

CB DIGEST FOR TECHNOLOGY

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Alibaba Unveils Automotive ISP with Improved Night Vision

cnTechPost reports that Alibaba DAMO Academy has developed an ISP processor for in-vehicle cameras that improves vision at night, thereby improving the safety of autonomous driving. The ISP is said to use a 3D noise reduction and image enhancement algorithm developed by the Alibaba DAMO Academy.

OneWeb files for bankruptcy

OneWeb, a high-profile startup that raised billions to build a global network of satellites for internet access, has filed for bankruptcy protection. The London-based company, which counts SoftBank as a key backer, cited the

Coffee Fraud

Luckin Coffee emerged from China in recent years with huge sums of funding and rapid growth figures that seemed to position it as a real threat to established industry giants. It went public last year, raising \$561 million at a reported \$4 billion-plus valuation. But it all seems to be falling apart: The coffee company announced this week the suspension of COO Jian Liu after an internal investigation found that Liu and other employees overstated early revenue figures by more than \$300 million. Luckin's stock cratered as a result, losing nearly 80% of its value this week alone

Apple, Tesla Working on Face Shields, Ventilators

Apple and Tesla are contributing to the fight against Covid-19 by designing their own face shields and ventilators.

These moves are an opportunity for big tech firms to transform their standing in the industry by making them more appealing to top talent and less threatening to regulators.

Apple CEO Tim Cook said Sunday on Twitter that in addition to purchasing 20 million masks through its supply chain, it has designed and is now shipping face shields to medical workers. Cook said Apple brought together product designers, engineering, operations and packaging teams to make the masks, adding that the company shipped a batch to Kaiser Permanente Santa Clara Medical Center this past week.

Cook showed off the masks in a video and noted that they can be assembled in less than two minutes. He said Apple planned to ship 1 million face shields a week and wants to expand distribution beyond the U.S.

Meanwhile, a group of Tesla engineers provided an update on YouTube for a ventilator they are working on based on Tesla's existing car parts. The engineers showed off the prototype of the ventilator, which uses the Model 3 infotainment touchscreen and computer. The engineers didn't say when the ventilators would be ready to ship, saying "there was still a lot of work to do."

Facebooks Sends 400 Newsrooms Grants

Facebook, which made \$69.7 billion in advertising revenue last year, sent out \$5,000 in grant money to 400 small newsrooms in the U.S. and Canada as part of a community journalism grant program. The grants are intended to help small, local news outlets cover costs while reporting on the coronavirus outbreak, even as the company's core platforms have been a vector of misinformation and conspiracy theories.

Google's Video Conferencing Service Is Adding Two Million New Users a Day

Google is adding more than two million new users a day to its video conferencing service Meet, the company said on Wednesday, as people around the world are leaning on online tools more than ever to stay connected amid the coronavirus pandemic. The growth for Meet—which was previously known as Hangouts Meet—is an encouraging

sign for Google. It suggests the tech giant can take some market share from Zoom, which has skyrocketed to prominence during the pandemic.

And the surge makes sense. Google has over six million paying businesses for its bundle of productivity products, G Suite. Employees at those companies are likely finding it convenient to start a video chat from the products they already use—like Gmail or Google Calendars—than needing to use a standalone conferencing product, like Zoom. In recent weeks, Google has also made the premium tier for Meet free to its customers, which allows for up to 250 participants and for meetings to be recorded and saved to Google Drive. Still, Google isn't alone in seeing demand increase for its video tools. In March, Microsoft said users for its video chat service, Teams, had increased by 40% from just weeks prior. Meanwhile, Google took a shot at Zoom by banning its use on employee devices.

Microsoft Moves All Events Online Until July 2021

Microsoft has decided to make all of its internal and external events online-only until July of 2021, according to The Verge. The move shows that Microsoft is quelling any speculation about the status of its future conferences as Covid-19 infections continue to spread around the world. The decision also shows how technology conferences—which typically attract thousands of attendees and are designed for face-to-face interactions—might be one of the last areas of the U.S. economy to return to normal once the coronavirus pandemic is over because of the significant health risks they pose.

The shift to online-only conferences is certain to add to the already intense traffic load that Microsoft's Azure cloud is experiencing, driven in large part by surging usage of its Teams workplace collaboration software. Microsoft says it is moving quickly to add extra capacity to Azure to address challenges that some customers have experienced.

Tesla Cuts Salaries, Furloughs Hourly Workers

Tesla, which has been forced to wind down production because of Covid-19 restrictions, is cutting pay for salaried employees and laying off hourly workers. Tesla announced the pay cuts and furloughs in an email to workers which also said that the electric car company plans to resume operations on May 4. The pay cuts are expected to remain in effect until the end of the second quarter.

Tesla is imposing a 30 percent pay cut for vice presidents and above; a 20 percent pay cut for directors and above and a ten percent reduction for the remaining salaried workers. Employees who cannot work from home and are not assigned to critical work will be furloughed. The salary reductions and pay cuts are effective as of April 13, CNBC reported. In addition, the company said raises and equity grants will be put on hold.

Yelp lays off 1,000 employees and furloughs 1,100 more

Yelp co-founder and CEO Jeremy Stoppelman announced in an internal email that the company is going through difficult times. Yelp has to cut expenses, which means a large round of layoffs and some additional measures — 1,000 employees have been laid off. According to an SEC filing, Yelp had 5,950 employees as of December 31, 2019. Today's layoffs represent a 17% staff reduction.

Exit delays

A handful of private equity firms are putting off planned exits until all the market chaos cools down, according to various reports. In Europe, EQT is delaying a potential \$3 billion sale of local software giant IFS, while Bridgepoint is postponing a planned \$1 billion exit from Rovensa, a maker of agricultural chemicals. And in Singapore, KKR is said to be pushing back plans for a scheduled exit from Goodpack, a logistics specialist.

A mega-deal undone

Those two deals got done, but plenty of other major transactions have recently been unwound. Xerox this week withdrew its hostile bid for HP, calling off a potential \$35 billion deal that would have combined two of the most notable US tech companies of the 20th century. The decision came after Xerox had seen its stock price decline by more than 50% since the middle of February.

Cisco aims to expand IoT reach with Fluidmesh acquisition

U.S. networking company Cisco announced the intent to acquire privately-held Fluidmesh Networks, a specialist in wireless backhaul systems, the former said in a release. Fluidmesh's technology delivers wireless solutions for mission critical applications. Fluidmesh's solutions are quick to deploy and configure, offering customers a cost-efficient, low-maintenance solution, Cisco said.

Fluidmesh will extend Cisco's industrial wireless offerings to industries with on-the-move assets and applications in situations where reliable backhaul is mission critical. Cisco's scale, combined with Fluidmesh's solution-based offerings and relationships with systems integrators, will accelerate Cisco's industrial IoT business to enable successful industrial wireless deployments, broaden reach to key customer segments, partners, and end users

Israel-based agritech startup AgroScout raises \$3M funding for its AI-based solution for sustainable crop protection

AgroScout announced that it has completed an investment round of \$3 million for its AI-based solution for sustainable crop protection. The investment round was led by Kibbutz Yiron, and included other investors – Exit Valley crowd-funding platform, Agriline, The Trendlines Group and grants from the Israel Innovation Authority and the BIRD Foundation.

Founded in 2017, the Misgav, Israel-based AgroScout is developing an autonomous system that allows for quick and efficient detection and monitoring of specific diseases. The AgroScout system combines data from multiple sensors (covering an entire field); external data from weather, satellite, local sensors; machine learning; and deep learning to accurately and autonomously detect, identify, and monitor diseases in the field. The data is later analyzed by AgroScout's algorithms to detect and identify disease and pests. The resulting data is then uploaded to the cloud, and farmers will receive actionable insights on their computer or mobile phone notifying them of disease location and status, with recommendations for treatment.

Myriota raises \$19.3 million to expand its IoT satellite constellation

Internet of things satellite connectivity startup Myriota has raised a \$19.3 million Series B funding round, led by Hostplus and Main Sequence Ventures, with additional funding from Boeing, former Australian PM Malcolm Turnbull, Singtel Innov8 and others. The company has now raised \$37 million in funding, and has four satellites on orbit already, with a plan to expand that to 25 by 2022 with the help of this new funding.

Myriota provides low-cost, power efficient direct satellite connectivity for IoT uses, including industrial applications like equipment monitoring and measurement of environmental measures like groundwater levels. The Adelaide-

based company has developed its own proprietary low-over IoT communications technology, that claims big advantages over existing solutions in terms of battery life, security, scalability and cost.

Open banking fintech Yapily raises \$13M Series A

Yapily, one of a number of fintech startups that offer an opening banking API to let enterprises, such as financial service providers and merchants, connect to banks, has raised \$13 million in Series A funding. Leading the round is Lakestar, which is also a backer of fintech unicorn Revolut.

Existing investors HV Holtzbrinck Ventures, and LocalGlobe also participated. Yapily last disclosed \$5.4 million in seed funding in May 2019, and counts the likes of Taavet Hinrikus (TransferWise chairman and co-founder), Ott Kaukver (Twilio's CTO), Roberto Nicastro (UniCredit's former deputy CEO) and Frank Strauss (Former CEO of Deutsche Postbank) as angel backers.

Founded in mid 2017 by ex-Goldman Sachs employee Stefano Vaccino, Yapily's open banking platform makes it easier for various service providers to connect to banks. Specifically, it provides a way to retrieve financial data and initiate payments via a "single secure API" that in turn connects to each supported bank's open API.

Koch Industries closes nearly \$13B Infor acquisition

Koch Industries announced today that it has closed on the acquisition of Infor, announced in February. The company never officially announced the purchase price, but sources indicated that it was close to \$13 billion, putting it in line to be one of the top 10 enterprise acquisitions this year. The company will remain an independent subsidiary of Koch, which tends to deal more in manufacturing than software. The goal is to use the resources of Koch to continue to build out the Infor product family with a focus on industry-specific solutions, according to the company.

Huawei buys into local 5G testing firm

Huawei has taken a stake in a state-owned wireless testing company – its latest attempt to strengthen domestic sourcing in the face of US sanctions. The vendor has invested 66 million yuan (US\$9.3 million) for an 8% holding in China Electronics Technology Instruments Co (CETI), a subsidiary of the giant China Electronics Technology Group (CETC) conglomerate. Seven other companies, including several CECT-linked groups, have also invested, such as the CETC 41st Research Institute (10%), CETC Investment Holdings (8.82%) and the Hefei-CECT Guoyuan Industrial Fund Partnership (8%). Huawei has not made any public announcement about the new investment and did not respond to a Light Reading request for comment.

Airbnb turns to private equity to raise \$1 billion

Airbnb said Monday that it has raised \$1 billion in debt and equity from private equity firms Silver Lake and Sixth Street Partners, even as the online rental marketplace has seen its business plummet due to the COVID-19 pandemic. Terms of the deal were not disclosed. It's unclear how this funding might alter Airbnb's previously shared plans to go public.

COVID-19, the disease caused by coronavirus, prompted governments throughout the world to issue stay-at-home orders, triggering a wave of cancellations in the travel and hospitality industries. Airbnb emphasized that the funds would support its ongoing work to invest over the long term, a statement aimed at couching this raise as strategic and not a bailout in troubled times.

Quanergy Changes CEO, Raises More Money

Quanergy appoints Kevin J. Kennedy as the company's new CEO and secures an new funding round. Kennedy keeps serving as a senior managing director of Blue Ridge Partners, one of the Quanergy investors. "While many LiDAR companies are focused on building LiDAR solely for transportation purposes, since its inception, Quanergy has emphasized the development of its technology for multiple industries," says Kennedy. "With this new capital, we are deepening our investment in our team and our technology and are positioned to prove the value of LiDAR for broader market applications.

Podium lands \$125M for customer messaging

Podium, a customer messaging platform for local businesses, announced this morning it has raised a \$125 million Series C round led by YC Continuity. The Lehi, Utah-based company is also rolling out a free version of its package that will allow businesses to interact with customers and process contactless payments completely via messaging.

CircleCI rounds up \$100M for software development

CircleCI, a platform used to automate tasks for software development teams, has raised \$100 million in its Series E round. IVP and Sapphire Ventures led the financing, which brings total funding for San Francisco-based CircleCI to \$215 million.

Glassbox reveals \$40M Series C

Glassbox, a developer of tools for companies to analyze their customers' online experiences, announced it has raised \$40 million in a Series C funding round. Brighton Park Capital led the financing, which brings total funding to date for the 10-year-old, London-based company to \$70 million.

SonderMind raises \$27M for mental health

Denver-based SonderMind, a startup that connects consumers with mental health providers within their insurance networks, has raised \$27 million in a Series B round of funding led by new investor General Catalyst. The company also recently rolled out a telehealth service, accelerating the launch as social distancing became widespread.

WeWork sues SoftBank over \$3B tender withdrawal

WeWork just announced that a special committee of its board is suing SoftBank for withdrawing its \$3 billion tender offer for shares in the coworking company. The suit alleges that failure to consummate the tender offer is a clear breach of contractual obligations.

Fintech startup SoFi to acquire Utah-based payment processor Galileo for \$1.2 billion

SoFi, a San Francisco, California-based personal finance startup, has agreed to buy Utah-based payment processor Galileo for \$1.2 billion. According to the CEOs of both companies, the cash-and-stock deal will help the companies launch new products, expand internationally and capitalize on consumers' shift to digital finance. Galileo, which has been around for more than a decade, is a more established company than its acquirer and works with many of SoFi's competitors.

SoFi acquires Galileo for \$1.2B

Online lending unicorn SoFi has acquired Galileo, a Utah-based financial services API and payments platform, for \$1.2 billion in cash and stock. In its announcement, SoFi noted that Galileo processed over \$53 billion in annualized payments in March 2020, up from \$26 billion in September.

Tyto Care raises \$50M for remote exams

New York-based Tyto Care, a company that performs remote medical exams on demand, has raised \$50 million in a growth round co-led by Insight Partners, Olive Tree Ventures and Qualcomm Ventures.

Instabox snags \$39M for logistics tech

Swedish logistics tech company Instabox has closed on \$39 million in a fresh financing round backed by Swedish investor Creades and London-based credit specialist CORDET. The company handles logistics for e-commerce retailers, offering same-day delivery through its network of last-mile smart delivery lockers.

Tonkean lands \$24M to automate operations

Tonkean, a developer of software platforms for operations teams to automate more tasks, has raised \$24 million in a Series A funding round led by Lightspeed Venture Partners.

Shippo secures Series C

Shippo, a shipping and order management platform for growing ecommerce businesses, announced that it has closed \$30 million in a Series C round led by D1 Capital Partners. The San Francisco-based company's stated goal is to make shipping "as easy as sending a text message."

AlertMedia closes on \$15M for emergency communications

Austin-based AlertMedia, a developer of tools for mass notification to communicate during critical events, has raised \$15 million in a Series C financing led by JMI Equity.

Seeqc raises \$5M to help make quantum computing commercially viable

Seeqc, a startup that is part of a relatively new class of quantum computing companies that is looking at how to best use classical computing to manage quantum processors, today announced that it has raised \$5 million from M Ventures, the strategic corporate venture capital arm of Merck, the German pharmaceutical giant. Merck will be a strategic partner for Seeqc and will help it to develop its R&D efforts to develop useful application-specific quantum computers. With this, New York state-based Seeqc has now raised a total of \$11 million, including a recent \$6.8 million seed round that included BlueYard Capital, Cambium, NewLab and the Partnership Fund for New York City.

Amazon business acquirer Thrasio secures \$110M

Thrasio, an acquirer of Amazon third-party private-label businesses, has closed on \$110 million in debt and equity financing at a post-money valuation of about \$780 million, the company has exclusively told Crunchbase News. Peak6, River Park Ventures, Western Technology Investment and Upper90 are among the backers.

Index Ventures closes \$2B for new funds

Index Ventures, a venture capital firm with dual headquarters in London and San Francisco, announced the closing of \$2 billion in new funds. The funds are dubbed Index Ventures 10 and Index Growth 5, totaling \$800 million and \$1.2 billion in size, respectively.

Cohesity nabs \$250M at \$2.5B valuation

Data storage provider Cohesity has raised \$250 million in funding, more than doubling its valuation to \$2.5 billion. The new round was led by DFJ Growth, Greenspring Associates, Foundation Capital and Wing Venture Capital.

SilverCloud raises \$16M for mental health

SilverCloud Health, a digital platform for mental and behavioral health services, just secured a \$16 million Series B funding round led by MemorialCare Innovation Fund. The Boston-based company's mental health programs are used by more than 300 health care systems, providers, health plans and employers.

IFM Restoration lands \$10M Series A

IFM Restoration, a service that matches property owners and managers with skilled tradespeople for maintenance and repair work, has raised \$10 million in Series A funding. The Dallas-based company anticipates business will hold up during the pandemic, since home repairs and maintenance are considered essential services.

Living Security locks down \$5M

Austin-based Living Security, a provider of security awareness software for enterprises, has closed on a \$5 million Series A funding round led by Silverton Partners.

Silicon Valley Bank Struggles as Startups Rush for Government Loans

By Kate Clark

As the first set of entrepreneurs learned they would receive emergency loans administered through the federal Small Business Administration, many of those who had applied through Silicon Valley Bank were stuck trying to deal with glitches in the application process.

The tech-focused bank had processed close to 5,000 applications to the SBA's Paycheck Protection Program by Tuesday evening, according to people familiar with the matter. But as many as 30% of those ran into issues requiring applicants to restart the process, the people said. SVB, which handles banking for about half of all venture-backed companies, said through a spokesperson that it had "received significant interest in the program." She declined to discuss specific numbers.

"We are experiencing high call and email volumes and are working hard to support our clients as quickly as possible," the SVB spokesperson added.

Meanwhile, JPMorgan Chase and Bank of America had processed 625,000 loan applications worth \$80 billion as of Tuesday, reports CNBC. Bank of America was the first big bank to begin accepting PPP loan applications on Friday, the same day the program went live. As of 2 p.m. Wednesday, 400,000 businesses had been approved for \$100 billion in loans, tweeted Republican Senator Marco Rubio.

In a matter of days, nearly 30% of the \$350 billion allocated to the PPP program had run out. An effort in Congress to increase the program by \$250 billion ran into a roadblock in the Senate on Thursday.

It's been a mad dash for banks to create digital portals for their customers to apply for the loans. The emergency funds—set at 2.5 times each company's average monthly payroll—are being released on a first-come, first-served basis. That means customers of banks that were able to swiftly activate application pathways for their customers have an advantage.

Initially, businesses were required to submit their applications through certified SBA lender banks. But on Thursday the U.S. Treasury approved nonbank financial services with established lending businesses, like Square and Stripe, as small business lenders.

After spending days creating a dedicated software application to facilitate the SBA loan application process, SVB failed to get the portal up and running by its own deadline of Monday. The bank ultimately began processing applications on Tuesday.

Then the support lines started to explode. Thousands of SVB clients have been reaching out, which has created its own set of problems for the bank, one person said. One issue: When companies applied for loans, the application would prepopulate the form with information that was sometimes outdated, like addresses and lists of existing shareholders. That would sometimes force entrepreneurs to restart the application process.

Shane Hegde, co-founder and CEO of workplace collaboration software tool Air, said he had to fill out an application twice and found that support lines were backed up, so he was unable to get clarity on the issues he was experiencing.

"It was a struggle to get guidance from [SVB]," he said. "All the founders I know were just waiting on Twitter and sitting in their inbox, waiting for a notification."

Meanwhile, some companies, like Veggie Grill, a fast-casual restaurant, received a commitment for funds, confirmed co-founder T.K. Pillan, who's also a co-founder of the growth equity fund Powerplant Ventures. Veggie Grill didn't apply for loans through SVB, however.

SVB isn't the only bank running into issues. Largely due to confusing PPP guidelines—which have divided the venture capital community—and issues with the SBA's antiquated loan authorization system, known as E-Tran, banks are struggling to rapidly facilitate applications.

Startups that compete with banks—such as firms that may advertise themselves as banking alternatives but usually offer a technology layer on top of a traditional bank account—have also struggled to support customers. Brex, which operates a banking alternative called Brex Cash, is supporting PPP applications through an existing relationship with Radius Bank, a traditional bank. But Brex didn't want to be overrun with applications, so it has been quiet about its ability to process them, leaving some of its customers confused and seeking other options.

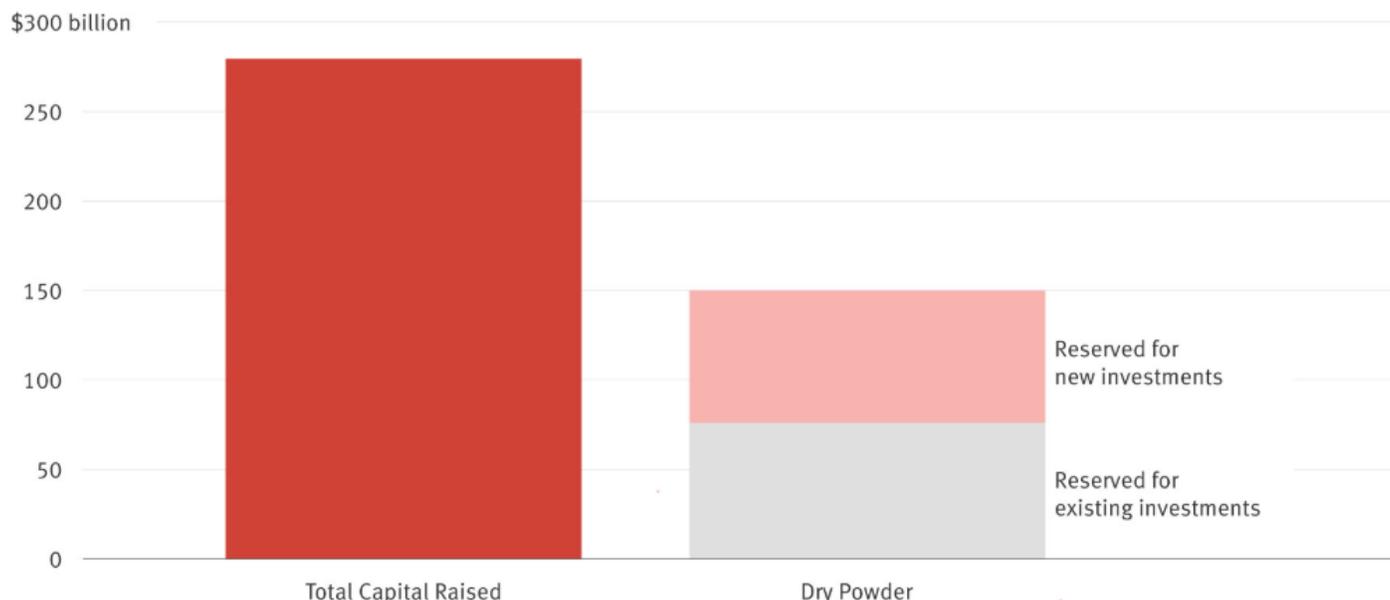
Cate Rung, co-founder and chief operating officer of Pngme, a lending platform for financial institutions in emerging markets, said she pursued a new relationship with a bank when she thought Brex couldn't process her application. “Basically it's a rush against time,” she said. “My biggest concern is submitting too many applications and none of them doing anything.... The people who are underresourced aren't going to get to take advantage.”

