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DR JEFF SOFTWARE
INDIE APP DEVELOPER

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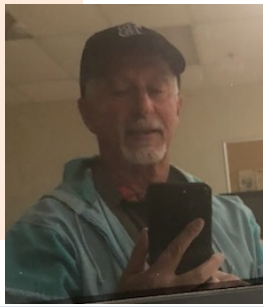
Fall 2022 | 11-19-22

Computer Organization (Architecture)

News



Dr Jeff Drobman
UCLA BS, MS, PhD

- **AMD** (1979-82)
  - 8085, Z8000
  - RAM
- **IDT** (1989-97)
  - **MIPS**
  - SRAM (DP/FIFO)
  - Logic

website ➡ *drjeffsoftware.com/classroom.html*

email ➡ *jeffrey.drobman@csun.edu*

Section

New News

State of the Art

Reports 3Q22

3Q ($B)

- Tesla = $21.5
- TSMC = $20.23
- IBM = $14.1

- Amazon = $127.1
- Apple = $90.1
- Google = $69.1
- Microsoft = $50.1
- Intel = $15.3

- Qualcomm = $11.4
- Nvidia = $5.9B
- AMD = $5.6B

2Q ($B)

- Amazon = $121.2
- Apple = $83.0
- Google = $69.7
- Microsoft = $51.9
- Intel = $15.3
- Nvidia = $6.7
- AMD = $6.6

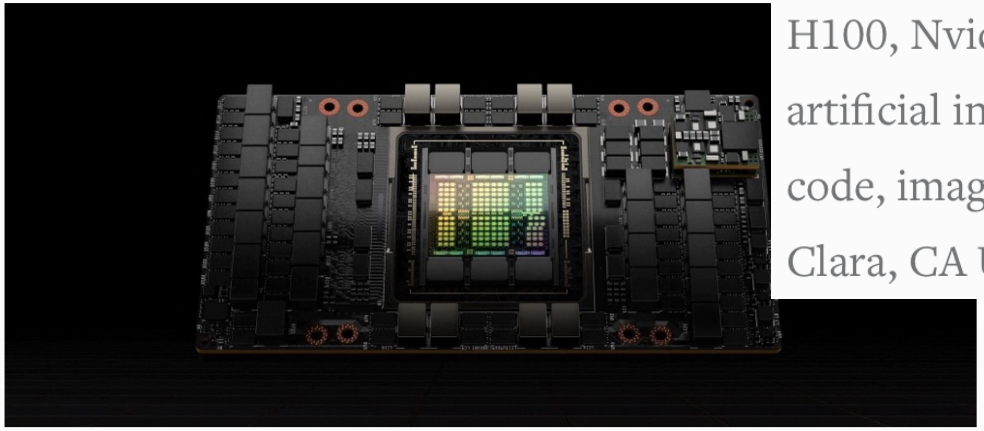
Nvidia

MEDIA NEWS

NOVEMBER 16, 2022 / 02:23 PM

Nvidia says it is working with Microsoft to build 'massive' cloud AI computer

By Jane Lanhee Lee



H100, Nvidia's latest GPU optimized to handle large artificial intelligence models used to create text, computer code, images, video or audio is seen in this photo." Santa Clara, CA U.S.,September 2022. NVIDIA/Handout via

Nvidia

The AI computer will operate on Microsoft's Azure cloud, using tens of thousands of graphics processing units (GPUs), Nvidia's most powerful H100 and its A100 chips. Nvidia declined to say how much the deal is worth, but industry sources said each A100 chip is priced at about $10,000 to $12,000, and the H100 is far more expensive than that.

"We're at that inflection point where AI is coming to the enterprise and getting those services out there that customers can use to deploy AI for business use cases is becoming real," Ian Buck, Nvidia's general manager for Hyperscale and HPC told Reuters. "We're seeing a broad groundswell of AI adoption ... and the need for applying AI for enterprise use cases."

Nvidia

The rapid growth of AI models such as those used for natural language processing have sharply boosted demand for faster, more powerful computing infrastructure.

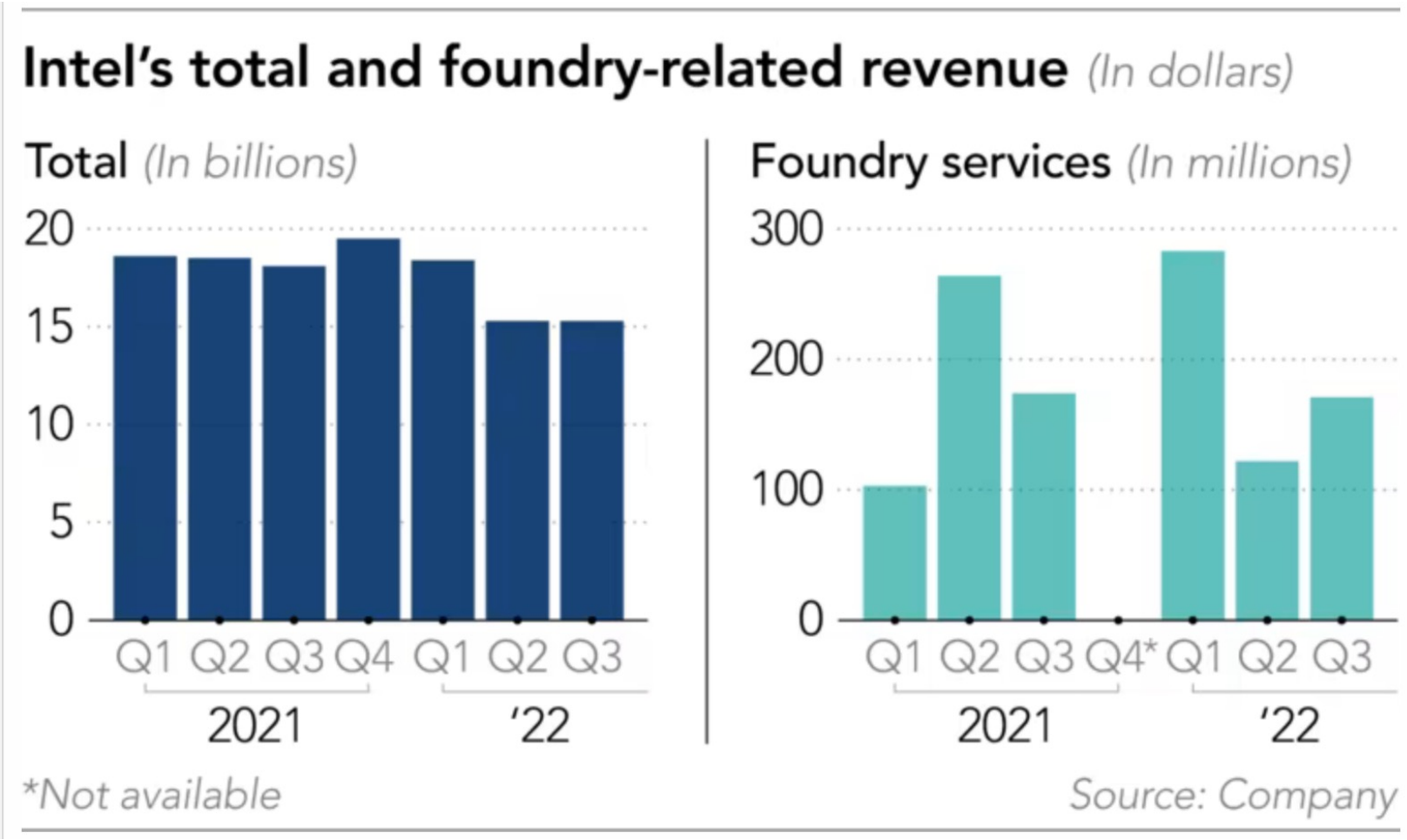
Nvidia said Azure would be the first public cloud to use its Quantum-2 InfiniBand networking technology which has a speed of 400 gigabits per second. That networking technology links servers at high speed. This is important as heavy AI computing work requires thousands of chips to work together across several servers.

TSMC 3Q22

- Revenue = $20.23B
- EPS = $1.79
- Wafer revenue shares
  - 5nm = 28%
  - 7nm = 26%

Samsung **7nm** did pretty good but Samsung **5nm** and **4nm** had serious PDK/yield problems and Samsung **3nm** is not really competitive against TSMC N3 and it requires new design considerations for **GAA**.

Intel's Foundry Biz (IFS)



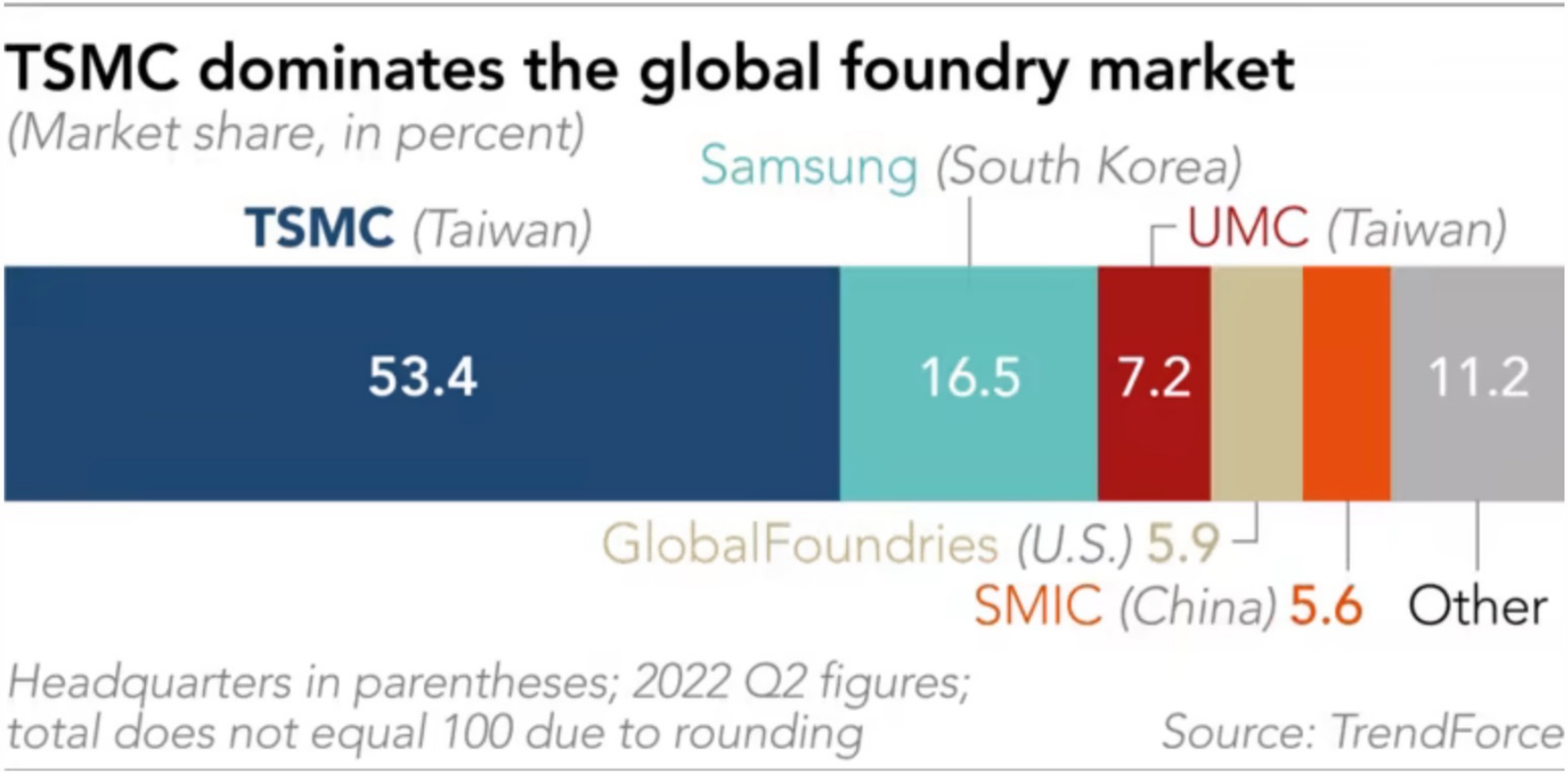
Intel's Foundry Biz (IFS)

The company's spending in this area includes $20 billion for a chip facility in Ohio and 17 billion euros ($16.8 billion) to build a plant in Germany, as well as $3.5 billion to expand its chip packaging facility in New Mexico, a $20 billion investment in Arizona fabs and a 17 billion euro expansion in Ireland. On top of that, Intel acquired Israeli foundry Tower Semiconductor for $5.4 billion in February.

