

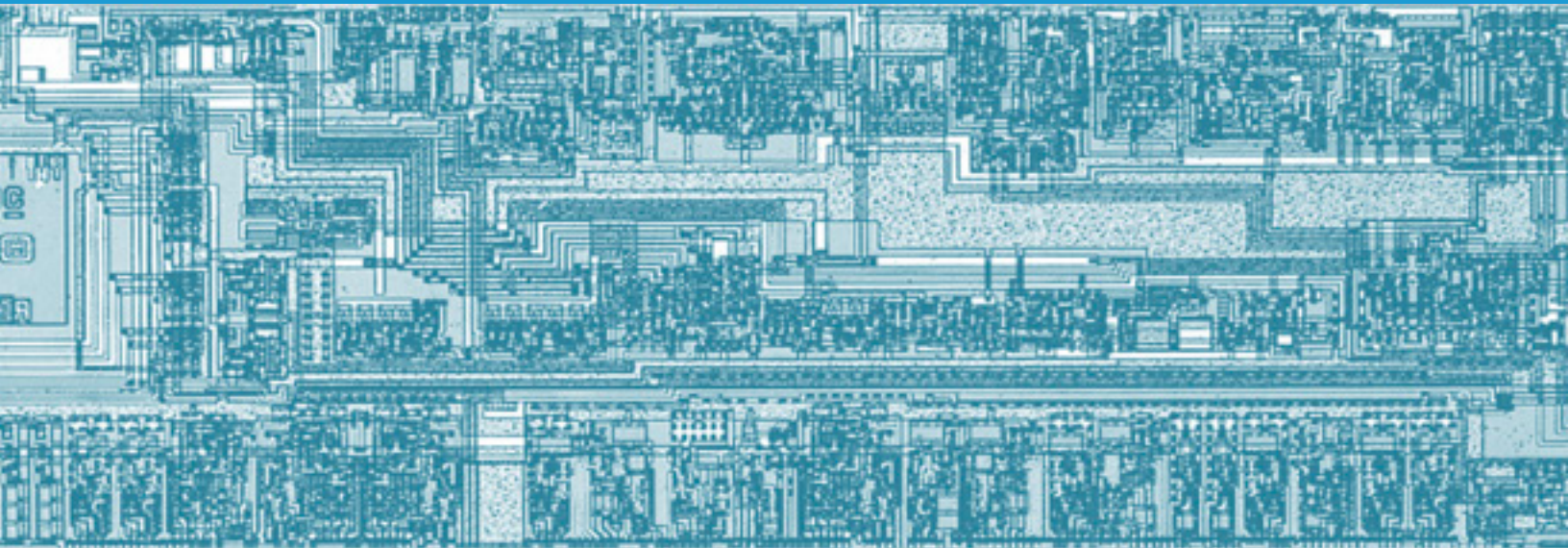


Volume 7 - Nov 2018

# SILICON STARTUP SOLUTIONS

A SILICON CATALYST NEWSLETTER

A VALUABLE RESOURCE FOR THE SEMICONDUCTOR STARTUP COMMUNITY



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



# Portfolio Companies



## ALUMNI



VOLUME 7

## IN THIS ISSUE

Since our last issue a lot has happened. We held our 8th screening event in September, and now welcome Espre Technology and Owl Autonomous Imaging as our newest Silicon Catalyst Portfolio Companies. Our network of Advisors continues to grow, now in excess of 100 members. We are pleased to announce the first Alumni from our incubator: Ayar Labs, AEAPONYX and CLOP Technologies. In addition, we're pleased with addition of two new Members to our Board: Jim Hogan - Managing Partner, Vista Ventures LLC and Esam Elashmawi - Chief Marketing and Strategy Officer, Lattice Semiconductor Corporation.



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it starts with startups.



Silicon Catalyst is the world's only incubator focused exclusively on semiconductor solution startups. We address the challenges faced by these startups while guiding them from idea to prototype, and then to product. Over 250 startup companies have engaged with Silicon Catalyst since April 2015, and we have admitted 18 exciting companies.

Silicon Catalyst exists to help semiconductor startups succeed. We have created a growing ecosystem of In-Kind partners, industry-leading companies, expert advisors, and investors. This ecosystem enables our startups to form deep relationships with people that provide value to their long-term success.

We provide the startups we incubate with goods and services from our network of In-Kind partners to dramatically reduce the cost of development. These goods and services include EDA tools, PDK access, foundry wafers, test equipment, design

services, and other valuable technical and business capabilities from our expanding network of In-Kind partners. Silicon Catalyst startups interact with a valuable network of expert advisors. In addition, our strategic partners share their experience and actively look for opportunities to work together with our startups.

Our two-year incubation program also provides a path to funding through our connections with venture capitalists, strategic investors, individual angel investors, angel investment groups, and government agencies that provide grants.

In our first year we were awarded the prestigious UBM Canon Startup Company of the Year, in anticipation of our impact on the semiconductor industry. We are proud to have created a broad ecosystem which provides our startups with the greatest opportunity for building a successful and valuable company.