Brex CFO Michael Tannenbaum said that Brex had begun processing applications for Brex Cash members through Radius Bank on Monday. Meanwhile, Brex itself is evaluating whether it makes sense for the business, most recently valued at \$2.6 billion, to apply for an emergency loan.

“What does it mean to really need the money? Everyone is impacted,” Tannenbaum said.

Cash Reserves

U.S. venture capital raised since 2014, including "dry powder" funds still remaining



Source: Analysis of PitchBook, NVCA data by Jon Sakoda of Decibel Partners

Venture capital investors are flush with cash, but they may want to slow down their spending.

U.S. venture firms have roughly \$150 billion of funds available to invest in cash-starved startups, a little more than half of the \$279 billion they have raised since 2014. That estimate of the VC industry's "dry powder"—business slang for cash reserves—comes from an analysis of data from PitchBook and the National Venture Capital Association performed by Jon Sakoda, founder of the early-stage venture firm Decibel Partners. He estimates that about half of the dry powder is reserved for new investments, while the other half is for follow-on investments in startups VCs previously put money into, as the chart above shows.

While that seems like a lot, VCs could exhaust that money in just four quarters if they continue investing as they have over the last two years—an average of \$35 billion a quarter—and don't raise another nickel for the foreseeable future. To avert that scenario, VCs might want to invest like it's 2016, when they averaged an investing pace of \$20 billion a quarter, which will stretch out their dry powder to nearly two years.

One reason why VCs may need to slow down: that \$150 billion figure could turn out to be overstated if limited partners—the people and institutions that invest in VC funds—renege on their capital commitments. There's a growing concern among startup founders and their backers that such a scenario could play out. On a conference call last week with The Information subscribers, one VC fund manager said he is already seeing some limited partners, especially family offices and hedge funds, wobble in their commitments.

"There's unfortunately a fear that's settling into the entrepreneurial community that everyone is running out of money," said Sakoda, a longtime venture capitalist whose firm, Decibel, is backed by networking giant Cisco Systems. "There are companies that have 18 months of runway that are wondering whether they are going to make it, solely because they think there might not be another venture capitalist on the other side of this."

He downplayed the significance of a cutback in VC funding for startups. “If we are able to still fund thousands of companies at the 2016 and 2017 levels, I don’t think that’s a Great Depression,” said Sakoda, who was a general partner at New Enterprise Associates from 2014 to 2018.

Uncertain Capital Calls

Economic downturns, like the one occurring now amid the coronavirus pandemic, adds uncertainty to capital calls, the process by which VC funds ask for money previously promised by their limited partners. There are a number of reasons why limited partners might flake on a financial commitment to a venture fund, including something called the “denominator effect.” That occurs when the falling value of public equities held by limited partners shifts the balance of their investment portfolios too far in the direction of VC, forcing them to rebalance the portfolio by selling or unwinding positions in venture funds.

The good news is that bigger venture funds, which tend to be backed by pension funds, endowments and foundations, are less likely to see their limited partners abandon them, Sakoda said. Smaller funds—which Sakoda’s analysis did not include—rely more on wealthy individuals, who may not be as steadfast during a downturn if the value of their assets falls.

Another asterisk on the \$150 billion figure is that about half of it is likely unavailable to entrepreneurs walking through venture firms’ doors with pitches for their brand-new startups. That’s because VC firms typically set aside about half of their funds for follow-on financings of their existing portfolio companies, by the estimate of Sakoda, who based his calculations on historical investing averages. On the other hand, that could bode well for established startups that need a lifeline.

To prepare the analysis, Sakoda analyzed 975 venture funds, each of which had raised a minimum of \$50 million starting in 2014, to determine the current amount of dry powder available to U.S. VC firms. The \$150 billion figure he arrived at reflects committed capital—that is, money the backers of venture funds have promised to VCs but not necessarily delivered yet. The average life cycle of a venture fund is roughly 10 years; venture firms tend to raise new funds every three years on average.

More Dry Powder

Still, VCs may be able to augment that dry powder even if a downturn persists. In 2009, during the last recession, VC firms raised a total of \$13 billion, which suggests VC fundraising won’t go to zero this time around.

Total U.S. VC fundraising has steadily increased over the last decade, breaking records in 2018 when investors collected \$58 billion, followed by \$46.3 billion in 2019. Over that period, average funds grew larger as startups stayed private longer and required more cash.

Still, VCs are likely to invest that money more slowly during the current downturn—which could be far more severe than the recession that started in 2008—than they have in the recent past. Early-stage investment data indicates a slowdown may already have happened. Startups everywhere are scrambling to cut costs by laying off staff, furloughing employees and slashing salaries.

Sakoda is optimistic that VCs have the funds to support startups during the current turmoil. “In a pleasantly surprising way, the industry has a lot more capital and a lot more reserves now than people realize,” said Sakoda.

The question, though, is whether VCs will actually invest that capital or hold onto it.



With many startups reporting layoffs, this Amsterdam-based logistics startup continues to thrive amid the coronavirus pandemic that has cost tens of thousands lives and trillions of dollars in economic damage. Quicargo is an online platform that connects empty trucks to any business that needs transportation in real time. In the midst of coronavirus, the scale-up Quicargo, a digital freight network serving both shippers and carrier, has managed to turn a complex and challenging situation into an opportunity for exponential growth.

In the first quarter of 2020, the Amsterdam, Netherlands-based Quicargo saw an increase in gross revenue of 240% when comparing the 1st quarter of 2020 to the similar quarter in 2019. The number of unique visitors to its website was more than tripled. The company also served about 1000 active shippers during the same period. During the month of March 2020, Quicargo automatically matched 70% of the shipments to a carrier. It is worth mentioning that at the end of March 2020, Quicargo broke its historical record for the number of transactions on one single day.

The arrival of the Coronavirus in Europe undoubtedly affected the number of transactions from several frequent shippers. Nonetheless, by increasing the number of active shippers – reaching a record of over 550 in March -, Quicargo was able to find opportunities for exponential growth.

Quicargo was founded by Israeli natives Avishai Trabelsi (CEO) and Roni Liberman (CPO) in the summer of 2016. Before founding the logistics startup, Avishai was the CEO of a family owned-transporting company in Israel. “When I realized that 50% of trucks in the industry were running empty, I decided to quit the family business and solve the problem on a global scale.” Empty, or partially empty trucks cause lots of inefficiencies for transportation companies. Besides that, because of this there are more trucks on the road than necessary meaning that we could contribute to reducing CO2 emissions by eliminating those empty trucks. This is how our mission “no more empty trucks” was born!

Quicargo now connects empty trucks to any business that needs transportation in real time, ensuring a more efficient road freight industry while reducing CO2 emissions and congestion on the roads. Quicargo was originally founded in Israel, but the company moved to the Netherlands in 2016. We are fully operational in the Netherlands and have made a first entry into Germany and Belgium. Quicargo is headquartered in Amsterdam with an ambitious team of 25 people.

Even though Quicargo is growing exponentially, the company emphasizes that safe working conditions are of the utmost importance. Employees have been asked to work from home. All the operations adhere to government regulations and advice. Quicargo expects the same from its partners. The digital freight network has released a COVID-19 statement on its website to keep everyone involved with Quicargo up-to-date about the possible impact of the outbreak on daily operations.

Sourced by TechXplore

In order to tackle the tasks that they are designed to complete, mobile robots should be able to navigate real world environments efficiently, avoiding humans or other obstacles in their surroundings. While static objects are typically fairly easy for robots to detect and circumvent, avoiding humans can be more challenging, as it entails predicting their future movements and planning accordingly.

Researchers at the University of California, Berkeley, have recently developed a new framework that could enhance robot navigation among humans in indoor environments such as offices, homes or museums. Their model, presented in a paper pre-published on arXiv, was trained on a newly compiled dataset of photorealistic images called HumANav.

"We propose a novel framework for navigation around humans that combines learning-based perception with model-based optimal control," the researchers wrote in their paper.

The new framework these researchers developed, dubbed LB-WayPtNav-DH, has three key components: a perception, a planning, and a control module. The perception module is based on a convolutional neural network (CNN) that was trained to map the robot's visual input into a waypoint (i.e., the next desired state) using supervised learning.

The waypoint mapped by the CNN is then fed to the framework's planning and control modules. Combined, these two modules ensure that the robot moves to its target location safely, avoiding any obstacles and humans in its surroundings.

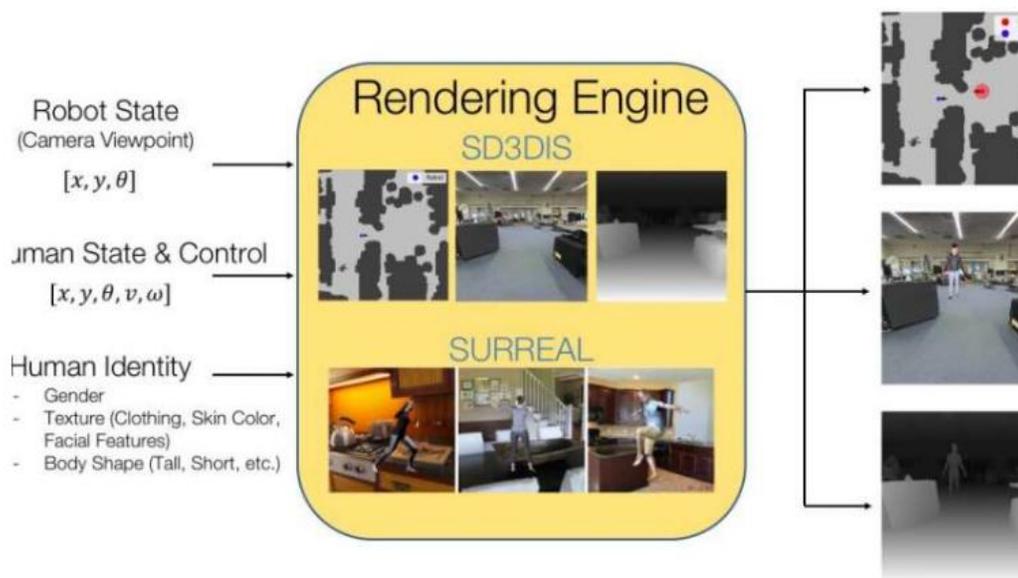


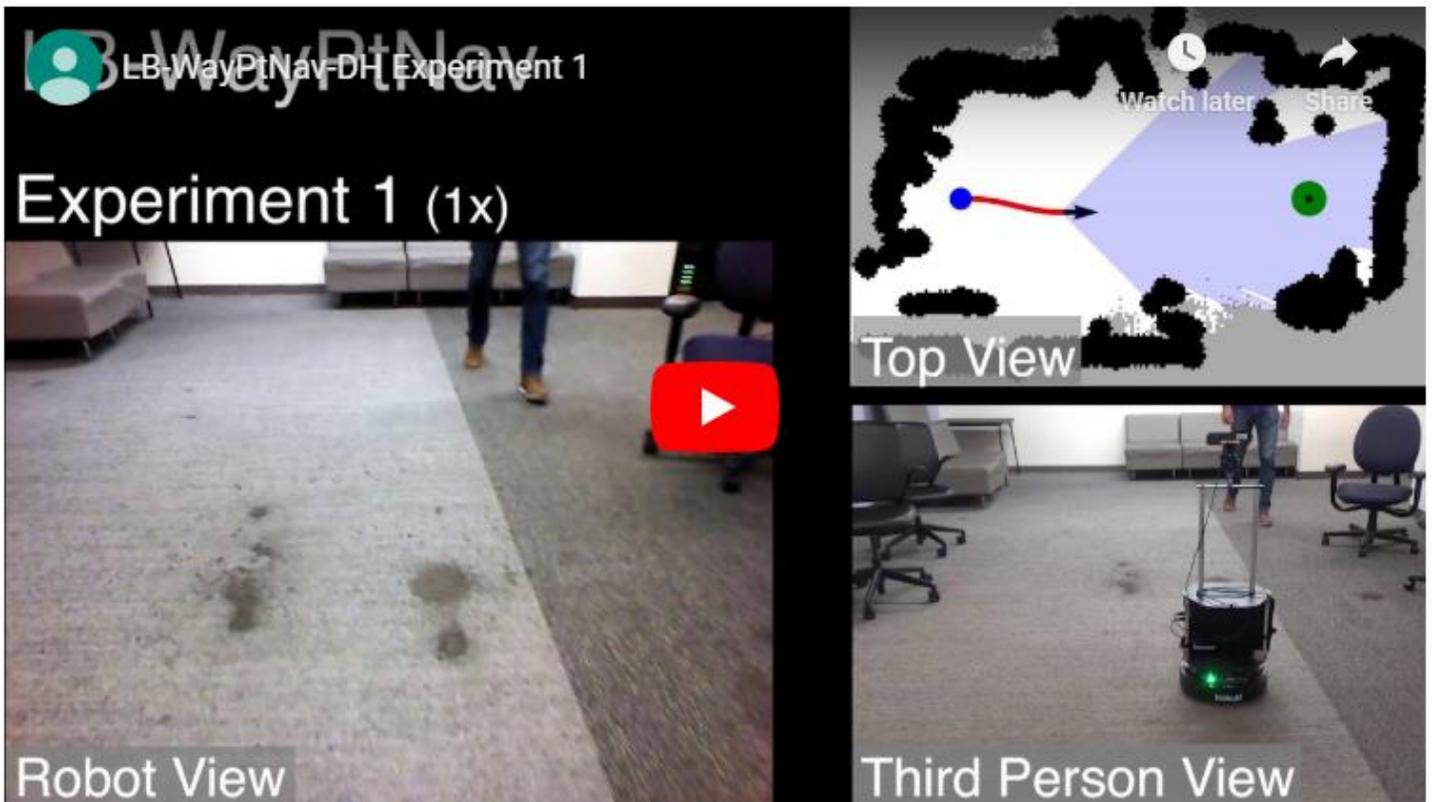
Image explaining what the HumANav dataset contains and how it achieves photorealistic rendering of indoor environments containing humans.

The researchers trained their CNN on images included in a dataset they compiled, dubbed HumANav. HumANav contains photorealistic, rendered images of simulated building environments in which humans are moving around,

adapted from another dataset called SURREAL. These images portray 6000 walking, textured human meshes, arranged by body shape, gender and velocity.

"The proposed framework learns to anticipate and react to peoples' motion based only on a monocular RGB image, without explicitly predicting future human motion," the researchers wrote in their paper.

The researchers evaluated LB-WayPtNav-DH in a series of experiments, both in simulations and in the real world. In real-world experiments, they applied it to Turtlebot 2, a low-cost mobile robot with open-source software. The researchers report that the robot navigation framework generalizes well to unseen buildings, effectively circumventing humans both in simulated and real-world environments.



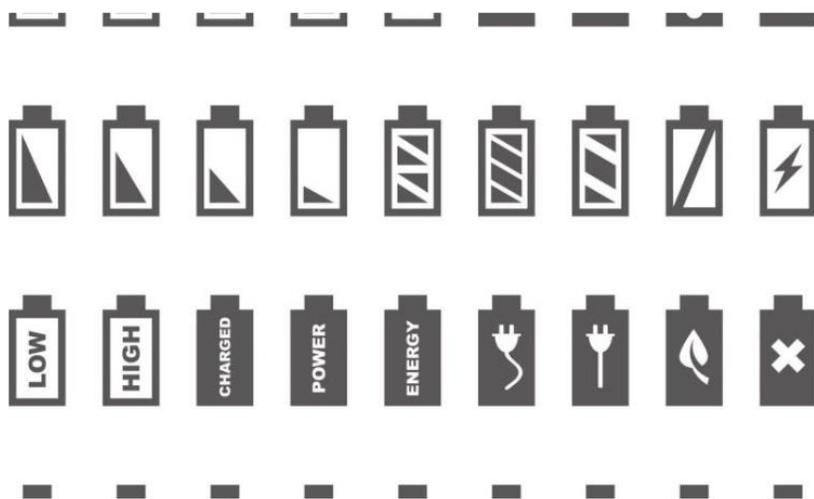
"Our experiments demonstrate that combining model-based control and learning leads to better and more data-efficient navigational behaviors as compared to a purely learning based approach," the researchers wrote in their paper.

The new framework could ultimately be applied to a variety of mobile robots, enhancing their navigation in indoor environments. So far, their approach has proved to perform remarkably well, transferring policies developed in simulation to real-world environments.

In their future studies, the researchers plan to train their framework on images of more complex or crowded environments. In addition, they would like to broaden the training dataset they compiled, including a more diverse set of images.

More information: *Visual navigation among humans with optical control as a supervisor.* arXiv:2003.09354 [cs.RO]. arxiv.org/abs/2003.09354
smlbansal.github.io/LB-WayPtNav-DH/

By University of Cambridge



Researchers have designed a machine learning method that can predict battery health with 10x higher accuracy than current industry standard, which could aid in the development of safer and more reliable batteries for electric vehicles and consumer electronics.

The researchers, from Cambridge and Newcastle Universities, have designed a new way to monitor batteries by sending electrical pulses into them and measuring the response. The measurements are then processed by a machine learning algorithm to predict the battery's health and useful

lifespan. Their method is non-invasive and is a simple add-on to any existing battery system. The results are reported in the journal Nature Communications.

Predicting the state of health and the remaining useful lifespan of lithium-ion batteries is one of the big problems limiting widespread adoption of electric vehicles: it's also a familiar annoyance to mobile phone users. Over time, battery performance degrades via a complex network of subtle chemical processes. Individually, each of these processes doesn't have much of an effect on battery performance, but collectively they can severely shorten a battery's performance and lifespan.

Current methods for predicting battery health are based on tracking the current and voltage during battery charging and discharging. This misses important features that indicate battery health. Tracking the many processes that are happening within the battery requires new ways of probing batteries in action, as well as new algorithms that can detect subtle signals as they are charged and discharged.

"Safety and reliability are the most important design criteria as we develop batteries that can pack a lot of energy in a small space," said Dr. Alpha Lee from Cambridge's Cavendish Laboratory, who co-led the research. "By improving the software that monitors charging and discharging, and using data-driven software to control the charging process, I believe we can power a big improvement in battery performance."

The researchers designed a way to monitor batteries by sending electrical pulses into it and measuring its response. A machine learning model is then used to discover specific features in the electrical response that are the tell-tale sign of battery aging. The researchers performed over 20,000 experimental measurements to train the model, the largest dataset of its kind. Importantly, the model learns how to distinguish important signals from irrelevant noise. Their method is non-invasive and is a simple add-on to any existing battery systems.

The researchers also showed that the machine learning model can be interpreted to give hints about the physical mechanism of degradation. The model can inform which electrical signals are most correlated with aging, which in turn allows them to design specific experiments to probe why and how batteries degrade.

"Machine learning complements and augments physical understanding," said co-first author Dr. Yunwei Zhang, also

from the Cavendish Laboratory. "The interpretable signals identified by our machine learning model are a starting point for future theoretical and experimental studies."

The researchers are now using their machine learning platform to understand degradation in different battery chemistries. They are also developing optimal battery charging protocols, powered by machine learning, to enable fast charging and minimise degradation.

More information: *Nature Communications* (2020). DOI: [10.1038/s41467-020-15235-7](https://doi.org/10.1038/s41467-020-15235-7)

Journal information: [Nature Communications](#)

By Adam Lewis

Despite lobbying efforts by House Minority Leader Kevin McCarthy and House Speaker Nancy Pelosi, it appears that most venture capital-backed companies still don't have clear access to the \$350 billion in loans available as part of the \$2 trillion US stimulus package. And middle-market companies with private equity owners are out of luck, too—at least for now.

Part of that contradicts what McCarthy told Axios on Thursday, when he said he was assured that VC-backed companies would soon be allowed access to the loan program after a conversation with US Treasury Secretary Steve Mnuchin. Late Friday night, the Small Business Administration, a department of the US Treasury tasked with setting up the program, updated its rules on which companies were eligible, added non-profits and faith-based organizations to the list. It said nothing specific about how VC-backed companies were exempt from the plan's original affiliation rules.

Further guidance on eligibility could still be made available in the coming days.

The issue comes by way of the Paycheck Protection Program included in the US stimulus package to help small businesses devastated by the financial impact of the coronavirus. Under the program, companies with less than 500 employees qualify for forgivable loans of up to \$10 million if they keep their employees on the payroll. The terms include an affiliation rule that counts all employees within a PE or VC firm's respective portfolio toward that 500 figure, making most of the portfolio companies ineligible.

But then came McCarthy's promise, adding a dose of optimism to VC-backed companies with multiple investors and doubt for most private equity-backed businesses, as many have one sponsor and thus would not qualify. But the new guidelines issued Friday by the SBA indicated that investors who held less than 50% ownership stake in a startup could still be considered a controlling investor, for instance when adding a member to the company's board of directors as part of an investment. Having a representative on the board, and the powers that come with that, could affiliate the company with the rest of the firm's investments.

If the new guidelines are the final word, it would mark a major blow for the National Venture Capital Association, a lobbying group that wrote a letter pushing for inclusion in the PPP. It would also be a setback for Pelosi, who pressed the SBA and Mnuchin for the inclusion of VC-backed companies. Pelosi's home district is San Francisco, where a number of startups have been forced to lay-off staff as they deal with the financial fallout from the coronavirus pandemic. A recent analysis by CNBC noted nearly 4,000 startup jobs across the country were eliminated in March.

The SBA launched the loan program to poor results Friday, as banks were overwhelmed with requests. Some VCs have still urged their portfolio companies to apply for the loan program, according to TechCrunch, with hopes that the PPP could eventually include startups.

"Startups are the engine of America's innovation economy and our districts in California's Bay Area and Silicon Valley are home to thousands of these companies," Pelosi wrote in a letter co-signed by US Rep. Ro Khanna (D-Calif.). "Other high-tech hubs around the country with a strong startup ecosystem will also be in need of PPP financing to preserve jobs and survive."

Private equity trade groups including the American Investment Council have intensively lobbied lawmakers to cover PE-backed companies, noting that many firms would have to cut payroll at portfolio companies because of the

pandemic if they didn't see some relief. The coronavirus outbreak has already ravaged PE-backed restaurants. CraftWorks, a Nashville-based restaurant chain backed by Centerbridge Partners, laid off most of its staff of 18,000 after it filed for bankruptcy.

"Businesses across America are looking for support immediately in order to survive and continue to employ people," AIC president Drew Maloney said. "It shouldn't matter if these companies are backed by investments from corporations, pension funds or others. We'll continue to work with the administration and Congress to request that federal programs support all businesses, regardless of ownership structure, and their workers."

Some of the congressional reluctance to bail out private equity-backed companies could be related to the industry's recent history. Over the past couple of years, Democrats in Congress have become increasingly critical of some of private equity's predatory tendencies. And the high-profile bankruptcy and liquidation of Toys R Us and Shopko didn't help that perception. But it's unclear if the PPP restriction was purposely targeting private equity-backed companies. Assuming the coronavirus pandemic continues to drag down the global economy, PE firms could potentially see some sort of relief, McCarthy noted, though nothing's guaranteed.

