ideas about what it means to be human." These are exceptionally large concepts that will play out on the global stage during the current decade. However, a more practical view of the current state of deployment of sensor technologies allows for some interesting conclusions about changes affecting us today at the start of 2021. This surge in sensor deployment has endless possibilities, but it has also highlighted one of the problems that have limited the effectiveness of the

technology for the past 15 decades. The problem can be described as "too much of a good thing." In most applications, sensors produce more feedback and stimulus than systems can use effectively. The common practice of most sensing systems is to log the sensor events into a massive database. The resulting data is temporarily stored and then discarded without offering the slightest insight or knowledge. Today, after more than 150 years, artificial intelligence is finally offering a path toward the creation of integrated



**PAUL PICKERING**  
SILICON CATALYST  
MANAGING PARTNER

Paul Pickering is a passionate advocate for emerging semiconductor and micro-fabrication technologies. His involvement with Silicon Catalyst as an advisor extends back to 2015. Prior to joining, he was the Chief Revenue Officer for Micralyne Inc. based in Edmonton Alberta, Canada. In August 2019, Micralyne was acquired by Teledyne Technologies. Paul is a graduate of West Chester University of Pennsylvania with a Bachelor of Science degree and attended Widener University in Chester, Pennsylvania. He is a recognized speaker at technology conferences and trade events in the semiconductor and MEMS industries.



systems that can rapidly receive the stimulus provided by sensors and present rational conclusions based on learned information. The current deployment of neural network processors and inference engines can now synthesize information from various sources to infer logical decisions. This capability is still early, and most applications are crude. The rapid change in this space is expected in the next five years as we see “edge” deployment of powerful AI devices married with sensors to create efficient “thinking” systems that take advantage of real-time sensor data and extract conclusions and feed high-quality stimulus to larger systems. The rapid advancements in artificial intelligence technologies have given rise to powerful new methods to analyze and derive novel insights from sensor data streams and external datasets. While this trend, classified as AI-Defined Sensing, is already apparent in areas like computer vision for analyzing image sensor data, these new capabilities are unlocking applications for a range of sensor types, including mechanical, acoustic, and thermal sensors, greatly increasing the utility of sensors and driving market demand. The broad set of new applications that are being considered as targets for AI implementation are accelerating the feature innovations of sensor systems. AI for analyzing sensor data will need to enable far more robust predictions and classifications using sensor signals compared to other

methods like physics-based models. This feature creep trend is already readily apparent in some use cases like computer vision. Other sensor types ranging from temperature sensors to magnetic sensors are also being impacted by this trend. One can envision a smart doorbell that contains a microphone, thermometer, and accelerometer that will be able to expand the functionality to include advanced features like fall-detection, security, kitchen safety, pool safety, lawn monitoring, and countless other convenient apps. As AI capabilities continue to improve at a rapid clip, we expect this trend to enable many new sensor applications, driving the sensor demand of the future into many hundreds of billions and even trillions of units. The 2020 forecast from Yole, the leading market research company, for the MEMS sensor industry predicts it will surpass \$17B by 2025.

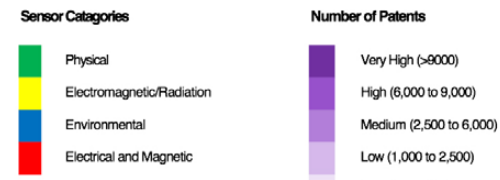
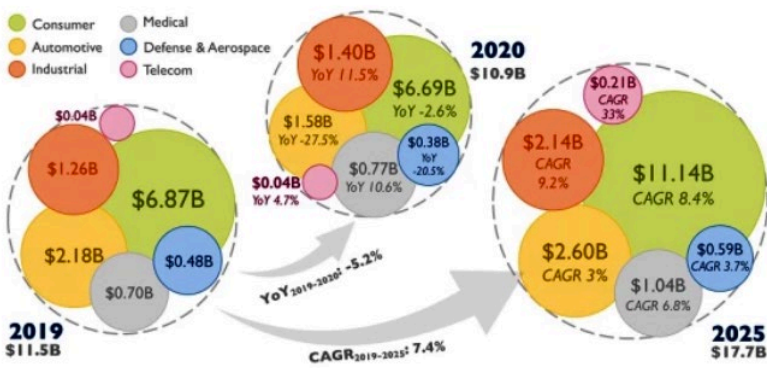
**AI-Defined Sensor Innovation**

One metric used to highlight the impact of Sensor and AI fusion is the global patent landscape. In a 2019 report authored by Lux Research, the worldwide number of granted patents for AI + Sensor applications were tallied over 7 years starting in 2012. They use this data to typify the areas of largest impact from AI, and in which industries and applications this trend most commonly finds use. Surprisingly, in four common industry verticals, Lux Research found that Consumer applications

see the most activity and automotive the least, with industrial and health applications falling in the middle. This is a somewhat surprising conclusion, but it is probably driven by the relative ease of applying new technologies to consumer products. On the other side, the lengthy process of applying new technologies to automotive applications is well understood by the industry. Further insight resulting from this study indicated that Optical sensors with AI show the greatest amount of innovation activity, followed by acoustic and then mechanical. Other sensor types, such as magnetic, electrical properties, and temperature sensors, find pockets of innovation in specific verticals. This data is helpful for sensor users and integrators to analyze and identify applications where AI-defined sensors can enhance their products or operations. Sensor component companies and fabless sensor manufacturers can also see the opportunity to innovate products where AI-defined sensing will be commonly used in the near future.

**AI-Defined Sensor Solution Costs**

In addition to the fast innovation of AI-Defined Sensors evidenced by patent grants in various markets, we can see strong evidence of a significant manufacturing shift in recent years that is driving sensor economics. The availability of low-cost, low-power AI engines and the manufacturing efficiencies of making sensors provides a good opportunity for adoption in high volume applications. Not surprisingly, AI-Defined Sensors are following the typical semiconductor price curves, even though they are not controlled by the same forces of Moore’s Law. The basic principles of sensor micro-fabrication have enough similarities to semiconductor fabrication that we can see a similar curve develop. These similarities include wafer size efficiencies, manufacturing yield improvements, and material cost reductions. All these elements are virtually identical to the semiconductor industry. Cole McCollum, a leading market analyst



Sensor Categories	Health and Medical	Automotive	Industrial	Consumer
Mechanical (pressure, accel, strain)	High	Medium	Medium	High
Acoustic (microphone, ultrasonic)	High	Medium	Medium	High
Optical (image sensor, spectrometer)	High	Medium	Medium	High
Other EM radiation (radars, X-rays)	High	Medium	Medium	High
Thermal (temp sensors)	High	Medium	Medium	High
Chemical (gas sensors)	High	Medium	Medium	High
Magnetic (magnetometer)	High	Medium	Medium	High
Electrical (EEG, ECG, Voltmeter)	High	Medium	Medium	High

Patent activity since 2012 heatmap shows the use of each sensor type combined with AI for each industry vertical

points out, “high-performance sensor costs, particularly MEMS and image sensors, have seen costs repeatedly drop over the last few decades. These falling costs are in part due to the heavy competition, miniaturization, and improved manufacturing processes, as well as the huge volume driven by waves of consumer electronics adoption.” With falling sensor costs and stable volume production in world-class foundries, sensor adoption has grown tremendously. The current research into less expensive and organic materials offer the promise of additional cost reductions in these solutions and will enable even broader adoption of AI-Defined Sensor applications.

**Sensor Sixth Sense**

So how will this growth in sensor capabilities provide a practical change to our lives and our world? As humans, we have the innate ability to not only perceive the stimulus from the five senses but also synthesize the stimulus into conclusions based on a completely different set of data that is already stored in our minds. The Myers Briggs Foundation, famous for its work on personality profiling, has also done extensive work on human Sensing and Intuition. They define sensing as “paying attention to the physical reality” and intuition as “paying attention to impressions or the meaning of patterns of the information”. To take full advantage of AI-Defined Sensors, the sensor experience will need to behave in ways that are similar to human senses, thought patterns and responses. The sensor provides the physical stimulus, and the AI engine provides the context and framework to collect and organize the stimulus data into useful conclusions upon which to act. People will often use the combination of their

senses and intuition to form a so-called “Sixth Sense” which is merely a rapid synthesis of these brain systems to form a feeling about a situation or event. Some people are great at these high-speed mental transfers. Others are less capable and struggle to even make simple connections. If we investigate the current stage of AI-Defined Sensor systems, we would likely conclude that the software and underlying intelligence models are still at an early stage and lacking in functionality. From a technology evolution perspective, facilitating the proper hardware is well underway. The next near-term challenge is the software and modeling necessary to deliver the complete sensing experience. However, now that the hardware is becoming available, the software, in the form of machine language and model definition, is the current focus of countless companies both small and large. Numerous organizations have popped up in recent years to facilitate the industry collaborations around AI-Defined Sensors like the TinyML Foundation. Broad adoption of programming languages like Python and R makes it easier to implement fast and efficient AI code on standardized platforms. Today, the products that deliver a true “SensorSixthSense” are closer than ever before, but there is still development

and commercialization needed to become a reality. The ideal AI-Defined Sensor solution that delivers a true “sixth sense” level of performance is found in “edge” applications and delivers low power, high-performance hardware with robust software and model support. These products will emerge in many applications by 2025. By 2030, AI-Defined Sensors will be so commonplace that we will forget what decision making was like in the past.

**Silicon Catalyst Ecosystem**

Silicon Catalyst is in a unique position to enable the emerging trends in silicon chips and sensor solutions. Artificial Intelligence and Sensor technologies are broadly represented in the current portfolio companies in the incubator process. The Silicon Catalyst team continues to expand the base of In-Kind Partners and Strategic Partners that support the most prolific and fast-moving technologies of the future. We are thankful for the outstanding support of our partners and advisors that put in countless hours with early-stage companies. The ingenious and creative early-stage companies that come into Silicon Catalyst continue to amaze us and we strive to look at each emerging trend as an opportunity to build the support ecosystem that makes innovation possible.

**SILICON CATALYST ACTIVELY WORKS WITH OVER 300 INVESTORS, FROM LARGE VCS TO SMALLER FIRMS, MULTIPLE ANGEL GROUPS, TIER-ONE CORPORATE VCS AND INDIVIDUAL ANGELS.**

Below is a sample of the investors who have engaged with Silicon Catalyst.



**Silicon Catalyst Portfolio Company Ayar Labs Secures \$35 Million in Series B Funding and Adds New Strategic and Global Investors as Interest in Optical I/O Grows**



Santa Clara, California - November 5, 2020 - Ayar Labs is pleased to announce the completion of a \$35M Series B financing co-led by Downing Ventures and BlueSky Capital. New investors include Applied Ventures, LLC, Castor Ventures, Downing Ventures (U.K.), and SGIInnovate (Singapore), expanding Ayar Labs' investor base with strategic ecosystem and global investors. Existing investor participation includes BlueSky Capital, Founders Fund, GLOBALFOUNDRIES, Intel Capital, Lockheed Martin Ventures, and Playground Global.

With the new investment, Ayar Labs aims to accelerate product development and commercialization of its in-package optical interconnect (I/O) solution, as well as grow the company's footprint internationally. Optical I/O (OIO) solves the major computing bottlenecks in interconnect bandwidth, power consumption, and reach. Removing these bottlenecks enables new system architectures that can bring improvements in power, performance, area, and cost beyond the limits of traditional Moore's Law scaling in important applications such as artificial intelligence, high performance computing, cloud, telecommunications, and aerospace.

"Over the last year, we have continued to invest and grow our organization, and have demonstrated a number of technology firsts while securing additional customer and ecosystem relationships", said Charles Wuischpard, CEO of Ayar Labs. "The investment

interest from new and existing strategic and financial investors despite these difficult global times allows us to continue executing our long-range plan for making Ayar Labs Optical I/O a ubiquitous computing solution."

"Ayar Labs represents the future of interconnects which have eventual applicability to every electronic device on earth", said Warren Rogers, Partner and Head of Ventures at Downing Ventures. "We have the highest confidence that when their optical I/O technology is applied to computing, the industry can accelerate even faster than Moore's Law and redefine the boundaries of computing."

"We've been an investor in Ayar Labs since the beginning and have been looking for opportunities to increase our ownership in the company" said Madison Hamman, Managing Director of Blue Sky Capital, "We are very excited about Ayar Labs and believe in their patented technology and execution of a plan that makes it a core building block of future computing systems."

Hsien-Hui Tong, Executive Director, Venture Investing, SGIInnovate states that "In the near future, the need for higher bandwidth will lead to short distance connections within data centres to be optical in nature. We believe that Ayar Labs has market leading technology in the area of in-package optics that will potentially revolutionise the industry and are delighted to be joining the round as investors."

**ABOUT AYAR LABS**

Ayar Labs is disrupting the traditional performance, cost, and efficiency curves of the semiconductor and computing industries by driving a 1000x improvement in interconnect bandwidth density at 10x lower power. Ayar Labs' patented approach uses industry standard cost-effective silicon processing techniques to develop high speed, high density, low power optical based interconnect "chiplets" and lasers to replace traditional electrical based I/O. The company was founded in 2015 and is funded by a number of domestic and international Venture Capital firms as well as strategic investors. For more information, please visit <https://www.ayarlabs.com>.





## Silicon Catalyst Portfolio Company SigmaSense Closes \$22M Series A Funding Round with Groundbreaking Invention Enabling Touchless Touch Screens



AUSTIN, Texas September 23, 2020 - SigmaSense, the global leader in touch screen performance, today announced the closing of \$22 million in Series A funding led by Foxconn Technology Group with participation from strategic investors Corning, E Ink, GIS and MRI (managing partner of LG-MRI). Former Dell CFO Tom Meredith also participated in the round.

SigmaSense intends to leverage these strategic and investor relationships to make its touch solutions the preeminent standard in the high-growth \$4.7 billion touch controller market - part of the larger \$100+ billion global display market that spans from mobile phones and laptops to large interactive digital signage and whiteboards. This financing will speed the development of SigmaSense's semiconductor and software solutions for a breakthrough generation of high-fidelity sensing data enabling new human-machine interactions.