## CHAIRMAN'S CORNER

### RICK LAZANSKY

Co-Founder - Silicon Catalyst  
serial entrepreneur  
and incubator fanatic

Richard Curtin, Silicon Catalyst's newest partner, challenged me to write something about what will be new and exciting in the world in five years. Essentially this amounts to asking "What does the future look like?" It's not a wise thing to try to do, but I surely am a sucker for a challenge – it's a certainty to be a disappointing, wholly incorrect, and personally embarrassing guess looking back five years from now.

If we replace 'five' with 'fifty' I'm happy to try, though, but while we're changing Richard's rules, let's toss "may be" in before "new and exciting". There are two reasons for the change in duration. The first is that a few things certainly seem true. We overestimate what will be achieved in two years, and underestimate what will be achieved in ten. Venture capitalist are inherently optimists – their investments over the next three to five years will end up being harvested in ten to eighteen. They're (ahem) the experts in predicting the future, as they're placing the big bets at the professional's table in the technology casino, maybe even with our pension funds. The second is that either I won't be around to see (a) how wrong I was or (b) my first guess will be right. So, let's get on with it...

1) Technology wins a big round battling death. AI/ML based classifiers will greatly accelerate learning entirely new things about what ages us, what ails us, and what kills us. Sensing technology will give us more data in a year than we've collected in a prior lifetime. This will be used to develop new drugs, diagnose genetic conditions, and regulate our autoimmune systems. Personalized medicine will become personally affordable. The intersection of life science and semiconductor know-how and their resulting economies of scale make it affordable. We're not talking immortality, but doubling a

life span will happen. The seeds are sprouting now, in the sciences, and in the semiconductor world.

2) We can reverse of climate change. I may be misquoting Robert Metcalfe on this, but if we really solve the energy problem, we'll have more than enough energy to solve the carbon problem. Maybe 10x today's production give us energy to spare which can be used to scrub.

3) Technology will augment of human intelligence. Google Glass wasn't such a bad idea. Better near-eye display and communication networks will allow us to search, analyze, and (for old folks like me) remember \*everything\*. We've been playing with this for twenty years, remembering back to the first 'project on retina' technology. It's becoming affordable. The "spectrum scarcity" which limits speed and availability of communications networks will vanish within a few years. Silicon Catalyst companies are, indirectly, working on this now.

4) We master our environment. Food, Air, Water, Energy and Climate will be thought of, and managed, as a system. Better powering, sensing, communicating and acting autonomously will fundamentally change the economics of doing so. Carnivores will be carnivores, but our ribeyes will be raised in a securely, well monitored lab. AI and robotics will give us 'lights out farming'. Ok, we'll still probably rely on photosynthesis, but it'll be lights out in the sense that the farmers won't be people (which is sure to be bad news for FarmersOnly.com).

5) We'll be harvesting asteroids for resources. While I hope and expect we'll have preliminarily begun colonizing our solar system, the big win will again be gathering and managing resources without risking human life, our paying the extra freight inescapable if actual people are actually mining (here or in space). To be honest, I think in fifty years those colonists that may be twenty years in place, may be yearning to venture beyond our solar system. If so, I expect one of the hardest challenges will be to bring the semiconductor manufacturing infrastructure along for the ride.

6) The Internet and its business model will be reinvented. This one is more of a hope than a guess. We've gotten to a state where technology is actually scary. We've crossed a barrier, according to Jaron Lanier, for whom I have the utmost respect and admiration. In his assessment, we've built an asymmetric, if not unidirectional, system of controlling information. We went quickly from managing access to information as paid for by advertising, to algorithmic supremacy in influencing human thought. We need to step back, develop a new, more fair and equitable economic solution to such access. To do other than ensure economic fairness allows a small number of companies and people to determine the entirety of our future.

OK, enough of my guesses. Let me share a few of what some real experts have suggested may actually happen in the next five years. I really wish I'd thought of them, because I do think they're likely ascendant in the next few years.

#### From Forbes

- Practical Augmented Reality
- Generative Adversarial Networks
- Real-Time Language Translation

#### From IBM

- AI powered robotic microscopes to clean up the world's water supplies
- Crypto & Blockchain protection and authentication throughout the food supply chain
- AI as the basis for unbiased decisions
- Quantum computing moves from the lab to the real world

#### and lastly, From Time

- The Tesla Model 3
- The Thyssen-Krupp MULTI elevator which runs on mag-lev and goes in all different directions. (This is even cooler than flying cars. My hat's off to you, Thyssen-Krup)

That's all for me. Thanks for reading.

## IN KIND PARTNER PROFILE IMEC



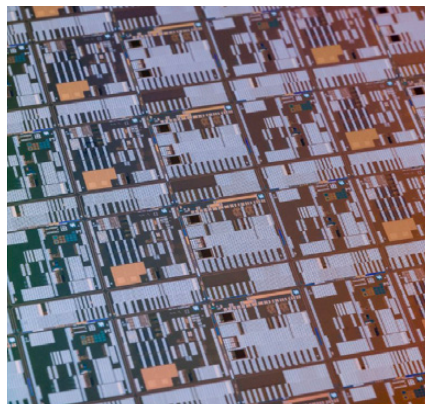
### Interview with Yong Pang, Head of NA Operations of Imec



Yong Pang, Head of NA Operations

#### ABOUT IMEC

Imec is the world-leading R&D and innovation hub in nanoelectronics and digital technologies. As a trusted partner for companies, startups and academia we bring together brilliant minds from all over the world in a creative and stimulating environment. By leveraging our world-class infrastructure and local and global ecosystem of diverse partners across a multitude of industries, we are accelerating progress towards a connected, sustainable future.