President Trump already has a relationship with some of the industry's biggest players. He recently held a conference call with a handful of business leaders, including Blackstone co-founder Stephen Schwarzman and Vista Equity founder Robert Smith, according to CNBC. But the call was reportedly focused on the state of the economy and not specific strategies to bail out companies. Schwarzman served on Trump's since-disbanded economic council early in his presidency.



SICK's nanoScan3 2D safety laser scanner

SICK is launching its newest ultra-compact safety laser scanner, the nanoScan3. The nanoScan3 combines smart safety functions with measurement data quality for accurate and reliable localization.

With an overall height of just over three inches, the nanoScan3 can be used wherever machines and vehicles require maximum performance, but have minimal mounting space. This enables manufacturers to use small AGVs or mobile robots equipped with SICK's safety technology.

Based on the microScan3 technology, the nanoScan3 2D safety sensor uses patented safeHDDM scan technology. This enables the nanoScan3 to hold up in harsh or challenging ambient conditions. It can also withstand interferences from dust, contamination, and ambient light.

Here are some of the features of the nanoScan3:

- Small housing, measuring only 3.15 inches in height
- Two pairs of OSSD safety outputs
- Design suitable for industrial use and easy to integrate with standard M12 connectivity
- Up to 128 freely configurable fields and monitoring cases
- Direct static and encoder inputs for flexible monitoring case switching
- Protective field range of three meters with a scanning angle of 275-degrees
- High-precision measurement data output for navigation support via Ethernet interface
- Maximum detection reliability even when subject to challenging ambient conditions
- Intuitive Safety Designer software enables flexibility in configuration and diagnostics

With its small size, the nanoScan3 opens up potential applications where space is critical, such as in mobile intralogistics, collaborative robots, or mobile assistance and mobile service robots.

From a technical approval perspective, the nanoScan3 fulfills Type 3 according to IEC EN 61496-3, SIL2 according to IEC 61508, and SIL2CL2 according to EN 62061, Category 3, as well as performance level d according to EN ISO 13849.

SICK in 2019 launched its outdoorScan3. SICK claims the outdoorScan3 is the first safety laser scanner certified to IEC 62998 for use in outdoor applications. The outdoorScan3 allows AGVs to navigate safely through outdoor industrial environments.

Seed companies suffer 'major setback' due to COVID-19 crisis – raising \$16 million in 21 deals in the quarter, down 70% in capital volume from 2019 quarterly averages, IVC says

By Shoshanna Solomon

The coronavirus will lead to a decline in new startups in Israel as smaller companies, the first to suffer from the consequences of the pandemic, face a funding crunch, IVC Research Center and attorneys ZAG S&W said in a report released on Sunday.

There were only four capital raising deals made since February, data in the report showed. Seed companies suffered a “major setback” due to the COVID-19 crisis – raising \$16 million in 21 deals in the quarter, down 28% in number and 70% in capital volume from the quarterly averages of 2019, the report said.

Larger companies — growth firms — managed to continue to show fundraising abilities, mainly because nine companies raised over \$50 million each in the quarter, raising \$1.37 billion in total. Of these, Via Transportation, a ride-sharing startup, held the largest fundraising round, with a \$400 million deal.

Because the first two months of the quarter were strong, showing mostly regular activity with figures at the same levels as previous, strong months, and because of the large funding rounds during the first quarter 2020, Israeli high-tech companies raised \$2.74 billion in 139 deals, up 76% up in capital volume from the first quarter a year earlier.

But in March, things ground to an almost halt.

“Two weeks into the month of March, the market stopped all at once. Most investors at various stages of negotiations simply backed out,” said Shmulik Zysman, founding partner of ZAG-S&W. “When it rains, everyone gets wet — even the best. It is clear by now that the high-tech industry, along with others, will not manage to avoid the effects” of the coronavirus.

The impact of the pandemic led to a “substantial decrease” in deal making throughout the month of March, in which just 17 VC-backed deals were registered, down almost 50% from the numbers observed in the other months of this year, the data showed.

“The strength of Israeli high-tech will be tested in 2020,” said Guy Holtzman, the CEO of IVC Research Center in a statement.

In the first quarter of 2020, seed financing rounds showed a drastic decrease to 24 deals, compared with the quarterly averages of 32 seed rounds in the years since 2013. With the advent of the crisis further into the first quarter, capital raising in seed rounds has almost completely ceased, with a minimal two deals in both February and March, the report said.

“It is already clear that the aggregate amount of transactions in the second quarter of 2020 will be significantly lower than what we have become accustomed to in the past few years,” Zysman said, and “recovery will not be easy.”

By Eva Yoo

While a number of startups have been hard hit by efforts to curb the spread of the COVID-19 virus, refurbishing firm Back Market is showing increased growth globally.

The Paris -based startup encourages customers to send in their old devices so they can be refurbished and resold into the e-commerce secondhand market. The growth achieved in the midst of the COVID-19 crisis is partly due to increased laptop sales as people seek better devices to work remotely.

For people who are unsure whether refurbished products are reliable, Back Market permits customers to send in old devices, exchange them for newer versions and pay the difference. CEO Thibaud Hug de Larauze said this payback service is currently possible only in France, but starting in Q2, it will be available in other markets.

Founded in 2014, Back Market has raised a total of €48 million in funding over two rounds, most recently a Series B in June 2018. The company is profitable and reportedly still has money to spend from its last funding round.

“We don’t release the gross merchandise volume, but it’s a three-digit growth rate,” Hug de Larauze told TechCrunch. “We saw an increase in demand for laptops, printers and other devices needed for working at home. Demand for refurbished phones is going down as people seek to get the first necessity items, like food for their situation.”

Over the past two weeks, Back Market saw skyrocketing demand from Italy, a nation with a high coronavirus death toll where citizens were warned they would be confined to their homes for four weeks.

Another factor that helped the platform’s growth: Smartphone brands like Apple and Samsung closed their retail stores, a move that turned Back Market into a major supply channel. While offline retailers and carriers are shut down in Europe, Hug de Larauze says Chinese offline retailers and refurbishing factories are starting to get back to work.

Logistics are critical for the company as it receives old devices and ships out refurbished units. All major delivery carriers like UPS, USPS, FedEx and DHL have remained open during the crisis, and despite the fact that some labor unions want to withdraw workers from delivery activities, Hug de Larauze said Back Market workers are handling the work safely.

The company now maintains offices in Paris, Bordeaux and New York. The platform operates in France, Belgium, the U.K., Spain, Italy, the United States, Austria and Germany (Austria and the U.K. launched in February).

“The U.S. and Germany are pushing the growth,” says Hug de Larauze. “They are the main two drivers of the boom of Back Market.”

The company works with 1,200 refurbishing factories in 27 countries, including France, China and the U.S., and takes a 10% commission from the facilities they work with. Globally, the refurbishing market is worth \$80 billion, with 13% growth year-over-year.

“They realized that it’s not only ecological, but it’s also a good business. Two hundred (new refurbishing factories) are on-boarding,” he says.

As customers head to Back Market instead of original device manufacturers, the startup is partnering with OEM brands. For example, when a customer sends a Dyson product to Back Market, Dyson will refurbish the product itself before reselling it on Back Market.

This approach sets it apart from other big players like Amazon, Craigslist and other C2C and B2C marketplaces, where consumers sell and ship their old gadgets. A possible competitor is Berlin-based Grover, which received €250 million in funding in January and offers a monthly subscription to private customers and businesses that allows them to buy and swap tech products.

“In the U.S., we saw the sales more than double in 12 months and it’s accelerating fast,” says Hug de Larauze. “We have been operating in the U.S. for two years and we are putting more resources there.”

Behind the scenes, he says the company is working on algorithms to provide better quality of their refurbished devices and claims to have cut its defect rate in half.

By Lucas Matney

The coronavirus pandemic has pushed entrepreneurs and investors into unknown territory.

Google's GV just led a \$10 million investment in Universe, a low-friction website builder that's venturing into the world of commerce.

The investment was in the works before COVID-19 hit America in force, but things were finalized for the Brooklyn startup in late March. I chatted with **M.G. Siegler**, the general partner at GV (and former TechCrunch writer) who led the deal, about how the crisis was affecting his investment work and how he was balancing portfolio work with sourcing new deals.

This interview has edited for length and clarity.

TechCrunch: This deal sounds like it was in the works before pandemic concerns really hit America, but when you saw this situation arise, did it change your thinking about this deal at all?

M.G. Siegler: The reality is we're still going to be continuing to look for interesting opportunities to invest in. History has shown that even during great financial turmoil, many companies are still being built, although it's certainly not easy for anyone, given that we're all stuck inside and trying to make things work. I think **Universe** is in an interesting spot; they have a tool that can potentially help some of these struggling businesses move online quicker and create commerce opportunities that they really need to think about given the current realities.

So there's no thought that we shouldn't do something just because of the current macro environment if we're really passionate about it to begin with. Obviously, there's varying degrees of that for different sectors, but I do think that Universe had been in a great position before this situation, and it seems like they have different opportunities now.

How is this changing your daily routine?

Frankly, there's a lot more portfolio work with everyone needing to make sure that the companies are in a good position to be able to weather this situation. I do think there are opportunities on top of that, and I do believe that we will still be active in pursuing new opportunities that are in play.

I think that's a natural outcome; we have to be mindful about what's going on in the world and we're trying to help out the portfolio companies to navigate some of situations as best we can. But the reality is that it always sort of ebbs and flows. This is a very, very extreme example, and I don't want to downplay it, of course, but it does ebb and flow with how much portfolio work there is versus how much new deal work there is. I think it's obviously the prudent thing to make sure that we're doing a lot of work within the portfolio to ensure that these companies are able to weather this all as best they can.

Are portfolio companies coming to you with concerns about fundraising right now?

I think it's an ongoing discussion, I do think that the timetables are significantly shifted, both up and back. For certain companies that were thinking about fundraising but are in a fine cash position this year, I think that there's discussions to be had about how to extend runway and potentially ship those out a bit.

It's not that people aren't out there looking for interesting companies to invest in. The reality is that a lot of people and funds are doing just what we were talking about, having these internal discussions and making sure that the companies within their portfolios are good, or at least in a position to be able to weather these storms. And so I

think it's natural that that's going to take a ton of their time so there's not going to be as much time, essentially, to meet with new companies and get to know new companies and spend all the time that's required to do those new deals. So yeah, we have to think about that.

In some cases, the opposite is true that it might make sense to raise now, whereas they may have thought about raising toward the end of the year or even next year, and maybe now it makes sense and there's interest to do that.

How do you balance keeping an eye out for hot opportunities with ensuring you're not too reactionary when the state of the market is a little uncertain?

Yeah, I mean, it's a good question, because obviously it's top of mind for investors looking at all the different opportunities and things that are bubbling up. Of course, Zoom is at the forefront of all of this, but like there's a bunch of other stuff. We're looking at entertainment-based services, learning-based services — all remote of course — so I do think that there are a ton of things coming into focus rapidly because of this current environment.

I am still interested in the broader spaces I was interested in before this all started, but I think that some of them especially play into the world of everyone being stuck at home. I've long been interested in the voice space. Obviously, that somewhat led to our Anchor investment, as mentioned before, but, I'm interested in mobile computing in general with Google Home and Alexa in the home. Now that we're all home all the time, we'll see how that usage ends up going and what those types of opportunities might look like.

What's the opportunity for a company like Universe that did just finish a raise?

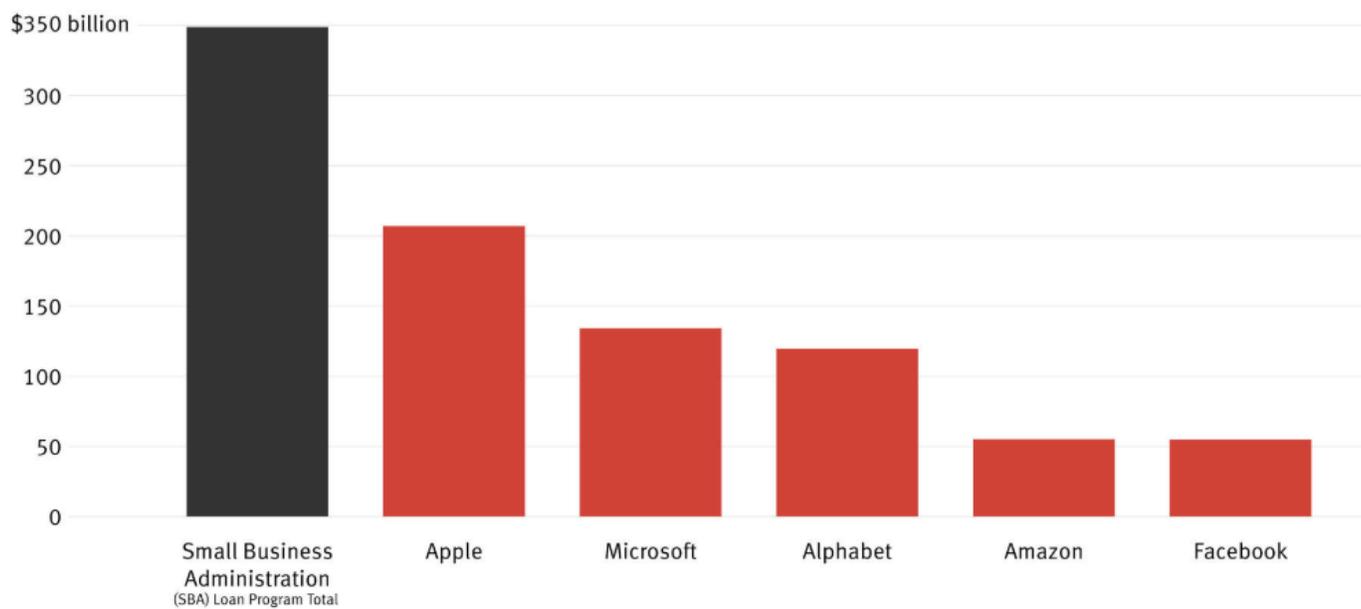
Yeah I mean, hopefully, it'll take some weight off their shoulders that may have been there otherwise, with regard to focusing on new initiatives versus just making sure that the company was sustainable. And I think that that's obviously still important, but I do think that it can take a little bit of a longer view to be able to work on the new initiatives, like what they're doing to push commerce forward right now.

You can also potentially hire in an environment where a lot of people aren't right now, but you have to be very cautious about that — even for companies with a good amount of capital on the balance sheet — because no one knows, frankly, how long this is going to last. There are opportunities to make strategic decisions for hiring for the right kind of people that they would need to get on the team to make this a long-term success.

By Nick Bastone

Cashed Up

How the SBA's small business loan program compares to tech companies' cash reserves



Source: Company filings

The Small Business Association has a \$349 billion emergency fund to provide some relief to small businesses across the country hurt by the coronavirus. But a possible alternative source of funding for cash-strapped tech startups could be the tech giants, which between them have much more cash than the SBA.

Apple, Alphabet, Amazon, Facebook and Microsoft had a combined total of \$570 billion in cash and investments at the end of December (see above chart for details). That positions the group to lend a hand by either investing in or acquiring cash-strapped startups with promising technologies or enterprising talent. It also is a reminder that the SBA program needs more money, a point that Senate Majority Leader Mitch McConnell made on Tuesday.

Of course, the big tech companies are not philanthropies or banks. They're not going to play the role of the government in bailing out struggling companies just to save jobs. Moreover, they're already under regulatory scrutiny for their history of acquisitions. While the pandemic may slow the pace of that scrutiny, it hasn't disappeared. The downturn has also affected them, so they may be cautious about what they spend on new investments.

Still, Facebook has already set up a \$100 million program to help struggling small businesses—a move of self-interest because Facebook, like Google, is reliant on small business advertisers. That suggests more programs from the big tech giants offering assistance to small businesses or startups are possible.

More broadly, the tech giants have a track record of acquiring small companies, either for talent or for technology. In some cases, they've even come to the rescue of companies—when it fitted their strategic interests. Microsoft, for instance, invested \$150 million in Apple in 1997 at a time the then-smaller company was struggling, as part of a deal

where Microsoft developed versions of its software for Apple products. Microsoft also lent \$2 billion to the group taking Dell private in 2013, which indicated Dell's importance to the PC ecosystem.

And these companies have maintained their acquisitive stance lately, even in the face of antitrust scrutiny. Last week, for instance, Apple bought the popular weather app Dark Sky for an undisclosed though likely modest amount—and promptly shut down the Android version of the app. Apple is reportedly also in the middle of a more sizable deal to buy virtual reality company NextVR, which could total \$100 million. Similarly, one of Alphabet's investment arms, GV, is ramping up the pace of its investments, a person directly familiar with the matter said.

While the economic downturn is hurting all the big companies to varying degrees, their dominant market shares and cash reserves insulate them from the worst effects. None has had major layoffs, and some, such as Google and Amazon, are still hiring. Most analysts expect the big companies are likely to emerge relatively better off.

During a downswing, “the strong get stronger,” Dan Ives, a managing director at Wedbush Securities, said. “These companies have hundreds of billions of dollars in cash, and are also generating billions each year. They, like everyone else, will get hurt relatively during this near-term apocalyptic economic environment. But ultimately, I think these companies gain market share.”

By Juan Pedro Tomas

Q&A with leader of Finland's 6G Flagship Program

Finland is among the first countries in the world to kick off research on future 6G technologies, which are forecast to appear in 2030. To know more about Finland's efforts towards 6G, RCR Wireless News interviewed Matti Latva-aho, Academy Professor and Director of 6G Flagship program.

Q: Who are the current members of the Academy of Finland's flagship program and what specific areas of research had been stipulated?

A: The Finnish 6G Flagship is a vigorous research and co-creation ecosystem for 5G adoption and 6G innovation led by the University of Oulu and appointed by the Academy of Finland, a governmental funding agency for high-quality scientific research. In the beginning of the program, five collaboration partners were named including Aalto University, Business Oulu, Nokia, Oulu University of Applied Sciences, and VTT Technical Research Centre of Finland Ltd. Currently, two more companies have joined as company co-creators including Keysight Technologies and InterDigital. Additionally, MoUs are being signed with other collaborators.

As 5G enters its deployment phase, 6G Flagship supports global industry in the finalization of the 5G standard especially through joint projects, trials and demonstrations. At the same time, 6G Flagship experts are already working on essential technology components and solutions needed for the 2030 wireless era. The research within 6G Flagship is organized into four interrelated strategic research areas: wireless connectivity, device and circuit technologies, distributed intelligent computing, and novel applications and services. Major scientific breakthroughs are sought in all of them.

Q: When do you consider that 6G technology will be a reality and what would be the main future uses of this technology?

A: 6G Flagship envisions a future society towards 2030, which is data-driven and enabled by near instant, unlimited wireless connectivity. 6G will emerge around 2030 to satisfy the expectations not met with 5G, as well as, the new ones fusing AI inspired applications in every field of society with ubiquitous wireless connectivity.

Main future uses of 6G are foreseen to take place in different verticals that 5G has already started to address. There will be very high capacity short-range solutions as well as solutions addressing the challenges of remote and rural areas.

Q: What would be the main drivers and the main challenges for this future technology?

A: 6G Flagship aims at solidifying a global 6G research vision which takes into account future productivity and quality of service demands, among others, but also focuses on the United Nations Sustainable Development Goals (UN SDGs) as major drivers. For this purpose, 6G Flagship builds a wide 6G ecosystem with its stakeholders to address how 6G can act as an enabler to help in meeting the SDGs and how 6G development should take the SDGs into account already in the research and development phase.

Many challenges arise from technical, regulation and business perspectives in the development of 6G. Operations in higher carrier frequencies and increasing use of data lead to new questions on who can use the data or who can use spectrum in the new 6G ecosystem with changing stakeholder roles.

Q: What are the main goals of the Flagship program? Does it have a specific timeline to produce reports or technical conclusions?

A: 6G Flagship is an eight-year program, which was launched in May 2018. The main goals of 6G Flagship are to support companies in finalization of the 5G standard by carrying out technology and system pilots, to develop the fundamental technology components to enable 6G systems, and to speed up dependable, robust and secure digitalisation of society via 5G and 6G. These three themes are running in parallel.

6G Flagship results are documented into a total of 838 peer-reviewed scientific publications so far from the launch of the program. 6G Flagship produces reports for the Academy of Finland every two years, but the reports are for internal evaluation only. In September 2019, 6G Flagship published a 6G white paper based on a workshop held in the first 6G Wireless Summit 2019 describing the 6G vision and key research questions for the development of 6G. The paper provides a focus for the major research challenges and helps in setting up the research agenda for the new decade. Now 6G Flagship experts are leading 12 experts groups producing 12 new white papers, which will be available for initial viewing by the end of April. All topics have their roots in the previous white paper. One expert group works on the linkage between 6G and the United Nations' Sustainable Development Goals (UN SDGs) and another focuses on connectivity for remote areas. Both groups reflect major societal challenges. One expert group develops business scenarios for 6G. The remaining groups are more technical and cover validation and trials, broadband connectivity, networking, machine learning, RF and spectrum, edge intelligence, security and privacy, critical and massive machine type communications, and localization and sensing.

Q: How this program will be financed and who are providing this financing? Which are the tech partners in this program?

A: The program is appointed by Academy of Finland and receives direct funding from it. Additionally, externally funded projects totaling 223 projects by the end of 2019 are included in the 6G Flagship program. Including University of Oulu's own funding, the total budget for the eight-year Flagship program is 251 million euros. So far, 75 companies have invested in 6G Flagship's research portfolio.