Amidst a broader set of future applications, SigmaSense technology will show up everywhere - from in-person touchless order kiosks for the hospitality industry to home entertainment - including reimaged interactive at-home learning and workspaces. The COVID-19 health pandemic has created a strong market demand for touchless technology to mitigate human contact and safeguard health. SigmaSense technology will power all these scenarios and provide an infinite amount of vertical integration possibilities. These opportunities include sensing in automobiles, consumer devices, medical products and industrial applications.

"This financing, and the powerful syndicate behind it, provide a strong endorsement of SigmaSense's technology breakthrough and the impact across market opportunities," said Rick Seger, SigmaSense's CEO. "Our team has spent years developing new touch experiences that outpace the market and will shift expectations across multiple multi-billion-dollar markets. From foldable phones to large-screen game tables, our new technology provides far better experiences."

Breakthrough in Sensing Means Faster Speeds, Higher Performance and Better Experiences

SigmaSense enables all-new interactive user experiences with responsive controls on and above all surfaces, including non-display surfaces, at unprecedented speeds. The company's SigmaDrive™ technology delivers 100X-1000X better signal-to-noise ratio (SNR), which translates directly to better performance, high-fidelity

data and improved user experiences. SigmaHover's touchless multi-layer interaction, which uses high hover and multidimensional sensing above the screen, is rapidly becoming an essential feature in a post-COVID world.

SigmaSense dramatically reduces overall system costs by rapidly supporting new sensor materials while greatly improving performance and responsiveness - making it ideal for gaming interactions. New conductive polymers can now be used for touch sensors in both small and large screens providing flexible touch screens and lower system costs. At the same time, noise tolerance further improves performance for tabletop and industrial applications, the type of products that benefit from Corning's Gorilla Glass.

Investor Perspectives on SigmaSense Series A Funding Round

"SigmaSense is delivering an exciting new sensing technology and we look forward to bringing some of their amazing touch capabilities to our interactive ePaper displays," said Johnson Lee, CEO at E Ink Holdings. "E Ink is devoted to strengthening its ePaper ecosystem. With the collaboration with SigmaSense, E Ink will be able to offer new technology to our customers to enhance their products."

MRI, the world's leader in outdoor digital signage through their joint venture, LG-MRI, said the reduced voltage and noise immunity properties of SigmaSense controllers are revolutionary for large-screen touch technology.

"We've been the leader in building ruggedized outdoor displays for years, but with the shift to interactive digital signage, all new opportunities are emerging," said Bill Dunn, CEO of MRI. "SigmaSense performs reliably in rain, heat or cold, which is an extreme engineering challenge. Simply put, they have nailed it, by providing reliable sensing through thick, vandal-proof glass while wearing gloves."

"Austin again proves itself as a fountain of creativity and innovation with the emergence of SigmaSense providing a new way of sensing to the world," said Tom Meredith, partner at Brightstar Capital Partners.

SigmaSense recently opened its new headquarters in north Austin and has a strong development team in Boise, Idaho. The company also maintains a customer and engineering support operation in Taiwan and is an active member of the Silicon Catalyst network.

SigmaSense, the global leader in touch sensing performance, is bringing the best user experiences to products ranging from mobile phones and laptops to large monitors and digital signage. We are pioneering a comprehensive sensing technology that delivers 100 to 1000 times improved signal-to-noise performance that was previously not possible. SigmaVision™ capacitive imaging technology provides touch, pressure and object detection to the sensing surface, enabling a new generation of perceptive devices that are interactive and engaging. SigmaHover™ provides a superior touchless experience for public displays as well as any other device that uses touch sensors. Headquartered in Austin, TX, SigmaSense provides semiconductor products with development tools and support. For further information, please visit <http://sigmasense.com>.

### ABOUT SIGMASENSE



## Silicon Catalyst Portfolio Company SPARK Microsystems Announces CDN\$17.5 Million Financing



Led by Cycle Capital to drive commercialization and Industry leaders Dr. Sanjay K. Jha and Paul Jacobs invested in the round

Montreal, Canada, February 16, 2021 - SPARK Microsystems, a fabless semiconductor company leading the way in ultra-low power, ultra-low latency wireless communications, announces the closing of a CDN\$17.5 million equity financing to accelerate commercialization. Led by Cycle Capital, the round included new investors ND Capital (a Silicon Valley and Europe-based venture capital firm dedicated to disruptive technologies) and Export Development Canada, as well as existing investor Real Ventures and private investors. Proceeds will be used to fund high-volume manufacturing, sales ramp and expanded R&D for next generation products.

Industry veterans Dr. Sanjay K. Jha and Dr. Paul Jacobs reinvest in SPARK Microsystems

Former Qualcomm CEO Paul Jacobs and former GlobalFoundries CEO Sanjay K. Jha, both reinvested in the company as part of the round.

Dr. Sanjay K. Jha is the former CEO of GlobalFoundries Inc., the second largest semiconductor contract manufacturer in the world. Prior to that, he was the Chairman and CEO of Motorola Mobility Inc., a role he held until the acquisition of the company by Google in 2012. Before Motorola, Sanjay worked at Qualcomm for 14 years, finishing his tenure there as the COO of Qualcomm, and President of Qualcomm CDMA Technologies (QCT), the CDMA & computing chipset and SW division of Qualcomm. Sanjay holds a PhD (ECS), and D.Sc (Hon) from the University of Strathclyde in Scotland, UK. In 2018, he was elected into the US National Academy of Engineering. He is an investor and board member of a number of private technology companies.

Dr. Paul E. Jacobs is the former CEO and executive Chairman of Qualcomm. During his tenure as CEO, Qualcomm's revenues quadrupled and its market capitalization doubled. Dr. Jacobs is a prolific inventor with over 80 U.S. patents granted or pending in the field of wireless technology and devices. He is a board member of a number of private technology companies. He founded Berkeley's Jacobs Institute for Design Innovation and was the university's 2017 Alumnus of the Year. Dr. Jacobs is a member of the National Academy of Engineering and a Fellow of the American Academy of Arts and Sciences.

In conjunction with the financing, Cycle Capital's Senior Partner Amit Srivastava also joins the Board of Directors. Earlier in his career, he led venture capital investments in the electronics sector at JP Morgan Partners and held key marketing and

engineering management positions at Texas Instruments.

Recently, SPARK launched the SR1000 ultra-wide band (UWB) wireless transceiver ICs enabling a new class of short-range wireless connectivity applications including gaming peripherals and AR/VR headsets, smart home devices, and battery-less internet of things sensors. Within nine months after the launch announcement, SPARK Microsystems has shipped tens of thousands of pre-production units to multiple customers; prototyped a next-generation wireless gaming hub with headset, mouse and keyboard in conjunction with a Tier 1 ODM partner; sold over 70 evaluation kits to companies designing wireless AR, VR, IoT and positioning products; delivered paid SoWs for advanced wireless products to multiple Fortune 100 companies

"In just four years since the Ecofuel Acceleration program, SPARK Microsystems was able to deliver a revolutionary low-power wireless solution to customers," said Andrée-Lise Méthot, Founder and Managing Partner of Cycle Capital and Chair of the Ecofuel Accelerator. "Cycle Capital invests in companies that have a meaningful impact on climate change. We believe that SPARK will not only enable battery-less networks and dramatically cut power consumption across a wide range of emerging wireless applications but also reduce electronic waste going to landfills."

"We are excited by the rapid customer adoption of the SPARK solution," said Sanjay Jha, former CEO, GlobalFoundries and active investor. "The company engaged with multiple customers who will deploy millions of wireless devices in the coming years. SPARK's technology significantly extends battery life for various Industrial IoT and consumer electronics including AR/VR, gaming and audio applications - enabling for new functionalities as well as improved performance. This financing puts SPARK in a strong position to meet the volume production requirements of those customers."

"We are very pleased to have received this strong financial backing from Cycle Capital, as well as new and existing investors," said Fares Mubarak, CEO, SPARK Microsystems. "This funding, coupled with many years of outstanding technical and operational leadership from the new Board members will help accelerate the commercialization of our UWB transceiver products into high-volume production and better position us to execute our growth strategy and expand in key markets."

"We are excited to see our dream of creating such a differentiated wireless technology to address many markets and expand the usability of wireless devices taking shape," said Dr. Frederic Nabki, Cofounder and CTO, SPARK Microsystems.

SPARK Microsystems, a fabless semiconductor company, commercializes ultra-low power and ultra-short latency wireless platform for the Internet of Things revolution. The company was founded in 2016, now employs 40 people in Montreal and in the US, and anticipates doubling in size over the next 18 months including adding 15 sales and application engineers. SPARK Microsystems was elected one of the "10 Startups in the Spotlight" on the latest EETimes Silicon 100 list, received the 2019 Defense Innovation Award at TechConnect., and won the 2018 Nokia Open Innovation Challenge. For more info: [sparkmicro.com](http://sparkmicro.com)

### ABOUT SPARK



## Silicon Catalyst Portfolio Company AEPONYX, Inc. Closes \$10M Funding Round



Montreal, March 15, 2021 – With the growing 5G networks, such as the 5G-enabled iPhone12 and Ericsson recently announcing over 200 million global 5G subscribers, AEPONYX continues to build out its 5G product portfolio with the closing of a \$10M new funding round. All previous investors supported this round, with Investissement Quebec joining as the new investor. This adds to AEPONYX’s previous \$30M funding and enables the company to move faster.

We are delighted to bring innovative products to the 5G market. The creation of our integrated photonics with MEMS products enable the Telecom industry to advance their next-generation networks. With the 5G adoption rate eclipsing where 4G was at this point in time, we see tremendous growth potential.

For AEPONYX and 5G, it’s all about moving data with fiber optics. These faster networks are needed to carry all the traffic we generate and use. AEPONYX’s integrated photonics innovations combined with

their fast-tuning and ultra-small MEMS devices are well suited to advance Telecom. “While our technology works beautifully in quantum computing, LiDAR, and sensors, we are targeting Telecom as our first market vertical” says Babin.

The company has focused its previous funding rounds on product and test development and is excited to advance its Telecom portfolio with this latest round. Participants in this funding round were Fonds Ecofuel, BDC, Investissement Québec, Pangaea Ventures, and Fonds Innovexport. “These optical devices, combining high data rates with being quite small in size, are exactly what the market is looking for to advance the global 5G infrastructure significantly” stated Richard Cloutier, Managing Partner at Ecofuel Fund.

Aeponyx develops advanced integrated photonics with MEMS products. Utilizing the next generation photonics material -Silicon Nitride, with very high-speed MEMS devices, we bring innovative products to market. Aeponyx has extensive experience in developing advanced technology. And we have grown a team with vast and deep expertise in bringing products to market. This is all driven by our key values of Teamwork, Trust, and Technology. These values make it all possible. This is all driven by our key values of Teamwork, Trust, and Technology. These values make it all possible. Aeponyx is a leader in integrated photonics with MEMS. For more information, please visit <https://aeponyx.com>

### ABOUT AEPONYX



## Silicon Catalyst Portfolio Company Adapdix secures \$8M Series A funding to accelerate growth of AI- powered automation and control software



PLEASANTON, Calif., Dec. 8, 2020 / PRNewswire/ -- Adapdix Corporation, the digital transformation leader in Edge AI automation and control software, today announced the completion of an \$8M Series A funding round, led by WRVI Capital, with participation from Micron Ventures and existing investor X2 Equity.

As the first predictive analytics solution based on an industrial-grade data mesh technology, Adapdix enables ultra-low-latency, predictive maintenance and control. This means that companies can now take the next steps in the Edge AI performance journey, from simply detecting and preventing faults to enabling control and automating self-correcting actions.

Anthony Hill, Founder and CEO at Adapdix, said, “Enterprise companies are increasingly moving processing power closer to the source of the data to increase model accuracy, reduce network cost and congestion, and latency. The Adapdix EdgeOps™ solution is addressing a significant and growing market need to extract value and control systems at the edge. This investment round will solidify Adapdix’s leadership position in the market and enable more enterprise companies to control their end-to-end operations - and ensure uptime - with real-time predictive analytics.”

Adapdix’s EdgeOps™ is a software-only solution that combines advanced artificial intelligence and machine learning (AI/ML) analytics with a distributed, edge-based control platform. By enabling control where the AI data is, the edge, Adapdix enables a distributed data mesh ecosystem that delivers the new foundation for customer-centric Edge AI deployments.

Nicholas Brathwaite, Founding Managing Partner at WRVI Capital, said, “Adapdix EdgeOps™ innovative technology provides a scalable multivariable platform allowing enterprises to operationalize AI/ML across critical infrastructure, improving significant uptime and business profitability as it has not been possible before.”

“Artificial intelligence will transform how enterprises automate and optimize processes in the workplace,” said Andrew Byrnes, director of venture capital at Micron Ventures. “Adapdix has an innovative platform with powerful capabilities to generate data insights that quickly and effectively unlock new levels of productivity and streamlined processes.”

Adapdix’s EdgeOps™ will initially focus on manufacturing customers in the semiconductor, electronics, and automotive industries, with more sectors to follow.

Adapdix provides an innovative software platform for enterprises that optimizes Artificial Intelligence (AI) and Machine Learning (ML) at the edge. The company’s customer-centric Adapdix EdgeOps™ platform provides previously unmatched performance increases in uptime of equipment, reduction in supply chain and logistics cost and increases in remote worker control and productivity. Founded in 2015, Adapdix is headquartered in Pleasanton, California – see [www.adapdix.com](http://www.adapdix.com).