#### Q. PLEASE DESCRIBE YOUR COMPANY AND GOALS

**A.** “Imec is the world-leading R&D and innovation hub in nanoelectronics and digital technologies with more than 3500 people worldwide. Imec IC-link is a division of imec that provides the ASIC design and manufacturing services for a wide set of customers. Our headquarter is in Leuven, Belgium, with operations worldwide. We do about 600+ tapeouts per year on behalf of our ASIC customers using leading commercial foundries such as TSMC. In process, we are providing access to technology and turnkey services, and helping companies design the ASICs better, with lower risk, and faster time to market, and ramp to volume production.”

#### Q. PLEASE DESCRIBE SPECIFIC ROLE/TITLE AND BACKGROUND

**A.** “I’m the head of North America operations for imec IC-link, focused on growing the North American business, building partnerships, and expanding presence for imec IC-link. Most of my career have been in ASICs, systems, and software.”

#### Q. WHY ARE YOU PARTNERING WITH SILICON CATALYST?

**A.** “We work with VC’s and incubators for technology startups because many of these startups need our

services. However, Silicon Catalyst is truly unique because it’s exclusively focused on semiconductor / ASIC startups. I must say that kind of focus is in short supply. In the past 15 years or so, many VC’s has been shying away from semiconductor startups because of the complexity, larger funding needs, ROI characteristics, and perceived risk. But with several technology trends all in play in the areas of AI/ML, Autonomous vehicles, Crypto, IoT / wearables / health tech, there has been a revival in hardware & chip startups. Many of these companies need guidance and funding, and Silicon Catalyst plays an important role in helping them get started in a capital efficient way. Imec can provide a range of services to help these startups get to ASIC faster with lower risk and cost. Many VC’s and startups alike, are finding that doing an ASIC can often be surprisingly affordable.”

#### Q. WHY SHOULD COMPANIES PARTNER WITH IMEC AND SILICON CATALYST?

**A.** “For Silicon Catalyst portfolio companies, IMEC can potentially offer the following services with favorable pricing:

- Access to advanced foundry nodes (5nm, 7nm, 12nm, 16nm, 28nm, and all larger nodes, including specialty processes)
- MPW, MLM, and Full-mask tapeout services

## IN KIND PARTNER PROFILE IMEC



Interview with Yong Pang continued...

- Turnkey ASIC services including ASIC design, package design, thermal solutions, DFT consulting, foundry tapeout, ATE test development, prototyping & board level hardware development, software application development, characterization & qualification services, prototyping, and high volume production
- IMEC in-house advanced R&D capabilities (semiconductors, medical / healthcare, wearables, IoT, wireless, AI/ML, crypto, etc.)
- Access to IMEC's advanced whitebox IP portfolio (including customized IP & services)
- Expertise in Rad Hard design, aerospace, harsh environment, automotive, industrial, and medical design & qualification
- IMEC's internal 200mm and 300mm fab for prototyping with customized processes
- Silicon Photonics services (MPW and full mask, including ability to customize process, plus various active & passive structures)
- Other IMEC processes & services such as GaN, etc.
- IMEC's VC Funding"

### Q. WHAT HAVE YOU LEARNED IN WORKING WITH SILICON CATALYST AND OUR PORTFOLIO COMPANIES?

**A.** "In the last couple of years, Silicon Catalyst was able to attract a set of important ecosystem partners with compelling offering

to portfolio companies. We've also participated in a number excellent events organized by Silicon Catalyst that were highly relevant to the semiconductor startups, partners, and investors. For SiCat and its potential portfolio companies, it's always a mutual selection process, and I'm very encouraged seeing the set of high quality portfolio companies."

### Q. WHAT RECOMMENDATIONS DO YOU HAVE FOR SEMICONDUCTOR ENTREPRENEURS ?

**A.** "From my experience, it's very important for semiconductor entrepreneurs to focus, and focus on the right priorities. Focus on where your product can differentiate, and where your team can add value. For example, a CEO of a startup once told me that his previous startup design a great chip, but they wanted to build the whole box, and that caused the complexity to multiply, and ultimately they weren't able to deliver the product. He told me if they had done the chip only, which is the key differentiating piece, they could have gone to market a year earlier. That could have made all the difference. I think Silicon Catalyst has a good set of advisors, partners, service providers, and the portfolio companies should really take advantage of these resources."

### Q. WHAT ARE YOUR GOALS FOR 2019 WITH SILICON CATALYST?

**A.** "Imec IC-link will continue to expand its presence & services in 2019 worldwide, and we plan to work closely with Silicon Catalyst and its portfolio companies in multiple fronts."