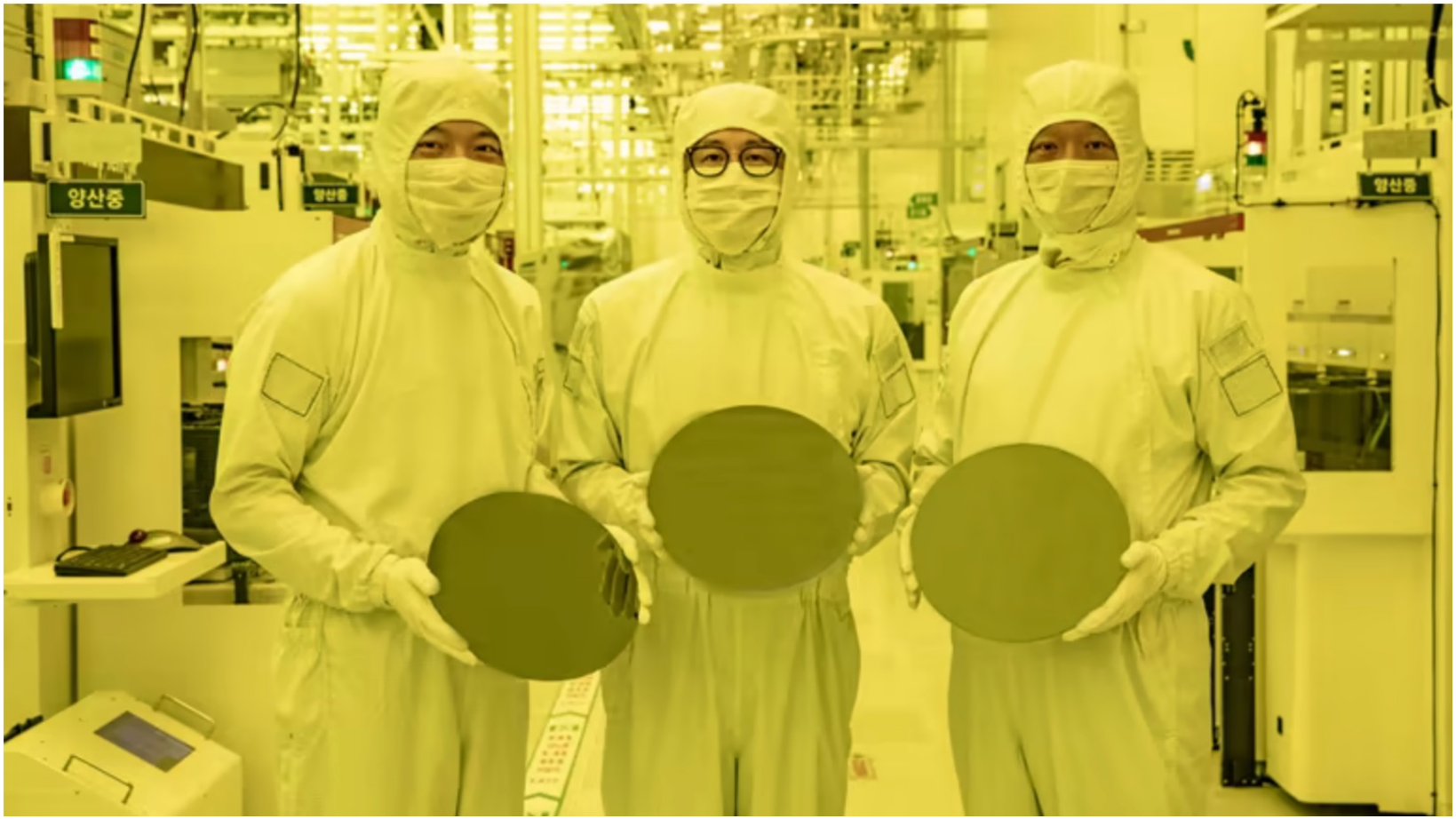
Meanwhile, slowing global demand for chips has weighed on Intel's top line. The company reported a 20% year-over-year drop in third-quarter revenue last week, and lowered its 2022 full-year revenue outlook to between $63 billion and $64 billion, down as much as $4 billion from its previous guidance. Coupled with the heavy spending on its foundry business, Intel is now expecting to end 2022 with a negative $2 billion to $4 billion free cash flow, compared to the negative $1 billion to $2 billion it projected earlier this year.

Intel's Fabs

Foundry Shares 2Q22



Samsung 12” Wafers



Qualcomm

Sources had said **Samsung's** low yield rate for 4nm was the cause and the US chip firm will be giving **TSMC** the order for 3nm chips because of this.

McGuire said Qualcomm's orders were too large for it to use a single foundry and using multiple foundries is not only advantageous in supply but also price and scale.

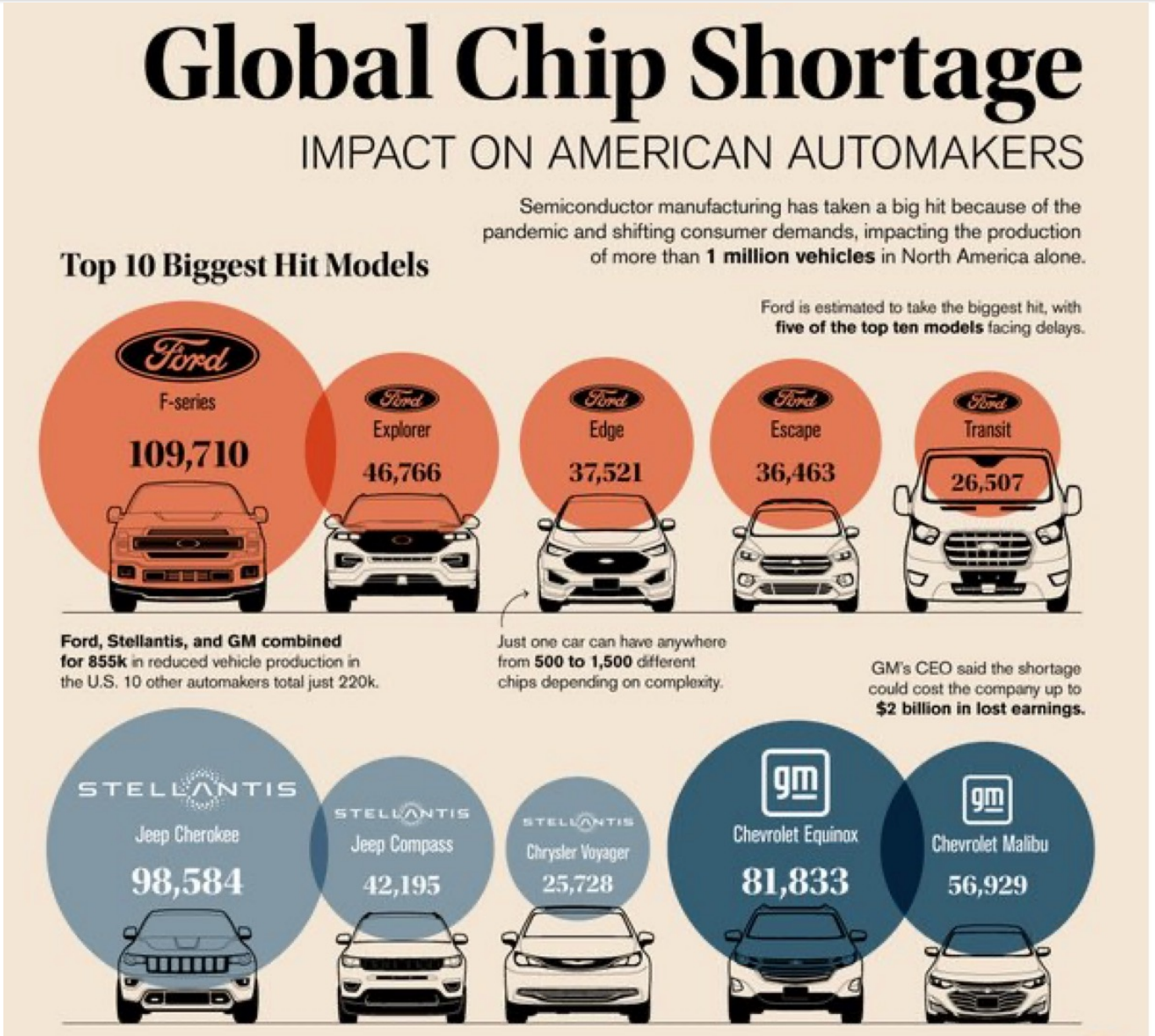
The US firm also needed multiple foundries to expand in other business areas besides smartphones, he added.

Meanwhile, **Samsung**, while it facing difficulty with yield with 4nm, was the first to start production of 3nm GAA chips.

TSMC has also started 3nm chip production but for these uses a FinFET structure rather than GAA. The Taiwanese giant is reportedly planning to apply GAA structure starting with 2nm.

Chip Shortage

Quora



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Google Pixel 7

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AMD Q3 Report

HPC: Servers

Looking at the broader competitive landscape, our third-gen EPYC CPUs in market today are the highest performant and most energy efficient x86 server CPUs available, and we expect to further extend that lead with our next-generation 5-nanometer Genoa processors, which deliver significant performance, energy efficiency and TCO advantages for both hyperscale and enterprise workloads.

We will publicly launch Genoa next week and are ramping production to support initial cloud deployments and the introduction of fourth-gen EPYC processor platforms by HP Enterprise, Dell, Lenovo, Super Micro and others.

AMD Q3 Report

Desktop

Desktop channel sell-through increased from the prior quarter, driven by increased demand for our Ryzen 5000 Series CPUs and the launch of our Ryzen 7000 Series processors and AM5 platform in September.

5nm

We launched our 5-nanometer Ryzen 7000 Series processors to strong reviews based on delivering leadership performance in gaming, productivity and content creation applications. We expect Ryzen 7000 CPU sales to ramp this quarter aligned with the launches of a broader range of mainstream and enthusiast AM5 motherboards.

AMD Q3 Report

GPU

Gaming graphics revenue declined in the quarter based on soft consumer demand and our focus on reducing downstream GPU inventory. We will launch our next-generation RDNA 3 GPUs later this week that combine our most advanced gaming graphics architecture with 5-nanometer chiplet designs.

Our high end RDNA 3 GPUs will deliver strong increases in performance and per-formance per watt compared to our cur-rent products and include new features supporting high resolution, high frame rate gaming. We look forward to sharing more details later this week.

AMD Q3 Report

Summary

We remain on track to further expand our product portfolio in 2023 with the launches of our edge and telco optimized Siena and cloud optimized Bergamo processors. With 128 cores and 256 threads per socket, we expect Bergamo will further extend our performance and energy efficiency leadership in cloud workloads.

Customer response has been very strong based on the performance, features and software compatibility Bergamo delivers. We believe our broad family of leadership CPUs, GPUs, FPGAs, adaptive SoCs and DPUs position us well for long-term growth and share gains in the Data Center.

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Dylan Patel
Oct 27
SemiAnalysis

ARM Licensing

DR JEFF SOFTWARE
INDIE APP DEVELOPER

Arm Changes Business Model – OEM Partners Must Directly License From Arm

No More External GPU, NPU, or ISP's Allowed In Arm-Based SOCs

The Qualcomm-Arm saga is epic and there is a new massive update in the case. This update contains evidence that Arm is changing its entire business model and moving to require licenses from OEMs. It also contains evidence of some hints at anti-competitive licensing behavior around GPUs, NPUs, and ISPs.

As a refresher, Arm sued Qualcomm. Qualcomm then filed a counterclaim, we covered that ~3 weeks ago.