### ABOUT ADAPDIX



**SoftMEMS**  
IN-KIND PARTNER PROFILE

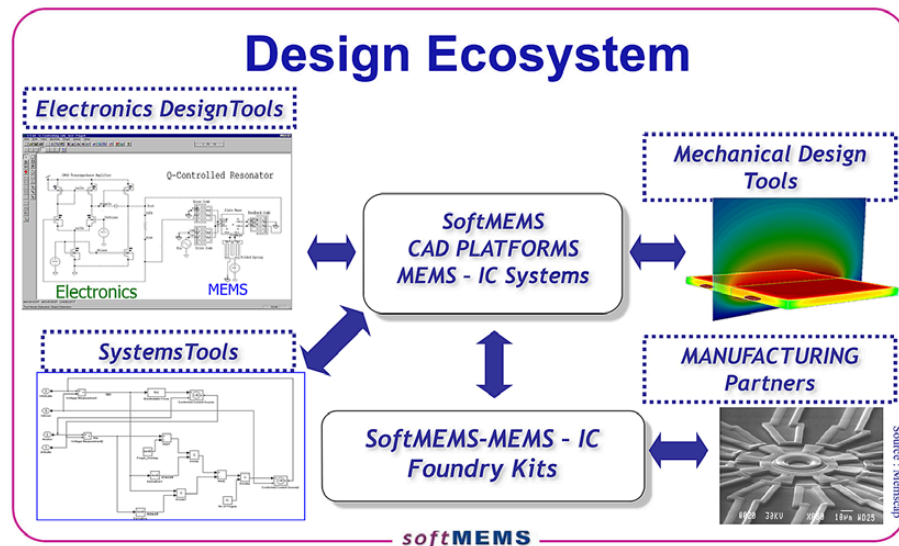


Mary Ann Maher shares how partnering with best in class EDA, MDA and systems software companies is creating the MEMS ecosystem

**PLEASE PROVIDE SOME BACKGROUND AS TO HOW YOU CAME TO BE INVOLVED IN THE MEMS MARKET.**

My background is in semiconductor device physics, analog circuits and EDA. I did my postdoc at the Centre Suisse Electronique and Microtechnique (CSEM) in a group working on analog memory and low power circuits to implement neuromorphic (biologically inspired) systems. While there, I was exposed to groups working on microphones and acceleration sensors. I was fascinated by these tiny machines and had to dig out my physics books to figure out how they worked-- it was like analog circuits but in multiple physics domains.

We called them microsystems being in Europe, so I didn't really hear about MEMS til I returned to the States and took a short course taught at MIT by Steve Senturia, Jed Harrison and Marty Schmidt. In 1996, I was working at Tanner Research on analog circuit simulation and DARPA, under Ken Gabriel, was funding a number of MEMS hardware initiatives at the time. They also funded some companies like ours to develop MEMS CAD tools to help in the development of the hardware under the Composite CAD program. It was a really great time as we worked closely with companies



SoftMEMS Software Ecosystem

developing new MEMS devices to figure out the kinds of CAD support they needed.

**COMPANY HISTORY AND DESCRIPTION ABOUT SOFTMEMS:**

We commercialized the results of our DARPA program bringing our popular MEMS design software to the market in 1997. Independently, Jean-Michel Karam at TIMA in France was working with Mentor Graphics to develop MEMS engineering kits (the first PDKs for MEMS) for the PolyMUMPS fabrication process from Cronos. I joined MEMSCAP in 1999 and our team

brought together the technologies from both companies and we began offering support for other EDA platforms and created design kits for additional MEMS foundries.

In 2004, I started SoftMEMS LLC to focus on the MEMS design software market. We partner with best in class EDA, MDA and systems software companies to create a MEMS ecosystem as shown in Figure 1. We decided that utilizing existing platforms and not trying to re-invent the wheel by creating our own layout editors, schematics editors or finite element software allowed us to focus on MEMS specific tools. In this way,



**MARY ANN MAHER**  
CHIEF EXECUTIVE OFFICER  
SoftMEMS

Dr. Mary Ann Maher received her PhD from Caltech in 1989 in the area of semiconductor device modeling. She has over 30 years of experience in the area of electronic design automation (EDA) for MEMS, sensors, and analog circuits. She held positions at Tanner Research and MEMSCAP before starting SoftMEMS in 2004 to provide design software to the microsystems market. She currently serves as CEO of SoftMEMS.

**SoftMEMS**  
IN-KIND PARTNER PROFILE



we integrate easily with the existing software out there and enable our MEMS customers to utilize and share information about their MEMS with their packaging and electronics design colleagues and finite element specialists.

SoftMEMS sells CAD tools for the co-design of products and systems including MEMS and sensors, packaging and electronics. Our software has MEMS specific mask layout automation and verification to help our customers make manufacturable masks. We also supply fabrication modeling for creating digital twins of MEMS devices for collaboration between mask designers and fabrication partners as well as for finite element analysis. We offer MEMS and sensor models and model building tools for co-simulation of MEMS, packaging and electronics. SoftMEMS also offers consulting services as customers may not have simulation and modeling or verification experience as its challenging enough for them to focus on the MEMS design. Our services include coupled physics fields modeling and simulation, design verification, software development and customization, design flow consulting and physical design kit generation. We don't do MEMS design, so as not to compete with our customers, instead we often partner with MEMS design houses, MEMS foundries, equipment makers, and MEMS packaging houses to help our customers bring products to market.

**WHAT DO YOU SEE AS THE MOST PROMINENT EMERGING TECHNOLOGY TRENDS IN MEMS AND SENSORS?**

There are many important technology trends going on as established MEMS sensors are becoming commodities and new MEMS sensors are just being

invented. The makers of established technologies are pushing up to the system level products and platforms including multi-sensor fusion coupled with AI chips and software. MEMS manufacturers want to own a larger part of the profits pie. The cost of a MEMS die has fallen drastically and offering more of the system allows them to capture more of the BOM. Some MEMS providers even see themselves as moving to a data play, where they make money off of the sensor information and the sensors are an enabler. At the same time, we see emerging technologies like new chemical sensors and new types of bio-sensors entering the market. COVID has certainly influenced the products and opportunities in this area for both established and new biosensors. We have also seen MEMS technologies being a growth driver in areas such as speakers, medical ultrasonics and 5G. Many of the new devices have required the development of new materials, new packaging and heterogeneous integration. The industry is also continuing to see tighter integration of MEMS on flexible substrates as well as combining flexible and printed technologies with rigid MEMS dies driven by wearables.

**MEMS SHARES MUCH OF THE SAME DNA WITH THE SEMICONDUCTOR INDUSTRY. (FAB TOOLING, EDA, PROCESS TECHNOLOGIES) HOW DOES THE EVOLUTION PATH FOR MEMS DIFFER FROM THAT OF SEMICONDUCTORS?**

One of the key differences, with the IC world is the one package, one process, one product rule stated by Yole and others. In the IC world, fabless designers take advantage of standard processes with design kits. Design creativity differentiates products. In the early days of the IC world, there

were a lot of competing technologies but then we settled down with CMOS on a roadmap based on Moore's law. Analog circuits are closer to MEMS with analog processes often specialized. We do see a few standard processes in MEMS or standard unit processes that can be composed. However, we don't see in MEMS yet, the huge numbers of fabless design houses being able to take advantage of standard processes. The equipment in MEMS and materials used also differ from that of a standard IC fab. In some areas of MEMS, there are attempts to make processes IC compatible so that MEMS can be made in the IC fab or integrated with electronics as a post processing step. At the moment, successful MEMS companies, work closely with their fabs in more of a partnership model as design and process are intertwined. So, we will see both an evolution over time to fabless designers making use of sensor platforms or processes from foundries, and a continuation of process innovation.

In the IC world, the function of the package is encapsulation and protection but MEMS must often be open to the outside world to perform its sensing function. MEMS devices are susceptible to packaging effects typically caused by materials' TCE mismatches. Stress from the package can affect the output of piezo-resistive devices that sense stress, the bias stability of inertial sensors and resonators and cause misalignment in optical MEMS devices. Specialized packaging isolation structures and interposers are used to decouple the packaging effects for high performance devices. The MEMS performance may also be set by the package. Because of this issue, MEMS packaging often must be co-designed with the devices. For example, the hermeticity of the package sets the

damping factor for moving MEMS devices which in turn can set the package cavity depth. The need to drive the cost down is also causing some types of MEMS to be packaged as cheaply as possible in plastic packages while other devices require high performance packaging. There is however, some standardization in packages for certain types of MEMS or applications. As MEMS volumes grow, we are seeing the ASIC packaging vendor offer MEMS specific packages. Digital ICs are tested at high speed in standard equipment. The big difference with MEMS is they must be tested in multiple energy domains with sensor specific stimuli and environmental conditions, often requiring specialized testers to “shake and bake” the MEMS. At the research stage, the MEMS motion is often measured with laser vibrometry and at the qualification stage drop tests are necessary. Whenever possible, at the production stage, some MEMS can be tested with electrical stimuli to induce motion and motion can be sensed through electrical transduction during self test in the field. In addition to specialized testers, MEMS may also require special handling equipment. As MEMS volumes have grown, vendors have jumped in to serve this need. More automation is being brought to bear as MEMS and IC test companies eye the market.

In the IC world, designers take advantage of standard transistor structures and primitives. But, in the MEMS world we see some common structures but no universal primitives, so devices are often hand crafted. We also see that the choice of MEMS technology has implications at the system level. As the same function, for example a gyroscope or actuator can be made with different physics principles-optical, electrostatic, piezoelectric, magnetic. This fact impacts their testing and even the parasitics that must be considered. In addition, MEMS are

### SoftMEMS popular products MEMS Pro and MEMS Explorer:

- 1) Create 3D models of fabricated MEMS/Sensor devices for input to 3D simulation
- 2) Provide MEMS/Sensor specific mask layout creation features and design guidance
- 3) Supply schematic, simulation models and programmable mask layout generators for common MEMS/Sensor structures
- 4) Generate reduced order models from 3D simulation results simulatable with electronics
- 5) Facilitate co-design of MEMS, Electronics and Packaging

3D moving structures, so they need to be analyzed with finite element/boundary element tools as well as at the system level. This fact drives the design tools that are needed. We offer both device design tools and tools that help system designers integrate their electronics and MEMS together. For mature devices, new designs can take advantage of previous designs and scalable device models and PCells can be developed so that structures can be optimized and retargeted to new markets. As the market evolves, we will see additional design tools used in MEMS that are similar to those used in the IC industry to enable design for test, design for manufacturing and more systems level tools. It is interesting to note that the IC industry is now grappling with some of the same problems we have dealt with in MEMS. We see competing process technologies and new materials for the next generation of transistors as the successor to finfets. Thermal and mechanical concerns join signal integrity as concerns in 3D ICs and advanced packaging.

### THE ENGINEERING COMMUNITY THAT SURROUNDS MEMS IS QUITE DIVERSE IN TERMS OF EDUCATIONAL

### BACKGROUND. CAN YOU PROVIDE SOME THOUGHTS ABOUT WHY THIS IS THE CASE?

It takes a village to make a MEMS! Since the devices typically operate in one or more energy domains and are often inserted in applications requiring domain knowledge, a team with diverse skills is often required to bring a MEMS product to market. For example, we were involved in a medical MEMS project involving a specialist in bio-compatible coatings, MEMS fabrication experts, medical doctors, mechanical engineers, computational fluid dynamicists, electrical engineers and packaging experts. The diversity of applications also brings different required backgrounds as MEMS are found in wireless communications, medical, aerospace and defense and consumer devices to name a few. Communication is often challenging as the lingo used in each field may be different and the expertise in each field may be deep and narrow to solve the tough problems required to innovate. In addition, the design and analysis tools that these people use are also vastly different and are focused on different time and length scales as some experts are concentrating at the atomic scale, others at the software level. Our software is often used to translate between the different views and information needed by the team members.

A challenge we see is that to increase the insertion of MEMS into more applications, we have to enable non-MEMS experts to utilize MEMS in their systems. Here, CAD tools can help by encapsulating MEMS knowledge and supplying design guides and rules and models to enable more engineers to access and utilize MEMS technology. This happened in the VLSI revolution with Carver Mead’s seminal book and it will happen in MEMS albeit slightly differently- we will always need people with deep MEMS understanding as we have people who deeply understand transistors but can we enable more

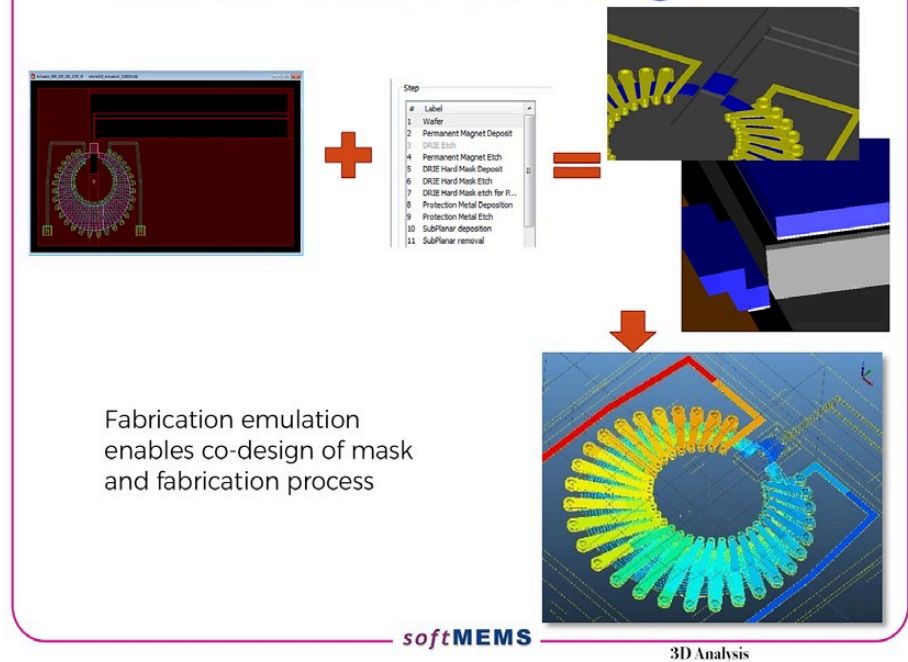
people to use MEMS and sensors in innovative systems?