A CONVERSATION WITH SILICON CATALYST PORTFOLIO COMPANY DOUGLAS KIRKPATRICK, CEO ERIDAN COMMUNICATIONS, A SILICON CATALYST COMPANY



Eridan Communications is a fabless technology company developing the devices and firmware for the next generation of communications hardware for 5G and beyond. Eridan Communications was founded in 2013 in Santa Clara, CA by Doug Kirkpatrick, Dubravko Babic, and Earl McCune.

**Q. PLEASE TELL ME ABOUT YOUR STARTUP AND GOALS**

**A.** “Eridan was formed in late 2013 for the purpose of exploring whether large advancements in Gallium Nitride (GaN) device capabilities and DSP CMOS technologies could enable a breakthrough in wireless communications. In mid-2017 that was answered with an emphatic “yes!” and we’re now focused on the goal of broadly commercializing this new capability across several market verticals.”

**Q. PLEASE TELL ME ABOUT YOUR SPECIFIC ROLE/TITLE AND BACKGROUND**

**A.** “My title is President and CEO of the Company. I am responsible for strategy, fundraising, marketing, customer and partnership development, and overall operations towards our goal of building a business. The largest part of my role is the join between technology and business strategy – mapping the technology development sequencing onto the market acceptance and “demand pull” and constantly adjusting priorities as productization and go-to-market risks are retired (or emerge).

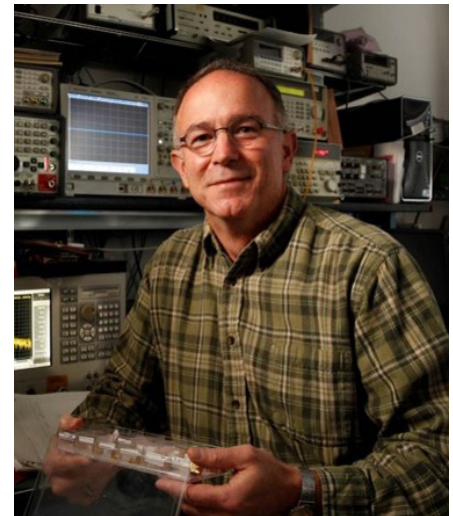
I have a long background in technology productization spanning technologies and businesses as diverse as nanomagnetic materials to RF driven lighting to LED flashlights and bio-derived jet fuel. I have a PhD

in Physics and school-of-hard-knocks learning of volume manufacturing (personal responsibility for the manufacture of 30Ku/mo of “engineering samples” and setup for volume manufacturing of >10Mu/yr).”

**Q. WHAT INSPIRED YOU TO START THIS COMPANY?**

**A.** “While I was at DARPA from 2002-2010 I had the opportunity to lead a large effort that required extensive (15 months) testing in the field with Special Forces. I became \*intimately\* familiar with the 45lbs of radios and spare batteries carried by an SF operator. I met my two co-founders as I was evaluating another startup in my role as a VC at the time – and the ensuing discussion led to Eridan’s founding and DARPA’s rapid award of a \$5M contract to push the technology forward.

A year into the development we realized we had a huge opportunity and we laid out a roadmap to change the wireless world.”



**DOUGLAS KIRKPATRICK, CEO**

Dr. Kirkpatrick is a founding General Partner of InnerProduct Partners, a seed and early stage investment fund that deploys into its portfolio companies to actively aid in the technology development and transition to product. He is an experienced senior manager of technology development and productization in both the commercial and government sectors. He has managed multi-disciplinary teams spanning a wide range of technical fields, and has led or managed project activities from initial exploratory research through low rate initial production. He is a strong leader and motivator, and has experience in both building new organizations and reshaping more mature teams.



A CONVERSATION WITH SILICON CATALYST  
PORTFOLIO COMPANY, ERIDIAN, CEO  
DOUGLAS KIRKPATRICK, CONTINUED...



## Q. WHY ARE YOU PART OF SILICON CATALYST?

**A.** “Our core initial developments were around the GaN MMIC and the digital /mixed-signal logic to make it all work. A year ago we started the process of integrating all of the digital / mixed-signal elements into a single ASIC for cost, efficiency, and performance. A dispassionate examination of a “conventional” ASIC development effort yielded a cost and timeframe that were at odds with our goals.

Silicon Catalyst changed all that. The experienced advisors and the engaged and committed partner organizations fundamentally change the time and resources needed to take the next step. We’re now on track to start shipping our first low-rate production modules by this time in 2019.”

## Q. WHAT HAVE YOU LEARNED IN THE PAST YEAR?

**A.** “Raising investment and landing customers are very similar challenges for a startup. Both require carefully crafted messaging because “all communication happens at the receiver.” It doesn’t matter what you transmit – it only matters what is heard. “Friendlies” are extremely important in this process. These can be exchanges with our Silicon Catalyst advisors, partners, or fellow portfolio companies – and in Eridan’s case each of these has been a resource to help us sharpen our thinking, strategy, and message.”

## Q. WHAT ARE YOUR GOALS FOR 2018?

**A.** “We aim to have our first CMOS tapeout of the first COTS components “moving” into the ASIC by mid-December, and a second iteration moving across most of the digital / mixed-signal functions before mid-2019. The final consolidation of the full stack into the final ASIC is targeted to occur by a year from now.

We have already landed our first two sampling customers, and one DOD customer has already committed to initial low-rate purchases. We hope to sample – and land – several commercial customers in the next 6 to 12 months.”