China's VC industry bounces back after coronavirus-induced winter

By James Thorne

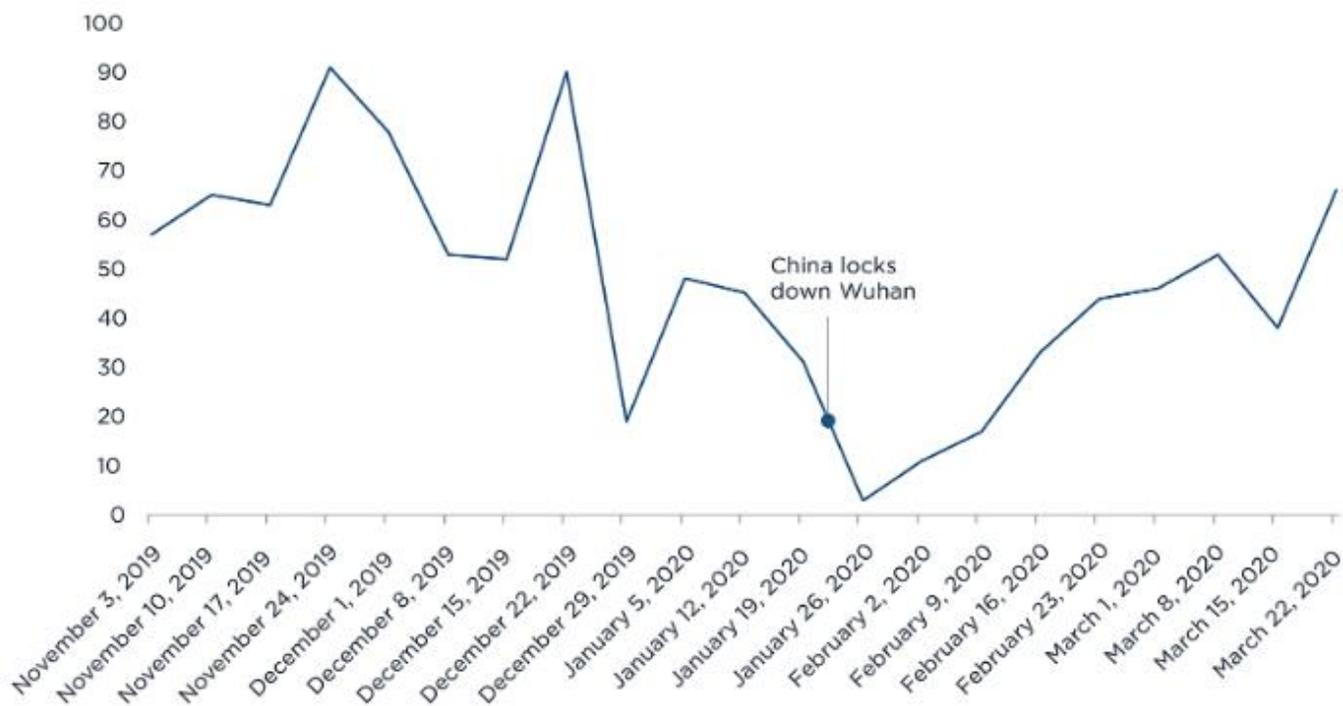
Dealmaking in China is mounting a comeback following a slowdown prompted by the coronavirus outbreak.

Chinese firms recorded 66 venture capital deals for the week ended March 28, the most of any week in 2020 and just below figures from the same time last year.

It's a sign that the VC industry in the rest of the world could also mount a quick recovery from travel restrictions and other measures that have made investing more challenging. In the first six weeks of the year, deal volume and capital raised in China had fallen more than 60% compared with the same period last year, according to PitchBook data.

But any optimism should be tempered with a note of caution. If a second wave of the virus were to hit China, stringent lockdown measures would be reinstated and deal activity would most likely dive again, said Alex Frederick, an emerging tech analyst at PitchBook.

VC deals in China by week



Source: PitchBook
As of March 31, 2020
*Dates represent start of week

Containment measures intended to slow the outbreak sharply curtailed many of China's hallmark industries, notably manufacturing and logistics. But it has also drawn attention to new opportunities.

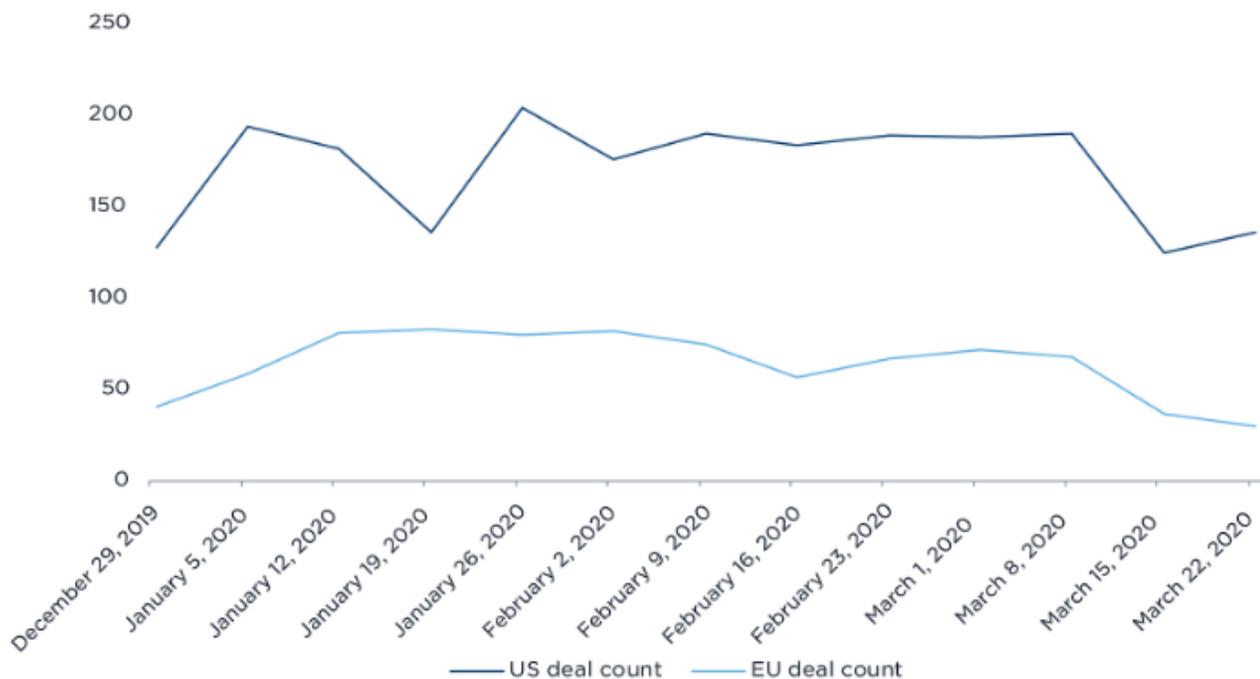
Two sectors that have seen an uptick in VC deals include advanced manufacturing and edtech, Frederick said. Last week, Chinese online education startup Yuanfudao hauled in \$1 billion at a \$7.8 billion valuation, according to

Reuters, at a time when the world is rethinking the merits of remote teaching. And Chinese software companies have fared particularly well in recent weeks, with the industry claiming nearly a third of all deals in the country.

The rebound is a welcome sign for startups and investors in the US and Europe, who are now seeing investment activity begin to slide. In the last week of March, the number of deals in the US was down some 26% compared to February's weekly average, according to PitchBook data.

That activity is likely to slow much more in the coming weeks as the US grapples with more official cases of COVID-19 than any other country. There is a natural lag time between when deals are made and when they are announced publicly.

VC deals in the US and Europe by week



Source: PitchBook
As of March 31, 2020
*Dates represent start of week

If investors are able to find deals, there's money to fund them. Globally, venture capitalists had around \$188.7 billion in dry powder as of mid-year 2019, according to a recent PitchBook analyst note on COVID-19's Influence on the US VC Market. That works out to more than two-and-a-half years of capital on hand.

Investors may also find that the market turmoil will make for new opportunities. During the Great Recession, the share of companies raising money at lowered valuations grew sharply, according to the analyst note. Investors also tend to demand more protection in deals during downturns, such as liquidation preferences and dividend rights.

Sourced by Forbes

In March, Stefan Seltz-Axmacher, CEO and founder of Starsky Robotics (* *Chambiz DF 17 Feb 2018*), announced the end of their trucking company, which combined autonomous driving software and remote monitoring techniques to move big rigs. Back in 2015, I had advised Seltz-Axmacher on their plan, but had lost touch. Recently he published a detailed essay outlining the causes of the failure of the company which caused some stir, because one of its assertions that effectively, the problem is too hard, and others will fail as well. Others have rejected that claim and argue that Starsky failed because of failings of the company itself, not the industry.

Let's look at some of the arguments made in the essay:

1. Supervised machine learning just isn't up to the autonomous driving task, and may be very far from getting there.
2. While there should be low-hanging-fruit in the trucking world for robotrucks, the industry is hidebound and not ready.
3. VCs don't like to invest in businesses which must include a traditional, lower-margin, more capital intensive component, such as owning and operating a freight delivery service.
4. Everybody talks about how Safety is #1, but it really isn't and doesn't attract attention or investment.

I'll actually start with some elements of #2 that I dug into in a discussion last week with Seltz-Axmacher. Starsky picked trucking because it's a horribly managed industry with lots of opportunities to do better. There's a giant driver shortage. Drivers are also sometimes unreliable — as one customer told him, a robot is unlikely to get into a fight with people at a warehouse, or decide to stop in Las Vegas and spend a few days in a strip club. This doesn't happen all the time in trucking, but it happens enough that having it never happen is a big plus. Starsky planned to run their trucks only on the easiest of highways, short to middle distance runs on clear, open uncongested highways. If a problem arose due to traffic or weather, the truck would just pull over — because multi-hour stops are common with human drivers too.

This also meant that a combination of full self-driving with occasional remote assistance could work on these easy roads. Their trucks would never change lanes on their own. They would not mind going slow behind other trucks. They would not mind anything. They felt they picked the easiest driving problem to solve, other than, of course the issue of moving an 40 ton vehicle at high speed and the risks that entails.

Current fleet operators are not early adopters. It is indeed going to be hard to convince them to do something this radical, even with the problem in finding good drivers, or any drivers at all. Starsky's original plan was all remote operation, sticking only to roads with good data. In 2015, I told them that finding such roads would be a challenge. It's more possible today, and the deployment of services like Starlink will probably make it much easier soon.

If existing operators are not early adopters, Starsky reports that investors are scared of having to become a freight carrier in order to be a robotic truck company. They're probably right — VC investing habits are strange to the rest of the world. They expect to invest in a dozen interesting startups each with the potential of becoming a “home run” and expecting the other 11 to try like crazy for that but flame out. Traditional businesses don't usually fit that mold.

So here we have a case where Seltz-Axmacher is right that trucking can be a hard sell — though it hasn't stopped many other trucking options from getting large investments.

Is the AI too hard?

You'll need to read the essay for the full details, but it touches on one of the big questions of 2020 — how much harder is self-driving AI than people originally thought? In particular, there was a lot of enthusiasm, some of it definitely hype, about the powers of deep neural networks.

Pretty much every car team has done extensive work building training data for these machine learning approaches. That means gathering real world data (images and LIDAR clouds) and having humans label them to train the AI. This technique has delivered astonishing results, by the standards of just a few years ago. The question is, is it good enough to provide the quality level for self driving, and when will it be, and will it ever be?

Seltz-Axmacher correctly points out it's pretty easy to get some early impressive results, and this guiles people into thinking full success is just around the corner. Several companies have even tried to build self-driving systems with "full end to end" neural networks, which are black boxes you stick camera pixels in and get driving commands out of (steering and pedals.)

He's right that pure supervised machine learning is not enough right now, and may be some distance in the future. Tesla is betting it isn't, but most companies are trying to build hybrids that use other algorithms combined with asking machine learning to do what it's best at. They still believe this strategy will succeed. Generally, they have looked with disdain on those hoping to use an end-to-end approach, for the very reasons that Seltz-Axmacher outlines. In 2019 and 2020, there has been a pull-back by several players, particularly those in no particular hurry to see the automotive industry disrupted. Those who exist to do that disruption always expected the problem to be hard, I believe, but do not think their efforts are wasted.

That includes the self-driving truck world. Many companies have been attracted to trucking because highway driving is simple, even if trucks are fast and heavy. I mean really simple compared to urban streets. And the commercial value is also very clear. If anything, the commercial value is too clear, and there could be backlash when accidents come (even if at a lower rate) that people are being hurt just to make shipping more efficient, rather than to change how transportation works in general.

VCs don't invest in this style of business

This claim is also true, though not entirely. There are forward thinking VCs and strategic investors who could be sold on a somewhat more capital and infrastructure intensive business. It's true that, given the choice, they would rather invest in an Uber that writes only software and owns no cars. The returns are far greater. But even Uber can get investment selling a story of switching to owning large fleets of robotaxis, replacing their drivers.

It may simply be that as the slowdown and market jitters have come, it was Starsky's plan and company that didn't pass muster, and not the concept behind it. Certainly several other companies have raised rounds and gotten good valuations, though perhaps not as stratospheric as the valuations from a couple of years ago. There is still a very big prize to be won.

Safety seventh

Seltz-Axmacher touches on a real issue when he wonders how much people really care about safety. After all, every company in every presentation you see says, "we are all about safety" and "safety is priority #1 for us." Now, you have to say that, and everybody is very interested in safety, because if you can't attain safety, you can't put your product on the market. So in that sense it's a top priority. But in reality, in almost every business, Safety is definitely third after functionality and price. We can recount a hundred stories of products that could have been safer if they cost more money, or has less functionality. After all, self-driving cars that only went 10mph would be pretty easy to make safe quickly, but nobody would want them.

In fact, when car buyers are asked what factors they are considering in choosing their next car, they always list "safety" as the first choice. Studies of what factors actually govern their choices have suggested it's really in more

like seventh place. Otherwise, nobody would buy from anybody but the highly-safety focused brands like Volvo and Mercedes, which at various times in history have had the top reputations in that area. They don't.

But Seltz-Axmacher points out something stronger — that the public, press and investors don't get excited about safety because it is inherently boring. And it is. The ideal demo ride in a self-driving car is dull as dishwater. It's hard to demo safety.

In the early days of the field, when advising a potential X Prize on self-driving to follow on the heels of the DARPA challenges, I suggested a man vs. machine safety contest. Vehicles would drive a tricky course, and fake obstacles, inflatable pedestrians and cars on small robot platforms, would create problems. Both the skilled race drivers and the robocars would compete on who could avoid hitting anything. It might have been popular — not when perfect, but when things are hit — but once the robots got perfect while the famous race car drivers were not, it would actually install confidence in the public. But nothing like this has ever been done, and no demo like this has been set up, both because nobody wants video of cars hitting even balloons, and it turns out that just driving was complex enough that handling fake situations never got high on the priority list. Teams now do this in simulator, or sometimes on test tracks, but it's never the exciting demo. (Waymo shows a video of their car reacting to employees letting moving boxes fall onto the road.)

Is everybody doomed?

I wasn't in the VC meetings that turned down more funding for Starsky. Today's VC climate has cooled, and a lot of companies are being turned down. They may have had other flaws which they don't want to go into. I suspect a lot of companies will continue to get funding, though some will be hurt by having initially received high valuations that can't be sustained.

And it may be true that building a robo-car or robotruck just isn't a game for a small startup. It's hard enough for the megafunded startups like Zoox, Cruise and Aurora. There's a tremendous amount of hard slogging detail work to get from 99% to 99.9999%, which is where you need to be. It's not 1% harder, it's 10,000 times harder, and not everybody realizes that. The closer you get to great safety, the harder and harder it is, because each issue becomes harder to find, and each change could cause a regression on something fixed long ago. This may remain something for the big boys, at least for a few years. (Things which took billions to do the first time eventually become doable in a dorm room, it often seems.)

Some companies were going to fail. There was no way they could all survive. Indeed, there is no way that most of the teams out there will survive. That's to be expected in something as audacious as this. Big valuations demand big results, and only a few will deliver them.

CVG first US airport to deploy Avidbots Neo floor-scrubbing robot

By Steve Crowe

The Cincinnati/Northern Kentucky International Airport (CVG) is now the first U.S. airport to deploy Avidbots' Neo floor-scrubbing robot. During a pilot program with Kitchener, Ontario-based Avidbots (** Chambiz DF 27 April 2019*) that began in November 2019, CVG used Neo to clean an average of 200,000 square feet of flooring per week.

Now that it's officially deployed, Avidbots' Neo is currently cleaning for six hours at a time, which is the maximum time it can run on one charge. Neo has two tanks, one for clean water and one for dirty water. This is important, according to CVG, because it's putting disinfectant into the clean water tank to ensure dirty water doesn't get re-used to clean the floors.

An Avidbots spokesperson told The Robot Report CVG didn't accelerate deployment of Neo per se, but that it did push Neo into service as quickly as possible to help sanitize CVG during the COVID-19 pandemic.

"At CVG, we aim to embrace what's next in all that we do," said Candace McGraw, CEO of CVG Airport. "Introducing new technologies to elevate the passenger experience is critical to our business. In the challenging and uncertain times we find ourselves, making sure our facilities are safe and clean is our top priority, so Neo has been a great asset to our team to ensure a high standard of cleanliness is met."

After an initial facility-mapping process, Neo can autonomously clean an environment thanks to proprietary software, 3D sensors and cameras. Connected to the cloud through WiFi and 4G, Neo includes 24x7 monitoring and automatically receives software updates to add new functionality.



“CVG is one of the world’s most innovative airports, deploying the latest technologies to deliver the very best passenger experience, so we aren’t surprised they are the first airport in the U.S. to deploy the Avidbots Neo floor-scrubbing robot,” said Faizan Sheikh, CEO and Co-founder of Avidbots. “Neo works 24×7 to keep CVG’s facilities spic and span, ensuring a safe and healthy environment for airport visitors, passengers and staff.”

While CVG is the first U.S. airport to use Avidbots’ Neo, it is already used in many airports worldwide, including Paris Charles de Gaulle, Singapore Changi, Tokyo Narita, Tokyo Haneda, Osaka Kansai, Montréal-Pierre Elliott Trudeau International, Ben Gurion, and Sydney Airport.

Founded in 2014 by Pablo Molina and Sheikh, Avidbots raised a \$23.6 million in Series B funding in March 2019. The round was led by returning investor True Ventures, and it brought the company’s venture capital financing to a total of \$36 million.

The commercial floor cleaning market accounts for an estimated \$5 billion in global sales annually.

By Eugene Demaitre



Until recently, many robots have had difficulty handling irregularly shaped or fragile objects for food processing or e-commerce order fulfillment. OnRobot A/S today announced the OnRobot Soft Gripper, which it said can manipulate items including eggs, fruit, or bottles.

“Our new Soft Gripper is challenging existing solutions for picking hard-to-grasp, delicate and odd-sized items,” stated Enrico Krog Iversen, CEO of OnRobot (**Chambiz DF 14 March 2020*). “Unlike proprietary solutions, the Soft Gripper offers seamless integration with most collaborative robots and light industrial robots through our One System Solution.”

The OnRobot Soft Gripper uses three interchangeable silicon-molded cups to precisely pick up almost any small object under 2.2kg with a precise touch, said the company. The flexible end-of-arm tooling (EOAT) comes in star and four-fingered configurations.

Unlike traditional vacuum grippers, the new end effector requires no external air supply, so it can reduce both cost and complexity, claimed the Odense, Denmark-based company.

Soft Gripper features and applications

The gripper includes the following features, according to OnRobot:

- Up to 2.2kg (4.8 lb.) payload based on the shape, softness, and friction of items to be handled
- Grip dimensions ranging from 11 to 118mm (0.43 to 4.64 in.), depending on cup used

- Certification from the U.S. Food and Drug Administration (FDA)
- Flexible, interchangeable silicon cups
- No need for supplied air
- Fast, flexible deployment with seamless integration on all major robot brands

The electric Soft Gripper is food-grade-certified and complies with FDA 21 CFR for non-fatty items and EC 1935/2004, said OnRobot.

While the robotic gripper is designed for pick-and-place food and beverage applications, as well as cosmetics and pharmaceuticals, it also provides flexible grasping for manufacturing and packaging.

One System Solution integrates with more robots

OnRobot said its award-winning One System Solution provides a unified mechanical and electrical interface between leading robot arms and any OnRobot EOAT.

The One System Solution has been newly expanded to include integration with robots from ABB Robotics and Hanwha Precision Machinery. Now, users of those robots can take advantage of the unified mechanical and electrical interface of any OnRobot product, for easier integration and faster return on investment, said the gripper maker.

Published by EETimes

Gallium nitride (GaN) is hot. Even hotter is a race to integrate GaN with other materials to boost GaN's performance further.

"GaN-on-diamond offers key parameters of high thermal conductivity, high electrical resistivity and small form factor at both device and system level. These benefits make GaN-on-diamond power amplifier devices very attractive for high power RF applications, such as commercial base stations, military radar applications as well as satellite communication and weather radars," explained Ezgi Dogmus, technology & market analyst from Yole Développement. "This innovative device technology, in development for over a decade, is expected to be launched commercially by leading industrial actors such as RFHIC, Akash Systems and Mitsubishi Electric in the next years," he added.

A team led by the School of Mechanical Engineering at Georgia Institute of Technology has implemented a series of results based on room-temperature surface-activated bonding (SAB) to bond GaN and single-crystal diamond with different interlayer thicknesses. The newly developed technique maximizes gallium nitride performance for higher power operations.

Integrating GaN with other materials is technically challenging. It is very difficult to bond diamond and GaN with thermally conductive interfaces and low stress at the interfaces. The modelling allows GaN devices to take full advantage of the high thermal conductivity of single-crystal diamond and thus achieve an excellent cooling effect for high-power solutions. The ambient temperature process does not induce physical stress problems due to the different coefficient of thermal expansion in other standard processes.

MOSFETs hit a limit

The power electronics industry has seen the theoretical performance limit reached by silicon MOSFETs and now needs to move to a new element. GaN is a wide bandgap, high electron mobility semiconductor that has proven to be a real added value in meeting new applications. High-electron-mobility transistor (HEMT) devices based on GaN offer superior electrical characteristics and are a good successor to MOSFETs and IGBTs in high-voltage and high-switching-frequency motor control applications.

As a wide bandgap material, GaN's forbidden band (corresponding to the energy required for an electron to pass from the valence band to the conduction band) is much wider than the one in silicon: it is, in fact, about 3.4 electron-volts, compared to 1.12 eV for silicon. Because of this high required energy, 10 times thinner materials are needed for GaN to block a certain voltage than silicon, resulting in much more compact device sizes. The higher electron mobility of a GaN HEMT leads to a greater switching speed since the charges that normally accumulate in the joints can be dispersed more quickly.

The faster rise times, lower drain-to-source on-resistance (RDS(on)) values, and reduced gate and output capacitance achievable with GaN all contribute to its low switching losses and ability to operate at switching frequencies up to 10 times higher than silicon. Reducing power losses brings additional benefits, such as more efficient power distribution, less heat generation, and simpler cooling systems.

GaN performance and reliability are related to temperature and joule heating effect on the channel. Substrates such as SiC and diamond integrated into GaN can improve heat management. This makes it possible to lower the operating temperature of the device. For GaN-on-SiC devices, 25 degree decrease in channel temperature would lead to about ten times increase in device lifetime.

Why GaN-on-Diamond HEMTs?

(Source: Emerging Semiconductor Substrates: Market & Technology Trends report, Yole Développement, 2019)



GaN-On-Diamond applications overview [Source Yole Développement]

The thermal conductivity of diamonds is 14 times greater than the one of silicon, and electrical field resistance is 30 times greater. High thermal conductivity allows the spreading of heat. Diamond has a bandgap of 5.47 eV, Breakdown field of 10 MV/cm, electron mobility of 2200 cm² Vs and a thermal conductivity of about 21 W/cmK.

The new technique developed presented by the team from Georgia Tech, Meisei University, and Waseda University allows the placement of high thermal conductivity materials much closer to the regions of the active devices in gallium nitride, thus maximizing gallium nitride performance for higher power operations.

GaN devices have had a widespread deployment in optoelectronics, RF, and automotive. The market about GaN-on-diamond is for defense radar and satellite communications, for now, massive production for 5G base station is ongoing as well.

GaN and diamond Features

The maximum output power of GaN-based HEMTs is limited by the high temperature of the channel substrate, which degrades system performance and reliability. Diamond is currently the material with the highest thermal conductivity, and through its integration with GaN, it helps to dissipate the heat generated near the channel.