### WHAT TECHNOLOGY BARRIERS ARE STILL CHALLENGING FOR THE MEMS INDUSTRY AND IMPACTING THE GROWTH IN THE COMING YEARS?

Technology transfer is still a challenge for the MEMS industry. Start ups often create prototypes in University fabs and the transfer to a second prototyping or production fab can often get stuck in cycles of short loops and NRE. The fab equipment, materials and recipes may be different in the university vs prototyping vs production fabs. The transfer from getting a few parts working to a manufacturable, yielding process can take years and many \$. Fabs must expend significant resources and NRE when they would like to be in production. Many startups run out of money in the tech transfer phase. Reducing this time to market is imperative to spurring growth in the coming years.

The lack of standardization in many areas of the MEMS supply chain is still challenging although progress is being made as groups like Semi’s MSIG tackle the issues. In the early days, proprietary solutions especially in areas like test were a competitive advantage. However, now we see more cooperation between vendors on pre-competitive areas and suppliers seeing an advantage in standardization. We have been working with fabs and design houses to standardize the information exchange between the two so that even though the process may be changing, (so we cannot populate a standard PDK), we can at least have the information communicated in a standard way. We call this “PDK on the fly.” When we do have a standard process, we supply PDKs with design rules, models etc. The PDK contains more information about packaging, wafer prep, and fabrication information, material properties in multiple physics domains etc than in a typical IC PDK.

## Mask/Process Co-design



Fabrication emulation  
enables co-design of mask  
and fabrication process

Packaging and integration also remain a challenge as often its thought about too late in the design process. A MEMS device may work by itself, but problems occur when the device is put together with its driving or sensing circuitry. Parasitics are often a culprit. So, it is important to co-design the package, electronics and MEMS to avoid problems later. Finally, an important issue I see is that we as an industry need to encourage design creativity so that the answer to getting performance from our products is not to always default to tweaking the fabrication process but also to innovate at the device design, calibration and systems levels.

### WHAT RECOMMENDATIONS DO YOU HAVE FOR EARLY-STAGE MEMS COMPANIES?

Your team is very important, think very carefully about the first few hires and pick people that have complementary skills to yourself. The Venture Capital community is looking for a strong team if you go that route. If you need to pivot, the ingenuity of your team will get you through. Many early

stage companies are tech heavy and neglect having plans for marketing, sales, and distribution as well as truly understanding the best business model to be successful. Partnering with Silicon Catalyst is a great way to navigate these waters. I have seen them work wonders helping start ups think through issues and present themselves well in addition to the great infrastructure they provide. Having a plan to withstand the market pricing pressure is also critical. Understanding the market dynamics and estimating pricing 5 years out is important to making sure you can survive the competition. Along these lines, a rule of thumb is that you need a 10x better solution than what is out there to weather the first few years. As mentioned above, tech transfer may kill you, so think about your manufacturing plan carefully. Finally, having a teaching customer can be invaluable.

For inquiries on products and services please e-mail us at [info@softmems.com](mailto:info@softmems.com)  
For customer support please e-mail us at [support@softmems.com](mailto:support@softmems.com)





## STMicroelectronics STRATEGIC AND IN-KIND PARTNER PROFILE



### Innovative solutions across diverse application segments

Friends of Silicon Catalyst know that electronic circuits form a mostly invisible part of the world we live in today. As the guts of computer chips, these circuits combine the latest advances in performance, intelligence, and efficiency and operate as the heart, brains, and soul of the millions and billions of electronic devices people across the globe interact with every day. In this unseen realm, STMicroelectronics creates the sparks that animate many of the electronic products we use. In fact, ST technology is found everywhere microelectronics makes a positive contribution to people's lives and its chips embed the most advanced innovations which are an essential part of products as diverse as cars and key fobs, giant factory machines, and data-center power supplies, washing machines and hard disks, and smartphones, and toothbrushes. ST helps its customers make these and other devices more intelligent, more energy efficient, more connected, safer, and more secure.



With leadership in Advanced Driver Assistance Systems and other automotive technologies, ST is making driving safer, greener, and more connected.

ST is 46,000 creators and makers of semiconductor technologies, devices, and solutions who work closely with the Company's customers and partners to design and build products, solutions, and ecosystems. The goal? Support customer sustainability and resource management challenges with semiconductor products and technologies that help those clients seize the opportunities they pursue.

In joining Silicon Catalyst, ST is expanding its extensive efforts to innovate. Already ST has 7,800 R&D employees, invests about 16% of revenues in R&D every year, and engages in extensive collaboration with leading research labs and corporate partners around the world. As both a Strategic and In-Kind Partner, ST is looking to the

collaboration to provide early access to these selection of early-stage silicon start-ups seeking to participate in the Silicon Catalyst Incubator, with an initial focus on MEMS sensors and actuators, where early-stage companies may benefit from ST's broad portfolio, long record of innovation, and

deep manufacturing expertise, along with its recently announced **Lab-in-Fab** for piezoelectric MEMS.

ST's innovations and manufacturing strengths stretch well beyond MEMS, and include many industry firsts, including its invention and continued development of **Bipolar-CMOS-DMOS (BCD)** technology, a key enabler for smart-power ICs; its development and introduction of Fully Depleted Silicon on Insulator (FD-SOI) technology as an evolution of planar CMOS manufacturing technologies that avoid the leakage problems of traditional CMOS at process geometries below 28nm; in embedded Phase Change Memories (PCM), that solve process-integration challenges of traditional Flash memory processing below 28nm; and in Imaging and Photonic Sensing, where ST's Time of Flight sensors are one example of broad imaging-technology portfolio and extensive expertise.



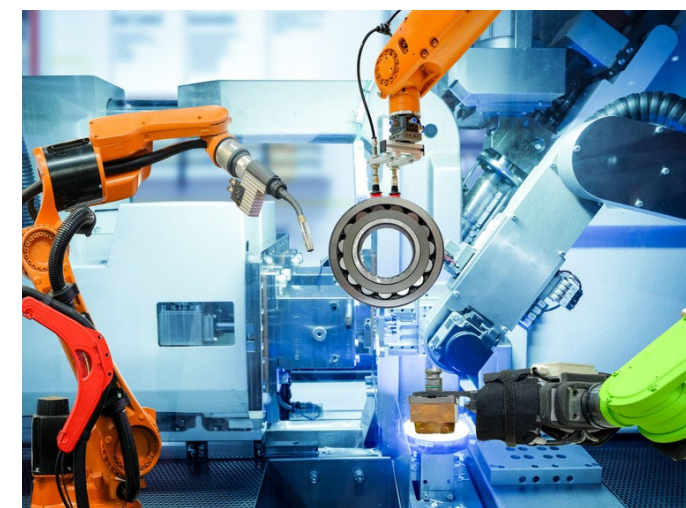
## STMicroelectronics STRATEGIC AND IN-KIND PARTNER PROFILE



More broadly, ST focuses on several long-term trends that are reshaping industries and societies. These trends, which have arguably been accelerated by the global pandemic, include the shift from traditional cars to smarter mobility solutions, the need for much more efficient power and energy management across all devices and systems, and the large-scale deployment of the Internet of Things (IoT), accelerated by the rollout of 5G connectivity.

As the world increasingly adopts smarter mobility solutions that include connected, digital, electric vehicles and their supporting infrastructure, there is a requirement to think differently about how we move around, while reducing pollution and congestion. ST's car electrification solutions are enabling automakers to build better, more affordable electric vehicles and the Company's Advanced Driver Assistance Systems (ADAS) support the market's quest to make driving safer for drivers and pedestrians alike.

ST is also a longtime innovator in power and energy management and continuing these efforts is key to addressing the growing global energy demand while reducing environmental impacts. Having



ST's extensive portfolio of microcontrollers, MEMS sensors and actuators, and power products are enabling Industry 4.0 and the factories of today and tomorrow.

invented smart power technologies, ST knows what the world needs to become a better steward of the resources it uses and the Company continues to lead the movement to green technologies. ST's pioneering efforts with wide bandgap materials such as **Silicon Carbide** and **Gallium Nitride** are enabling the industry to save energy without compromising innovation.

The large-scale deployment of the Internet of Things (IoT), accelerated by the rollout of 5G connectivity, is a third trend and it is transforming every area of everyone's life -- where they work, live, the cars they drive, and the objects they use. The IoT and 5G are enabling billions of cloud-connected devices for personal, corporate, and public applications and ST's products have been leading contributors to the Internet of Things transformation and big data collection. Moreover, ST is at the forefront of data security with solutions that help implement the latest cryptographic measures.

Providing the brains in many of these systems, with its industry-leading **STM32** family of Arm® Cortex®-core microcontrollers, ST also is a top manufacturer and supplier of sensors. With a long history and demonstrated expertise in Micro-Electro-Mechanical Systems (MEMS) sensors and actuators, ST launched the consumer MEMS revolution by making motion sensors small, accurate, and affordable through innovative product design, deep application expertise, and industry-leading process and packaging technology. It is an effort that continues today and, with the collaboration with Silicon Catalyst, is positioned for acceleration.

Driven by ST's values - integrity, people and excellence - ST superimposes the need for a more sustainable world on these trends and has shown, for more than 25 years, that sustainability is an integral part of ST and guides the way the Company does business and works with its customers, partners, and employees.

[www.st.com](http://www.st.com)

**SILICON CATALYST UNIVERSITY PROGRAM OVERVIEW**

**Silicon Catalyst Announces University Initiative to further Semiconductor Industry Innovation**

World-wide outreach in conjunction with leading academic institutions

Silicon Valley, California, April 5, 2021 – Silicon Catalyst, the world’s only incubator focused exclusively on semiconductor solutions, is pleased to announce the introduction of the company’s University Program. Many of the successful startups in the Silicon Catalyst Incubator were launched based on fundamental research originating at leading universities and research centers around the world.

The Silicon Catalyst University program has been established to unite academic institutions around the globe with the Silicon Catalyst ecosystem of Advisors, Partners and Investors. For these institutions, Silicon Catalyst will provide speakers and panel experts, judges for pitch competitions, mentoring, internships via our portfolio companies and in turn we anticipate discovering qualified start-ups to join our incubator.

During the trial launch of the University Program, Silicon Catalyst hosted events with world class institutions such as Stanford (see lecture here: <https://www.youtube.com/watch?v=UamKPPgqf5o>) Cornell University Praxis Center for Venture Development, the Cal Poly Center for Innovation, Georgia Tech and Imperial College London. The breadth of these events included a joint panel session, an investment overview for entrepreneurs, a course on how to build an IC company, placement of interns, mentoring of capstone projects. The University Program tailors each relationship to the specific needs of the institutions.

“Over the years Silicon Catalyst has been a remarkable partner for both our Masters students in Electrical and Computer Engineering and Integrated Innovation as well as with the Emirates-CMU i-Lab. Silicon Catalyst connects up aspiring entrepreneurs with hardware prototypes to showcase to senior executives. The proximity to our Silicon Valley campus allows the students to interact with hardware engineers and specialized equipment to hone the skills they need to get great jobs. It is a privilege to work with the many advisors, as well as entrepreneurs, in the Silicon Catalyst ecosystem. In the classroom, the guest lectures by Silicon Catalyst and their portfolio companies are always the highlight of my class,” stated Stuart Evans, Distinguished Service Professor and Director of the Emirates-CMU i-Lab – Carnegie Mellon University.

“Silicon Catalyst is a fine match for Georgia Tech and its CREATE-X program which encourages entrepreneurship from students. Georgia Tech is one of the leading engineering universities in the country with one of the largest electrical engineering programs, so the value of Silicon Catalyst will be accessible to a broad base of talent. While the engagement is just getting underway, Silicon Catalyst is already consulting with a startup at Georgia Tech,” stated Todd Cutler Silicon Catalyst Ambassador-Georgia Tech Alum.

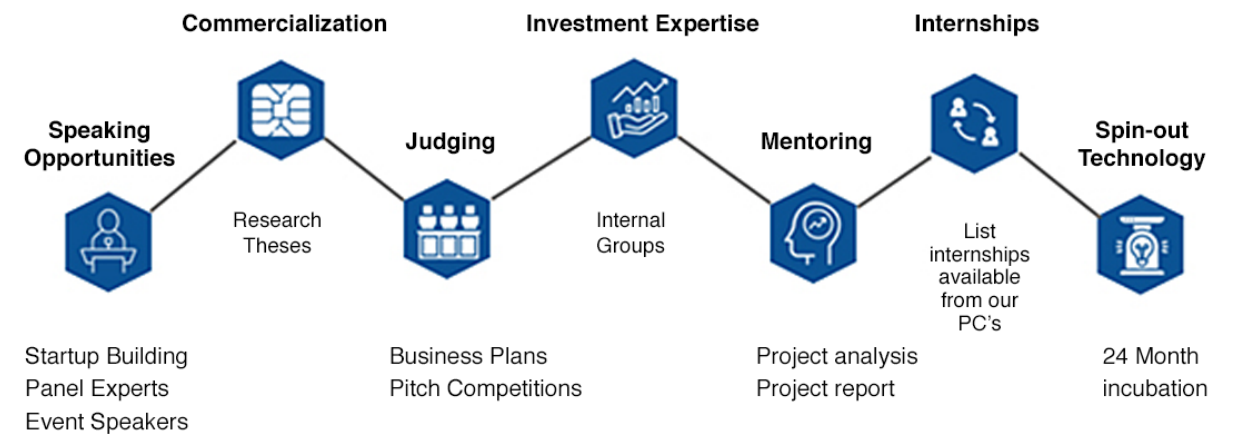
“We have hosted several events with Silicon Catalyst, combining our ecosystems to provide an amazing platform



**LAURA SWAN**  
**PARTNER**  
**UNIVERSITY PROGRAM MANAGER**

Laura is an investor with Sand Hill Angels and is a founding partner of The Batchery a tech incubator in Berkeley California. Laura started her career in networking before the explosion of the internet, she worked in several networking startups that delivered the very first switches and routers. Laura has a thorough understanding of the engineering development process (functional specification, system/architecture design, development, testing, and deployment) based on over a decade of software/firmware development experience. She moved into engineering Program Management where she used her engineering development experience to manage products from cradle to grave (early engineering specification through alpha and beta testing).