## Q. WHAT RECOMMENDATIONS DO YOU HAVE FOR SEMICONDUCTOR ENTREPRENEURS?

**A.** “How you build your extended “team” tells everyone looking at you what you’re about. Do you have that special blend of experience and unbridled energy? Do you understand what you’re trying to do – both technologically and business-wise? “You can’t push a rope” – have you identified that ultra-high-pain-point customer that will pull you through to product? Because in the end, most customers won’t be first adopters and you need someone to go first.

In this regard, Silicon Catalyst provides an excellent platform for semiconductor entrepreneurs. They’re part of your extended team and bring a wealth of practical experience. Most of them have been down the technology-to-market path several times, and both failure and success are excellent teachers.”

## Q. WHAT IS IT LIKE AS A STARTUP WORKING IN THE BIO + SEMI SPACE IN SILICON VALLEY?

**A.** “There is a readiness to take technology and business risks that is rarely found elsewhere. This has been true for so long at this point that it has become part of the culture. Its origin is in the sheer number of startups and large companies that dot the landscape – unemployment is historically low and one startup closing leads to five new employment opportunities the next day. Concerns about the “risk” of taking a startup position are reduced, and the upside is reinforced by successful outcomes on what seems like a weekly basis. Concomitantly, this also means that the Valley rapidly weeds out weak performers as their best employees are siphoned off to better opportunities. Truly unique companies with a big vision and solid performance are rewarded; me-too companies have a very narrow margin for error.”



## SILICON CATALYST'S RICHARD CURTIN SAT DOWN WITH NEW BOARD MEMBER JIM HOGAN

Silicon Catalyst Board member Jim has worked in the semiconductor and EDA industry for more than 40 years, starting his career at National semiconductor and Phillips Semi. He has held executive positions at Cadence Design Systems, Artisan Components, now part of ARM and has been involved with many startups in the EDA and semiconductor segments.



### **Jim Hogan, Silicon Catalyst Board Member**

**Q. WITH ALL OF YOUR OTHER INVOLVEMENTS IN HIGH-TECH, WHAT'S IT ALL ABOUT AND WHY DID YOU JOIN?**

**A.** The thing I'm most concerned about nowadays is how do we innovate, at a reasonable and economic level - because there's a lot of great ideas but they never see the light of day because we can't find a way to fund them. So the incubator really provides a great way for folks with ideas to come and take care of a couple of big expenditures that happen right off. Outside of people, when you do a

semiconductor startup you're going to worry about design tools and then foundry capability or rather foundry capacity, and the incubator helps you with a lot of that. Another thing the Silicon Catalyst Incubator helps a lot out with is just mentoring technical founders on how to run their business. So, what I'm looking for is the opportunity to interact with those technical innovators and hopefully make them more successful.

**Q. THE WORLDWIDE SEMICONDUCTOR INDUSTRY HAS COME OFF OF A VERY STRONG YEAR WITH 21% GROWTH YEAR-OVER-YEAR FOR 2017 TO BREAK THROUGH THE \$400 BILLION LEVEL FOR THE FIRST TIME IN THE INDUSTRY'S HISTORY; REMOVING THE MEMORY SEGMENT IT WAS 10% GROWTH VERSUS 2016. IS THIS A ONE-TIME EVENT OR DO YOU FORESEE EVEN HIGHER GROWTH RATES FOR THE NEXT FIVE TO TEN YEARS?**

**A.** I suspect the growth rate will continue. I think what the growth rate masks is the growth rate in segments that aren't as big as memory, for example, data conversions. We see a lot of edge-based devices, where there's a lot of data that's going to be captured, converted to digital and then processed. So, for example,

I think the analog-ish stuff on the edge is going to continue to grow at a rate way higher than 10% and as an absolute number it's usually not a big number because the devices themselves aren't priced at a very high ASP, but in terms of design innovation and volume they are quite large, volume in terms of number of piece parts. So I see it could keep on going for quite a while. If you look at the edge where we're just collecting so much data that's great, the problem is how do you transport that data to the cloud and be processed. We're going to need a lot more solutions around autonomous intelligence at the edge, and that should be a high growth rate.

**Q. WHAT'S YOUR VIEW ABOUT INTEGRATING THE ANALOG MIXED-SIGNAL SENSORS WITH THE LOCAL COMPUTING?**

**A.** There are just overwhelming volumes of data that exist today and are all forecasted to grow by orders of magnitude. So how are you going to deal with that data? Biology deals with it locally. Biology puts filters and does processing on our eyes, for example, we have filters in them that eliminate a lot of fidelity in the images that come. Why is that? Well, evolution has taught us that a lot of that data is not necessary to perform