According to the updated Qualcomm counterclaim, after 2024, Arm is no longer going to license their CPUs to semiconductor companies such as Qualcomm under technology license agreements (TLAs). Instead, Arm will only license to the device-makers. Arm is allegedly telling OEMs that the only way to get Arm-based chips will be to accept Arm's new licensing terms. Qualcomm claims that Arm is lying to Qualcomm's OEM partners about Qualcomm's licensing terms.

ARM Licensing

Furthermore, Qualcomm claims that Arm is telling the OEMs that semiconductor manufacturers will not be able to provide other elements of their Arm-based SOCs that Arm also offers as a licensed product. This includes GPUs, NPUs, and ISP. It seems that Arm is effectively bundling its other IP with the CPU IP in a take-it-or-leave-it model. That would mean Samsung's licensing deal with AMD for GPU or Mediatek with Imagination GPU is no longer allowed after 2024. Furthermore none of these firms could use their in-house ISP or NPU despite it being far superior to Arm's.

If true, it seems Arm is playing very dirty with their threats to Qualcomm and OEMs. Mediatek, Samsung, and other Arm partners should be very scared. This is going to accelerate RISC-V roadmaps rapidly. It also reeks of anti-competitive behavior. Nvidia has a 20-year Arm license secured, so they will be fine. Apple obviously has great licensing terms due to their history with founding Arm. We hear Broadcom also has very favorable terms as well.

Section

Recent News

State of the Art

RISC V

- Gartner reported that RISC-V architecture, an alternative to RISC and CISC, is attracting investments, partnerships, and product innovation opportunities from device manufacturers. As the ecosystem matures, strong adoption growth driven by easy IP availability and the support of leading semiconductor vendors is expected. By 2026, 25% of semiconductor devices are forecasted to leverage one or more RISC-V cores, up from less than 5% in 2022.
- According to Gartner, the worldwide device market declined again by 9.2% compared to a year ago, recording four consecutive quarters of shipment decline. All device types showed a YoY decline, with laptops having the steepest decline at 16.2%, affected by the depressed 50% YoY decline of Chromebooks.

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CHIPS Act in Ohio

DR JEFF SOFTWARE
INDIE APP DEVELOPER

Sept 2022

CHIPS Act in Ohio

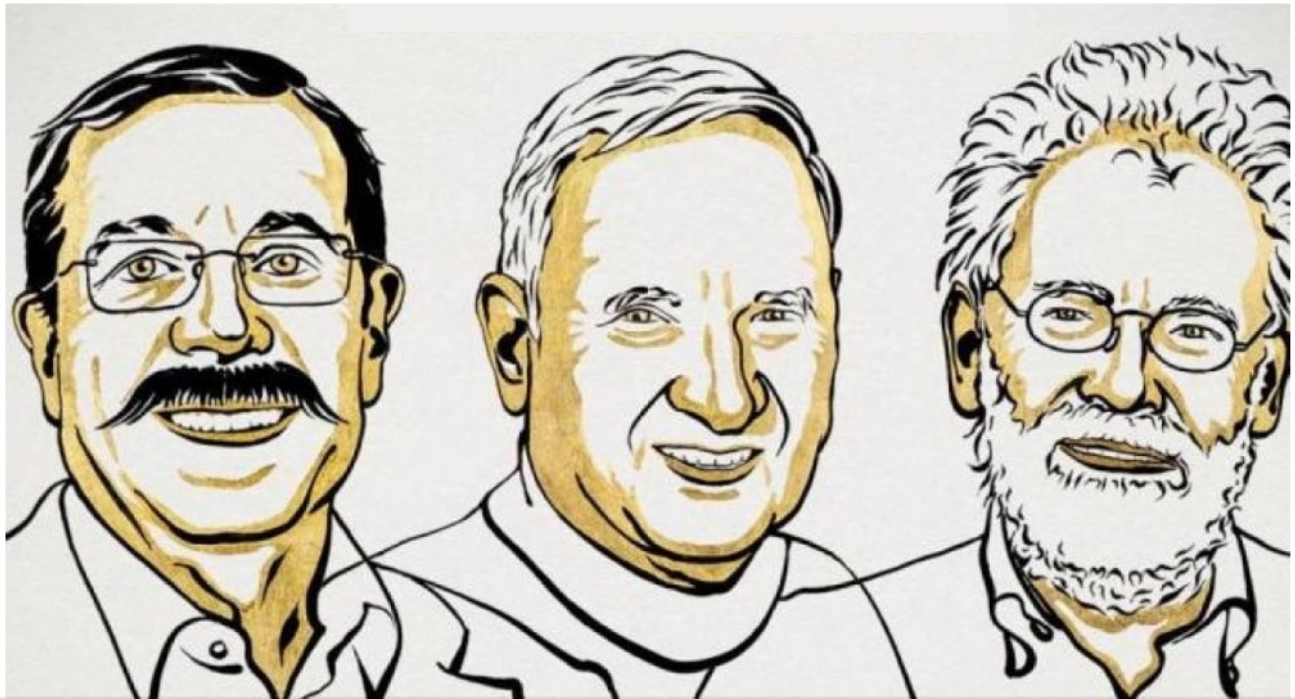
IBM $20B

10-6-22

Quantum Nobel

SET

Nobel Prize 2022 in physics for research in quantum mechanics



Quantum Nobel

Schaffhausen Institute of Technology
Sponsored ·

Professor Dr. Alain Aspect has received a Nobel Prize for Physics jointly with John Clauser and Anton Zeilinger, "for experiments with entangled photons, establishing the violation of Bell inequalities and pioneering quantum information science".

Professor Aspect is, among other accomplishments, the co-founder of the quantum computing start-up company PASQAL, a technology that is one of the main domains of expertise in SIT. #Quantumcomputing is indeed part of the main technology market trends that are expected to solve many world global challenges for the years to come, and for which SIT is a long-time advocate through our research areas, university programs, and business offers.

We congratulate Professor Aspect on his #NobelPrize Award and reiterate our commitment to further achievements in quantum computing.

Earlier in 2021, our investment funding partner Runa Capital, which was co-founded by SIT Founder, Serg Bell, made investments in Pasqal. Pasqal builds quantum computers from ordered neutral atoms in 2D and 3D arrays to bring a practical quantum advantage to its customers in addressing real-world problems, especially in quantum simulation and optimization.

Tesla Robot

TSMC $ Apple

Taiwan Semiconductor asked for 2023 price increase from Apple, tech giant said no: report

Sep 28, 2022 11:23 AM ET | **Taiwan Semiconductor Manufacturing Company Limited (TSM)** | Chris Ciaccia, SA News Editor

Taiwan Semiconductor (NYSE:TSM) is slated to raise prices on its customers starting in 2023, but the company's largest customer, Apple (NASDAQ:AAPL), has reportedly told the global foundry no deal.

According to Chinese news outlet Economic Daily News, Taiwan Semiconductor (TSM) wanted to increase the price of the process for its 3 nm process by 3%, which may be used in the A17 chip in some of Apple's (AAPL) Mac computers and perhaps next year's iPhone. However, the tech giant refused and said no, the news outlet said, citing sources.

In May, it was reported that Taiwan Semiconductor Manufacturing (TSM) had started to tell some of its customers that it will raise its prices between 5% and 9%, starting next year, due to inflation concerns, rising costs and its expansion.

Cupertino, California-based Apple (AAPL) is Taiwan Semiconductor's (TSM) largest customer and some reports have suggested that it accounts for as much as 25% of the global foundry's annual revenue.

25%

Apple at Foxconn

News

APPLE INC (AAPL) (*116.59 +0.56*) *I*

Market Chatter: Foxconn to Move Some Apple Production to Vietnam
03:41 AM EST, 11/27/2020 (MT Newswires) -- Taiwanese manufacturer Foxconn is transferring some iPad and Macbook assembly to Vietnam at Apple's (AAPL) request, Reuters reported Thursday, citing an unnamed source familiar with the matter. The move is ... (MT Newswires 03:41 AM ET 11/27/2020)

Intel – Italy Deal

Italy, Intel close to $5 billion deal for chip assembly and packaging factory

I think Intel believes it can manage the cost in Italy that is comparable or cheaper to what other Intel assembly and packaging sites in Vietnam, Malaysia, Philippines, China, and Costa Rica. It's hard to believe it unless it's almost fully automated and use few workers.

Exclusive: Italy, Intel close to $5 billion deal for chip factory

Italy is close to clinching a deal initially worth $5 billion with Intel to build an advanced semiconductor packaging and assembly plant in the country, two sources briefed on discussions told Reuters on Thursday.

www.reuters.com

Intel News: Italy Fab

Market Chatter: Intel, Italy Reportedly Pick Veneto Region as Location for Proposed Chip Factory

4:39 AM ET, 09/26/2022 - MT Newswires

04:39 AM EDT, 09/26/2022 (MT Newswires) -- Intel (INTC) and the Italian government have selected the town of Vigasio in the country's Veneto region as the location for a proposed chip factory, Reuters reported Sunday, citing anonymous sources familiar with the matter.

The factory, with an initial investment of some 4.5 billion euros ($4.36 billion), is part of the company's planned investment of 80 billion euros ($77.34 billion) to grow capacity in Europe, according to the report.

The new facility is expected to create 1,500 jobs and is slated to start operations between 2025 and 2027, Reuters reported.

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TSMC 3nm

DR JEFF SOFTWARE
INDIE APP DEVELOPER

SemiWiki.com
The Open Forum for Semiconductor Professionals

8-17-22

TSMC's Initial 3nm HVM Yield To Be Better Than Its 5nm

TSMC **N3e** is the HPC version for Intel, AMD, Nvidia, etc... The SoC companies Apple, Mediatek, will use **N3**. Please remember that TSMC sets expectations on the conservative so they don't disappoint. According to my sources N3 for Apple was frozen in December and the N3e process is now frozen with HVM starting in 1H 2023.

- Apple now in production (HVM) with **4nm**

Baidu Supercomputer

Baidu Launches Superconducting Quantum Computer Qian Shi

4:43 AM ET, 08/25/2022 - MT Newswires

04:43 AM EDT, 08/25/2022 (MT Newswires) -- Baidu (BIDU) on Thursday announced its new superconducting quantum computer Qian Shi for applications such as artificial intelligence and computational biology.

Qian Shi features a 10-quantum-bit processor, according to the company, which also developed a 36-qubit superconducting quantum chip.

Baidu also developed Liang Xi, an all-platform quantum hardware-software integration technology that can be plugged into Qian Shi and other third-party quantum computers.

Baidu was up 3.9% in recent premarket activity.

- 10 qubit processor
- 36 qubit chip

Intel to Fab MediaTek

Intel, MediaTek Enter Into Chip-Manufacturing Agreement

5:50 AM ET, 07/25/2022 - MT Newswires05:50 AM EDT, 07/25/2022 (MT Newswires) -- Intel (INTC) said Monday it entered into an agreement with MediaTek to manufacture chips using Intel Foundry Services.

The chipmaker said MediaTek aims to use Intel's process technologies to produce multiple chips for *smart edge* devices.

Financial details of the agreement were not disclosed.

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Intel 14th Gen *Meteor Lake*

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Rumor Mill 8-8-22

- Intel **14th Gen** *Meteor Lake* Rumored To Drop TSMC 3nm Node For tGPU, Might Be Used in **15th Gen** *Arrow Lake* CPUs

Meteor Lake is supposed to be **3 chipsets** - so they'll still need capacity for the I/O die and the iGPU from somewhere. N3 was only to be used for the iGPU where I/O was an older node. This seems like something specific to the iGPU (Intel design not ready) and/or N3 (capacity, timing, etc).

It is neither. ***Meteor Lake*** is yielding fine: Intel 4 CPU, TSMC N3 GPU, TSMC N5 base die and SoC.