**Ways Silicon Catalyst can assist Universities**



to share our expertise in frontier technology and to expose the startups in our incubator to an impressive group of Silicon Catalyst Advisors. Through our relationship with Silicon Catalyst, Geegah, one of the companies launched from our Praxis Center, has recently joined the Silicon Catalyst Incubator,” Robert Scharf, Director of the Cornell University Praxis Center for Venture Development.

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 five 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) to dramatically reduce the cost of chip development. 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.

“This is an incredibly exciting time to be in the semiconductor industry, as the opportunities for applying the academically sourced innovations to real-world problems have exploded. Key application areas ripe for improvement include everything from cost-effective medical point-of-care, to smart farming, safe cities and 5G communications. Silicon Catalyst is honored to have these prestigious academic institutes participate in our launch

event,” stated Laura Swan, Silicon Catalyst Partner and University Program Manager.

**About Silicon Catalyst**

It’s About What’s Next® - Silicon Catalyst is the world’s only incubator focused exclusively on accelerating solutions in silicon (including IP, MEMS & sensors), building a coalition of in-kind and strategic partners to dramatically reduce the cost and complexity of development. More than 400 startup companies have engaged with Silicon Catalyst since April 2015, with a total of 37 startup and early-stage companies admitted to the incubator. With a world-class network of mentors to advise startups, Silicon Catalyst is helping new semiconductor companies address the challenges in moving from idea to realization. The incubator/accelerator supplies startups with a path to design tools, silicon devices, networking, access to funding, banking and marketing acumen to successfully launch and grow their companies’ novel technology solutions. The Silicon Catalyst Angels was established in July 2019 as a separate organization to provide access to seed and Series A funding for Silicon Catalyst portfolio companies.

More information is available at [www.siliconcatalyst.com](http://www.siliconcatalyst.com) and [www.siliconcatalystangels.com](http://www.siliconcatalystangels.com)

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**TESSOLVE**  
**IN-KIND PARTNER PROFILE**

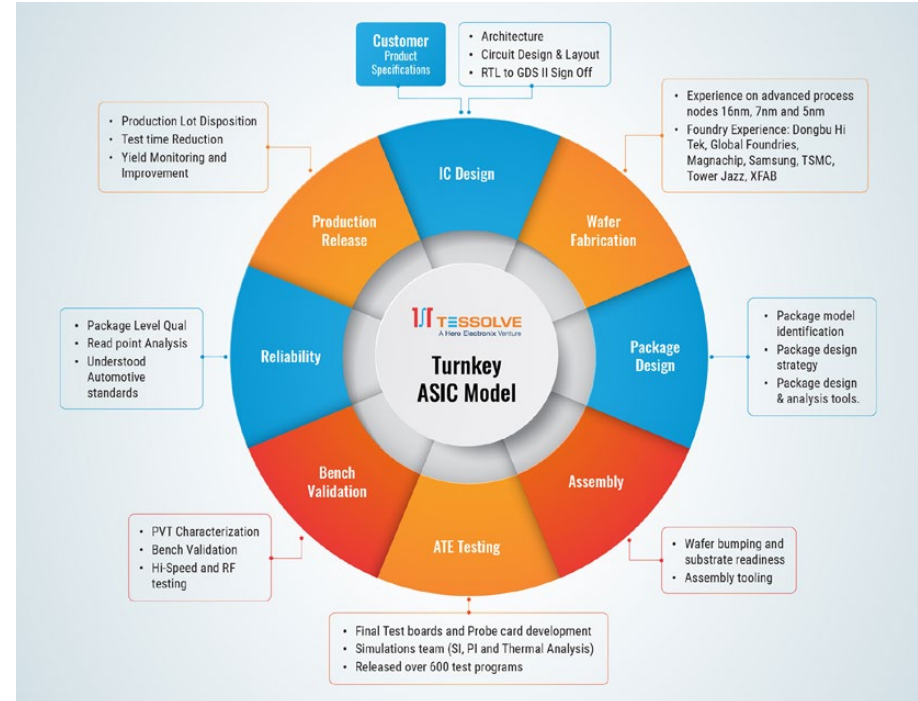


The #1 Semiconductor ASIC solution provider accelerates your concept to execution

Tessolve is the # 1 Semiconductor service/solution partner, supporting customers across the silicon and system development cycle. Starting as a borrowed back office one-man show with an ESD/LU machine, in 2004, it has now grown to house over 2000 engineers across the globe. It provides a one-stop-shop solution with full fledged hardware and software capabilities including its advanced silicon and system testing labs. Tessolve offers a full Turnkey ASIC Solution, from design to packaged parts.

**TARUN:** We all know Raja's story in building Tessolve from that back-office to an innovative, customer centric, silicon engineering company. You are the Co-Founder of the company and have been with him every step of the way, but now with you at the helm as the new CEO, how do you see Tessolve's evolution?

**SRINI:** Tessolve has constantly evolved from offering just post-silicon solutions to adding Chip design and Embedded systems design solutions along the way. We are uniquely positioned in having such diverse offerings under one roof. We are combining all these competencies to provide a full turnkey ASIC model and beyond for our customers. We want to be a one stop shop for our customers to enable them to productize their ideas. This fits in well especially with startups and mid-size



Tessolve's ASIC Solution: From design to packaged parts.

companies looking for partnerships in silicon engineering space. This is where we find our partnership with Silicon Catalyst crucial to collaboratively push the semiconductor market forward. Cutting-edge technology start-ups are hungry to productize their ideas, but they require an experienced ecosystem to execute. This is where solution-providers are playing a bigger role.

**TARUN:** What exactly do you see as the solution provider's role? And how is your team preparing to work with

some of these new technologies?

**SRINI:** There are really two ways that Tessolve has been molding its solution. 1) We have been actively building a partnership ecosystem across the silicon and systems supply chain. Silicon Catalyst being an example, but also with EDA and Tester companies, IP Providers, FABS, OSATs, and EMS. This is beneficial for both the customer and the supply chain. Customers get the most comprehensive solution, optimized for efficiency, time and cost and the supply



**SRINI CHINAMILI**  
**CEO**

Srini has over 25 years of experience in Semiconductor Engineering and Management. He held technical and management positions at Cirrus Logic and Centillum Communications prior to joining Tessolve as Co-Founder. He has extensive experience in Silicon Validation, Product Engineering and has managed high volume productization of several complex System on Chip and Mixed Signal devices. He takes pleasure in building startup teams into world class organizations. Srini completed his Masters in Electrical Engineering from University of Southern California and Bachelors in Electronics from Birla Institute of Technology.

**TESSOLVE**  
**IN-KIND PARTNER PROFILE**



chain are integrated into one solution. For example, foundry experience and PDK access are important, especially for development on emerging technologies like 7/5nm. Similarly, IP partnerships come handy when we integrate highly complex products. 2) In the last few years Tessolve has been actively identifying and investing in promising technologies such as 5G mmwave, High Performance Compute, Photonics, RISC-V, ARM and more. Each technology is identified as an emerging technology initiative and Tessolve invests resources and infrastructure to develop our solution to be ready for customers.

**TARUN:** We are seeing start-ups popping up all over the globe. What is Tessolve's experience on best engagement model? What is Tessolve's vision to support this global market?

**SRINI:** There are many variables that

dictate the best engagement model with a customer. Our ultimate goal is to allow our customers to focus on their core idea development, what is considered their secret sauce. As a partner, Tessolve can support the entire execution of their concept from design to final parts, both at a prototype stage and transitioning customers into volume production. With emerging technologies, there is considerable amount of collaboration on those first devices and that is a reason why Tessolve has multiple locations across the globe to support that close interaction. Our breadth of device expertise and ecosystem strength allows us to be an active partner by not only being able to execute customer ideas but provide a strategy for the best path of execution. Especially in early feasibility analysis which is crucial for new tech. Our silicon partnerships with companies like MediaTek, NXP, Qualcomm,

Renesas, and ST Micro allow us to take those emerging solutions and integrate it into final products through our embedded systems team. This creates a bidirectional expertise flow from silicon design to packaged parts to end products for applications such as automotive, industrial, avionics, medical and niche consumer.

**TARUN:** Any last words for our readers?

**SRINI:** If I were to describe Tessolve in one word, it is 'commitment'. The team goes above and beyond to ensure customer success and that's what excites us. Silicon Catalyst members can view us as their sounding board to productize their ideas and utilize our engineering teams as their extended execution arm.

These are exciting times for the semiconductor industry. Silicon Catalyst is doing an outstanding job in facilitating the momentum and we are excited to be part of it.

**Emerging Technologies Initiatives**

- ARM, RISC-V Subsystem and Analog Block Development
- 5G Solution
- High Performance Compute Solution
- Automotive Compliance Solution

**Tessolve Value-Add**

- Building ARM and RISC-V-based subsystems for accelerated chip development
- Develop Analog Design IP blocks to reduce design cycle and increase first cut alignment on target specification
- Hardware and test library development for testing of spectrum between 30 GHz and 300 GHz.
- Custom built test solution for Engineering Validation & HVM both 5G & Sub-6GHz range.
- HSIO: Ethernet 400G, PAM4 test measurements, DSP routines/Offline program development
- HPC DFT structure of IEEE 1500,1687,1149.10
- Custom ATE-Bench integration for High Speed Interface characterization and high current handling
- ISO26262 Compliant Design/Hardware/Software Development
- AUTOSAR SW(MCAL/CDD/BSW) Development, Integration & Validation
- Automotive Application Software, HMI Integration & Validation

Overview of Tessolve's Emerging Technologies Initiatives. Tessolve invests in resources and infrastructure to build solutions to address emerging technologies in silicon and systems development.



## Silicon Catalyst Expands Ecosystem with 4 Additional In-Kind Partners

September 9, 2020 – Silicon Valley - Silicon Catalyst, the world's only incubator focused exclusively on accelerating solutions in silicon, announced today the expansion of its ecosystem with the addition of four companies to its comprehensive family of In-Kind Partners (IKP). These include:

- DXCorr – Full custom physical design
- Efabless – Configurable open-source SoC design templates
- SalesDev.Global – Sales training workshops and coaching
- Tessolve – Semiconductor and System Engineering services & solutions provider

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) to dramatically reduce the cost of chip development. These Portfolio Companies 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 very excited to bring on these four new In-Kind Partners to further extend our growing ecosystem. Our Portfolio Companies are developing products for a broad spectrum of market segments and can now take advantage of the wide range of services offered by these partners ranging from IP, design templates, chip design and post silicon technical services as well as sales training workshops," stated Tarun Verma, Managing Partner at Silicon Catalyst.



### About DXCorr

DXCorr is the last independent stronghold for the art and craft of full-custom physical design or, as it was once known, semiconductor design. We know that the PPA of physical IP will determine the overall performance of a chip. The final frontier for performance comes from the countless degrees of freedom afforded by physical design - where everything can be optimized down to the shape of a transistor and placement of a wire. Further information can be found at [www.dxcorr.com](http://www.dxcorr.com)



### About Efabless

Efabless accelerates the development of new products and initial proof of concepts through a novel solution based on configurable open-source SoC design templates and automated design generation. Non-IC experts use this solution to rapidly, cost-effectively and easily create custom silicon. IC designers use the solution to dramatically reduce cost and time to market for proof of concept of new and exciting ICs. Our model is extendible to advanced packaging, software, subsystems and full systems. Efabless has partnered with a broad range of industry leading companies to develop the Efabless platform, advance open source and open innovation models in electronics and facilitate IC design for novel applications not sufficiently addressed by traditional design business models. Efabless is headquartered in San Jose, CA. For more information, visit [www.efabless.com](http://www.efabless.com)



### About SalesDev.Global

SalesDev.Global provides live sales coaching and on-demand support to help technology startups meet customers and grow sales. Members get private mentoring, weekly public roleplay sessions and expert training designed for the challenging enterprise sales environment. SalesDev.Global gives startups proven tools and hands-on techniques to shape their technology into the products customers want, and sell them profitably. For more information, visit [www.SalesDev.Global](http://www.SalesDev.Global)



### About Tessolve

Tessolve offers a unique combination of both pre-silicon and post-silicon expertise to provide an efficient turnkey solution for silicon bring-up, spec to the product. With 2100+ employees worldwide, Tessolve enables customers a faster time-to-market through deep domain expertise in Analog, Digital, Mixed Signal, and RF, broad ATE platform experience, embedded software services, and built-in infrastructure including three test floors, characterization, reliability, and system-test labs. Tessolve allows customers to leverage high-end engineering in an optimized cost model by being able to scale teams to meet exact customer needs. For more information, visit [www.tessolve.com](http://www.tessolve.com)



## Silicon Catalyst Partners with OnScale to provide Cloud Engineering Simulation capability to early-stage MEMS and Sensor companies

Silicon Valley, California, November 18, 2020 - Silicon Catalyst, the world's only incubator focused exclusively on semiconductor solutions, announced today the continued expansion of its In-Kind Partner ecosystem with the addition of OnScale, the leading provider of Cloud-Based CAE simulation. The partnership accelerates the development of complex mechanical and 3D structures through the OnScale cloud-based design environment. Silicon Catalyst portfolio companies will gain access to the OnScale tool suite, which enables fast and extensive simulation, and reduces costly engineering issues before tape-out.

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 five 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) to dramatically reduce the cost of chip development. 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.

"In recent years, Silicon Catalyst has engaged with a growing number of companies developing ultrasonic MEMS devices and high-frequency resonators," said Pete Rodriguez, CEO of Silicon Catalyst. "OnScale has consistently been the requested simulation and Digital Prototype solution. We're pleased to now have OnScale's support in our ecosystem."

OnScale's scalable Cloud Engineering Simulation platform enables Digital Prototypes built by running thousands of full 3D parametric multiphysics simulations in parallel on cloud supercomputers - distributed cloud computing powered by cloud HPC vendors like AWS and Google Cloud. Designers can gain critical insight into design performance without wasting time iterating through cycles of wafer fabrication.

"Early stage MEMS and semi startups can no longer rely on costly, time-consuming, and risky physical prototyping - I learned that lesson the hard way at my first MEMS startup, NextInput," says Ian Campbell, CEO at OnScale. "Digital Prototyping with OnScale allows MEMS and semi designers to simulate, evaluate and optimize device designs while minimizing the overall cost, risk, and time-to-market compared with physical prototyping processes. We are very excited to partner with Silicon Catalyst and help drive the next wave in silicon startups."