“During the HEMT device working, a large voltage drop near the gate induces localized Joule-heating. The heating area is located within tens of nanometers, which results in super-high local heat flux. The local heat flux value of GaN-based HEMTs could reach more than ten times larger than that of the sun surface. Proper heat spreading technique, such as putting diamond as close as possible to the hot-spots, could decrease the channel temperature effectively, facilitating the device stability and lifetime,” said Zhe Cheng, a recent Georgia Tech Ph.D. graduate who is the paper’s first author and now is a postdoc in UIUC.

The techniques currently used involve the direct growth of diamond deposited by chemical vapor (CVD) on GaN with a dielectric layer as a protective layer because the plasmon during diamond growth would damage GaN. The combination of the thermal resistances of the materials and the interfaces prove to play a pivotal role in heat flow

management, especially for high-frequency applications for switching power supplies. The growth temperature of the CVD diamond is above 700 °C. When the devices cool down to room temperature, the stress at the interfaces would crack the wafers. Additionally, the adhesion layer increases the thermal resistance of the GaN-diamond interface, which offsets for the benefit of the diamond substrates high thermal conductivity.

The research presented by the team from the Georgia Tech, Meisei University, and Waseda University used two modified SAB techniques to bond GaN with diamond substrates with different interlayers at room temperature. The two to-be-bonded surfaces are cleaned and activated by Ar ion beams, which generate dangling bonds at the surfaces. Then the two surfaces are pressed together at room temperature. The dangling bonds would form covalent bonds at the interfaces. In their work, some silicon atoms are added at the interface to enhance the interfacial bonding.

“The bonding is finished at Meisei University and Waseda University (Fengwen Mu and Tadatomo Suga). Then the bonded interfaces are measured by time-domain thermoreflectance (TDTR) at Georgia Tech (Zhe Cheng, Luke Yates, and Samuel Graham). Related thermal modeling is also performed at Georgia Tech to evaluate the impact of the bonded interface on GaN devices”, said Zhe Cheng

TDTR is used to measure thermal properties. Material characterization can be performed by high-resolution scanning electron microscopy (HR-STEM) and electron energy loss spectroscopy (EELS).

Time-domain thermoreflectance (TDTR)

Time domain thermoreflectance (TDTR) is a pump-probe technique with an ultrafast femtosecond laser, which measures the thermal boundary conductance of the GaN-diamond interface. This technique uses an ultrafast laser modulated between 1 and 12 MHz to control the thermal penetration depth. The probe pulse is delayed between 0.1 and 7 ns compared to the pump pulse to allow the decay of the relative surface temperature to be measured through this time. A Lock-in amplifier allows extracting the read signal picked up by a photodetector. The temperature variation is measured by the reflectivity variations of a thin metal transducer (50-100 nm). The system is capable of measuring thermal conductivity between 0.1 and 1000 W/m-K and thermal boundary resistance between 2 and 500 m²-K/G. A Ti-sapphire femtosecond laser is used.

Fabrication and test

In this research presented by the Georgia Tech and Meisei University, GaN was bonded to diamond by adding some Silicon atoms at the interfaces to help chemical adhesion of the interface and lowering thermal contact conductance. Thermal boundary conductance (or TBC) describes the heat conduction between solid-solid interfaces. The related coefficient is a property indicating the ability to conduct heat across interfaces.

Two samples were used by the team. The first sample consisted of a thin layer of GaN (~700 nm) bound on a commercial single-crystal diamond substrate (grown by CVD) with a Si interlayer of ~10 nm thickness. The other sample had a GaN of ~1.88-μm thickness bonded on a commercial single-crystal diamond substrate grown by a high-pressure high-temperature method (HPHT). The thickness of GaN is polished to be thin enough for TDTR measurements (Figures 1 and 2).

With the following sample structures, the thermal conductivity of the individual crystalline diamond substrates on the GaN-free area was measured. Then TDTR measurements were performed on the area with the GaN layer to measure the TBC of the GaN-diamond structure.

“The measured thermal conductivity of the diamond substrates was used as a known parameter in the adaptation of the TDTR data to extract the TBC when measuring above the GaN layer. Overall, there are three unknown parameters: Al-GaN TBC, GaN thermal conductivity, and GaN-diamond TBC. TDTR is a technique to measure the thermal properties of both nanostructured and bulk materials. A modulated laser beam heats the surface of the

sample while another delayed beam detects the change in surface temperature through thermoreflectance and captured by a photodetector”, said Zhe Cheng.

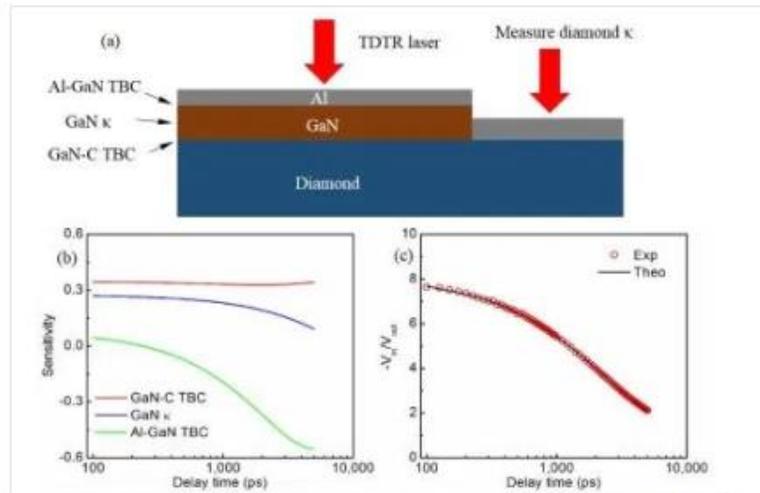


Figure 1: (a) TDTR measurements on the diamond and bonded GaN-diamond samples. (b) TDTR sensitivity of the three unknown parameters. (c) TDTR data fitting of Samp2 with a modulation frequency of 2.2 MHz at room temperature [Source: Scientific Article]

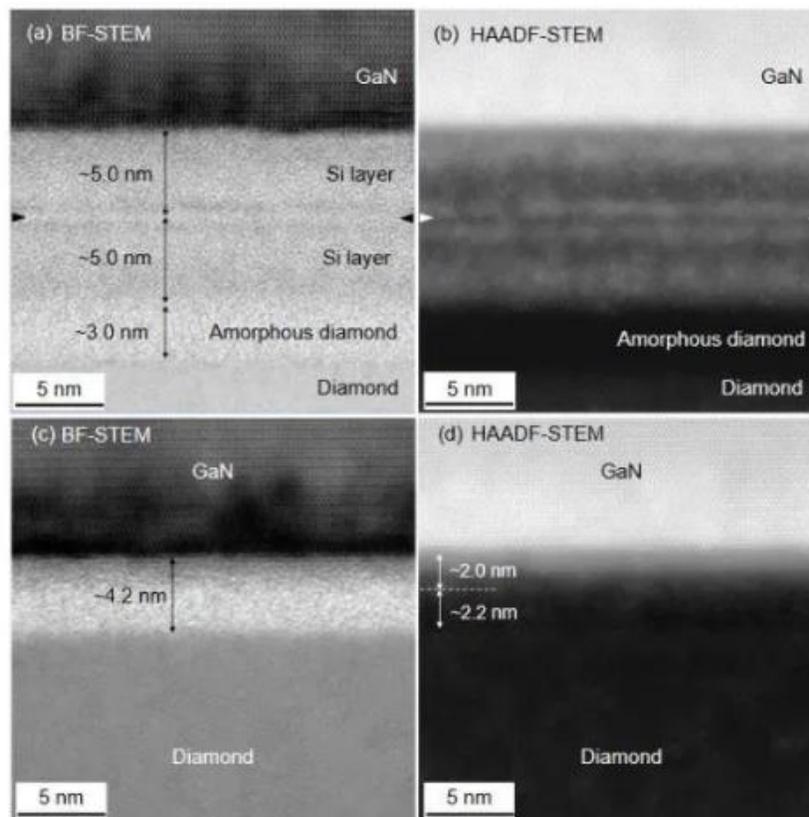


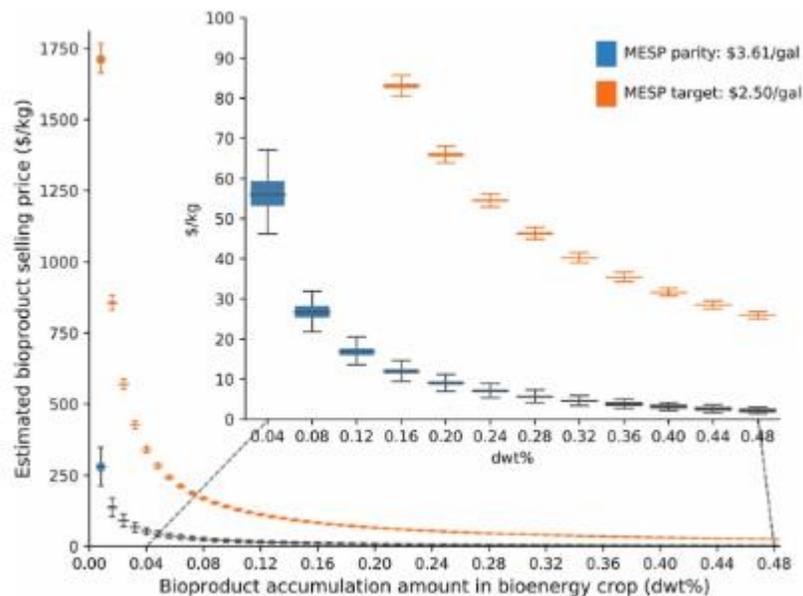
Figure 2: (a-b) Cross-section images of GaN-diamond interfaces of Sample 1. (c-d) Cross-section images of GaN-diamond interfaces of Sample 2. [Source: Scientific Article]

The TBC measurements of GaN-diamond interfaces are among the high values reported in scientific literature and are influenced by the thickness of the interlayer. Due to the disorder and defects of the interfaces, weak temperature dependence of the GaN-diamond has been observed. The modeling of the device shows a relatively large GaN diamond TBC ($>50 \text{ MW/m}^2\text{-K}$). This could allow the high thermal conductivity of the single crystalline diamond to be fully used. The application mainly ranges from defense applications (Radar, satellite communications) to commercial applications (energy infrastructure, automatic cars, and 5G base station).

This research was supported by the DOE Office of Science @ Berkeley Lab

Researchers at the Department of Energy's Lawrence Berkeley National Laboratory (Berkeley Lab) and the Department of Energy's Joint BioEnergy Institute (JBEI), which is managed by Berkeley Lab, have quantified how bioproduct accumulation in plants—i.e., engineering plants to produce valuable chemical compounds, or bioproducts, as they grow—affects biofuel selling prices.

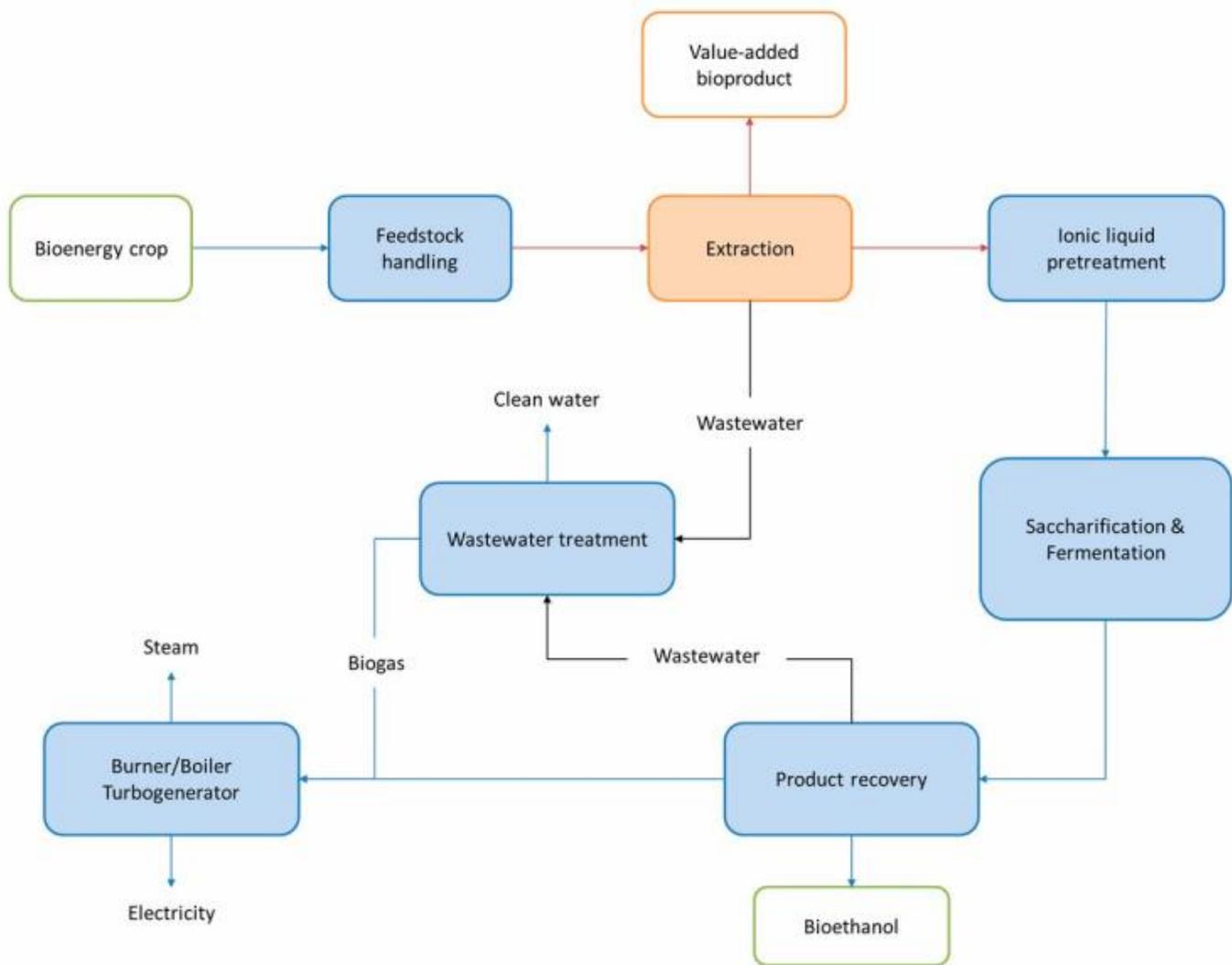
Their open-access study, jointly led by Corinne Scown and Patrick Shih, was published recently in the Proceedings of the National Academy of Sciences. In the study, they present the range of bioproduct selling prices and accumulation rates needed to compensate for additional extraction steps and reach a target \$2.50/gallon minimum biofuel selling price.



Minimum required selling price ranges for bioproducts (\$/kg) under different in planta accumulation amount (dry basis) in order to reach the MESP parity (\$3.61/gal) and targeted selling price of ethanol (\$2.50/gal). The Inset shows the estimated bioproduct selling price of less than \$100/kg. Yang et al.

The researchers first gathered information on a group of well-studied bioproducts that plants can already effectively produce—ranging from flavors and fragrances to biodegradable plastic. Making a valuable bioproduct would help offset the cost of making biofuels and make the whole process cheaper.

They then designed and simulated what it would take to extract these bioproducts from plant material in the context of an ethanol biorefinery. In this setting, valuable bioproducts would be extracted from the plant, while the remaining plant material would be converted into ethanol.



A schematic of bioethanol production process with the value-added bioproduct and the integrated one-pot high gravity ionic liquid-based pretreatment process. Biomass sorghum is used as a representative bioenergy crop. In this study, the selected value-added bioproducts are limonene, artemisinin, PHB, latex, and cannabidiol. Yang et al.

The results showed that the amount plants need to make is actually quite feasible. For example, they calculated that when accumulated at 0.6% of the biomass dry weight, a compound such as limonene would offer net economic benefits to biorefineries. In other words, for 10 dry metric tons of sorghum biomass from an acre of land, they need to recover only around 130 pounds of limonene from that biomass.

The researchers in our Feedstocks Division were surprised by how modest the target levels were. The levels we need to accumulate in plants to offset the cost of bioproduct recovery and drive down the price of biofuels are well within reach.

—Corinne Scown

The results show that this strategy for reducing the cost of biofuels is feasible; but also that the market for each high-value product is limited in size. The analysis suggests that just five commercial-scale biorefineries could support

the entire projected 2025 market demand for limonene. Scown said crops need to be engineered to produce a broad range of products to make sure the industry is diversified and the market is not flooded for any one product.

Resources

- Minliang Yang, Nawa Raj Baral, Blake A. Simmons, Jenny C. Mortimer, Patrick M. Shih, Corinne D. Scown (2020) “Accumulation of high-value bioproducts in planta can improve the economics of advanced biofuels” *Proceedings of the National Academy of Sciences* doi: [10.1073/pnas.2000053117](https://doi.org/10.1073/pnas.2000053117)

How Facebook became “the most Chinese company In Silicon Valley”

In this excerpt from Alex Kantrowitz’s new book, “Always Day One,” he describes how Facebook’s Mark Zuckerberg responded to the threat posed by Snapchat.

By Alex Kantrowitz



Mark Zuckerberg (left) and **Evan Spiegel** (right). [Photo: Anthony Quintano/Wikimedia Commons (Zuckerberg); Flickr user JD Lasica (Spiegel)]

At around the same time Facebook was working out its News Feed issues, an upstart messaging app called Snapchat — led by the brash Stanford graduate Evan Spiegel — built a feature called Stories, which let people share photos and videos with friends that disappeared in a day. Snapchat’s users loved how Stories gave them a carefree way to post (in contrast with Facebook, where your posts would go to everyone and stick around forever) and the app’s usage exploded. Spiegel, who once spurned a \$3 billion acquisition offer from Zuckerberg, was now hitting him where it hurt. In the zero-sum game of social media, where time spent on one platform is time not spent on another, Spiegel had the energy, the sharing, and was driving his company toward a hot IPO.

As Snapchat took off, an 18-year-old developer named Michael Sayman joined Facebook. Sayman had built a game that caught Zuckerberg’s eye, and the company hired him as a full-time engineer in 2015. Sitting through orientation, Sayman heard speeches about how Facebook’s leaders would listen to anyone’s ideas, and took the message to heart. “I believed it,” he told me. Before orientation was over, he spun up a presentation about how teens, already drifting to Snapchat, were using technology, and how Facebook might want to build for them.

Still barely old enough to buy a lottery ticket, Sayman started presenting his ideas to Facebook’s executives and soon found himself in front of Zuckerberg. His presentation didn’t initially impress. But Chris Cox, then Facebook’s

head of product, convinced Zuckerberg to give him a small team to experiment. “There was no blueprint,” Sayman told me. “I had a few ideas, people thought that they should let me be creative, they gave me the headcount to be creative, and there was no problem.”

As time went on, Sayman watched his fellow teens sharing less on Facebook’s family of apps, and more on Snapchat. He turned his focus to Snapchat Stories, which he believed Facebook should build into its products. “I wanted the company to feel like Snapchat was an existential threat,” he said. “I wanted Facebook to panic.”



Alex Kantrowitz [Photo: courtesy of David Fitzgerald/Web Summit via Sportsfile]

Sayman brought his concerns to Zuckerberg, who had heard from others who came to similar conclusions. As a teenager, Sayman was invaluable. He could help Zuckerberg learn Snapchat’s culture. “He would point us to — Here’s the media that I follow, or here are the people I think are influential, who are cool,” Zuckerberg said. “I’d go follow those people, or talk to them, have them come in. That ends up being the iterative process of learning what matters.”

Zuckerberg said he followed these tastemakers on Instagram, but confirmed he’s a Snapchat user too. “I try to use all the stuff,” he told me. “If you want to learn, there are so many lessons out there where people will tell you about things you’re not doing as well as you could. People tell you so much if you just care about understanding what they’re looking for.”

This sort of experimentation has led Zuckerberg to some unexpected places. “When we were originally thinking about formally building a dating service for Facebook, I signed up for all the dating services,” he told me. “I was showing Priscilla (his wife) one of the apps. It was an app where you got matched with one person a day. I was like, ‘Here’s this app.’ And she said, ‘Hey, I’m having dinner with her tomorrow night!’” He matched with his wife’s friend. No word on how that dinner went.

Sayman confirmed Zuckerberg was a willing Snapchat student. “He’d send snaps with me and I would critique him on his snaps,” Sayman said. “I’d be like ‘No, Mark. That’s not how this works!’”

Eventually, the groundswell of support for Stories inside Facebook — generated by Sayman and others — got through to Zuckerberg. And in August 2016, Facebook’s executives called reporters into their offices to reveal a new product they called Instagram Stories. The product was a carbon copy of Snapchat Stories, lifting everything including the name.”They deserve all the credit,” then-Instagram CEO Kevin Systrom told TechCrunch, nodding to Spiegel and his team.

Copying Stories was ruthless. It slowed Snapchat’s growth considerably, and likely destroyed billions of dollars of value in its parent company, Snap Inc., which is trading below its IPO price as of this writing. Snap, frustrated and weakened, is now speaking with FTC’s antitrust investigators about Facebook’s anti-competitive tactics, relying on a dossier it’s built up called “Project Voldemort,” a reference to the villain in Harry Potter.

Evil villain or not, Facebook would’ve been in serious trouble without Stories, which has helped it recapture the friends and family sharing it was losing a few years ago, and restore the vibrancy to its app. Facebook is still losing teen users in the US by about 3% each year, according to eMarketer. But without Stories, and a renewed focus on messaging (another form of intimate sharing), it could’ve been in a much worse position. Copying was a move of self-preservation.

Sayman credited Facebook’s ability to stay relevant with an internal awareness of its place in the world. “Facebook is just an internet app. Especially in 2015 and 2016, it was just an internet app. Any other app could come

about and beat it,” he said. “Mark was like, What do people want? Let’s just give it to them. He was a bit more cautious. He was more vigilant. He was definitely not thinking his product was eternal.”

In China, where copying and iterating on products has long been the norm, Facebook is known as “the most Chinese company in Silicon Valley,” according to Chinese venture capitalist Kai-Fu Lee, who wrote about this in his book, *AI Superpowers*. I sat down with Lee on one of his periodic visits to the Bay Area, and asked him to share his feelings about Zuckerberg. “Why do we stigmatize copying?” Lee said. “Don’t we learn everything from copying first? Don’t we learn music by copying Mozart and Beethoven? Don’t we learn art by copying whichever style that is taught? Through copying, you understand the essence of what you’re building, then you can innovate and build. It would seem copying is a reasonable way to get started.”

From the moment Facebook copied Stories, it’s iterated on it and improved it. And now, its version is widely considered better than Snapchat’s. Some of Facebook’s improvements have been so good that Snapchat has even copied them back.

The graveyard of dead social networks is littered with the corpses of companies that were once unstoppable but were ultimately done in by pride or an inability to invent. MySpace, Livejournal, Foursquare, Friendster, and Tumblr are among them. Facebook, meanwhile, has reinvented repeatedly and remains on top, in large part due to its feedback culture.

“Obviously, we’d rather be genius and invent first,” Lee told me. “But if you can’t, then copy first and then iterate.”