AMD Adds Data Center Services

COMP222

4-15-22

As you know AMD acquired Xilinx, creating the industry's high-performance and adaptive computing leader. On this note, we announced the acquisition of of Pensando:

"To build a leading-edge data center with the best performance, security, flexibility and lowest total cost of ownership requires a wide range of compute engines," said Dr. Lisa Su, AMD chair and CEO. "All major cloud and OEM customers have adopted EPYC processors to power their data center offerings. Today, with our acquisition of Pensando, we add a leading distributed services platform to our high-performance CPU, GPU, FPGA and adaptive SoC portfolio. The Pensando team brings world-class expertise and a proven track record of innovation at the chip, software and platform level which expands our ability to offer leadership solutions for our cloud, enterprise and edge customers."

– Dr. Lisa Su, AMD Chair and CEO.

Other New Chips

Quora

Wafer Scale

April 2022

Brett Bergan ·
Building PC's f

We CAN make bigger processors. and we DO make bigger processors. The Cerebras Wafer Scale Engine is 46,225mm² and runs 1.2 trillion transistors and 400,000 CPU/GPU cores on 15,000 watts. These are fabbed at 16nm.

But there is a new 7nm chip in the works (Cerebras WSE-2) that will run 2.6 trillion transistors on 850,000 cores on the same 46,225mm² and the same 15,000 watts. Double the performance and double the transistors on the same silicon at the same power. By shifting from 16nm to 7nm.

This is ENORMOUS!

Other Chips

Quora

Brett Bergan ·
Building PC's f

The thing is, most chips made today work extremely well made at 14nm or 22nm. The ubiquitous **Broadcom BCM2711** used by the Raspberry Pi4 (and numerous other SBC's) is still made at 28nm. At 14nm it could be twice as fast or four times as efficient—but cost a lot more to make.

14nm means you can put 4X as many transistors on the same die as a 28nm chip. 7nm means you can put 4X as many transistors on the same die as a 14nm chip.

Knowing that you could fit 4X Raspberry Pi CPU's on one die at 14nm you could build the world's first 16-core Raspberry Pi. The cool thing is that you actually could do that very thing. RISC-V is a chip development "company" basically run out of Berkeley.

Intel New Euro Fab

INTEL CORP (INTC) (*47.70* *-0.01*) *I*

Market Chatter: Intel Reportedly Chooses Germany's Magdeburg as Location for New European Chip Factory

08:22 AM EST, 02/28/2022 (MT Newswires) -- Intel (INTC) has picked the city of Magdeburg in Germany as the location for a new European chip factory, Reuters reported on Saturday, citing an unnamed person familiar with the matter. The US ... (MT Newswires 08:22 AM ET 02/28/2022)

Read more

GlobalFoundries

Major 2021 Accomplishments and Key Fourth Quarter Business Highlights:

- In 2021, GF entered into 30 significant long-term customer agreements that provide assurance to our customers and provide revenue visibility to GF.
- In 2021, GF broke ground on a new fab on its **Singapore** campus, expanded capacity in Fab 1 (**Dresden**) by over 25%, and announced expansion plans for its most advanced manufacturing facility in **upstate New York**.
- GF set a "Journey to Zero Carbon" goal to reduce greenhouse gas emissions by 25% while expanding global manufacturing capacity.
- On October 28, 2021, GF began trading on **Nasdaq** Stock Market under the ticker "GFS."
- In the fourth quarter, GF announced an extension of its wafer supply agreement with **AMD**, increasing the number of chips GF will supply, as well as extending the terms of the agreement to secure supply through 2025.
- In the fourth quarter, **BMW** signed a direct supply assurance agreement with high-tech microchip developer INOVA Semiconductors and GF to secure long-term semiconductor supplies.
- In the fourth quarter, GF and **Ford** announced a non-binding strategic collaboration to advance semiconductor manufacturing and technology development within the US, aiming to boost chip supplies for Ford and the US auto industry.

Section

Old News

Intel's Newest Fabs

$**20B** in Ohio

Online end of **2025**

SATURDAY, JANUARY 22, 2022 A9

Intel to build chip factories in Ohio

Company will invest $20 billion as a global shortage highlights the risks of reliance on manufacturers in Asia.

Samsung in Texas

Chipmakers are diversifying their manufacturing sites in response to the shortages. Samsung said in November that it planned to build a $17-billion factory outside Austin, Texas.

Micron Technology, based in Boise, Idaho, said it would invest $150 billion globally over the next decade in developing its line of memory chips, with a potential U.S. manufacturing expansion if tax credits can help make up for the higher costs of American manufacturing.

Micron globally

10,000 jobs in Ohio

Two chip factories on the 1,000-acre site in Licking County, just east of Columbus, are expected to create 3,000 company jobs and 7,000 construction jobs, and to support tens of thousands of additional jobs for suppliers and partners, the com-

CHIPS for America Act

Lawmakers have been urging House and Senate leaders to fully fund a law meant to address the semiconductor shortage. They want Congress to fully fund the $52-billion CHIPS for America Act, allowing for stateside investment in semiconductor factories.

More on Intel's New Fabs

Semi Wiki

$52B Chips for America is barely a rounding error

When you assume that the Chips for America act is a one time, one shot disbursement spread over a number of years and a number of companies it becomes clear that its not much against TSMC's spend.

It also does not compare to what China as a whole is spending on semiconductor technology.

Basically the US is being outclassed and outgunned by both China and Taiwan (probably part of China in the not too distant future).

Even if Intel got the whole $52B it still couldn't keep up as the spend would be over several years. Never mind that only $10B of the $52B is for fab projects with a $3B limit per project. Essentially the $52B will be spread so thin as to be ineffective versus the focused sharp spend of TSMC.

More on Intel's New Fabs

Semi Wiki

Can the US fabs being built make a difference?

Intel announced two fabs in Arizona at $10B each along with TSMC announcing a 5NM fab in Arizona which by the time its operational will be a drop in the bucket trailing edge fab perhaps meant to mollify the US.

Samsung has announced a $17B in Texas in addition to existing facilities there. It looks like Intel has chosen Ohio for its "megafab" project and Micron is eyeing North Carolina.

While details are scarce, it sounds like the Intel Ohio and Samsung Texas fabs are the most impactful on the US. Samsung would be somewhat less impactful as we assume that bleeding edge technology R&D will continue to be done in Korea making the Texas fab a "fast follower" much as the existing Samsung fab in Texas is today. That leaves Intel Ohio as the only trail blazing R&D facility in the US.

It also remains to be seen if the brain trust in Portland can either be moved or shared with Ohio or if Portland remains the R&D center with Ohio for production.

Intel's New Fab Equip.

EUV from ASML

Intel Places Order for ASML's Extreme Ultraviolet Technology

04:49 AM EST, 01/19/2022 (MT Newswires) -- Intel (INTC) and ASML Holding (ASML) said Wednesday that the US chip maker has placed its first purchase order for ASML's TWINSCAN EXE:5200 extreme ultraviolet high-volume production system. The purchase ... (MT Newswires 04:49 AM ET 01/19/2022)

QC's

How close are we to practical quantum computers?

We already have them! ... sort of

2 main competing implementations (others in development):

1. Trapped ions
   - UMD : 53 qubits

2. Superconducting circuits
   - Google : 72 qubits
   - IBM : 50 qubits
   - Rigetti Computing : 19 qubits
   - UC Berkeley : 10 qubits

But these numbers do not tell the complete story

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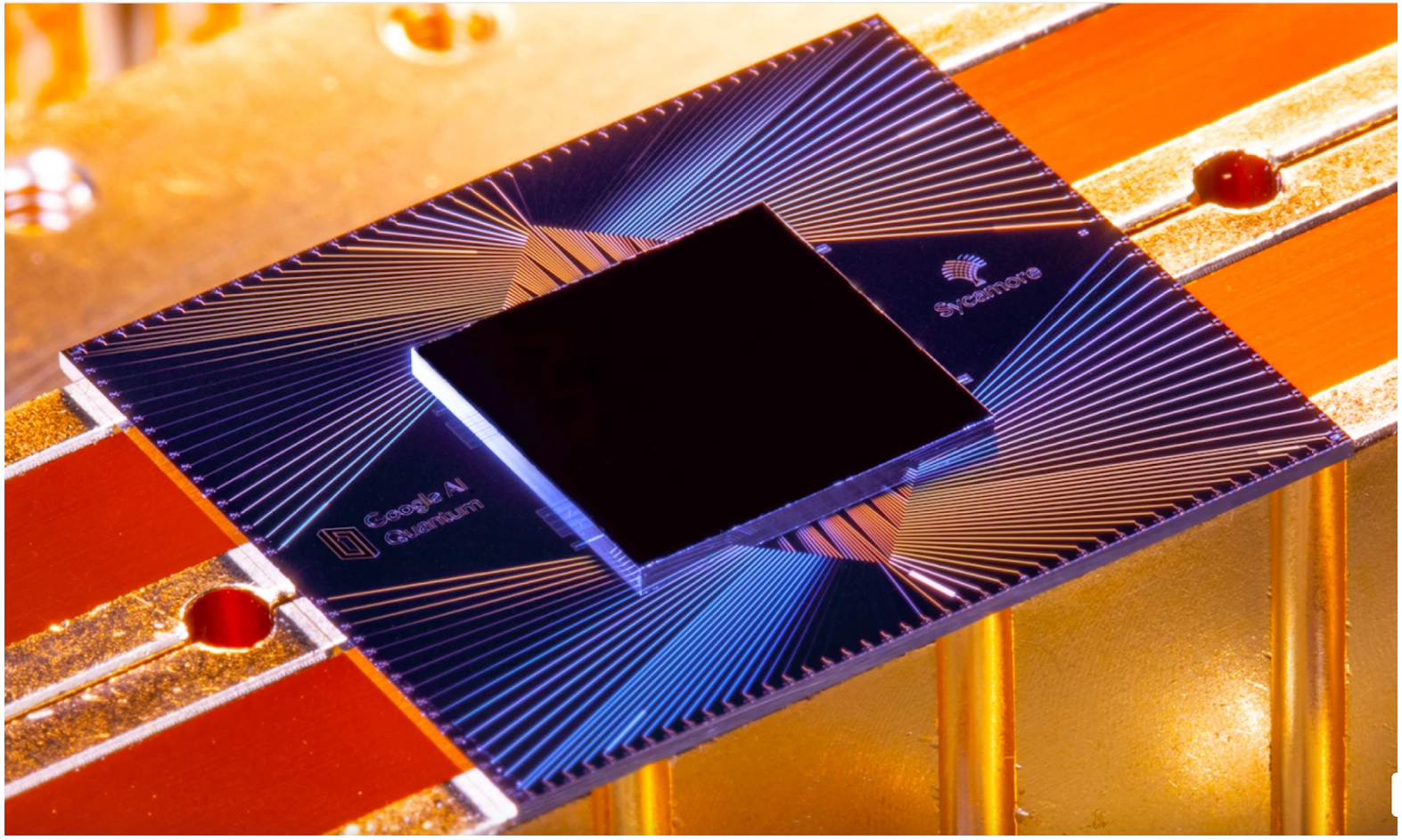
PHYSICS

Google Sycamore QC

Time crystals created in Google's quantum processor



Section

Other/Misc

Atomic Clocks

What are the advantages of an atomic clock over a normal clock?

Jeff Drobman, works at Dr Jeff Software

Answered just now

confusion abounds here. probably what you are thinking of as an "atomic clock" is one you can buy for <$100 that is a "radio controlled" clock that tunes to the US NIST time signal on AM radio. NIST in Fort Collins, CO transmits its real "atomic clock" signal both over AM radio and also to GPS satellites, where we get our accurate and reliable cellular and cable TV clocks. (In case you wonder why we never have to set these clocks.)

the actual cesium-laser atomic clock used at NIST has multiple levels of accuracy, with the highest level called "Stratum 1". other levels are derived from this. Stratum 2 is transmitted to the GPS satellites. the AM radio signal is probably Stratum 4 or 5 — good enough for our cheap clocks and watches. most data and telecom networks use a Stratum 3 or 4e system clock.