One such MEMS startup, Geegah, uses OnScale for digital prototyping of next-gen MEMS-based biometric sensors. "OnScale has been instrumental in allowing Geegah to optimize our devices. The support is fantastic," says Amit Lal, CEO of Geegah.

The OnScale and Silicon Catalyst partnership expects to see many more examples of MEMS startups leveraging digital prototyping techniques to drive down cost, risk, and time-to-market. "We're very excited to see how the new crop of MEMS and Semi startups will leverage OnScale and the other resources at Silicon Catalyst to bring the world innovative new hardware technologies," says Paul Pickering, Managing Partner at Silicon Catalyst and MEMS angel investor.



### About OnScale

OnScale is the first and only Cloud Engineering Simulation platform. OnScale combines powerful multiphysics solver technology with the limitless compute power of cloud supercomputers. With OnScale, engineers can run massive numbers of full 3D multiphysics simulations in parallel to create true Digital Prototypes – digital representations of physical high-tech devices that capture the complete behavior of a device over its operating envelope. By shifting expensive and time-consuming physical prototyping to digital prototyping, OnScale massively reduces cost, risk, and time-to-market for R&D firms pushing the boundaries of new technology. OnScale™ is the Future of Engineering™. Visit [www.OnScale.com](http://www.OnScale.com) to try out the platform today.

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## SILICON CATALYST ISRAEL: WHERE VENTURE CAPITAL MEETS STARTUP INNOVATION



Silicon Catalyst has a very synergetic relationships with the Venture Capital community in Israel. We have a shared interest in promoting new and innovative ideas in semiconductors. Together, we also support those early-stage startups on their way to success – be it financial assets, industry knowledge and connections, and access to a range of tools, services and other resources through our great In-Kind Partner network. In fact, we recently launched an “Investors” tab on our website, describing this close cooperation and highlighting some of our allies in the investment community.

Israel features a vibrant and advanced VC community, where international and local firms, besides many Corporate venture offices, are very active. Our Israeli partners, Moshe Zalcberg and Dany Biran, recently held a discussion with some of our local partners about how they see the current semiconductor ecosystem and associated opportunities for high-quality start-ups.

The panel included **Dov Moran**, Managing Partner at Grove Ventures; **Zvi Oron**, General Partner at Viola Ventures; **Gonzalo Martinez de Azagra**, Partner at the Spanish-Israeli Cardumem Capital and **Dede Goldschmidt**, VP & Managing Director at the Samsung Catalyst Fund, representing the Corporate Venture Capital (CVC) segment.

### WE ASKED THE PANELISTS HOW THEY SEE THE CURRENT STATUS OF THE SEMICONDUCTOR INDUSTRY.

“Well, I think that everyone is aware that semiconductors are booming” opened Dov. “Software is



**MOSHE ZALCBERG**  
MANAGING PARTNER  
SILICON CATALYST  
ISRAEL



**DANNY BIRAN**  
MANAGING PARTNER  
SILICON CATALYST  
ISRAEL

eating the world’ is, as you know, the slogan of one of the smartest and largest VC firms in the world, but software runs on hardware. Data is generated by sensors. Storage at scale is essential to keep all this data. Faster communication is required to gather the data. All this means is that the world will continue to rely heavily on semiconductors. The essentiality of this resource will push semiconductors to advance.”

Zvi also focused on the dynamic relationship between Software and Hardware: “In the cycle between HW and SW, we are at the stage that SW got to its peak while the HW limits it and we need a new generation of HW. We see this in many different places. For example, Nvidia offered a special HW for AI and created a big disruption based on GPUs. This is a \$6B market today and will grow into a \$30B market in 6-7 years, in the data center segment alone. There are other markets where the SW demands a new generation of HW, and someone needs to create it.”

Gonzalo highlighted the need for greater innovation: “In the past, it was often enough to ride the down-sizing enabled by Moore’s law. Now that we are hitting the limits of such scaling, there is a constant need for innovation allowing new and more value-add applications.”

“I’d like to turn the spotlight onto the Israelisemiconductor ecosystem” said Dede. “As challenges addressed by silicon chips get more complicated – such as AI computation or high-speed networking — and with the continued evolution to smaller geometries (down to 7nm, 5nm and below), the barriers to entry and the complexity and cost of bringing chips to market have grown tremendously. Nevertheless, as a result of decades of silicon innovation in Israel, we have a sizeable pool of experienced semiconductor professionals, including repeat entrepreneurs, and see a continued flow of exciting ventures being founded here.

The semiconductor industry requires large financing rounds early on,



**DOV MORAN,**  
MANAGING PARTNER  
AT GROVE VENTURES

especially when targeting leading-edge production technologies such as 7nm and below. Luckily, VCs with a track record in semiconductors are not hesitant to fund these startups. There are also several multinational corporates that invest in Israel in this domain, such as Samsung, Intel, Qualcomm, and Microsoft.”

### SO WHAT OPPORTUNITIES DO YOU SEE NOW FOR SEMI STARTUPS? WHERE CAN SEMI STARTUPS EXCEL?

Zvi continued his theme of specialized hardware supporting specific applications: “Startups can thrive in places where they can offer a device with a major boost in cost, performance, power consumption, and in areas that so far use a “generalist” solution. This explains the attention AI got in recent years. Therefore, entrepreneurs need to identify additional problems that today are not big enough but will be in a few years, that require a specialized solution, and be ready with the right solution at the right time.

Another interesting segment is automotive. Next year, a typical car

“I trust Silicon Catalyst to be a very knowledgeable sounding board.”

- Dov Moran

will include \$600 worth of chips. If you consider there are 100m cars sold per year, it’s a \$60B semiconductor market, only for automotive. I see new car makers entering the market and believe the incumbent players will have to align to the new rules of the game, such as shorter sales cycles. In a \$60B market, I believe that there are interesting opportunities.”

Dede also highlighted these two main segments: “Israel traditionally had many communications and connectivity semiconductor startups, but nowadays we see activity in two key domains:

**A.** The data economy has led to massive volumes of data that can be processed and monetized, and that in turn accelerates the need for machine learning. Analytics and machine learning are typically executed in the cloud and we see the need for

architectural changes in data centers to enable these workloads. There are several Israeli companies that address the new data center workloads in the domains of computing, networking and storage. These startups offer disruptive architectures that can support orders of magnitude higher data processing capabilities.

**B.** The second domain is sensors. The profound digital transformation and use of analytics and AI in areas such as automotive, healthcare, industry 4.0, smart cities and more requires high-resolution, multi-dimensional information about a surrounding environment through various sensors, such as novel image sensors, 4D radars, LIDARs, bio-sensors, environmental sensors and more.

We believe that these domains are therefore open to the kind of out-of-the-box thinking that startups excel at.”



**GONZALO MARTINEZ DE AZAGRA,**  
PARTNER AT THE SPANISH-ISRAELI  
CARDUMEM CAPITAL

Dov concurred with the importance of the cloud segment, that requires advanced computation and storage capabilities besides advanced automotive, that requires more sensors and extremely low power chips. And added: “On top of that, I believe that as we are headed towards massive changes in medical treatment, including remote patient monitoring and advanced analysis, new forms of semiconductors usage will be created. We are at a time of significant progress. Companies and founders that will heed the market’s needs and will be innovative and bold have a tremendous opportunity to excel.”

“We believe there are a myriad of segments where semiconductors can

## “In Israel, we see a continued flow of exciting ventures being funded here.” - Dede Goldschmidt

disrupt existing and new markets”, summarized Gonzalo. “We’d like to see more entrepreneurs coming forward and tackling these difficult problems”.

### NEXT, WE ASKED WHAT IS IMPORTANT IN THEIR VIEW IN A SEMICONDUCTOR STARTUP:

“As a CVC” said Dede, “we screen potential investment deals using two lenses. First, the startup should be highly attractive as a financial investment, with an exceptional team that is attempting to address a very significant market need by solving a difficult problem with barriers to entry. The second consideration is of course our desire to find the Samsung angle—how can we work together and create incremental value. Our team works hard to generate engagements with Samsung business units.”

“From my perspective,” said Gonzalo, “there are opportunities in many different markets, and we are not closed to specific areas. The most important are the size of the opportunity and team’s capability to innovate and create significant value.”

“We need to see a team that understands the market and the customers, who has expertise and know-how, as well as the balance and leadership to lead the company for the long term”, added Dov.

Zvi agreed: “We look for very big market opportunities with strategic interests, and there are opportunities in different segments such as data centers, automotive, 5G, edge computing, short range communication, etc.”

On the team, he added: “Domain expertise is critical – we need at least one founder with deep semiconductor experience but you must also have a full understanding of the system requirements to do a proper optimization of the solution”.

### LASTLY, WE ASKED FOR THEIR VIEW ON SILICON CATALYST’S MOST IMPORTANT CONTRIBUTION TO THE STARTUPS AND TO THEIR OWN INVESTMENT ACTIVITIES.

“Silicon Catalyst helps motivating entrepreneurs to start semiconductor companies, through increased awareness and creating a platform where they can get the support they need and exchange ideas and experience”, said Zvi.



**ZVI ORON,**  
GENERAL PARTNER  
AT VIOLA VENTURES



**DEDE GOLDSCHMIDT,**  
VP & MANAGING DIRECTOR  
HEADING SAMSUNG CATALYST  
FUND, REPRESENTING THE  
CORPORATE VENTURE CAPITAL  
(CVC) SEGMENT

“Silicon Catalyst can offer important support early on (pre-seed/seed stage) to founding teams to facilitate an early examination of their idea before the major funding rounds needed for semiconductors ideas. Silicon Catalyst can also leverage its network to help the entrepreneurs obtain early feedback from the market as well as facilitate the syndication of larger financial rounds required to launch a semiconductor product”, said Dede.

Gonzalo highlighted the special liaison function that Silicon Catalyst provides to both VCs and start-ups: You have great contacts in the semiconductor space, that can generate leads and help VCs with great insights and validation onto their own due diligence process. Also, I believe you are in a special position to help the start-up companies to form a syndicate for a round.”

Dov summarized what he values the most: “I trust Silicon Catalyst to be a very knowledgeable ‘sounding board’. I need you to listen and advise.”

## ventureLAB and Silicon Catalyst partner to expand hardware and silicon ecosystem in Canada

MARKHAM, Ontario, SILICON VALLEY, California - September 14, 2020 - ventureLAB announced today that it has partnered with Silicon Catalyst to expand its reach for the Hardware Catalyst Initiative (HCI), Canada’s first hardware and silicon lab and incubator. Silicon Catalyst is the world’s only incubator focused exclusively on accelerating solutions in silicon, offering a coalition of in-kind and strategic partners to dramatically reduce the cost and complexity of development.

With a world-class network of mentors to advise startups, Silicon Catalyst is helping new semiconductor companies address the challenges in moving from idea to realization. The incubator/accelerator supplies startups with a path to design tools and silicon devices, as well as offering networking opportunities and access to funding, banking and marketing acumen to successfully launch and grow their companies’ novel technology solutions.

According to the Semiconductor Industry Association, the global semiconductor industry generates \$7 trillion in economic activity, creates 4.89 indirect new jobs for every one semiconductor job, and enables the development of breakthrough products like smart energy, autonomous vehicles, and innovative healthcare solutions. Canada is a leader for creating and scaling IP-rich semiconductor and hardware companies and a magnet for home-grown and global talent.



The new partnership will expand the HCI’s expert network to support hardware and silicon start-ups and scale-ups building and commercializing transformative solutions in healthcare, telecommunications, advanced computing, connected transportation and smart energy. This expanded support will also help the HCI deliver its mission to accelerate commercialization and reduce cost of development for emerging hardware and silicon leaders who are Built-to-Scale from Canada and go global.

“We are delighted to partner with Silicon Catalyst as the reach of the Hardware Catalyst Initiative expands coast-to-coast and around the world,” said Melissa Chee, President and CEO, ventureLAB. “Canada is a recognized leader for creating and scaling IP-rich semiconductor and hardware-based companies and a magnet for home-grown and global talent. We are excited to collaborate with Silicon Catalyst in our collective bold vision to enable Canada’s pioneering tech founders scale in the global innovation economy.”

“Our mission is to provide early-stage entrepreneurial teams with the strongest possible foundation for business growth,” stated Rick Lazansky, co-founder and Chairman of Silicon Catalyst. “Through our collaboration with the ventureLAB technology hub and its Hardware Catalyst Initiative, these startups will gain access to critically important tools, services and in-depth semiconductor industry expertise uniquely available from our ecosystem.”



## Octane and Silicon Catalyst Announce a Broad Collaboration to Support Semiconductor Innovation

February 12, 2021 - Aliso Viejo and Silicon Valley, California - Octane Enterprise Solutions, a subsidiary of Octane, the convening organization of Southern California's technology and med-tech ecosystem, has established a collaboration with Silicon Catalyst to assist early and growth stage semiconductor companies in Southern California. Silicon Catalyst is the world's only incubator focused exclusively on semiconductor solutions, offering a coalition of in-kind and strategic partners to dramatically reduce the cost and complexity of development for startups in the semiconductor industry.

Through the new partnership with Silicon Catalyst, Octane Enterprise Solutions (OES) will help to develop Southern California's early-stage semiconductor companies. The new partnership will greatly improve access to capital and expertise to support the Southern California semiconductor community.

The partnership includes a referral system for Octane to offer the Silicon Catalyst incubator process to qualifying companies and makes available to graduates of the Silicon Catalyst incubator participation in Octane's award-winning company accelerator, LaunchPad SBDC. These companies will now also have an opportunity to pursue funding from the investment ecosystems available from both OES and the Silicon Catalyst Angels investment group.

LaunchPad SBDC works with technology companies to enhance their investment capital strategy. Companies that have completed the LaunchPad process have collectively raised over \$2.8 Billion. Over 80% of LaunchPad's 600+ Alumni since 2010 have successfully raised capital.