By Eliza Haverstock

The coronavirus outbreak has already caused a slowdown in mergers and acquisitions, and the unprecedented nature of the global crisis means executives don't know how long the calamity will last—or how bad it will get.

For now, many dealmakers are forgoing transformational mega-deals in favor of smaller, discounted acquisitions. They're also focused on liquidity, shoring up balance sheets and tapping credit lines to make sure they're prepared for whatever comes next.

"Cash right now is king, so that's paramount," said Bill Casey, an executive at Ernst & Young who worked on the consulting giant's survey of more than 2,900 global executives. "But once companies get beyond that, the next step is really ... scenario planning and preparing for the recovery."

The survey, which was published last week, found that 73% of respondents expect the COVID-19 outbreak to severely undermine the economy, a major shift from last quarter's survey, when 54% of executives didn't expect any sort of economic downturn in the near- to mid-term. Of course, few could have anticipated a global pandemic.

The survey showed marked uncertainty about when the market will recover. Some 54% of respondents anticipate a more gradual recovery on a U-shaped curve after a longer slowdown that will extend into 2021. Another 38% expect a quicker, V-shaped recovery, with economic activity returning to normal in 2020.

For M&A, that recovery hinges on the return of workers to their offices and other usual employment locations.

"I think there will be a tremendous uptick in the level of deal activity," Casey said.

With that in mind, about 56% of executives surveyed are actively planning to pursue acquisitions in the next 12 months, an increase from October's figure of 52%. With companies selling for less than they typically would, some brave buyers plan to forge ahead in this market. Private equity firms are particularly well-positioned to scoop up companies at lower valuations now: US firms boasted a war chest of about \$1.25 trillion as of June 30, according to PitchBook data.

Corporate resilience will be a key metric for evaluating future targets. Companies that were overly reliant on outsourcing or supply chains tied to certain regions may re-evaluate associated risks. This will in turn trigger future transactions to patch up these vulnerabilities, Casey said.

There's consensus that the pandemic's impact will be palpable. Just 5% of surveyed executives expected no hits to their profitability and margins. Some 56% of respondents expect a minor impact, and 39% expect a severe one.

Certain industries are better positioned for resiliency, like those with robust digital markets. Survey respondents ranked media, utilities and real estate as least likely to face difficulties during the outbreak. On the flip side, sectors like oil & gas, automotive, manufacturing, travel and leisure, food service and brick-and-mortar retail face the greatest challenges during this time—and some companies here will likely consolidate as a result, Casey said.

But for those companies that can weather this storm, M&A will present an attractive route to transform business models for a new reality where digital and physical life are synonymous and remote-work arrangements will no longer carry the same hesitations. Whenever the uncertainty ends, dealmakers may want to make up for lost time.

"Ultimately, companies are going to have to reimagine their business," Casey said. "The world will be changed fundamentally as a result of this, and that will lead to more transactions."

By Tom Dotan and Jessica Toonkel

The severity of the pandemic-caused ad market slump is becoming clearer. The immediate impact is particularly sharp for digital media, where some executives report declines of as much as 50% in ad bookings. But analysts also predict that big companies like Alphabet, Facebook and Twitter will be hurt—and that they could feel the damage for several years.

Ad platforms like Facebook and Google will lose \$50 billion in ad revenue cumulatively over the next four years in the U.S. from small and medium-size businesses going out of business as a result of the pandemic lockdowns, estimates Standard Media Index, which tracks advertising trends. That amount translates to about 10% of the two giants' combined U.S. annual ad revenues. It's going to take years for the ad market to recover, said James Fennessey, CEO of Standard Media Index.

Smaller social networks like Snap, Twitter, Pinterest and ByteDance's TikTok are likely to be even harder hit, ad executives say. As marketers reduce their resources, they're likely to concentrate their efforts on the biggest platforms, said Fabian Seelbach, chief marketing officer of Curology, on a subscriber call for the Information on Tuesday.

Already, advertiser pullbacks in major categories like travel and retail have contributed to digital ad prices tumbling 20% to 30% over the past month, according to executives who've been advertising on the sites, as well as analytics firms. The severity of the decline is likely to be particularly apparent in the second quarter, more than the first quarter, because the pandemic's freeze-up of the economy only hit late in the first quarter. SMI expects advertising to drop 5% on social platforms this year and 9% on paid search.

Pinterest on Tuesday put out a statement saying it "began to see a sharp deceleration" in revenue in the middle of March, adding that before that the quarter was in line with its expectations.

The massive cuts have already sparked layoffs and pay cuts across digital media firms and newspapers. Some parts of the digital ad industry may never recover—such as the use of automated auctions to sell ad space on the open web, which accounts for 30% of all online advertising, said Aaron Goldman, chief marketing officer at ad analytics company 4C. That could further hurt the digital arms of newspapers that sell their ad space through these auctions. The turmoil will hit some companies harder than others and create opportunities for those marketers that are still spending money. Here's how things break down.

Losers, ranked in order of impact:

- The biggest losers include ad-dependent online publications such as BuzzFeed, Vox and Bustle Digital Group. Large portions of their revenue come from retail, entertainment and travel, areas where advertising is at a standstill. An executive at one digital media firm said half of the company's second-quarter advertising deals had been canceled in the past few weeks.
- News sites are suffering doubly because many advertisers are loath to appear next to coronavirus-related stories. Last month, The New York Times said it expected digital ad revenue to decline 10% in the first quarter, while overall ad revenue would likely drop by a percentage rate in the mid-teens.
- Twitter looks to be one of the worst hit because it is heavily exposed to marketers trying to gin up excitement around an event, such as a concert or a product launch. At Havas, a large ad agency, some advertiser clients have pulled back from Twitter because they used it to promote live events or sports, which aren't happening now, said Jessica Richards, global head of social at Havas Media Group. Mark Mahaney, an

analyst with RBC Capital Markets, projects that Twitter's second-quarter revenues will drop 27% from the same period a year earlier.

- Snap also could suffer badly. While its advertiser base is more diverse than Twitter's—a point that Snap CEO Evan Spiegel made at a recent staff meeting—the company still isn't profitable. It doesn't have the deep pockets of Google or Facebook to tide it over if it experiences a severe drop in revenue lasting a year or two. Jason Kanefsky, chief investment officer at Havas, notes another weakness: advertisers are focused on reaching people aged 25 to 55, not the teens that dominate Snap's user base. And as an experimental media format, it is vulnerable to quick cuts in spending.
- Pinterest, a smaller platform is also exposed to advertisers focusing on bigger services. Pinterest said on Tuesday that its exposure to “some of the most affected segments like travel, automotive and restaurants has not been significant.” It also forecast that first quarter revenue would be between \$269 million and \$272 million, still up significantly from the year-earlier period of \$201.9 million. But the second quarter is when the full impact of the ad slump will be felt.
- Google could see an unprecedented decline in revenue. Advertisers paying for search ads cut their spending by 20% in the last week of March compared to the last week of February, according to Mark Irvine, director of strategic partnerships at ad analytics service Wordstream. Google is heavily dependent on travel firms, which make up 10% to 15% of its ad revenue, estimates Mahaney. He projects that Google's revenue will drop 4% in the second quarter.
- Facebook may fare relatively better but still suffer. It relies heavily on small business advertisers, which are hard hit by the downturn. The rate that Facebook charges for each click on an ad dropped 30% during the month, estimates a research firm, Socialbakers. Still, Mahaney says Facebook may not be quite as badly hit as Google because it isn't as exposed to travel. He currently expects Facebook's second-quarter revenues to be up 4%—a markedly slower growth rate than last year's 28% growth in the same period.

Winners:

Lower ad prices are good news for those advertisers looking to promote their services. These include:

- Mobile gaming firms that sell ads prompting people to install their apps. “I've never seen anything where advertising got this much more attractive in this short a time,” said one mobile gaming executive. The executive said that the drop in prices follows several years of rising prices, driven by competition among advertisers to reach potential customers. Prices have now fallen back to where things were four or five years ago.
- Direct-to-consumer online retailers depend heavily on social media sites to find new customers. The lower ad rates have been a boon to these businesses, as they now can spend less to reach the same number of customers.

Will Ferguson, head of marketing at Bark, says he's seen the ad rates on Facebook and Instagram drop around 15% to 30% in the past few weeks. The company, which sends customers a monthly box of dog toys, is a major spender on these apps, in the tens of millions every year. The effectiveness of its ads has been up in the past few weeks, a trend he attributes in part to the ability to reach more customers for less money.

Ferguson also says other aspects of the crisis have helped boost business. Dog owners, especially in New York, have been buying more dog toys to entertain their pets while they remained holed up in their apartments. And many people who previously were dogless decided to adopt for some companionship at home.

By Romain Dillet

Public markets around the world have been tanking for the past few weeks, and many companies simply can't operate during a lockdown. Sheltering in place has had some terrible economic consequences, with a record number of Americans getting laid off, including many startup employees.

But what is happening in Europe? You might also be wondering whether European tech startups have to lay off a significant chunk of their workforce and whether financial capital has become scarce.



That's why I interviewed Jean de La Rochebrochard, a partner for Kima Ventures, backed by French telco and media entrepreneur Xavier Niel. They focus on seed and Series A investments and invest in dozens of startups each year. He oversees hundreds of startup investments at any given time, which means he has his finger on the pulse of the tech ecosystem in France and across Europe.

The interview was translated from French and edited for clarity and brevity.

TechCrunch: At [Kima Ventures](#), have you seen any change when it comes to investment pace?

Jean de La Rochebrochard: There has been a big change at the deal-flow level. But we already committed to some deals before the lockdown. We're currently closing all the deals that we were looking at. Over the past 15 days, we've closed 15 deals, I think.

So it might slow down in the next 15 or 30 days...

Yes, it's going to slow down, that's for sure. But we'll only know for sure in a month when we're done with our backlog.

How do you explain that your deal flow has slowed down? Do entrepreneurs censor themselves?

That's exactly what's happening. Our attention has shifted from inbound deal flow to portfolio management. Before, we would spend a quarter to a third of our time on our portfolio, and two-thirds to three-quarters on deal flow. Now, it's the exact opposite. We're going to allocate a quarter to a third on deal flow and the rest on our portfolio.

The cognitive bandwidth of investors on deal flow has shrunk. Entrepreneurs realize that. Instead of getting turned down abruptly, entrepreneurs who can wait a few weeks... They're smart.

Entrepreneurs who contact me today, I see that they don't understand the current situation. They seriously lack self-awareness.

In your portfolio specifically, do you face unprecedented situations?

We have decided to sort our startups in four quartiles. In the top two quartiles, companies are doing fairly well. In the last two quartiles, they're doing so-so.

In the top quartile, we have companies that were doing well before the crisis and that have cash reserves. They're

going to manage the situation in the most responsible way possible to get through winter. I'm not telling you that we're not worried for them, but we just check that they're addressing the situation.

In the second quartile, you can find companies that have a solid pre-crisis foundation. This foundation is still true but they were at the end of a financial cycle. They don't have enough cash to get through this year. How are they going to raise money? That's the issue. We're trying to see if they can raise a bridge round in order to have enough cash so that they can start fundraising during the summer or fall 2021.

For example, we have a portfolio company that was about to raise a €30 million round. The lead investor dropped them two days before closing the round. That company managed to raise one-third less at a valuation one-third lower. The deal was done really quickly because it has a strong foundation, the company is doing well. But that's the market right now. Companies are going to raise one-third less or even 50% less compared to what they were supposed to raise before COVID-19 — and the valuation is cut in half.

You'd say that the difference between the first and second quartile is the amount of cash in the bank account?

Absolutely, that's the only difference.

In the third quartile, you'll find companies that don't have an insane growth rate. Some parts of their business model are still shaky and they don't have a lot of cash. Those companies seriously have to trim down their expenses — quite drastically. Investors won't necessarily spend a lot of time looking at them to inject cash in those companies. Those companies will suffer. And then companies in the fourth quartile are companies that are going to shut down.

Companies in the fourth quartile would have gone bankrupt anyway?

Probably. Those entrepreneurs haven't found a product-market fit or didn't grow as fast as expected. Or they didn't execute as well as expected.

When you talk about trimming down for the third quartile, what does it mean?

Fifty percent — 50% staff reduction, even though those companies were only burning hundreds of thousands per month when they were investing hard. Those companies are going to scale down to burning €50,000 to €100,000 per month. They're going to stay afloat as long as possible.

So you predict layoffs at French startups...

Yes, that's for sure. But I know plenty of companies that are doing well but couldn't recruit talent. There was a talent shortage and there's going to be talent on the market, so that's good. When you lay off 100 people, you're not going to see 100 people looking for a job — half or two-thirds are going to be hired quite quickly.

By other tech startups or tech giants?

Both.

Will some industries be affected more than others when it comes to cash burn and liquidity?

It's a good question — I don't know. Just look at Lime right now [Lime's valuation is [reportedly down 80%](#)]. Business models like Lime, Deliveroo and Uber are only focused on pure growth. When there's a crisis, unit economics don't work anymore.

But marketplaces could more easily scale back...

Maybe. This crisis could be an opportunity for some companies that had raised a lot of money. They could use this opportunity to go back to their core business because they were doing crazy stuff.

What are you thinking about, at the marketing level, because of the size of the teams?

At the global expansion level. I think those companies are going to scale back to their core geographies and core market.

What do you think of France's support plan for startups?

Some people criticize it, but I think France's public investment bank is supposed to be a supermarket. They're not supposed to tell you: "You get in, you don't." As long as you fit the bill, you get in every time. And that's really good for companies that can take advantage of those aids.

All our companies are going to take advantage of the plan. The issue with the European ecosystem is that it's still booming and it hasn't reached maturity. We don't have very, very big companies so it's much easier to die than to survive in that ecosystem. If you let companies shut down too quickly before they become big companies, it becomes "Resident Evil" and it's ugly.

If we look at VC firms, do you think some firms are going to report terrible returns and won't be able to raise another fund?

Firms that were in the process of raising a new fund are going to suffer. As for others, funds that still have enough cash for the next two or three years, they're going to slow down and are going to wait so that valuations go up again because unrealized gains have taken a serious hit.

Ten percent of VC funds generate 90% of returns. The power law is true for entrepreneurs — but it's true for VCs too. The only thing that I know for sure is that everybody has a shot when market conditions are good. When things get more difficult, only those who know how to adapt have a chance at succeeding. It's true for entrepreneurs and VCs.

How long do you think the crisis is going to last before things go back to normal?

I think recovery starts in September, things go back to normal around the holidays. That is, if we manage to find a solution to the health crisis. I'm quite optimistic, but I think growth, valuation and round sizes will go up again in Q3 or Q4 2021.

The U.S. is getting crushed and that would suck if they can bounce back more quickly than [Europe]. We saw it with the last crisis — the U.S. got crushed and bounced back immediately.

When you say the U.S. is getting crushed, are you talking about layoffs?

Yes, it's extremely violent. Europeans put a lot of money on their savings accounts while Americans have a lot of debt. I'm concerned that the health crisis is going to trigger a bigger crisis at this level. I hope it's not going to get out of control because we need Americans.

Even before COVID-19 thrust AI into the spotlight, the technology was gaining widespread adoption in the most surprising places.

By Brian Peccarelli

Just about four years ago, I wrote an article for CFO entitled “**The Robo-Accountants Are Coming,**” which was meant to calm the hysteria that was rapidly building over the role of artificial intelligence (AI) in professional services. At the time, we knew that AI would soon be infiltrating the audit functions of major accounting firms. We knew it would have a significant impact on business. But it was still hard to separate the hype from reality.

Would the technology replace humans as the fear mongers warned? Would it fail spectacularly as the curmudgeons admonished? Or would AI emerge as just another efficiency tool that we had come to rely on to keep pace with a world in which everything keeps moving faster than it did the day before?

That answer has revealed itself over a series of recent events that make it clear that AI has officially gone mainstream. The most prominent of these, of course, is the **prominent role that AI solutions are playing** in the fight against the COVID-19 pandemic. AI solutions are tracking the virus’ spread, identifying trends that could speed the development of treatments, and even determining the likelihood that patients will develop severe symptoms.

Even before COVID-19 thrust AI into the spotlight, the technology was gaining widespread adoption in the most surprising places. In January, *The Wall Street Journal* **reported** that the Internal Revenue Service (IRS) was busy working on AI-driven auditing and transaction analysis tools and that it was already using AI in its criminal investigations unit to identify non-filers. Yes, the IRS, the government bureaucracy more commonly associated with decades-old green screen technology than state-of-the-art AI-powered software, now makes AI part of its core tech lineup.

The IRS is not alone among global tax authorities. Brazil, Canada, and several other countries are already using AI in everything from enforcement to customer service functions. It is safe to say that AI has now officially gone mainstream.

In the span of just a few years, the technology that spawned so much speculation and starry-eyed hyperbole has been fully integrated into the healthcare, tax, and accounting toolboxes. And, contrary to what the alarmists feared, we’re all still here to talk about it.

While governments ramp up their AI efforts, corporations and accounting firms already have many years of tech development and implementation under their belts. AI has automated large pieces of the audit process for the Big Four by ingesting large amounts of data and scouring it for anomalies and flagging issues that require further investigation.

The technology is being used in the tax research process to surface information faster and support natural language searches.



I recently had a conversation about this very topic with Mark Goodburn, global head of advisory at KPMG, whose firm has been a leader in the implementation of AI technologies into tax and audit. He explained how the growth of AI has manifested itself.

“If you had asked us three or four years ago, ‘where are you going with technology and how will it affect our people?’ the answer might not have been so clear. But the fact is, we use more technology than we ever have. And we have more people today than we ever had in the history of the firm. And I can say the same thing three years from now, five years from now,” Goodburn explained.

He then went on to describe precisely how AI is being developed to augment — not eliminate — human functions.

“As technology takes out some of the standardized steps that exist at the beginning of the process — the repetitive data gathering and review-type steps — we can then use our time to focus on the judgment that you can make from insights in the data.”

He added: “The technology and the increase in talent are going to go hand in hand.”

So that brings us to the big question: If AI, which was pitched as a massive disruptor, has already become such a mainstream part of the routine operation of tax professionals, what’s next?

The short answer is that we need to disrupt ourselves to find out. The expansion of technology that has swept through the professional services sector over the last several years shows no sign of slowing. But contrary to the doomsday forecasts, it’s not reducing the need for people; it’s increasing it. It’s also elevating the level of skill and sophistication those people will need to stay competitive.

As technology becomes more sophisticated, it is also delivering new insights, new ways to think about compliance and enforcement, and much faster results that go into the human decision-making process. We have more, higher quality information to work with. As a result, we need to evolve the way we process that information and make strategic decisions.

That’s the next disruption. Now that we have powerful AI technologies augmenting our capabilities, we need to learn to maximize that power. It’s like when Iron Man tries on his **suit for the first time**. He is so intoxicated by his new-found superpowers that he flies out of the Earth’s atmosphere, freezes the suit, and plummets back to Earth.

Now’s the time when we need to stretch our minds and throw away old notions about what was possible and what wasn’t as we train ourselves to harness the technology to its fullest potential.

The current business response to the COVID-19 crisis has only underscored that fact. A few years ago, the idea of shifting global workforces to work-from-home operations would have been impossible. Today, thanks to the last several years of cloud-based technology adoption and growth of remote working tools, the transition has been rolled out globally. We will get through this crisis, but there will always be new challenges ahead. The magic formula for getting through those challenges is flexibility and constant adaptation.

New Indoor Drone Uses UVC Lights for Disinfection of Essential Businesses

Sourced by Digital Aerolus



Digital Aerolus - a global leader in autonomous technology for any vehicle that flies, drives, dives or swims - has developed the first indoor drone with germicidal C-band ultraviolet (UVC) emitters at 265nm, creating a remote and mobile disinfection method for essential businesses.

The Aertos 120-UVC combines industrial drone technology with powerful UVC emitters, allowing essential businesses to rapidly deploy disinfection tactics remotely, without putting humans at risk.

Digital Aerolus' industrial drones do not require GPS or external sensors to fly indoors, enabling drones to operate stably in places other drones cannot go, including small and confined spaces.

The company pivoted over the past few weeks to launch a new drone with UVC LED emitters, as a tool to mitigate the spread of pathogens for people working at essential businesses. The Aertos 120-UVC can be used for disinfection in critical places, including:

- Healthcare facilities - patient rooms, hospital rooms, and waiting areas
- Grocery stores - checkout spaces
- Airplanes and Public Transit – seats and exposed surfaces
- Business common areas - restrooms, workrooms, breakroom surface areas
- Warehouses and product areas – work surfaces, product handling and storing areas

UVC disinfection is well-understood and has been used for decades to keep pathogens out of our drinking water and off surfaces. But generally, UVC sources are large, cost-prohibitive or impractical to deploy. UVC energy cannot be directly used around humans, given that these same killing attributes of this energy also damage human DNA. The new Aertos 120-UVC from Digital Aerolus allows more organizations to deploy UVC disinfecting tactics quickly.

Digital Aerolus is co-founded by [Jeff Alholm](#), a leader in the development of the first smartphone, the Newton-based Seahorse; millimeter-wave imaging technology; the 802.11 Wi-Fi standard; the pulse oximeter; and the capnograph.

“As this global crisis has unfolded, we’ve been committed to developing an innovative and accessible solution to wage war against COVID-19 and mitigate the risk to humans worldwide,” said Alholm.

“Like many others, we are innovating to combat this horrible virus, and we’re focused on how we can use our unique technology to deliver pathogen-killing energy in challenging environments. Using UVC energy to disinfect isn’t new, but our delivery method is. The method matters, because it helps to keep people safe amid a pandemic.”

The Aertos 120-UVC will be available in volume in May through Digital Aerolus partners and resellers including [CDW](#). Learn more about the [Aertos](#)

Overview

Digital Aerolus, a spinoff of Caltech's Planetary Science Group, designs and develops an unmanned aerial vehicle for commercial and industrial purposes. It offers Aertos120 that features ducted fans and has an endurance of up to 11-15 minutes. The company also develops a proprietary flight control and operating system called Folded Geometry Code which is built on flight mathematics used in space navigation. The flight controller is integrated with TANGLE, a telemetry system, and DABLE (Digital Aerolus' Behavioral Language and Environment) for ensuring Aertos120 has stable flights and can operate in GPS denied areas as well. Applications are in the areas of reconnaissance and inspection of highways & railroad bridges, boiler or storage tanks, buildings, underground vaults & manholes, warehouse, underground mining, etc.

Sourced by Mathew Arcoleo, OmniVision Technology

One of the most vital areas of development for semi- and fully-autonomous vehicles is driver gaze and eye tracking, but there are several implementation challenges facing designers. First among them is the broadly defined set of features that are needed to qualify an eye-tracking system as ASIL-B certified for Level 3 autonomous vehicles, which has resulted in a wide variety of ASIL features among chip vendors. This is especially true with image sensors, which are critical to the success of key functions like driver-state monitoring.

Obviously, image-sensor functionality is only one consideration when creating an eye-tracking system. The other critical piece is the algorithm that makes use of sensor data. Let's take a closer look at what automotive designers need in order to ensure safe Level 3 operation of driver eye tracking for vision-based driver monitoring systems (DMSes) in autonomous vehicles.