Neuralink

Technology

Interfacing The Brain To A Computer

https://www.youtube.com/watch?v=0jOjn6Iwp9w&feature=youtu.be&fbclid=IwAR1f6hb65is2zqKDJJ-xDuPnlqm7-O8vcRXX0q4dcFTMPUTgHIhaG-2Fqx4

Neuralink

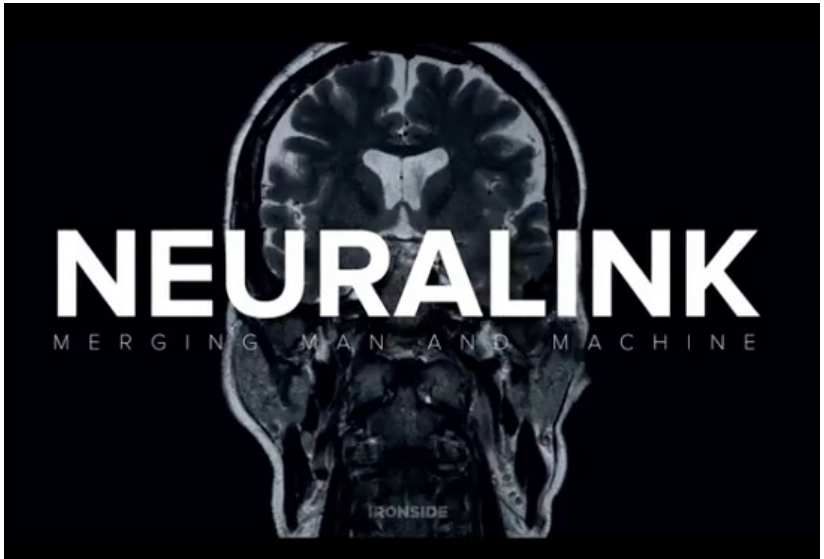
The brain-machine interface

(Click image for link.)

Neuralink is a company set up by Elon Musk in 2016 that is exploring the human brain and how it can be connected to a computer interface. Operating at a much smaller scale than Tesla or SpaceX, this conceptual startup aims to use this brain-machine interface to integrate humans with artificial intelligence by surgically implanting processors into our brains with a procedure that is said to be no more invasive than something like LASEK surgery.

Neuralink

Source: Interesting Engineering (26 Mar 2020)



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Neural Brain Chips

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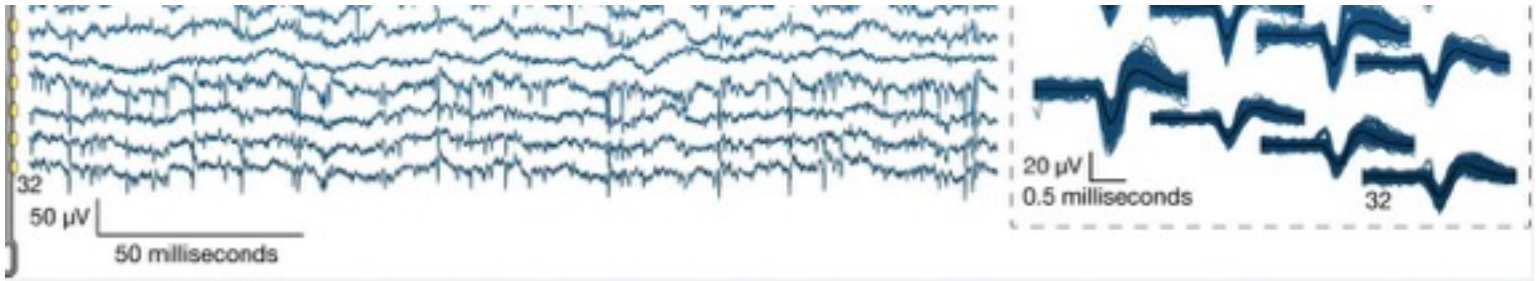
Preprints (earlier versions) of this paper are available at https://preprints.jmir.org/preprint/16194, first published September 09, 2019.

An Integrated Brain-Machine Interface Platform With Thousands of Channels

Elon Musk [1]; Neuralink [1]



igure 7. The broadband signals recorded from a representative thread. Left: Broadband eural signals (unfiltered) simultaneously acquired from a single thread (32 channels) nplanted in rat cerebral cortex. Each channel (row) corresponds to an electrode site on the

Neural Brain Chips

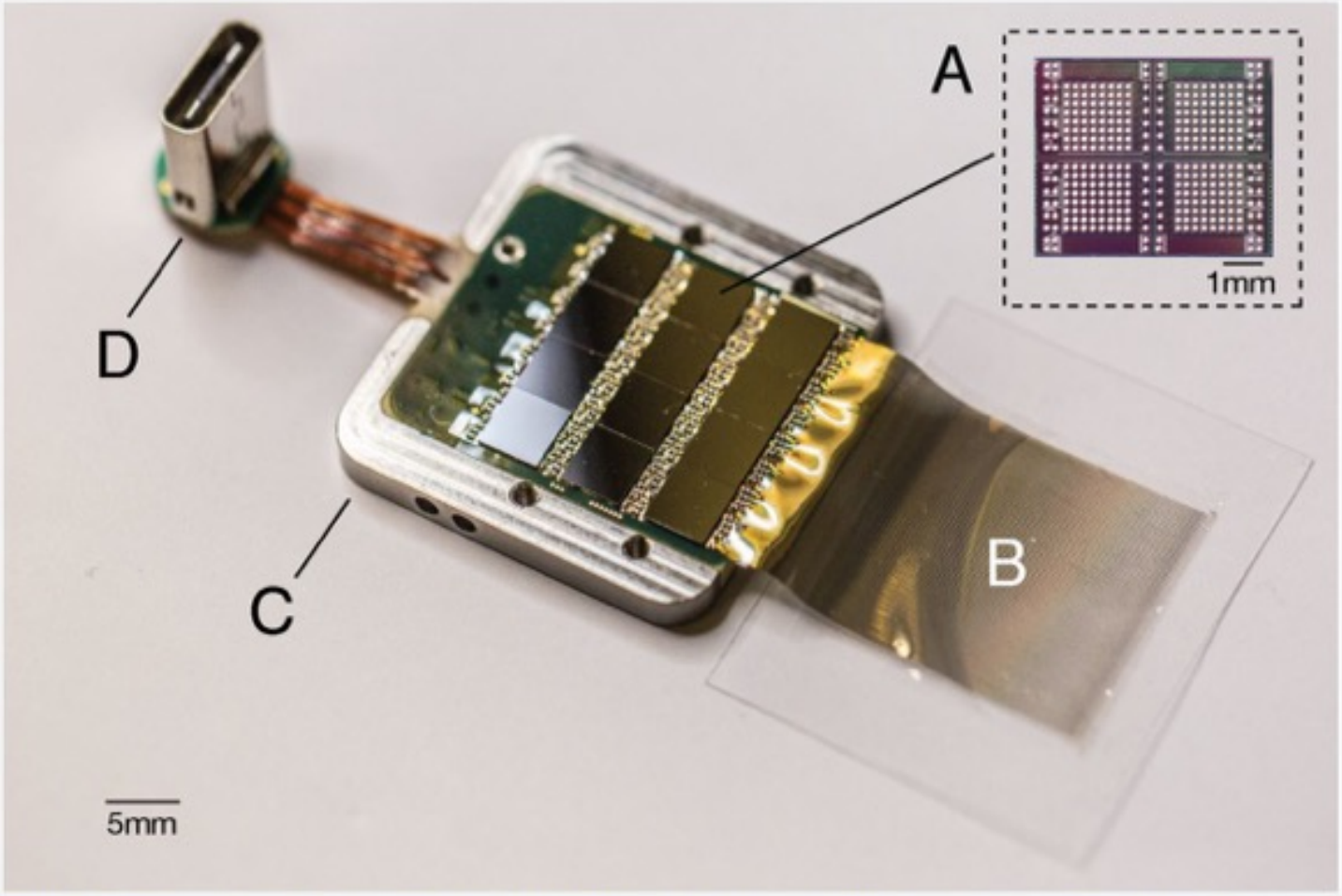


Figure 5. A packaged sensor device. (A) Individual neural processing application-specific integrated circuit capable of processing 256 channels of data. This particular packaged device contains 12 of these chips for a total of 3072 channels. (B) Polymer threads on parylene-c substrate. (C) Titanium enclosure (lid removed). (D) Digital USB-C connector for power and data.

Neural Brain Chips

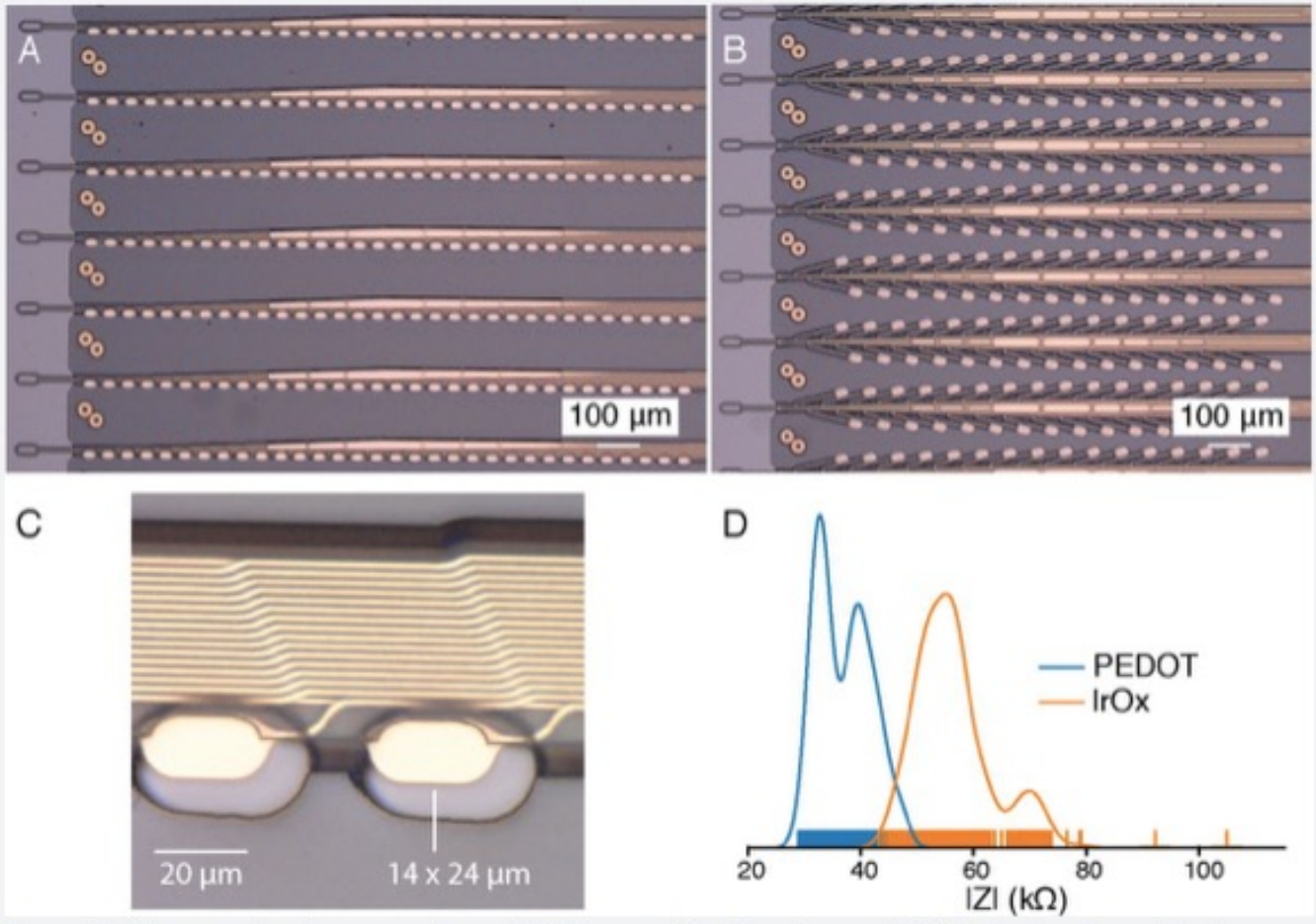
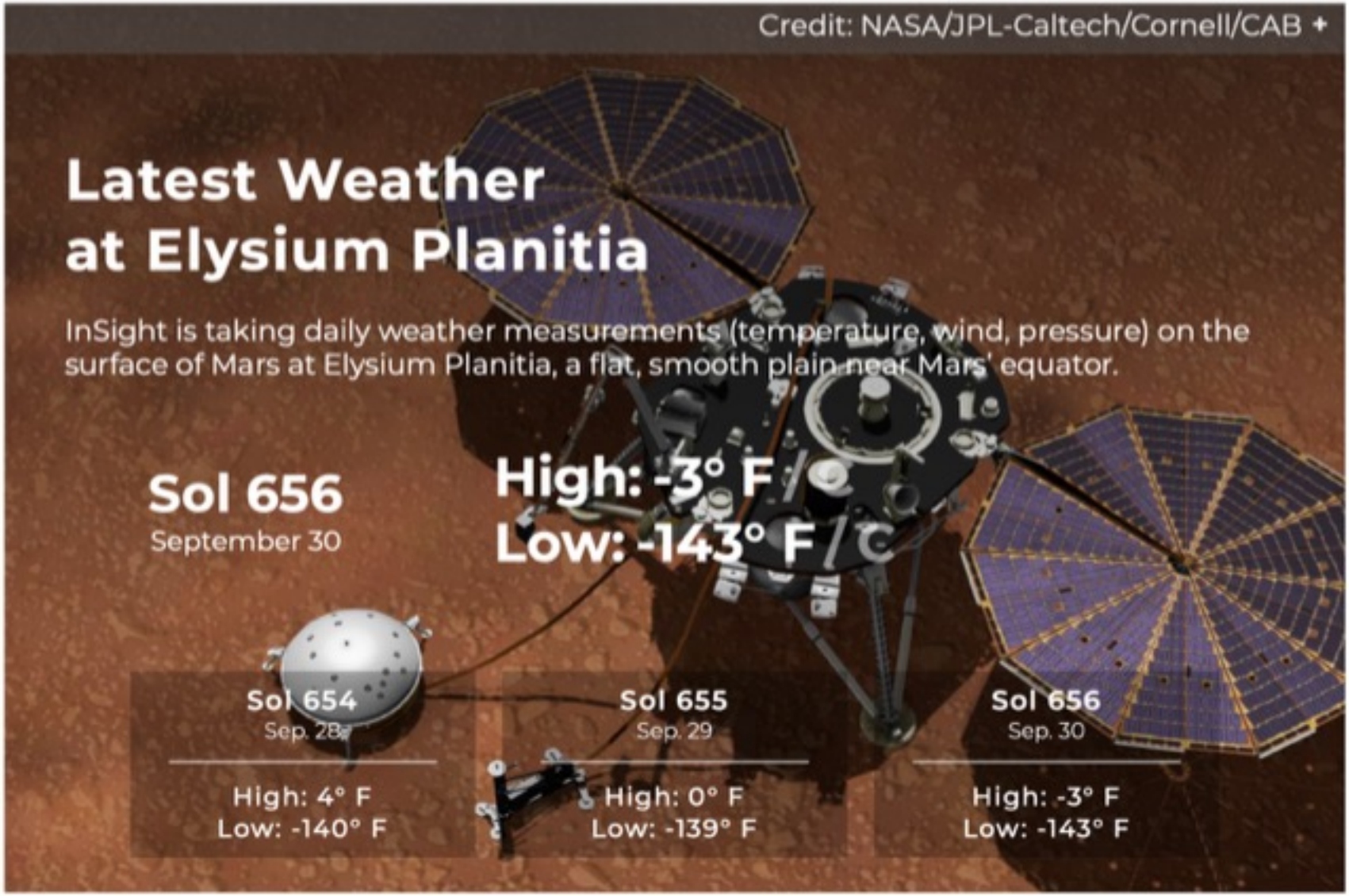