Paul Tobin, President of OES said: "The combination of OES and Silicon Catalyst will ensure that Southern California's innovative semiconductor companies get the support they need from their earliest days, with world-class mentoring and advice from our combined ecosystem of industry experts. The WSTS projects strong growth in 2021 for the industry, reaching \$469 billion in world-wide revenue. This partnership will help build on the entrepreneurial spirit in our region and will drive further contributions via California's leadership in this massive and highly competitive global semiconductor industry for generations to come."

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 five years, the Silicon Catalyst partner ecosystem has enabled early-stage companies to build complex silicon chips at a fraction of the typical cost.

"We welcome the Octane organization to our expanding eco-system and look forward to working with the innovative semiconductor companies in the region. Our industry has had numerous successful, public semiconductor companies originate out of Southern California and our team is ready to assist in building this next wave of success stories," stated Pete Rodriguez, CEO of Silicon Catalyst.

Silicon Catalyst has created a unique ecosystem to provide critical support to semiconductor hardware startups, including tools and services from a comprehensive network of In-Kind Partners (IKPs) to dramatically reduce the cost of chip development. 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.

More information is available at [www.siliconcatalyst.com](http://www.siliconcatalyst.com) and [www.siliconcatalystangels.com](http://www.siliconcatalystangels.com)

## 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 8 companies, 7 of which are from the Silicon Catalyst Incubator/Accelerator. The total investment amount by the members now stands at ~\$1 million.

Interested in joining?  
Interested in pitching?

Please contact Richard Curtin, VP of Business Operations  
[richard@siliconcatalystangels.com](mailto:richard@siliconcatalystangels.com)  
[siliconcatalystangels.com](http://www.siliconcatalystangels.com)



Enabling the next phase of Moore's Law through optical connectivity  
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Board members, Raul Camposano, Amos Ben-Meir & Michael Joehren

# Semiconductor Industry Forecast: Sunny and Bright with Few Clouds in Sight



By Tekla S. Perry

December 7, 2020

Semiconductor industry mavens gather (virtually) to review the current state of the industry and challenges on the radar

"I've never seen a better time for this industry," said Mark Edelstone. "Chips are cool again."

Edelstone, who is chairman of global semiconductor investment banking for Morgan Stanley, and has some 30 years of experience in the chip business, was speaking on a panel at the annual semiconductor forum held (virtually this year) by startup incubator Silicon Catalyst. He was not alone in his assessment.

"The market is hot," said fellow panelist Ann Kim, managing director and head of the frontier technology group for Silicon Valley Bank. "There is a strong funding environment and the cost of capital is low. Venture capital funds have over \$150 billion of dry powder. Companies in semiconductor space are raising massive growth rounds...[and] semiconductor entrepreneurs should be attacking the market right now."

The reason for such a sunny outlook? Surprisingly, it's due in large part to winds that changed as a result of the coronavirus storm.

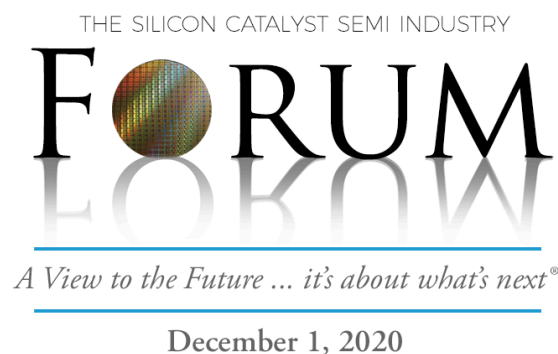
Said Edelstone: "The shift to the cloud and work from home are significant trends right now, catalyzed by COVID."

Both are fueling demand for semiconductors, he indicated—in particular, acceleration of the move by companies from their own computer infrastructures to cloud services will continue post-pandemic. "We are only about 10 percent of the way there in terms of what can move to the cloud."

The fact that the pandemic has proven to be more of a boost than a drag on semiconductor industry fortunes was not exactly expected.

Said Jodi Shelton, cofounder CEO of the Global Semiconductor Alliance: "I don't think any of us anticipated how well things would hold up. People [initially] talked about a lot of cost-cutting, but by May and June, the attitude changed."

"The pandemic has been toxic for the economy," she



said, "but Nasdaq and the Dow hit records, there are record deals, record amounts of money being raised...You wouldn't know we are in a pandemic if you look at those numbers."

### The (Brief) Pandemic Pause

Kim also reported that the initial fears by semiconductor company leaders were short-lived. "We spoke to the VC-backed companies that we work with at the beginning of sheltering in place," she said. "There was definitely a pause. Management teams had to take a fresh look at their runways; people rushed to the capital market to close equity rounds. But then they realized that debt is available and cheap, and they can use debt as a safety blanket."

"We thought we would see a U-shaped curve," said Edelstone. He was referring to a rapid drop and then a slow period for semiconductor companies before a recovery—one that would be "easier to come out of than the dot-com crash."

"But to see how it has shot up has been amazing," he said.

Contributing to that extremely short pause and quick turnaround has been the ability of the semiconductor industry to pivot to remote work, a more daunting challenge than the adjustment faced by the software-centric tech companies.

"The thing that has impressed me the most is just how

productive everybody has been," Edelstone said. "All of our companies in our industry are operating virtually, designing these complex devices and taping them out relatively on schedule. It has been incredible to watch the resiliency that technology has been able to deliver."

Industry executives had been somewhat worried that the boom was due to inventory stockpiling, and were concerned that either manufacturing issues due to the virus or trade issues with China would cause the companies that use semiconductors in their products to order more devices earlier, panelists reported. But that seems to not be the case. Said Shelton: "It seems a lot of inventory has been burned off."

### The China Question

Those trade issues still form the hint of a cloud on the horizon, panelists indicated. "Things with China may likely get worse before they get better," said Shelton. And the tensions between the U.S. and China could spread to Taiwan, affecting TSMC. With TSMC being such a dominant manufacturer in terms of both technical capabilities and market share, any disruption there would ripple throughout the entire industry.

So, said Shelton, the question is, "Can we reset the relationship with China, dialing down the rhetoric and moving towards a solution? The Biden administration will have pressure placed on it to remain tough on China. And we have six weeks more of the Trump administration;

there are things they could do [with regards to China] that would be hard to undo."

### Beyond the COVID Era

After the pandemic, when the world settles back to normal—or a new normal—what will the chip industry look like? That was the question posed by moderator Don Clark, a New York Times contributing journalist.

Said Shelton: "We are very optimistic about the future. The industry has a lot of room to grow."

But the way the industry grows may be different than it has in the past, with semiconductor companies competing with each other to create the most powerful or lowest-power processors.

Instead, said Edelstone, "I think we will increasingly see semiconductors as a core competency for companies. They start with software, develop a chip to drive it, and go to market as a systems company."

Consider Nvidia, he said. Even 10 years ago, "[Nvidia CEO] Jensen [Huang] would have said that it is not a semiconductor company, it is a full stack, end to end, solution provider. That is where the future is going to be," not, he indicated, in bringing a \$10 product to market as a standalone semiconductor company.

[spectrum.ieee.org](http://spectrum.ieee.org)



Discussing the pandemic pause and the future of the semiconductor industry are (clockwise from top left) Don Clark, Mark Edelstone, Jodi Shelton, and Ann Kim.



## Silicon Catalyst's Semi Industry Forum – All-Star Cast Didn't Disappoint

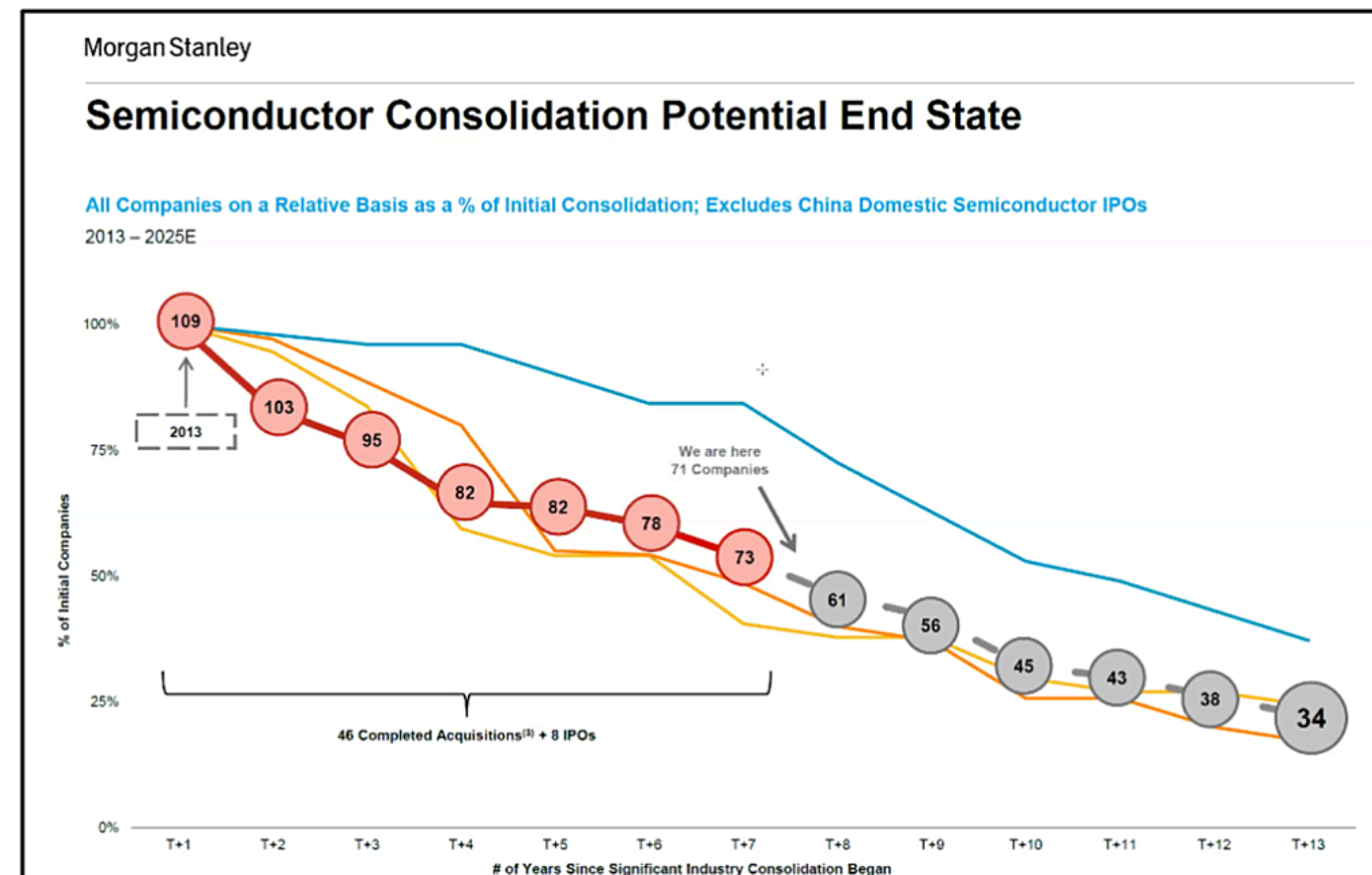
by Mike Gianfagna  
as published on [www.semiwiki.com](http://www.semiwiki.com), December 18, 2020

A few weeks ago I wrote about an upcoming event Silicon Catalyst was hosting, the Semiconductor Industry Forum – A View to the Future. I mentioned a high-profile group of presenters: Don Clark, Contributing Journalist, New York Times as moderator; Mark Edelstone, Chairman of Global Semiconductor Investment Banking, Morgan Stanley as a panelist; Ann Kim, Managing Director, Frontier Tech, Silicon Valley Bank & Kauffman Fellow as a panelist; Jodi Shelton, Co-Founder and CEO, Global Semiconductor Alliance as a panelist with both Pete Rodriguez, CEO at Silicon Catalyst and Richard Curtin, Managing Partner at Silicon Catalyst providing opening remarks. I had the opportunity to attend the event and I'm here to tell you it was insightful, thought-provoking and at times quite surprising. The all-star cast didn't disappoint.

Don Clark began the panel session with an observation that "chips are cool again". Don explained that he's been covering semis since about 1987 when he interviewed

Andy Grove, so he brings a substantial perspective to this event. He then engaged with each panelist. There were many great insights offered during this portion of the evening. I will offer a key point or two from each of the panelists here. A replay link is coming – I strongly encourage you to watch the entire event. It's definitely worth the time.

First up was Mark Edelstone, who pointed out that he's been watching semis for over 30 years and has never seen a better time for the industry. That statement alone made the whole event worthwhile for me. Mark presented some slides about the trends and what they mean. As is typically the case, he worked through a huge amount of data and turned it into clear and easy to understand trends. There is one slide in particular I'll share here. I mentioned it in my previous post on the event. It's an analysis of semiconductor consolidation trends and it shows what the semi world will look like in a few years. As shown in the graph, Mark sees a significant amount of further consolidation in the industry, projecting it to shrink to less than three dozen companies in the next five years.



Semiconductor Consolidation Trends

## Semiconductor Consolidation Trends

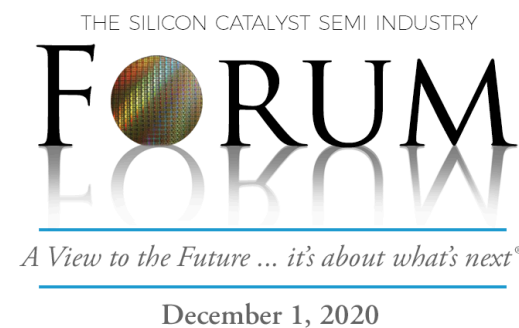
Next was Jodi Shelton. Early in her discussion she said, "we're reminded as never before that the global economy runs on semiconductors." That's another one of those statements that made the whole evening worthwhile. Jodi presented a thoughtful analysis of the current tension with China and shared some views of how to get back to a more productive path for both countries. Taiwan and its unique position were also discussed. Jodi made a final comment about the significant lack of engineering talent. She pointed to the female population as an underserved demographic for engineering. The GSA will be promoting STEM education for women. If you're a female who is choosing a college career, or if you know someone who is, give engineering a serious look – you will find a warm welcome with that credential.