Why Eye Tracking?

Designers cite safety as the top reason for adding eye tracking; carmakers are looking to integrate eye-tracking technology into vehicles because driver drowsiness or inattentiveness can be detected and prevented before accidents occur. Eye tracking also enables driver identification, which can be used to create in-cabin comfort and information systems preference settings that operate without the driver even having to press a button (after initial setup). Most importantly, eye-tracking technology will become essential as we move up the autonomous levels.

Determining the ASIL Rating

The first question that needs to be answered in creating an eye-tracking system is, what ASIL rating is needed to meet current and future requirements? The safety level required for a sensor targeting automotive safety applications determines the features needed in that selected sensor. It's also important to stay on top of trends that may impact future ASIL requirements, since sensors have a long life cycle in the automotive market. For eye tracking, a sensor's application may include more safety-critical functions in the future, so it's likely to require a higher ASIL certification.

Configurability and conformance with ASIL B/C allows the same sensor to be used in multiple applications across a line of automotive products with different technical requirements. Additionally, since development, verification, and maintenance consume such a large portion of automotive costs, a higher safety rating increases ROI while incurring no area or margin penalties.

We at Omnivision think ASIL B/C is the ideal rating for DMSes, because these systems are used both for autonomous driving and as a safety feature. For example, if other systems crash, or other safety features detect critical failure, the DMS must remain functional in order to alert the driver.

Achieving ASIL B/C

To achieve ASIL B/C for a DMS, the system's image sensor must ensure that the image is not corrupted by noise, mirror/flip, row/column defects, or pixel defects. Additionally, the system must include safeguards to ensure the algorithm can trust the image content.

Specifically, the following DMS safety goals must be met:

- The device shall not mirror the whole image or parts of the image in the horizontal or vertical direction.
- The device shall not transfer images with the incorrect size in terms of rows and columns.
- The device shall not send any data that is unprotected by a cyclical redundancy check (CRC) that includes the appropriate hamming distance.

Staying Ahead of the Curve

To stay on top of automotive safety requirements, it's essential to review all the relevant standards and regulations, and to stay abreast of any updates. Additionally, it's important to read the latest research and attend industry events, both to ensure compliance with current requirements and to predict future ones.

If organizations would like a voice in the standards being developed for the cars of tomorrow, we also recommend participating in the working groups that are defining them. For example, OmniVision tracks and contributes to the "ISO 26262 TC 22/SC 32 Working Group 8 – Functional Safety" and the MIPI Camera Working Group with specific focus on functional safety and cybersecurity. In doing so, organizations can apply all of this knowledge by developing and continually refining their own safety requirements.

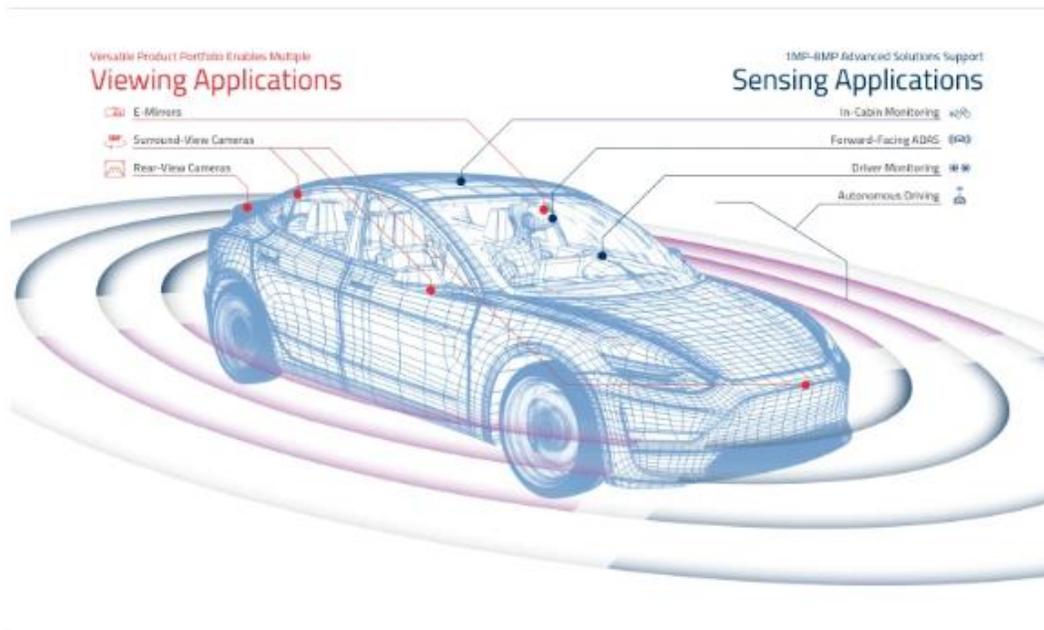


Figure 1: Examples of automotive imaging applications that require an ASIL-B/C rating.

Setting Safety Requirements

For any potential failure of a defined function at the vehicle level, a HARA (hazard and risk analysis) helps to identify the intensity of the risk of harm to people and their property. Once this classification is completed, it assists in identifying the processes and the level of risk reduction needed to achieve a tolerable risk for any automotive system. Safety goal definitions, as required by ASIL, are then set for both hardware and software processes within the automotive design to ensure the highest levels of functional safety.

Two excellent tools that we recommend for developing component and subsystem safety definitions are FMEDA (failure modes, effects, and diagnostic analysis) and FTA (fault tree analysis). These tools allow designers to link all the technical safety requirements to the specific failure modes and effects, and then map them to the appropriate blocks. It's also important to verify that the initial safety requirements are captured before the design of each DMS component or subsystem has a finalized safety plan.

Mathew Arcoleo joined OmniVision Technologies, Inc. in 2019 as a Staff Product Marketing Manager. He is responsible for product marketing and building business successes with key partners in OmniVision's automotive segment. Previously, Arcoleo worked in engineering and product marketing roles at Cypress Semiconductor, Micron, and most recently with SiTime. With more than 25 years' experience in the semiconductor industry, he has held a number of positions in engineering, applications, and marketing. Arcoleo earned a BSEE degree from San Jose State and an MBA from Santa Clara University.



Nuro joins Waymo as the only two companies cleared to test driverless vehicles in California

By Steve Crowe

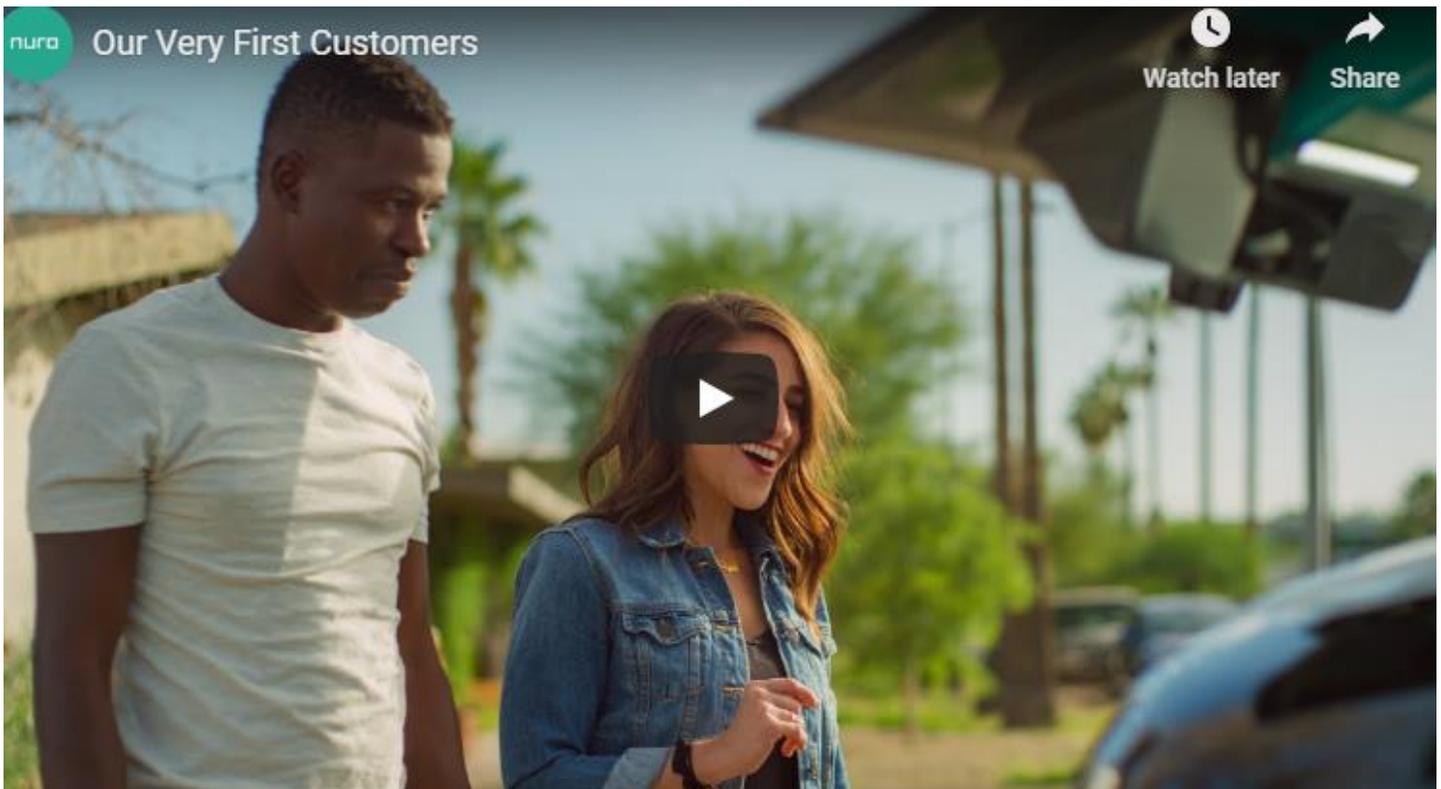
I have three kids under the age of 7. So my wife and I are being extra careful during the **COVID-19 pandemic**. This includes not going to the grocery store. We haven't been in about a month. The store offers a delivery service, thankfully, but wait times are already two weeks out. Who knew grocery delivery was so exciting, but we wave enthusiastically through the window to the delivery driver as our groceries are placed on the front porch.

Next comes the fun (or crazy) part. I then go out and use wipes to sanitize the food packaging before bringing the groceries into the house. Scientific experts have different opinions on whether this is necessary, but we don't know who the delivery driver has been in contact with, so why take the chance?

The novel coronavirus has highlighted the need for contactless delivery services. And autonomous delivery startup **Nuro** (** Chambiz DF 8 Dec 2018*) is one step closer to making that a reality. The Mountain View, Calif.-based company has been granted permission to test its driverless vehicles on the streets of California.

Nuro, which **raised \$940 million from the SoftBank Vision Fund** in 2019, is allowed to test two of its low-speed, electric R2 autonomous vehicles in parts of Santa Clara and San Mateo counties. The permit allows the Nuro R2 vehicles to operate at a maximum speed of 25 MPH, only in fair weather conditions, and on streets with a speed limit of no more than 35 MPH. The permit covers nine cities:

- Atherton
- East Palo Alto
- Los Altos Hills
- Los Altos
- Menlo Park
- Mountain View
- Palo Alto
- Sunnyvale
- Woodside



The permit grants Nuro permission to conduct deliveries from its local retail partners. This won't start right away, however, due to stay-at-home orders issued by California Governor Gavin Newsom. In the meantime, Nuro will engage in logistical planning for its future operations. "Our hope is that residents of neighboring cities and counties will see R2 on the road soon," said Nuro's Chief Legal and Policy Officer David Estrada.

In December 2019, California approved testing of light-duty autonomous delivery vehicles on its public roads. The new rule opens up testing for autonomous vehicles that weigh less than 10,000 pounds. So this includes only Class 1 and 2 vehicles such as passenger cars, mid-sized pickup trucks and cargo vans.

Nuro's Head of Robot Operations, Andrew Clare, is keynoting RoboBusiness 2020. Clare's keynote will explore some of the non-passenger applications of autonomy, discussing robot operations, and how Nuro is tackling the challenges associated with designing vehicles and putting forth a consumer-facing service.

Nuro joins Waymo in exclusive club

Nuro wrote on its blog that this is the "first permit ever granted by the State of California to test a self-driving vehicle on public roads that is not only driverless, but also passengerless."

There are currently 65 companies with an active permit to test autonomous vehicles with a human safety driver in California. Nuro has had permission to test in California with safety drivers since 2017. However, Nuro and Waymo are now the only two companies allowed to operate driverless vehicles on California's public roads.

The Nuro R2 was recently granted an exemption by the U.S. Department of Transportation, allowing it to be tested on public roads without certain features of traditional, passenger-carrying vehicles. It lacks side mirrors, rear visibility, and a windshield that can be seen through, all of which are required in human-driven vehicles, according to the Federal Motor Vehicle Safety Standards. The exemption also permits the Nuro R2 to operate its rearview cameras while moving forward, since the vehicle will never be occupied by a human driver who could be distracted by the rear video display.

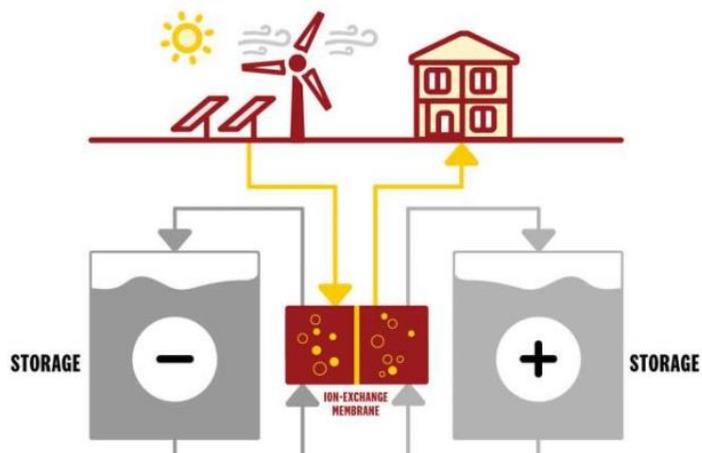
“The safety of the motoring public is the DMV’s top priority, and we do not give out these permits lightly,” DMV Director Steve Gordon said. “Nuro has met the DMV’s requirements to receive this permit to test their driverless delivery vehicles on California’s public roads.”

Nuro was founded in 2016 by Dave Ferguson and Jiajun Zhu, both former Alphabet engineers who worked on the company’s autonomous vehicle efforts, which have since become Waymo. Nuro has already run pilots in Arizona and Texas, conducting deliveries for partners such as Domino’s, Kroger, and Walmart using a fleet of retrofitted Toyota Priuses.

“We have always believed in the transformative power of autonomous vehicles, and in the climate of COVID-19 we understand their potential even more deeply,” said Estrada. “Putting our driverless R2 delivery vehicles on the road in California will be an important first for our company and the self-driving industry. But it is just a glimmer of what is to come.”

By Gary Polakovic, University of Southern California

Battery to Advance Renewable Energy



How the redox flow battery works. Credit: USC

USC scientists have developed a new battery that could solve the electricity storage problem constraining widespread use of renewable energy.

The technology is a new spin on a known design that stores electricity in solutions, sorts the electrons and releases power when it's needed. So-called redox flow batteries have been around awhile, but the USC researchers have built a better version based on

low-cost and readily available materials.

"We have demonstrated an inexpensive, long-life, safe and eco-friendly flow battery attractive for storing the energy from solar and wind energy systems at a mass-scale," said chemistry professor Sri Narayan, lead author for the study and co-director of the Loker Hydrocarbon Research Institute at USC.

Energy storage is a big hurdle for renewable power because power demand doesn't always coincide when wind turbines spin or sunshine hits solar panels. The search for a viable storage solution faces multiple challenges, which is the problem the USC scientists sought to solve.

They focused on the redox flow battery because it's proven technology and has been deployed in limited applications so far. It uses fluids to store electrochemical energy, sorting electrons and recombining by reduction and oxidation, and releasing them to make electricity when its needed.

The key innovation achieved by the USC scientists involves using different fluids: an iron sulfate solution and a type of acid. Iron sulfate is a waste product of the mining industry; it is plentiful and inexpensive. Anthraquinone disulfonic acid (AQDS) is an organic material, already used in some redox flow batteries for its stability, solubility and energy storage potential.

While the two compounds are well known individually, it's the first time they've been combined to prove potential for large-scale energy storage. Tests at the USC lab proved the battery has big advantages over competitors.

For example, iron sulfate is cheap and abundant—a dime buys about 2.2 pounds—while large scale manufacturing of AQDS would cost about \$1.60 per pound. At those prices, material costs for the type of battery developed by the USC scientists would cost \$66 per kilowatt hour; if manufactured at scale, electricity would cost less than half the energy derived from the redox batteries that use vanadium, which is more expensive and toxic.

Also, in tests at USC, the researchers found that the iron-AQDS battery can cycle, or recharge, hundreds of times with virtually no loss of power, unlike competing technologies. Durability for energy storage systems is important for large-scale use.

"The materials developed are highly sustainable," said Surya Prakash, co-author of the study and director of the Loker Institute, who collaborates with Narayan in developing new organic quinones. "AQDS can be manufactured from any carbon-based feedstocks, including carbon dioxide. Iron is an earth-abundant, non-toxic element."

The technology also has advantages over lithium ion battery storage. The proliferation of consumer electronics and electric vehicles, powered by lithium ion batteries, creates scarcity for the element, which drives up costs. In turn, those economics make other, less expensive energy storage options more appealing, the study says. Also, lithium ion batteries don't last as long, due to recharging, as most anyone who's recharged cellphones and laptops know.

"... The iron-AQDS flow battery system presents a good prospect for simultaneously meeting the demanding requirements of cost, durability and scalability for large-scale energy storage," the study says.

Renewable energy use is growing, yet is constrained due to energy storage limitations. Storing just 20% of today's solar and wind energy requires reserve capacity of 700 gigawatt hours. One gigawatt hour is enough electricity for about 700,000 homes for an hour.

Said Narayan: "To date there has been no economically viable, eco-friendly solution to energy storage that can last for 25 years. Lithium-ion batteries do not have the long-life and vanadium-based batteries uses expensive, relatively toxic materials limiting large-scale use. Our system is the answer to this challenge. We foresee these batteries used in residential, commercial and industrial buildings to capture renewable energy."

More information: Bo Yang et al, A Durable, Inexpensive and Scalable Redox Flow Battery Based on Iron Sulfate and Anthraquinone Disulfonic Acid, *Journal of The Electrochemical Society* (2020). DOI: [10.1149/1945-7111/ab84f8](https://doi.org/10.1149/1945-7111/ab84f8)

Universal Robots' ActiNav aims to democratize autonomous bin picking

Source by Universal Robots

Designing for ease of use has long been a mantra of the robotics industry. It is key to getting new industries and companies to adopt automation. And due to the COVID-19 pandemic, ease of use is perhaps more important than ever for robotics companies.

Autonomous bin picking is a common robotics application, but it is rarely, if ever, referred to as “easy to use.” Deploying autonomous bin picking systems usually requires integration and programming efforts customers can’t do themselves.

Universal Robots is hoping to change this with its new ActiNav autonomous bin-picking kit for machine-tending applications. ActiNav is the newest addition to the recently launched UR+ application kits, a series of “plug-and-produce” kits the company said will make it easier to deploy collaborative robots for common applications.

ActiNav requires a UR5e or UR10e cobot, an end effector of the user’s choice, and an application-specific frame or fixture. The kit includes the ActiNav software and autonomous motion module controller, the URcap user interface software, along with a choice of 3D sensors. It can handle vision processing, collision-free motion planning, and autonomous real-time robot control.

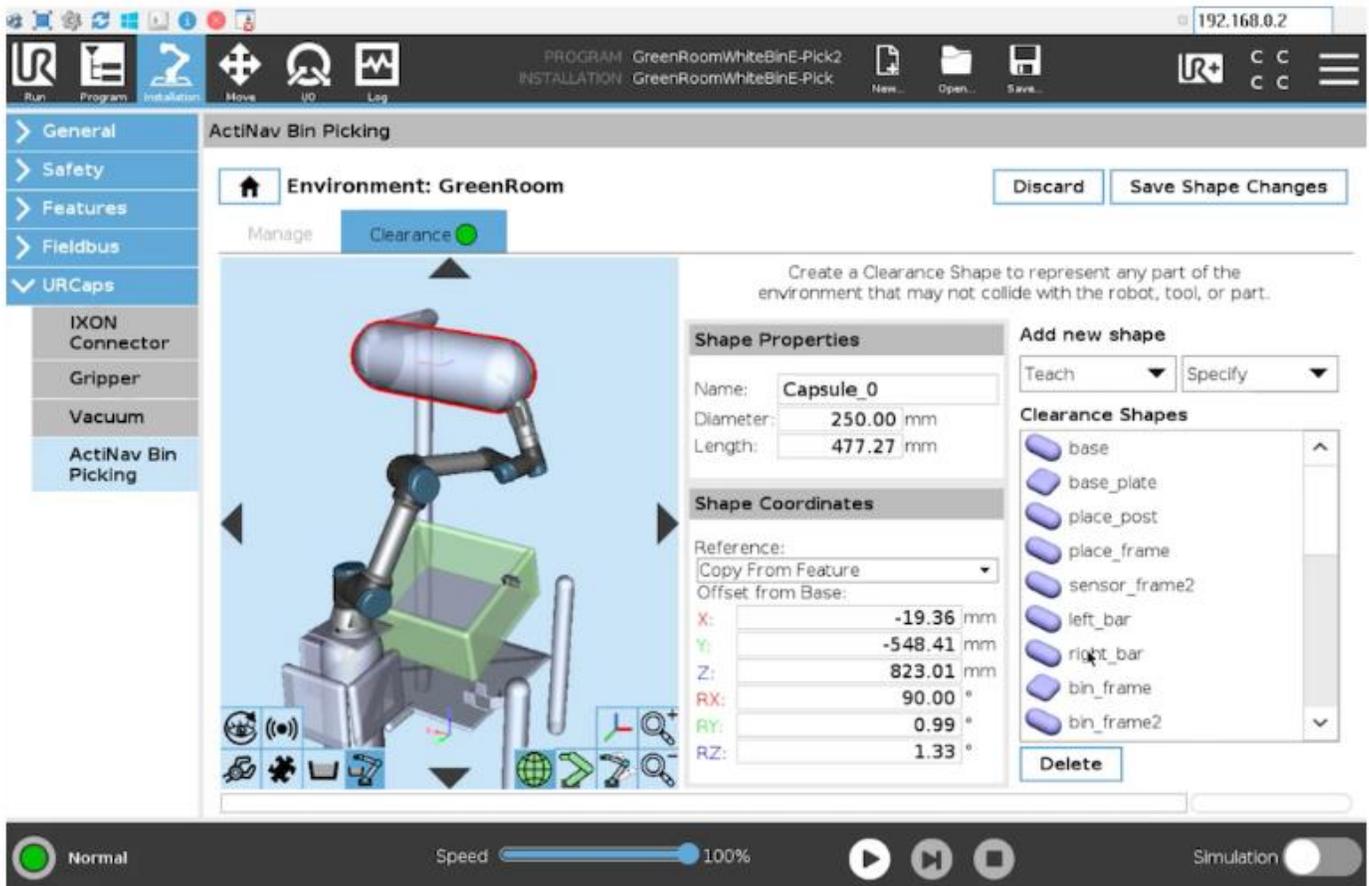


Jim Lawton, vice president of product and applications management at Universal Robots, said the UR5e and UR10e are the “sweet spots” for this application. “ActiNav works on the UR3e and UR16e as well, but large parts typically come in on a conveyor, and you can get away with a feeder and such on smaller parts,” he told The Robot Report.