## SILICON CATALYST'S RICHARD CURTIN SAT DOWN WITH NEW BOARD MEMBER JIM HOGAN CONTINUED ...

the function that was intended for. I know this a big stretch, but I think we can apply that notion to the edge-based stuff. Turns out that you don't need a lot of compute capability in terms of software - you need to do some training of the AI functions on the edge but that isn't a big embedded computing problem, we can trim that down and make it smaller. I think that'll help in two ways; one is we will get the performance up because it'll be local. The other thing it will do is just reduce power significantly so a lot of these edge-based applications are going to be measured in battery life in decades and so we have to do things like that. I usually focus on the edge-based markets for sure because we see a lot of those things at Silicon Catalyst, but the medical opportunity to start measuring a patient's health continuously is going to be a pretty cool thing. I think we would probably expand that to be a lot more localized as well. Certainly, the cloud's going to have all the statistical data, we're going to be able to farm that data and look for AI opportunities there to learn something about our health and our ability to take care of ourselves. But a lot of the routine stuff will be at the edge for a lot of things - so when we talk about Silicon Catalyst, I'm looking for companies that are worried about the edge-based computing. I'm also looking for things that can impact people's lives in a positive way, the world is divided in so many ways and I'm a technologist and this is an area that I can actually impact people's lives or have a hand in doing that, so this appeals to me in a lot of ways.

**Q. THERE'S A LOT OF LEVELS OF DISCUSSION NOW TAKING PLACE AROUND THE IMPACT OF GEOPOLITICAL CONCERNS AND TECHNOLOGY, LIKE NEW INITIATIVES - CHINA 2025 AND DARPA'S ERI - WITH TERMS WE HAVEN'T SEEN BEFORE, LIKE "RESURGENCE". WHAT IS THIS ALL ABOUT WHY IS IT NOW BECOMES SO GEOGRAPHICALLY POLITICALLY ORIENTED - IS THIS BEGINNING OF A NEW ERA LIKE THE SEMICONDUCTOR OLYMPICS OR THE WORLD CUP FOR SEMICONDUCTORS; ARE WE IN THE GROUP STAGES OR ARE WE IN THE KNOCKOUT ROUNDS?**

**A.** I hope it's not like the World Cup exactly for the United States because we always are the team who goes out in the first round typically. But let me focus on the United States, for a second if you go back to when I was a kid, graduate school, there were a lot of great R&D labs, in fact, one of our great desires was going to work at Bell Labs or IBM or HP's lab and they have these huge R&D teams that would actually do fundamental research on practical applications at those sites. None of that stuff exists anymore and why is that? Well, there's so much pressure in the public markets to return profits to the folks so when your R&D budget goes from 22% to 30% the shareholder advocates are on the executive branch to bring in the profits, right? As a result we lost a lot of fundamental research and I think they just didn't get replaced right away; certainly universities are cranking out graduate students that have a lot of capability. So the first order of problems is how do we deal with that? DARPA's going

to help a lot on that and I think we'll start seeing a lot of funding for core semiconductor hardware systems, related to semiconductor rooted systems that DARPA will be deem worthy of investment and research. The second problem, you have the research and have the capability, how do you fund these things? And you know there's been a couple really big corrections in this century right at the beginning of the century the dot-com correction occurred then the big one happened in 2007 and 2008 and what that pretty much did was drive the VCs to look for big opportunities in the expanding markets like social media for example. So we hear all day long about some social media guys getting a hundred million dollars on a couple slides and away they go. To be honest the big VC's have to look for those opportunities to put their money to work. What's left in the marketplace in the United States is for the seed round and A-round kind of investors and investments, and as a result, made it really difficult for innovative startups to start here in the states. So hopefully Silicon Catalyst can help address that, that's certainly one of the reasons I joined the Board of Directors, because I wanted to try to find another funding mechanism. Relative to China that's one we always talk about. China you know has a totalitarian government, it's very efficient right? You don't have to ask a lot of people questions. By and large, the people that run China are Engineers, so they understand the engineering process and they take these long-term views and they decided economically that the balance of trade on Semiconductors is enormously negative for them.

## SILICON CATALYST'S RICHARD CURTIN SAT DOWN WITH NEW BOARD MEMBER JIM HOGAN CONTINUED ...

They're doing things to ensure that they have domestic supply and pull that negative maybe to a positive. Now one of the things I initially had a hard time understanding a few years back was the rate of domestic consumption of semiconductors in China - it's enormous, it dwarfs anything we see and of course as China continues to create its version of a middle-class, those people become consumers of electronics and as a result they're going to consume a lot more semiconductors, so economically China has to do it right so it's a technology race. I think first is a capability race, certainly, China has got a lot of folks being graduated every year with EE degrees - we know about some of these things, they are starting up their own incubators, but what do they lack? Initially, it looks like they lack a couple things - their gaining semiconductor process capability, as they're building big memory fabs. Memory fabs are usually where you start because that ensures that you can get cycles of learning that will bring up yields and make predictive production capable. Where they are lacking is they don't have design enablement capability up; they have some tools here and there, but generally speaking they're primarily relying on American companies to provide that. On the other side of it is they don't have a whole lot of IP yet. Now we have seen some things like ARM's capability in China has just been announced and they're starting a different company and it's going to provide that in China and over time that will grow, but there's probably a generational thing for the next 20 years or so - North American is going to be a source of a lot of IP.

**Q. IT COMES BACK TO THE SAME FUNDAMENTAL PROBLEM - STARTUPS NEED CAPITAL.**

**A.** I don't think they need much though. That's something you like about semiconductors that are analog based versus chips that are going into cell phones for example. It costs about \$10 million to \$15 million to get to a point where you know that if the company's going to make it or not, and then ultimately a total cost about \$60 million dollars, which is still a lot of money - but nothing in comparison to a big processor outfit requiring a couple hundred million dollars.