Figure 1. Our novel polymer probes. (A) "Linear Edge" probes, with 32 electrode contacts spaced by 50 µm. (B) "Tree" probes with 32 electrode contacts spaced by 75 µm. (C) Increased magnification of individual electrodes for the thread design in panel A, emphasizing their small geometric surface area. (D) Distribution of electrode impedances (measured at 1 kHz) for two surface treatments: PEDOT (n=257) and IrOx (n=588). IrOx: iridium oxide; PEDOT: poly-ethylenedioxythiophene; PCB: printed circuit board.

Section

More Old News

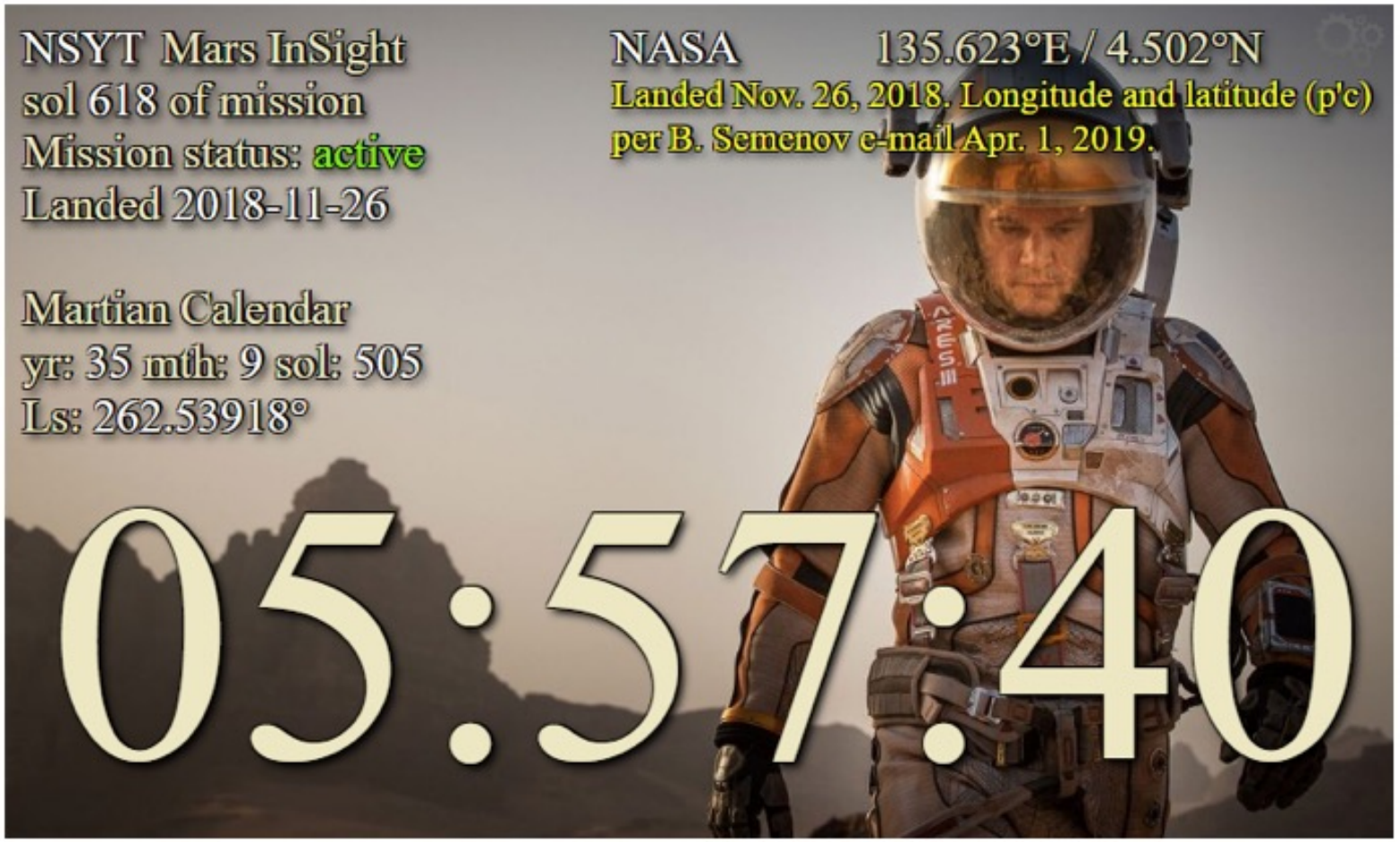
Mars Clocks/Weather



Phil's Mars Weather page shows seasonal trends since March 2019.

Mars Clocks

Phil wrote most of the software himself, with the exception of libraries for the keyboard and FTP which he pulled from GitHub. Here's **all the code**.



The Mars Clock's various skins show details of missions to Mars, as well as the location's time and date

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Microsoft Undersea Servers

Sep 15, 2020

Microsoft Retrieves Its Sea Floor Data Center After 2 Years

PCMag Follow
Sep 15, 2020 · 2 min read ★

Microsoft Undersea Servers

By Matthew Humphries

In May 2018, Microsoft Research decided to test how well a self-sustaining underwater data center would work: The company sealed 12 racks of servers in a cylinder and dropped them in the ocean off Scotland's Orkney Islands. Two years later, the cylinder has been retrieved.

The experiment is called Project Natick, and as the BBC reports, it looks to have been a success. In total, 864 servers were contained in the cylinder, and only eight of them failed. According to project lead Ben Cutler, "Our failure rate in the water is one-eighth of what we see on land." As to why the failure rate was so much lower, Cutler speculates that, "We think it has to do with this nitrogen atmosphere that reduces corrosion and is cool, and people not banging things around."

One of the main reasons for attempting to run an underwater data center is the potential for huge energy savings, because cooling is naturally provided by the cold water surrounding the cylinder. But it seems that wasn't the only advantage, and the significantly lower failure rate is just another tick in the box for this type of data center being taken seriously in future.

2 New Undersea Cables

News Story

Market Chatter: Facebook Teams Up With Google, Regional Companies for 2 New Undersea Cables

7:03 AM 3/29/2021 - MT Newswires07:03 AM EDT, 03/29/2021 (MT Newswires) - **Facebook** (FB) has entered into a partnership with **Alphabet** (GOOGL) unit **Google** and regional telecommunication companies for two new undersea cables to connect Singapore, Indonesia and North America, Reuters reported Monday, citing an official statement. The undersea cables, called Echo and Bifrost, are expected to increase overall subsea capacity in the **trans-pacific by about 70%,** Facebook Vice President of Network Investments Kevin Salvadori reportedly said in a statement. Salvadori said Echo is being built in partnership with Google and Indonesian telecommunications' company XL Axiata. The cable is set to complete by **2023**.Bifrost is being developed in partnership with Indonesia's Telkom unit Telin, and Singapore's Keppel, with completion scheduled by **2024**.

(Market Chatter news is derived from conversations with market professionals globally. This information is believed to be from reliable sources but may include rumor and speculation.)

Intel etc News

Semiconductors in Science and Industry

Semiconductor Industry News

- Intel news:
  - Notebookcheck and others reported System76 updated its Lemur Pro and Galago Pro laptops with 11th Gen Tiger Lake CPUs.
  - SemiAccurate reported Intel has delayed another mainstream server project, Ice Lake-SP. Noting that both dies, the HCC and XCC, are reportedly behind schedule, Demerjian stated "Intel is no longer a viable player in the server market, it is that bad."
  - The Wall Street Journal discussed Intel's past success and recent downfalls with creating its own chips.
  - Intel debuted its first discrete graphics processing unit (GPU) for the data center, based on the Xe-LP microarchitecture, and announced the gold release of Intel oneAPI toolkits coming in December.
- Nvidia news:
  - A supercomputer at Texas A&M University will be powered by Dell Technologies and come equipped with Intel Xeon Scalable processors, Nvidia A100 GPUs, Nvidia RTX 6000 GPUs and Nvidia T4 GPUs.
- Other semiconductor industry news:
  - TSMC's Board of Directors approved spending $3.5B on the company's upcoming fab in Arizona.

Intel etc News

Technology in Science and Industry

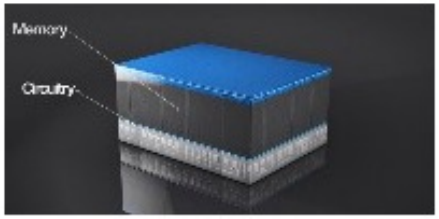
Intel Previews WiFi 7

Wi-Fi 7 will be an extension of Wi-Fi 6 and it will support current Wi-Fi bands. One key feature that Cordeiro highlighted was deterministic low latency for applications that require a quantifiable upper bound of low latency such as industrial and enterprise applications like augmented and virtual reality and VR.