Next was Ann Kim. The memorable quote here was, "VC funds have over \$150 billion of dry powder. It's a great funding environment." She pointed out that a large influx of capital into the semi sector will help companies get to that all-important tapeout. Don asked Ann "what's hot these days?". Ann covered several areas. An interesting one was space technology. She said companies like SpaceX, Virgin Galactic and Blue Origin are doing well. Autonomous technology is popular in the air as well as on the ground it seems. Health care and life sciences are also driving a lot of interest.

After a few rounds of discussion with the panel from Don, the floor was opened to a very spirited Q&A from attendees. Many topics were covered; you need to see it for yourself. The all-star cast didn't disappoint. You can see the full replay of the event here, starting with the introductory remarks from Richard regarding the Forum's charter and an overview of the Silicon Catalyst Incubator by Pete.

By the way, for those of you engaged with early-stage semiconductor startups, the application deadline to the Silicon Catalyst Incubator is January 11, 2021.

<https://semiwiki.com/events/294074-silicon-catalysts-semi-industry-forum-all-star-cast-didnt-disappoint/>



## Semiconductor knows no borders: Q&A with Silicon Catalyst partners



By Judy Lin, reprinted from digitimes.com/news/  
Monday, January 4, 2021

While many might be deterred by the hefty costs of starting a semiconductor company, there are still many other entrepreneurs with a silicon dream knocking on the door of Silicon Catalyst (SC), an incubator and accelerator for semiconductor startups.

Digitimes recently talked to SC's managing partners **Richard Curtin** and **Tarun Verma**, as well as partner **Lance Bell** over Zoom trying to better understand the company and their insights into the latest industry trends.

**Q: PLEASE GIVE A BRIEF INTRODUCTION TO THE ACCELERATOR AND THE BACKGROUND OF THE CORE TEAM. SEMICONDUCTOR IS A VERY SOPHISTICATED TECH AND INVOLVES VERY COMPLICATED PROCESS. DO YOU HAVE ANY SPECIFIC ASPECT THAT YOU FOCUS ON?**

A: We are Silicon Catalyst, the world's only incubator exclusively focused on accelerating semiconductor solutions, including IP, MEMs, and sensors. We started operation in 2015, co-founded by Rick Lazansky, Dan Armbrust and Mike Noonan, against the backdrop of a falling growth in R&D in the industry, due to massive consolidation in recent years. Our executives and partners all have long careers in the semiconductor industry. We understood there is still significant room for improvement in industries developed by silicon. Based on that we try to address the largest problem silicon ventures have, mainly to lower infrastructure costs to make it happen. We put together an ecosystem of in-kind partners, that provide goods and services at either no cost or at a significantly reduced cost, spanning the pre-silicon and post-silicon stages of development, as well as an ecosystem of advisors, strategic-partners, and investors.

We started this vision in 2015, at that time we had 18 in-kind partners, and a score of advisors; today we have 42 in-kind partners, almost 200 advisors, 300 investors, and seven strategic partners. We have expanded our footprints to other areas in the world. We have a JV in China, operations in Israel, and have been in discussion to

expand to EU, India, Taiwan, and Korea as well. While we've done that, we are strengthening our partnerships with Global Semiconductor Alliance (GSA) and SEMI. We have recently expanded our university ambassador program on a worldwide basis.

**Q: OUT OF THE 350 STARTUPS THAT YOU HAVE ENGAGED WITH SINCE 2015, YOU HAVE ONLY ADMITTED 35 OF THEM OVER THE YEARS. AND YOUR CHENGDU JOINT VENTURE HAS ACCEPTED 16 CHINESE STARTUPS SINCE 2019. HOW DO YOU PICK STARTUPS? WHAT ARE THE CRITERIA?**

A: We look at all the factors that venture capitalists would look at. But we bring real experts to bear - some of whom have built companies, been CEOs, or have been at the forefront of the industry for decades. That is part of our secret sauce. The seasoned semiconductor veterans in our ecosystem see their engagement with Silicon Catalyst as a "give back" to the industry.



**RICHARD CURTIN**  
SILICON CATALYST  
MANAGING PARTNER

How do we screen the startups? For example, first we look at the team: is it a capable team? We look at the market, what pain they are solving? We look for evidence of customer traction. What is the value proposition? Are customers willing to pay for it? Finally, can they execute their plans to hit the market window? Do they have access to the right channels and go-to-market strategies? And then to get to the right design, and realize the revenues? We are very selective. We try to help every startup that chooses to engage with us, providing feedbacks to them. Some of them come back and get admitted later. We use the same formulae in China. China is a market with huge demand, with thousands of startups. It's been almost two years since we started operation there, and our joint venture will finish this year with a dozen startups in their incubator.

## Semiconductor knows no borders: Q&A with Silicon Catalyst partners



When we first started, we only look at early-stage companies. As we have grown our ecosystem, we now have later-stage companies that have joined us. People that have raised may be US\$5-10 million, may be more. We don't focus on any specific area. We are really looking for a business model that needs a piece of silicon to differentiate itself. So whether it's 5G, data-harvesting, AI, it's ok. We don't focus on a specific market segment at this point.

**Q: YOU MENTIONED THAT YOU HAVE ESTABLISHED A JOINT VENTURE IN CHINA. CAN YOU ELABORATE ON THE DETAILS?**

A: We partnered with a company called Silicon Power Technologies. The primary ownership is a Sino-American company headquartered in Hong Kong. The Chengdu venture is focused on semiconductors for the power electronics market. There is a lot of semiconductor demand in China, and so the innovative products that the startups are developing can address the needs of the market.

We help the generally techno-centric people to round out their value proposition, reduce the seed investment amounts and the time to prototype for them through our 24-month incubation. We provide in-kind partner goods and services. Everything from pre-silicon to post-silicon, all the way through to businesses support services, such as corporate attorneys, IP attorneys, business development consultants, advisors, etc. And this is done on a worldwide basis. We have an application cycle twice a year, and we are coming to our application deadline on January 11, 2021 for the next batch of applicants. We go through the screening processes, meet with the entrepreneurial team we select with an agreement, and bring them into the incubator.

During those 24 months of incubation, all in-kind partner goods and services are provided free of charge, or at a dramatically reduced cost, so they don't need to raise the money just to get business off the ground. We take that burden of design tool and shuttle run cost completely off the table. We can take them with their concept, and everything through from design, IP, design services, foundry. We have been working with TSMC since the first days of our incubator, enabling the startups with rapid access to MPW shuttles. When a company comes into an incubator, they have full access to all these goods and services that are only available with Silicon Catalyst.



**TARUN VERMA**  
SILICON CATALYST  
MANAGING PARTNER

Very clearly, TSMC is front and center for companies in our incubator, being able to provide shuttle runs for their designs. We have access to the process-design kits (PDKs) for all the models. They can immediately start designing and knowing they can get onto a shuttle when they are ready to tape out.

**Q: FOR THE 16 STARTUPS OF YOUR JV INCUBATOR IN CHINA, DO THEY USE THE LOCAL FOUNDRY OR TSMC?**

A: Since they are focused on the power space, they have some specialty foundries in China applied on the power IC segment. When we set up a joint venture overseas, what they do is take our methodology and recipe and then localize it. They have experienced a very rapid learning curve because we have been at this for so long. We have a process that is second to none, and you need the support of an industry to get them from a concept on the back of a napkin all the way to have a cashflow-positive business that maybe ultimately ends up with an acquisition, whether domestic or international.

**Q: DUE TO THE GEOPOLITICAL COMPETITION, SOME PEOPLE ARE SAYING THAT THE G2 TREND ARE GOING TO LAST. WHAT DO YOU THINK?**

A: Silicon Catalyst is really looking to be "the Switzerland of the semiconductor industry." The semiconductor industry has been growing incredibly over the last few decades. This has always been a global innovation market. The inventors know no borders. Let's find a way to make that continue. There are too many problems to be solved. Some people focus their attention on 5G, but there are far more problems than 5G. Silicon Catalyst is a worldwide incubator, we stay agnostic and work with startups and partners from all countries. More than half of our startups are from outside of the United States. We find our incubator provides essentially an epicenter of synergy to connect those startups with industry experts, as well as access to all the resources they need. We have engaged with over 350 new applications to enter our incubator - we have incubated companies involved with diverse market segments, from memories to biotech, to 5G, to energy harvesting. Where do we see a startup that is applying to our incubator? How will they fit into our ecosystem of advisors, strategic partners, and in-kind partners? And that really is the secret sauce of our organization because there is so much support in each and different areas.



Semiconductor knows no borders: Q&A with Silicon Catalyst partners



We only accept a startup that we think will be enabled with the access that we provide. One thing we do is truly unique: we de-risk the investment. So you have a company like TSMC that offers us shuttle runs to companies in our incubator, with their knowledge and access to manufacturing experts. And Synopsis or Advantest, and other leading pre-silicon and post-silicon vendors of design tools and services, coupled with experienced semiconductor executives. Once accepted, the chances of succeeding for those startups become ultimately greater. They come from all over the world, which is very exciting for us.



**LANCE BELL**  
SILICON CATALYST PARTNER

optical connectivity. Many of the startups spawn from university environment. Ayar Labs had a foundation technology developed by a professor in UC Berkeley, collaborating with two PhD students and one master's student. They developed a revolutionary I/O solution that they are able to push for significantly faster data transmission speeds. The key to their success is that they answered one of the questions we asked during those screening meetings: in order for your technology to be successful, does the entire industry need to lean towards your direction? Or are you actually a plug-and-play the existing ecosystem? In

fact, they are manufacturable. They not only had a breakthrough technology, but also easy for the industry once they overcome the hurdles as a startup. This optical I/O is truly a game changer.

We introduced them to various venture capitalists, guided them and helped to establish their strong foundation for business growth. They recently closed on a Series B round, raising US\$35 million from investors. We would like to think that our very early engagement with them in our incubator aided them on their meteor path to success. We have multiple success stories like that. New technologies are coming everywhere, and over 50% of our startups are located outside the United States. It's our knowledge-based connection to a unique and growing ecosystem that is heart of our success, coupled with a comprehensive screening process to filter out early, those companies that have the greatest chance to succeed. With a willing group of participants as in-kind partners, they brought in with their services at no cost or low cost to our startups, because they, too, are in search of potential customers at this significant age of consolidation. Budgets for research and development had been slashed, so innovation from large companies have been limited.

The future landscape could not be healthier. It has a worldwide footprint, and we are beyond delighted to explain our model and communicate to Digitimes readers. You cannot think about semiconductor without mentioning Taiwan. Silicon Catalyst is looking forward to even more semiconductor innovation in the years ahead.

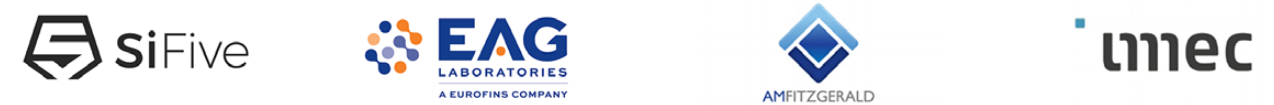
<https://www.digitimes.com>

**Q: YOU SEEM TO HAVE AN INTERESTING STARTUP PORTFOLIO.**

A: Let me show you the landscape of applications: everything from life-sciences, to edge-computing, to artificial intelligence (AI), machine-learning, inferencing for edge-computing, energy harvesting, cyber-security, etc. Everything has to do with semiconductors. Just recently we expanded our footprint into the MEMS, sensors, and actuators markets. One of the recent partners is ST Microelectronics, which is the world's largest MEMS manufacturer. This is an exciting development for us because there are many applications such as microphones, all the way to life science, etc.

**Q: PEOPLE ARE MUCH CONCERNED ABOUT THE BOTTLENECK OF MOORE'S LAW. BUT AS YOU MENTIONED, THERE ARE EMERGING APPLICATIONS AND DEVELOPMENTS IN THE INDUSTRY. DO YOU FORESEE A PERIOD OF "GOLDEN YEARS" FOR SEMICONDUCTOR INDUSTRY? ANY NEW TRENDS SPOTTED?**

A: We are now down to 3nm process technology, enabling billions of transistors per design. But there is an interesting new segment we are seeing in our companies of portfolio, which is optical computing. Optical computing probably is going to be the next wave. So if you are thinking computing horse power is reaching its limit, because there are so many parallel machines and architecture. But the next bottleneck is interface communication, I/O. Now we are seeing enormous growth in optical interconnect. One of our portfolio companies, Ayar Labs, is doing





# SILICON STARTUP SOLUTIONS

## About Us

Silicon Catalyst is the world's only incubator focused exclusively on semiconductor solutions (incl. IP, MEMs and Sensors). We accelerate our startups from idea to prototype, and then onto a path to volume production.

We have engaged with over 400 startups worldwide since April 2015 and have admitted 37 exciting companies. Silicon Power Technology, our Chengdu Joint Venture, has accepted 21 startups in China since January 2019.

Our companies participate in a 24-month incubation program; a Silicon Catalyst partner is assigned to each company to advise and advocate for them during this period. Silicon Catalyst has created a unique and growing ecosystem which provides our startups with everything they need to design, fabricate and market semiconductor solutions.

- **In-Kind Partners** (TSMC, Synopsys, Arm, ST and over 40 more) – provide each startup several millions of dollars worth of goods and services including EDA tools, IP, PDKs, prototypes, test equipment, design services, packaging and business solutions.
- **Strategic Partners** (TI, ON Semi, Soitec, Bosch, Cirrus Logic, Arm and ST) – participate in the selection process and actively look for opportunities to partner with our startups.
- **Investors** – a path to funding through a large group of VCs, Angels and Angel groups, Corporate VCs, and Family Offices. Silicon Catalyst Angels, an angel group created from our ecosystem, launched July 2019.
- **Advisors** – a valuable network of industry experts that we match to the specific needs of each startup.
- **Universities, Industry Orgs., Incubators, Government Agencies** – we nurture dozens of key relationships for the benefit of our portfolio companies and the industry.

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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