A seed round of a couple million dollars will get you to technology proficiency and some market validation. With that, you can go out and get an institutional round A, which is around \$5-\$10 million - gets you to the market, to get some customers and hopefully get you to the point where you get the mezzanine round to take them public.

Most of these companies will never be public because they'll get picked up in their B round, but I think that's why our emphasis on the edge-based segment will result in companies that are either bought or end up actually going public at some point.



## EVENTS



**11.04-07.2018**  
**SEMI ITPC 2018**  
Maui, Hawaii

**11.13-16.2018**  
**SEMICON EUROPA**  
Munich, Germany

**01.08-11.2019**  
**CONSUMER ELECTRONICS SHOW**  
Las Vegas, NV

**01.29-31.2019**  
**DESIGNCON**  
Santa Clara, CA

**02.02-07.2019**  
**SPIE PHOTONICS WEST**  
San Francisco, CA

**02.17-21.2019**  
**INTERNATIONAL SOLID-STATE CIRCUITS CONFERENCE**  
San Francisco, CA

**02.25-28.2019**  
**MOBILE WORLD CONGRESS**  
Barcelona, Spain

**03.17-21.2019**  
**IEEE APPLIED POWER ELECTRONICS CONFERENCE**  
Anaheim, CA

**03.20-21.2019**  
**UWAVE AND RF**  
Paris, France

**03.25-29.2019**  
**DESIGN, AUTOMATION, AND TEST IN EUROPE**  
Florence, Italy

**03.25-28.2019**  
**GOVERNMENT MICROCURCUIT APPLICATIONS & CRITICAL TECHNOLOGY**  
Alberquerque, NM

**05.13.2019**  
**CHIPEX**  
Tel Aviv, Isreal

**06.02-06.2019**  
**DESIGN AUTOMATION CONFERENCE**  
Las Vegas, NV

**07.09-11.2019**  
**SEMICON WEST**  
San Francisco, CA

**12.09-11.2019**  
**INTERNATIONAL ELECTRON DEVICES MEETING**  
San Francisco, CA



# SILICON STARTUP SOLUTIONS

## SILICON CATALYST CEO FEATURED SPEAKER AT GSA EAST

Silicon Catalyst CEO Pete Rodriguez was a featured panelist at the GSA Silicon Summit - East event in Saratoga Springs, New York which was hosted by both the Saratoga County Prosperity Partnership, Saratoga County, New York's economic development agency and the Center for Economic Growth, a regional economic and business development organization.

Silicon Catalyst's CEO was a panelist along with Brian Pierce / Director, Information Innovation Office / DARPA, Yunsup Lee / Co-founder and CTO / SiFive, and Fran Korosec / Vice President of Program Management / BRIDG speaking on the "Semis Matter - Building a Research Based Innovation Pipeline and Ecosystem" program. In a fast-paced and engaging presentation entitled

"Accelerating Innovation by Powering Semiconductor Startups", Pete spoke of the current semiconductor startup landscape which is being shaped by extensive industry consolidation, which has led to a dramatic decrease in both R&D and innovation. This comes against a backdrop of expanding applications which will find their way onto silicon being fueled by innovations in IoT, bio, wearables, HV, and the like. Hardware is making a big comeback and Silicon Catalyst is uniquely positioned as the only incubator focused exclusively on semiconductor solution startups.

With a theme of "Harnessing Emerging Semiconductor Market Opportunities," the event served to advance semiconductor technology and to promote collaboration within our industry. The event featured

keynote addresses from two industry technology and market thought leaders: Dr. Gary Patton, Chief Technology Officer and Senior Vice President of Worldwide Research and Development at GLOBALFOUNDRIES, and Mark Lipacis, Managing Director of Jefferies Group LLC and a top analyst in identifying semiconductor trends and opportunities.

More than 150 leading semiconductor executives and technologists converged on Saratoga Springs for the inaugural event which was a global industry conference aimed at extending semiconductor technology and business, highlighting developing market trends, and enabling opportunities for regional collaboration and growth.

## Silicon Catalyst Expanding Ecosystem



Good for Startups, Partners, Investors, Advisors ... the industry

SILICON SUMMIT  
EAST 2018

scpp Saratoga County  
Prosperity Partnership

GSA



## SEAMLESS MICROSYSTEMS JOINS SILICON CATALYST INCUBATOR

Silicon-proven IP Company Delivers Innovative ADC Solutions

Silicon Valley, CA (Nov. 2, 2018) – Silicon Catalyst, the world's first startup incubator focused exclusively on solutions in silicon, announces the admission of Seamless Microsystems into the incubator.

Seamless Microsystems is focused on delivering a family of silicon proven designs to address the critical challenges of high-performance Analog-to-Digital Converter (ADC) solutions, targeting numerous market segments, spanning medical imaging, LiDAR and next-generation communication systems, including 5G and G.FAST. A key feature of the Seamless Microsystems' patented IP is Switched-Mode Signal Processing, enabling significant power reduction without sacrificing performance for Analog / Mixed-Signal CMOS designs.