He then pointed to a theoretical data rate when comparing Wi-Fi 6 to Wi-Fi 7: "We are talking about a data rate increase of almost five times [and]if you look at the client side [there is]an order of magnitude of two times," he said.

Semiconductors in Science and Industry

Micron Develops 176-layer NAND Memory



--Micron

Micron's 3D NAND Chip

> Eschewing floating gate in favor of a charge trap approach and combining it with its CMOS-under-array architecture enables Micron to significantly improve performance and density, said Derek Dicker, corporate vice president and general manager of Micron's storage business unit. The company's 176-layer NAND improves both read latency and write latency by more than 35% compared with the company's previous generation of high-volume 3D NAND and a layer count that is nearly 40% higher than its nearest competitor.

More: Micron Leapfrogs to 176-Layer 3D NAND Flash Memory

From EE Times -- Contributed by STEVE ZELENCIK "Z" on 17 November 2020

News

CO[illegible]

Science and Industry

Semiconductors in Science and Industry

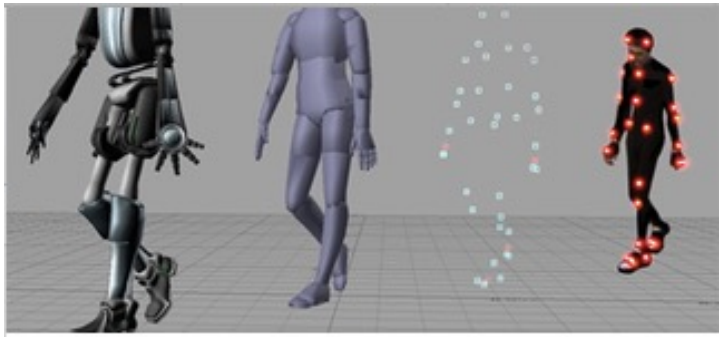
Semiconductor Industry News

Semiconductor company news:

- Intel news:
  - Intel announced the launch of Intel Iris Xe MAX graphics and Intel Deep Link Technology. Coverage was neutral and factual in nature, focusing on which systems and markets Xe MAX and Deep Link are currently available in. Coverage appeared in AnandTech, CNET, Forbes, PCWorld, The Verge and others.
  - HotHardware, PC Gamer, Wccftech and others reported on leaked images of Intel's upcoming processors. YuuKi_Ans at Bilibili posted alleged photos of Intel's 11th Gen Rocket Lake Desktop CPUs, while Videocardz posted supposed shots of an Intel 12th Gen Alder Lake processor.
- Nvidia news:
  - VideoCardz shared photos of a GIGABYTE RTX 3060 Ti Eagle OC, claiming the card will feature 4864 CUDA cores, 182 Tensor Cores, 38 RT Cores and 8GB of GDDR6 clocked at 14Gbps. VideoCardz noted it can't confirm if Nvidia will offer an FE variant, but expects AIB cards to launch on December 2 for around $400 USD.
    - According to VideoCardz, ASUS RTX 3060 Ti cards have been recently submitted to the Eurasian Economic Commission website. The outlet notes that the EEC listings appear "weeks before the graphics cards are ready for launch," which is allegedly Dec. 2.
    - TechRadar reported that RTX 3060 Ti cards are on sale in Saudi Arabia, the only retailer market that has "ignored the official release scheduled" for the cards. A Twitter user shared a video clip of the GIGABYTE 3060 Ti Eagle graphics card packaging, which "would be difficult to fake."
  - VideoCardz claimed Nvidia will move forward with an RTX 3080 Ti, despite the card supposedly being cancelled about a month ago, as Nvidia looks "to counter the AMD Big Navi series." The card is expected to feature 10496 CUDA cores – mirroring the RTX 3090, so it "will certainly not be cheap" – and be supported by 20GB of GRR6X VRAM.
- Other semiconductor industry news:
  - Arm has launched the Arm Cortex-A78C CPU, a new CPU that can support up to eight cores and eight MB of cache to meet compute-intensive workloads.

2020 Turing Award

- **Edwin Catmull** *(pictured)* and **Pat Hanrahan** are awarded the Turing Award for their work on computer-generated imagery.



Computer-generated imagery (**CGI**) is the application of computer graphics to create or contribute to images in art, printed media, video games, films, television programs, shorts, commercials, videos, and simulators. The visual scenes may be dynamic or static and maybe second-dimension (2D), thou

Patrick M. Hanrahan is a computer graphics researcher, the Canon USA Professor of Computer Science and Electrical Engineering in the Computer Graphics Laboratory at Stanford University. His research focuses on rendering algorithms, graphics processing units, as well as

Edwin Catmull

Edwin Earl Catmull is a retired American computer scientist and former president of Pixar and Walt Disney Animation Studios. As a computer scientist, Catmull has contributed to many important advances in 3D computer graphics.

Section

CSUN News

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DR JEFF SOFTWARE
INDIE APP DEVELOPER

Apple + CSUN = $$

FROM THE OFFICE OF THE PRESIDENT

CSUN

- New Building

8-31-21

Earlier today, Apple announced a transformative gift to support CSUN's new Global Hispanic Serving Institution (HSI) Equity Innovation Hub as part of its Racial Equity and Justice Initiative. This is the second largest gift from a single donor in CSUN's history and significantly expands the programmatic scope and potential of our work on this project in conjunction with the $25 million capital allocation for the building announced in the state budget this May.

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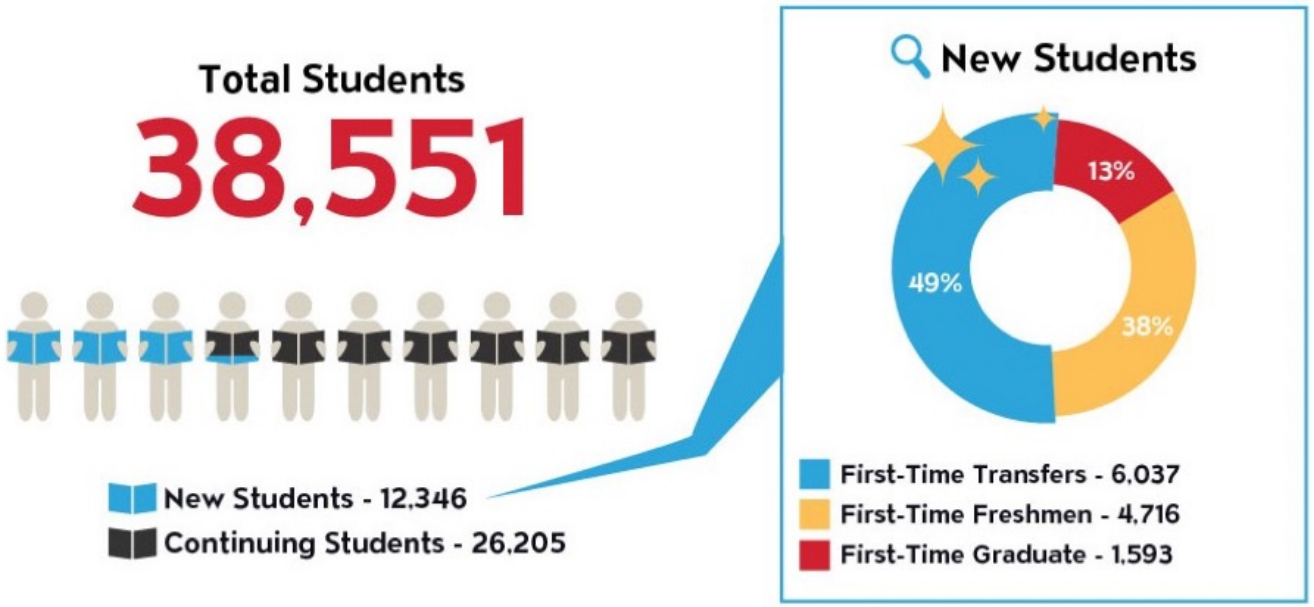
CSUN Enroll Data

CSUN | CALIFORNIA STATE UNIVERSITY NORTHRIDGE | INSIDE COUNTS

Fall 2021 CSUN Student Snapshot

We hope that this Fall semester is off to a good start. Check out a preview of our strong student enrollment this semester.



Top Schools for DIversity

THE WALL STREET JOURNAL.

Inclusive environments

The subset of the WSJ/THE ranking that focuses on the collegiate environment—specifically the racial and ethnic diversity of students and faculty, the percentage of undergraduates awarded need-based federal Pell Grants and the percentage of international students—is led by La Sierra University, a small Seventh-Day Adventist school in Riverside, Calif. About half of La Sierra's undergraduates receive Pell Grants; 48% of undergraduates are Hispanic, 17% are Asian, 12% are white and 7% are Black.

Rutgers University-Newark in New Jersey comes in second in the environment ranking, followed by California State University, Northridge, the University of California, Irvine, and San Francisco State University, all tied for third. In all, 14 schools in California are ranked among the top 20 schools in this category.

World Rankings of CS

2021 TFE Times World rankings of computer science schools
https://www.timeshighereducation.com/world-university-rankings/2021/subject-ranking/computer-science#!/page/0/length/25/sort_by/rank/sort_order/asc/cols/stats

1 Oxford, 2 **Stanford**, 3 MIT, 4 ETH Zurich, 5 CMU, 6 Cambridge, 7 Harvard, 8 NU Singapore, 9 **UCB**, 10 Imperial London, 11 Princeton, 12 Tsinghua China, 13 Georgia Tech, 14T Cornell, 14T Tech U Munich, 16T **UCLA**, 16T Ecole Poly de Lausanne, 18T Nanyang Tech Singapore, 18T UCL (UK), 20 Illinois, 21 Washington, 22 Edinburgh, 23 Toronto, 24 Columbia, 25 CalTech, 26 Michigan, 27 Johns Hopkins, 28 Peking, 29 Yale, 30 Texas, 31 Hong Kong, 32T Chicago, 32T Penn, ... 36 NYU, 37 **UCSD**, 38, **USC**, ..., 48 UBC

CSUN Data

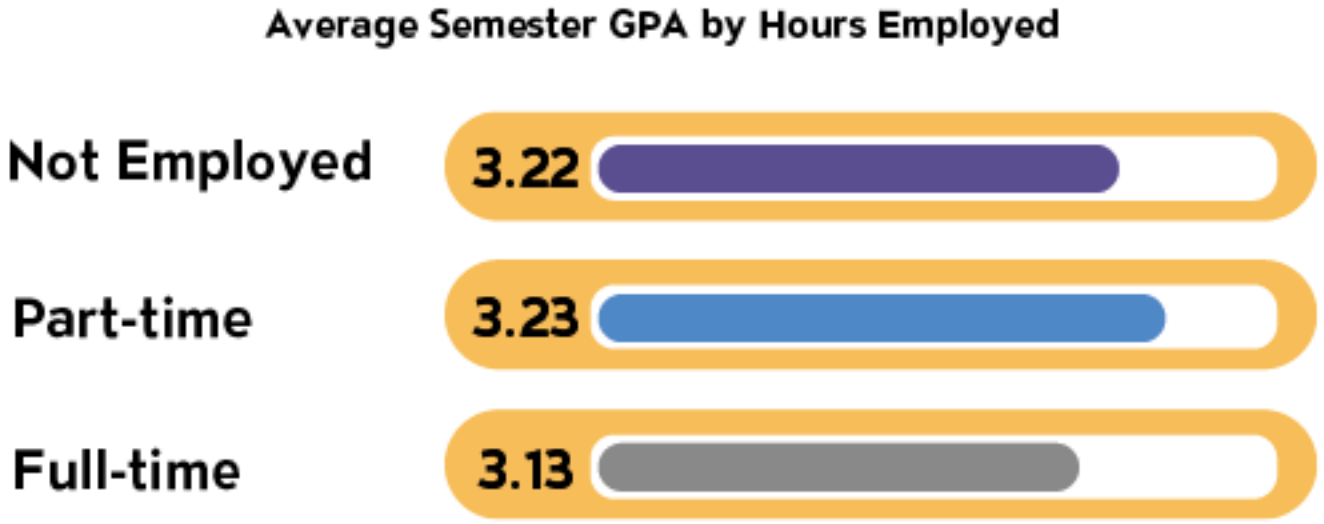
According to senior student responses to the NSSE:

72% of students at CSUN are employed.