ActiNav can autonomously insert parts into CNC or processing machines such as drilling, deburring, welding, trimming, or tapping.

ActiNav’s teach-by-demonstration programming

Odense, Denmark-based Universal Robots claimed that ActiNav requires no vision or robotic programming expertise to deploy. It uses a teach-by-demonstration approach via a wizard-guided setup process on the cobot’s teach pendant. The company said this can be done the first time in about two hours, and it generates just six to 12 lines of programming. The video above demonstrates the process, and here are the steps.



ActiNav’s teach-by-demonstration interface. | Credit: Universal Robots

To train ActiNav on the bin, touch the top, bottom, and sides of the bin with the cobot’s end effector. To train the system on a pick, users need to attach the part at the pick point and scan it. To train a place in the environment, move the part to the location it is being placed. ActiNav will remember the part location and orientation. Then hit the play button on the teach pendant, and ActiNav should get to work.

“Anyone who’s used a UR robot before has figured out the teach pendant,” said Lawton. “The wizard is walking you through the steps in the interface you’re used to working with. You won’t need to hire an outside agency to set this up.”

ActiNav taps into Energid’s motion-control expertise

ActiNav actively navigates the robot autonomously into the bin, moving through the environment without collisions and placing parts into a machine. To do this, Universal Robots tapped into the expertise of its sister company, Energid Technologies, which makes the Actin real-time adaptive motion control software. Bedford, Mass.-based

Energid's areas of expertise include bin picking, which it demonstrated at trade shows during the launch of Actin 5 in 2018. Check out this demo from IMTS 2018, for example:



Teradyne Inc., a Reading, Mass.-based developer of automatic test equipment, owns both Energid and Universal Robots. It acquired Energid in 2018 for an undisclosed amount, while Teradyne bought Universal Robots in 2015 for \$285 million. If you've ever wondered about the synergy between the three companies, wonder no more.

Machine tending a massive opportunity

Lawton said machine tending as a category offers more than 20 million opportunities for cobot companies. But tending in a lot of environments, especially if you're picking from a deep bin, can be tough to do.

"Machine tending has always been one of the mainstay applications for our collaborative robot arms," he said. "We discovered a significant market need for a simple solution that enables UR cobots to autonomously locate and pick parts out of deep bins and place them precisely into a machine. This is not pick and drop; this is accurate pick and part-oriented placement."

According to Universal Robots, ActiNav costs about \$100,000, but the ability for quick deployment provides a return on investment in less than 18 months of a two-shift operation. The company also claimed that ActiNav reduces deployment time by three to six weeks when

compared to other autonomous bin-picking systems.

ActiNav expands UR+ application kits

Universal Robots has been testing ActiNav with early access customers since mid-2019, said Lawton. He added that ActiNav mirrors the mantra of the other UR+ application kits: Make it easier for customers to deploy automation and lower their risk.

"We looked at customer's recent applications with cobots and the amount of time involved with each step of deployment," he said. "There was good news and bad news. The good news is the programming has become so easy it represents about 10% of the time to deploy a cobot. The bad news is the other 90% percent of the time is spent on choosing the end effectors and sensors and figuring out if the system actually works."

"Launching these kits takes all of that out of it. We've done all the work," said Lawton. "You're buying this kit with all these parts that work together reliably. Just work your way through ActiNav's setup wizard, and hit Play."

With little water, scorching temperatures, and not much arable land, the UAE currently imports 80% of its food. Can it go local?

By Adele Peters



In an industrial park built off a highway in the arid land between Abu Dhabi and Dubai, a sprawling new indoor farm will soon grow tomatoes under LED lights in a climate-controlled warehouse near a plastic production facility and other factories. The farm, the first in the world to commercially grow tomatoes solely under artificial light, is one part of a push to transform food production in the United Arab Emirates, where 80% of food is

imported. The government realizes that to be resilient, it will need to find new ways to grow food in a desert climate with little rain and temperatures that regularly stay above 100 degrees.

In a new investment announced today, the Abu Dhabi Investment Office, a central government hub supporting businesses, is putting \$100 million into four agtech companies, including Madar Farms, the startup building the indoor tomato farm; Aerofarms, a New Jersey-based vertical farming company that will build a massive new R&D center; RDI, a startup developing a new irrigation system that makes it possible to grow plants in sandy soil; and RNZ, a startup that develops fertilizers that make it possible to grow more food with fewer resources. The investments are the first in a larger \$272 million program to support agtech.

“Agtech will be part of the solution to how we can better utilize water, how we can be more efficient, and how we can drive yield in farms,” says Tariq Bin Hendi, the director general of the Abu Dhabi Investment Office. “We’re embracing technology because we know it’s the future.”

Indoor farming, which grows food in far less space and with far less water than traditional agriculture (and without being subject to extremes in outdoor temperatures), makes particular sense in the area. “First, we have to deal with a very limited supply of arable land,” says Abdulaziz Al Mulla, CEO of Madar Farms. “So any kind of production method that we use has to be one that’s land agnostic. Secondly, the current way of production draws far too much on our precious water reserves. At the rate we’re going, we might run out of water within the next 50 years.” The company’s hydroponic systems, like those at other indoor farms, can recycle around 95% of the water that they use. The new 53,000-square-foot farm is set to be complete by the end of the year and begin production early in 2021; it’s also designed to expand. The first building covers around 53,000 square feet, 10% of the space that the company has leased in the industrial park.

In Abu Dhabi, Aerofarms will use the new investment to build a 90,000-square-foot facility to continue its research in how to grow crops indoors, including new research in breeding seeds that are optimized for indoor growing

conditions. “We have been talking to people in the UAE for a long time,” says Aerofarms CEO David Rosenberg. “Part of our business model, the way we think of it is: Where’s our value proposition most strong? Where are there a lot of people without access to fresh food? And it’s basic—where there is water scarcity, arable land scarcity.” In New Jersey, Aerofarms works in a series of buildings repurposed for indoor growing—an abandoned steel factory, an old paintball facility, an abandoned nightclub—but the new R&D facility in the UAE will be designed from scratch.

More than 60 engineers and scientists will study plant science and automation at the new center. “We want to grow more plants, know how to grow better, know how to grow with lower capital cost and operating costs,” Rosenberg says. “That all stems from an ability to understand plants.” By growing in a controlled environment, he says, it’s easier to understand the variables that affect factors like growth rate, nutrition, and taste. In the past, the company has focused mostly on environmental factors, such as the right “light recipe” or temperature to make plants grow well. Now it will also study breeding. “Most seed breeders work to optimize drought resistance, or pest resistance,” he says. “Here, because it’s fully controlled, we get to say, you know what, let’s focus on taste, texture, yield, nutrition.”



The new investments add to a small but growing indoor agriculture sector in the region. A startup called Badia Farms grows microgreens inside a warehouse and delivers them to local restaurants in Dubai, where the Ministry of Climate Change and the Environment made a deal to establish 12 vertical farms. In the middle of the desert, Pure Harvest Smart Farms grows tomatoes in a climate-controlled greenhouse with imported bumblebees. In a town on the outskirts of Dubai, an indoor farm raises salmon in huge, computer-controlled circular pools. A 130,000-square-foot indoor farm from a startup called Crop One, producing three tons of greens a day, is expected to break ground in Dubai later this year.

The indoor farming industry is still nascent, and it’s possible that the new wave of support in the UAE could help push it forward. The challenges that are most pronounced in the desert also exist elsewhere: In the U.S., for example, most lettuce is grown in California and Arizona, where water shortages will continue to increase with climate change.

Abu Dhabi and Dubai are also testing technology designed to help in other parts of the food system, including tech that can reduce food waste in restaurants, drones that can map plants on outdoor farms to save resources, and artificial caves in the Persian Gulf that are meant to help fish stocks grow. “It really has to be comprehensive coordination across different solutions, if you really want to build a truly resilient, food-secure sector,” says Al Mulla.

By Anna Flockett

A staggering 66% of startups have less than 12 months runway and 39% have less than six. These bleak statistics paint a somewhat gloomy picture and yet, in the UK alone, we saw a steady 8.5% increase in the number of companies being registered last year, so these figures are certainly not deterring the business leaders of today. Here James Hyde, CEO and co-founder of James and James, explains more...

One of the fundamental reasons for these grim statistics is that many leaders fall into the trap of trying to push for growth and profit simultaneously, but often lack the knowledge and insight on how to successfully achieve this.

THE 'DRAGONS' DEN' APPROACH

Consider the traditional business school approach of starting a company. You've created your 'big' idea and a business plan. You then pitch to investors in a 'Dragons' Den' styled environment, after which you hopefully come home with the cash investment you need to kick start your business and enable it to grow.

You then repeat this process a few times and hope for an IPO at the end. At this stage, investors don't care about current profits; they just want to know how you will make a profit further down the line when they decide to sell out. However, this doesn't necessarily mean you should ignore profit to start with and focus on growth. Let's look at the drawbacks of not making profit.

Blunt as it is, it's really a do or die situation. A lot of companies fail because they run out of cash. Without profits, your business is solely reliant on continual investment. And, you're not only running out of cash - you're running out of control. The value of the company may be increasing from an investment perspective, but the value of shares will be decreasing and eventually, you will dilute the company so much that you no longer have control.

THE TWO-STEP APPROACH

With the right approach, you can grow your business and be profitable. In the last 12 months, our profits have increased by 145% and our five-year Compound Annual Growth Rate is 108%. So, how did we build high growth from profits alone?

In short, we focussed on two things: quickly identifying a product that customers would pay for; and cutting out unnecessary expenditure. Many entrepreneurs think you can't win clients or build a company without shiny things. In reality, if you have the right idea and are willing to invest in only what you need, not what you'd like, both growth and profitability are possible.

IDENTIFYING WHAT CUSTOMERS WOULD PAY FOR

Ten years ago, James Strachan and I were struggling to find a modern fulfilment provider for the eCommerce business we worked for. We had an idea to move away from the pen-and-paper approach of traditional logistics firms and develop a more dynamic, real-time solution. Our vision was an all-singing, all-dancing cloud-based system, to help clients keep on top of orders and stock control.

We developed a minimum viable product and contacted people in our network to try to sell it. A fundamental flaw in our idea was that people were not interested in just the software; they wanted a more complete fulfilment service. So, we hired a corner of a warehouse and used our technology to provide that service. This quickly generated profits, which we reinvested back into the technology.

CUTTING OUT UNNECESSARY EXPENDITURE

An interesting and challenging time, we found some novel ways of doing more with less, stretching our cash profits as far as we possibly could. For example, when the new labels didn't fit in the printer, we didn't simply go and buy a new printer; we modified the old one with two cans of paint to feed the roll of existing labels through. When we ran out of office space, we didn't decide to invest in a bigger office; we converted the ladies' toilets.

A product is not inferior simply because it's developed on a shoestring budget. If you have a solid USP, clients will only interest themselves in the benefits. But satisfying clients isn't the only hurdle to overcome.

ATTRACTING THE RIGHT PEOPLE

The next challenge in nailing your profit-driven approach is staff. It can be difficult to attract the right people on a budget. Unsurprisingly, few people want to work in a low-paid job within an 'underinvested' company. This means you're generally hiring behind the curve, not ahead of it, but what you can offer is culture; something that shouldn't be overlooked in today's mindful society. Furthermore, your management team will likely be made up of less experienced, junior people, which means that you will most definitely be wearing more than one hat and working long hours.

With investment comes expertise, advice and a valuable network. You will of course need the latter, but if you're looking to grow organically you will need to find this elsewhere. Writing a business plan ten years ago to pitch to several business angels, I wasn't necessarily after the cash investment – I was looking for the relevant expertise. Although our angel investor, Peter Cowley, didn't come with a shiny halo, he was very well connected, with the business expertise to match. Peter has since made 100x return on his investment.

SO WHERE ARE WE NOW?

It's safe to say that we've come full circle. Ten years ago, we thought we were a software company. 2020 will see us launch our second major client for SaaS with several buyers now approaching us for our software and processes. We've also been named in the top 100 fastest-growing companies in the UK and top 1,000 in Europe - proof itself that you can have growth and profit. Although it has been a long process, we recognised that it would be foolish to move into an already crowded software market before we had cemented our USP and tested our software.

We are now closing our first private equity investment - through choice not necessity. This time, it's about increasing our expertise, network and business maturity to take us to the next stage of growth.

For any business leaders who are facing this growth vs profit conundrum, whatever you decide, make it an active choice. Trying to maximise both at the same time is a fool's errand. Profit is key to basic financial survival, but growth is key to profit and long-term success. There is a high chance organic growth will work best if there is existing competition and your product has a genuine USP. Often, profitable growth is the better choice, it just doesn't make the headlines like big bang growth can.

From monitoring of equipment health to providing timely support and services to product development, the digital-twin industry has boomed into a promising investment avenue.

The concept of digital twins isn't entirely new. It was introduced years ago in conventional forms for production and product lifecycle management. This era of Industry 4.0, with advanced sensors, artificial intelligence (AI) and Internet of Things (IoT) adoption, has now refined digital twinning and expanded its applications.

Fundamentally, a digital twin is a virtual representation of equipment, processes, information, and numerous physical assets. Data from many sources, such as sensors, is synchronized to offer real-time status. The technology helps to optimize operations, lower costs, and implement predictive maintenance capabilities.

Manufacturing, retail, and automotive sectors have rapidly deployed digital monitoring and control solutions over the years. But the systems are proving beneficial for healthcare providers and utilities as well. For example, the concept is being explored to create a virtual replica of the brain and heart to speed up diagnosis and treatment.

Two of the most promising digital-twin application areas are the energy and infrastructure industries. Utility providers consistently look for ways to reduce operational costs, enhance efficiencies, and detect problem areas. Digital platforms and connected solutions can allow energy firms to manage physical assets remotely and save on human work hours and expenses.

Annual valuation of the global digital twin market is expected to reach US\$20 billion by 2025. Buildings and energy applications could account for a notable share of these revenues. Undoubtedly, mounting power consumption every year and rapid urbanization will fuel the technology demand.

Driving Innovations and Efficiency in Energy, Utility Apps

Decarbonization trends have led to developments in clean technologies while highlighting the importance of connected assets. Physical asset performance and transmission efficiencies are key advantages of digital twinning. Leading technology providers are teaming up with utilities to drive digital transformation.

Microsoft confirmed that Norway's electricity supplier Agder Energi uses Azure Digital Twins. The utility wanted to find out how it can increase its grid and operational efficiencies. Prominent tools enabling the transformation are device controls, distributed energy resources, and predictive forecasting. This would allow the firm to cut down on costs and unnecessary energy upgrades.

Digital twins represent the integration of sensor technology, IoT, and smart platforms. Operators are able to map physical assets with accuracy into a digital version. Virtual reality is also a fast-growing segment, fueling innovations in utility management.

Renewable energy generation will rake in large prospects for virtual twin service providers, owing to the need to operate a vast array of physical equipment. Assets could include wind turbines, energy transmission and distribution (T&D) lines, and energy storage.

Digital Twin of a Wind Turbine

It's imperative that wind turbines last for decades. Ensuring consistent performance in the harshest of conditions requires continuous monitoring, which will also avoid unexpected failures. Power generation from wind farms accounted for more than 17% of the U.K.'s total generated capacity in 2018. The statistic indicates massive potential from the renewables sector for digital-twin industry players.

GE had previously unveiled a digital wind-farm concept for recording the configuration of turbines, before procurement and construction. Each wind turbine can feed its virtual twin to allow for software-based performance optimization.

A turbine's digital twin equips operators to detect possible dysfunction or when it's not performing optimally. This renders the on-site presence of an engineer unnecessary.

Besides, utilities will be able to predict the increase and decrease in wind speeds through simulations. Energy output can be predicted to help meet market demand and adjust the power mix, since most grids comprise multiple sources.

Asset Visualization and Analytics

Utility assets including power plants, T&D networks, and substations require effective and accurate management, with low cost to operator-owners. Digital-twin solutions can better enhance the reliability of energy infrastructure and operations.

Bentley Systems developed a suite of services catering to the need for physical asset and network management. These include a solution to offer immersive 4D visualization and advanced analytics using digital information to support utilities' decision-making processes, while improving infrastructure performance. The company is also providing a service that will deploy virtual twin technologies to consolidate, validate, and align geographic information system (GIS) performance as well as other forms of enterprise data.

The expansive deployment of IoT devices helps feed data for analytics. Records on inspection and surveys, and failure and work histories, can also be input into analytics software. Utilities could utilize this information to gain insights into existing conditions, anticipate breakdowns, or optimize for future performance.

Eliminating Barriers in Data Sharing

Data is the cornerstone of utility management, driving the efficiency of operations and grids and impacting future strategies. The traditional structure of energy management involves data silos across different grid models, which makes it difficult to connect platforms and share resources. Silos also lead to higher costs in terms of unwarranted labor use, blackouts, and lower performance.

Controlling costs and mitigating operational errors, T&D losses, and system failures will become more important as renewables constitute a greater portion of global energy consumption. According to the International Energy Agency (IEA), this share is expected to reach over 15% by 2030, implying the significant need for modernizing power generation and T&D infrastructure.

The Electrical Digital Twin offered by Siemens that powers utilities brings together the physical and virtual assets in a common network model. It removes data silos across all IT systems of a utility, to facilitate accurate electrical system planning, efficient operations, and predictive maintenance.

Emerging factors like IoT, renewable power generation and storage, micro-grids, and rapid digitization have accelerated the increase in connected endpoints and data gathered. This data is deemed important to optimize system performance and can be utilized effectively via digital twinning.

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By Taylor Hatmaker

As the U.S. and much of the world hunkers down to slow the spread of the novel coronavirus, some virus-related conspiracy theories are having a heyday. Specifically, a conspiratorial false claim that 5G technology is linked to COVID-19 gained ground, accelerating from obscurity into the rattled mainstream by way of conspiracy theorists who'd been chattering about 5G conspiracies for years.

While there is scientific consensus around the basic medical realities of COVID-19, researchers are still filling in the gaps on a virus that no one knew existed five months ago. That relative dearth of information opens the way for ideas usually relegated to the internet's fringes to slip into the broader conversation about the pandemic — a dangerous feature of an unprecedented global health crisis.

According to Yonder, an AI company that monitors online conversations including disinformation, conspiracies that would normally remain in fringe groups are traveling to the mainstream faster during the epidemic.

A report on coronavirus misinformation from the company notes “the mainstream is unusually accepting of conspiratorial thinking, rumors, alarm, or panic” during uncertain times — a phenomenon that explains the movement of misinformation that we're seeing now.

While the company estimates that it would normally take six to eight months for a “fringe narrative” to make its way from the edges of the internet into the mainstream, that interval looks like three to 14 days in the midst of COVID-19.

“In the current infodemic, we've seen conspiracy theories and other forms of misinformation spread across the internet at an unprecedented velocity,” Yonder Chief Innovation Officer Ryan Fox told TechCrunch. He believes that the trend represents the outsized influence of “small groups of hyper passionate individuals” in driving misinformation, like the 5G claims.

While 5G claims about the coronavirus are new, 5G conspiracies are not. “5G misinformation from online factions like QAnon or Anti-Vaxxers has existed for months, but is accelerating into the mainstream much more rapidly due to its association with COVID-19,” Fox said.

The seed of the false 5G coronavirus claim may have been planted in a late January print interview with a Belgian doctor who suggested that 5G technology poses health dangers and might be linked to the virus, according to reporting from Wired. Not long after the interview, Dutch-speaking anti-5G conspiracy theorists picked up on the theory and it spread through Facebook pages and YouTube channels already trafficking in other 5G conspiracies. Somewhere along the way, people started burning down mobile phone towers in the U.K., acts that government officials believe have a link to the viral misinformation, even though they apparently took down the wrong towers. “Owing to the slow rollout of 5G in the UK, many of the masts that have been vandalised did not contain the technology and the attacks merely damaged 3G and 4G equipment,” The Guardian reported.

This week, the conspiracy went mainstream, getting traction among a pocket of credulous celebrities, including actors John Cusack and Woody Harrelson, who amplified the false 5G claims to their large followings on Twitter and Instagram, respectively.

A quick Twitter search reveals plenty of variations on the conspiracy still circulating. “... Can’t everyone see that 5G was first tested in Wuhan. It’s not a coincidence!,” one Twitter user claims. “5G was first installed in Wuhan and now other major cities. Coincidence?,” another asks.

In the past, 5G misinformation has had plenty of help. As The New York Times reported last year, Russian state-linked media outlet RT America began airing segments raising alarms about 5G and health back in 2018. By last May, RT America had aired seven different programs focused on unsubstantiated claims around 5G, including a report that 5G towers could cause nosebleeds, learning disabilities and even cancer in children. It’s possible that the current popular 5G hoax could be connected to disinformation campaigns as well, though we likely won’t learn the specifics for some time.

In previous research on 5G-related conspiracies, social analytics company Graphika found that the majority of the online conversation around 5G focused on its health effects. Accounts sharing those kinds of conspiracies overlapped with accounts pushing anti-vaccine, flat Earth and chemtrail misinformation.

While the 5G coronavirus conspiracy theory has taken off, it’s far from the only pandemic-related misinformation making the rounds online lately. From the earliest moments of the crisis, fake cures and preventative treatments offered scammers an opportunity to cash in. And even after social media companies announced aggressive policies cracking down on potentially deadly health misinformation, scams and conspiracies can still surface in AI blindspots. On YouTube, some scammers are avoiding target words like “coronavirus” that alert automated systems in order to sell products like a powdered supplement that its seller falsely claims can ward off the virus. With their human moderators sent home, YouTube and other social platforms are relying on AI now more than ever.

Social networks likely enabled the early spread of much of the COVID-19 misinformation floating around the internet, but they don’t account for all of it. Twitter, Facebook and YouTube all banned Infowars founder and prominent conspiracy theorist Alex Jones from their platforms back in 2018, but on his own site, Jones is peddling false claims that products he sells can be used to prevent or treat COVID-19.

The claims are so dangerous that the FDA even stepped in this week, issuing a warning letter to Jones telling him to cease the sale of those products. One Infowars video cited by the FDA instructs viewers concerned about the coronavirus “to go to the Infowars store, pick up a little bit of silver that really acts its way to boost your immune system and fight off infection.”

As it becomes clear that the disruptions to everyday life necessitated by the novel coronavirus are likely to be with us for some time, coronavirus conspiracies and scams are likely to stick around too. A vaccine will eventually inoculate human populations against the devastating virus, but if history is any indication, even that is likely to be the fodder for online conspiracists.