Dr. Jayanth Kuppambatti, Seamless

Microsystems CEO and co-founder, is joining the other 15 start-ups selected to join the Silicon Catalyst incubator.

"This is a great milestone for our company as this will enable us to focus our efforts to rapidly develop and deliver innovative ADC solutions required by the semiconductor industry for the next generation of mixed-signal devices."

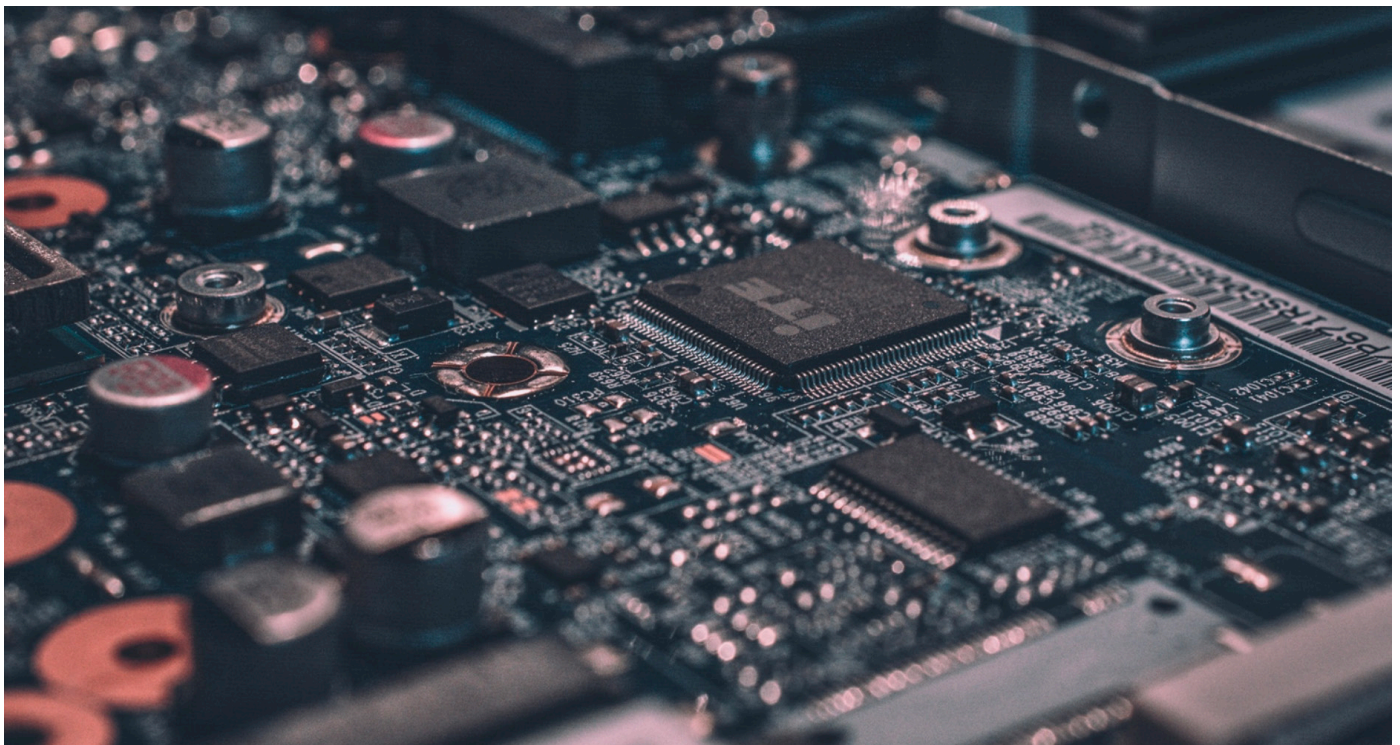
Silicon Catalyst uniquely provides startups with goods and services from a comprehensive network of In-Kind Partners (IKP) and Advisors to dramatically reduce the cost of development. Over the past three years, Silicon Catalyst has reviewed over 250 applicants to the Incubator and has now admitted a total of 16 startups. Portfolio Companies can utilize tools from a wide variety of design and test vendors, as well as access to shuttle / MPW runs with TSMC foundry fab services, free-of-charge. Additionally, the startups can tap into the rapidly expanding Silicon

Catalyst network of advisors, IKPs and investors.

"We are extremely pleased to have Seamless join our program for start-ups. The Silicon Catalyst selection committee was impressed with their management team and their design expertise. Their ADC solution is already silicon proven in 28nm CMOS and can be rapidly incorporated in the next-generation of AMS ICs," stated Silicon Catalyst CEO Pete Rodriguez.

About Seamless Microsystems

Seamless Microsystems is a fabless semiconductor startup, working on innovative high-speed ADC designs for next generation SOCs in a wide range of applications, ranging from consumer medical imaging, LTE 5G communications, to LiDAR in autonomous driving. More information can be found <http://www.seamlessmicro.com>





# Strategic Ecosystem Partners



# In-Kind Ecosystem Partners





# SILICON **STARTUP** SOLUTIONS

A VALUABLE RESOURCE FOR THE SEMICONDUCTOR STARTUP COMMUNITY