Of these students, 44% work 20 hours or less, 28% work 21-29 hours, and 28% work 30 hours or more per week

CSUN Data

Students who work fewer than 30 hours per week look very similar to students who are not employed, but those who work more than 30 hours per week earn lower GPAs.



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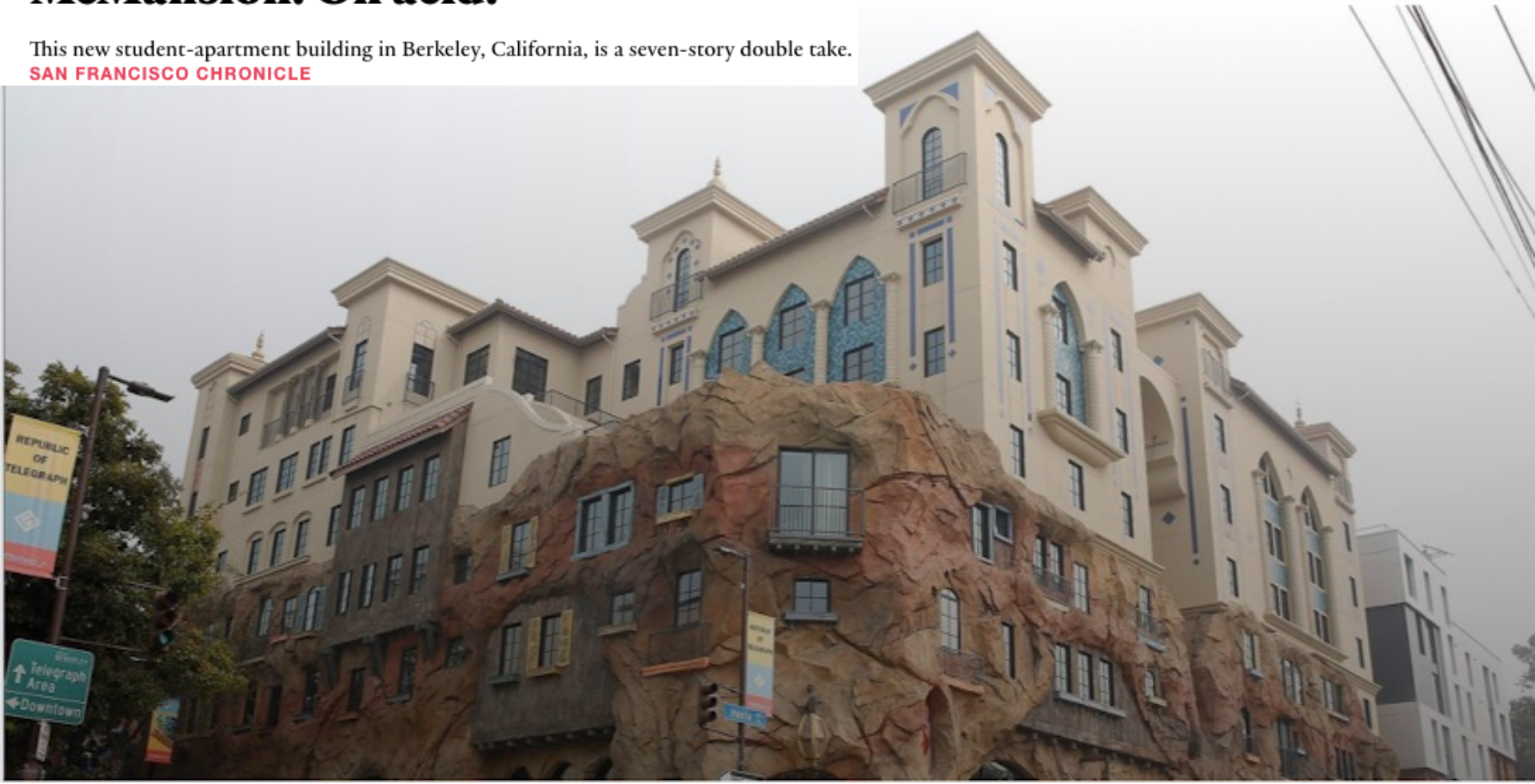
Student Housing

News+

"It's as if Harry Potter and Fred Flintstone decided to build a McMansion. On acid."

Chronicle

This new student-apartment building in Berkeley, California, is a seven-story double take.
SAN FRANCISCO CHRONICLE



Section

Health News

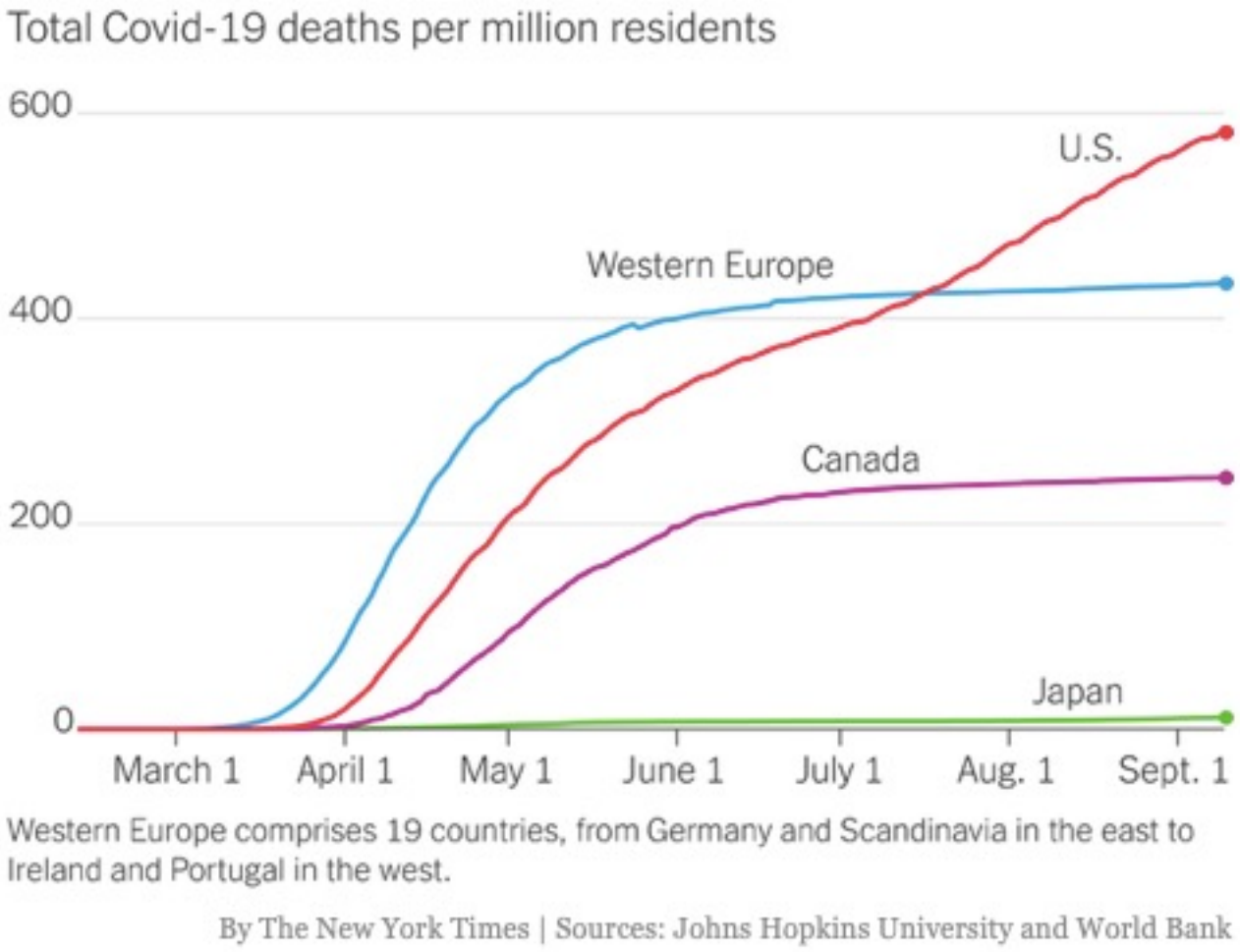
Health

- Defense: antioxidants
- Offense: immune system

- **Vitamin D3**
- Ginger
- Turmeric

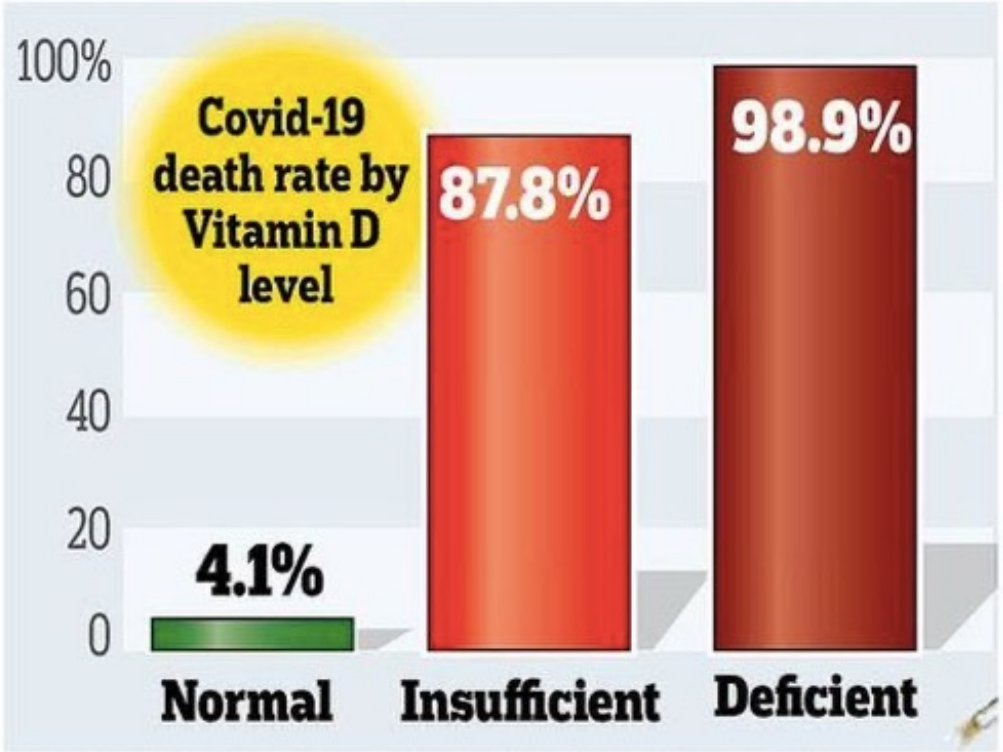
COVID-19 Data

Johns Hopkins



Vitamin D3

Terrifying chart shows how Covid-19 patients who end up in hospital may be almost certain to die if they have a vitamin D deficiency



Nearly 99 per cent of Covid-19 patients who are vitamin D deficient die, according to a terrifying study that adds to mounting evidence that the 'sunshine' nutrient could be a coronavirus life-saver. Scientists in Indonesia analysed hospital records of 780 people who tested positive for SARS-CoV-2, the coronavirus that causes Covid-19. Results revealed 98.9 per cent of infected patients defined as vitamin D deficient - below 20ng/ml - died. Yet this fell to just 4.1 per cent for patients who had enough of the nutrient. Researchers warned the study was not definitive, however, because the patients with high vitamin D levels were healthier and younger. It comes as health chiefs are urgently reviewing the use of vitamin D as a coronavirus lifesaver, with several studies suggesting that Covid-19 patients are far more likely to die if they have a deficiency. The National Institute for Health and Care Excellence is conducting a 'rapid evidence review' of the issue - and publication is expected as early as next week.

UC Requires Flu Shots