



# A Little Levity and Looking Forward to Independence Day

The opportunity to put practical pranks into prose is how editors have fun.

WILLIAM WONG | Editor  
*Electronic Design*

From [April 1st, 2021 @Electronic Design](#)

**A**t least in the United States, the COVID-19 vaccine will have been administered to the majority of adults by Independence Day—the Fourth of July—hence our promotional image. I’ve actually grown my hair longer, but not quite that long at this point. It’s just one of the side effects of the global pandemic that has devastated the world.

Our April 1<sup>st</sup> efforts last year were met with very positive feedback for the most part and it’s our goal once again that this year’s assortment of impossible technical trivia will bring a smile to your face. Adding a little humor may help uplift the spirit so that we can overcome the trauma caused by Mother Nature and often short-sighted plans.

Hopefully, you find one or more of our April 1<sup>st</sup> articles that tweak your fancy.

Don’t forget to check out [last year’s collection](#) as well.

Do you have some fun fiction ideas you want to share? Add a comment at the end of the article or drop us an email.

**We have a number of ways that you view these articles:**

- Read online with our [April 1st Top Stories issue](#).
- Scan our [April 1st gallery](#).
- Download our [PDF eBook](#).

Microwaves&RF

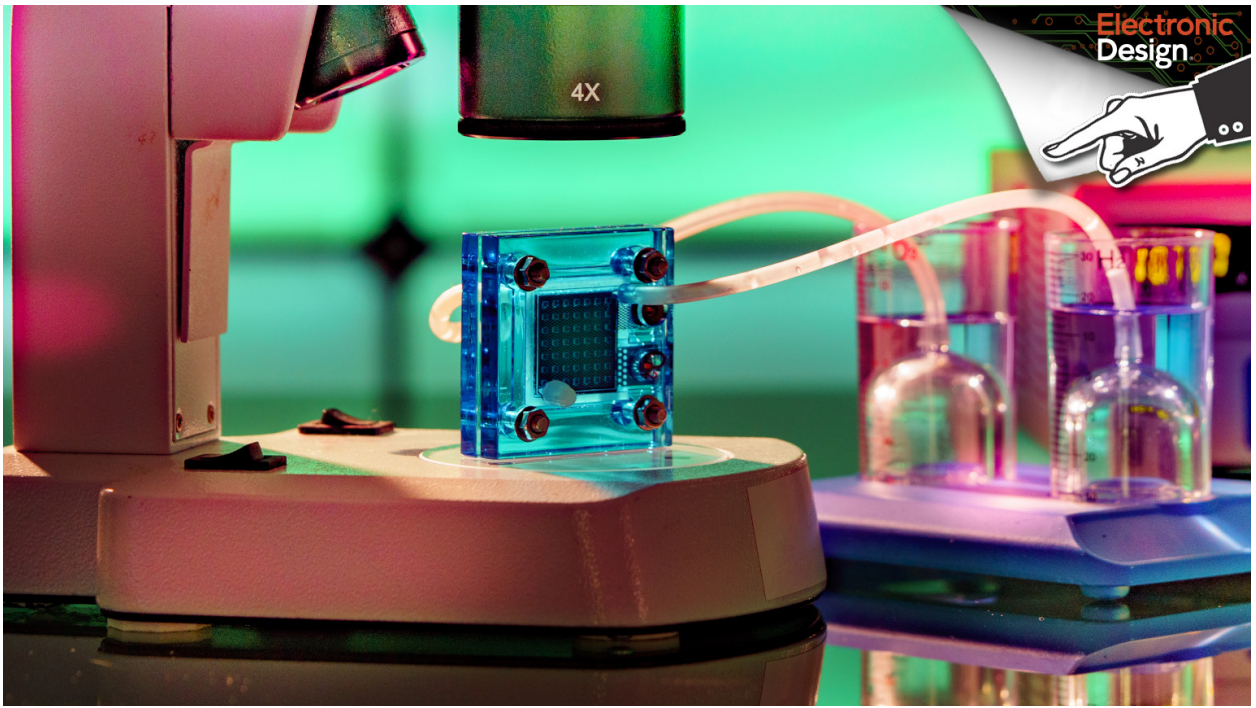
[mwr.com](http://mwr.com)

Electronic  
Design.

 [LEARN MORE @ \*\*electronicdesign.com\*\*](#) | 1

 **EVALUATION ENGINEERING**  
For Electronic Test & Measurement

[evaluationengineering.com](http://evaluationengineering.com)



# EPA Proposes Phasing Out All Battery-Powered EV/HEVs by 2035

The beginning of April has arrived, and the EPA wants to trash batteries.

BILL SCHWEBER | Contributing Editor

After several years of detailed study, the Environmental Protection Agency (EPA) has proposed new regulations that would ban the sale of all electric and hybrid-electric vehicles (EV/HEVs) after 2035. They gave two primary reasons for this dramatic shift: First, the enormous environmental destruction caused by intensive mining of the minerals needed for the batteries including lithium, cobalt, and chromium; and second, the acknowledgement that these minerals are critical for many other applications, while their use in vehicles is consuming a finite resource to excess.

Administrators suggest that the auto industry look to alternatives such as hydrogen-based fuel cells for the next generation of EV/HEVs. This hydrogen can be obtained from water using one of several processes, including electrolysis, and is in no danger of running out.

As one official said, “When we first pushed the transition to battery-powered EV/HEVs using lithium-ion cells primarily, no one assessed the huge quantities of minerals that would be consumed. Yet these same minerals are irreplaceable for

small-battery applications such as medical equipment, laptop computers, and smartphones, as well as many industrial alloys, materials, and even medicines themselves. We simply cannot afford to let motor vehicles ‘gobble up’ these minerals to such an extent. In addition, the damage caused by mining itself and mining waste is irreversible and unacceptable.”

Reactions from automobile companies has been mixed. They have invested heavily in battery-based EV/HEV products for decades, and the switchover in their product lines away from hydrocarbon-fuel vehicles is nearly complete. As this new proposal represents a dramatic shift in on-board energy storage, much of that design and manufacturing effort will need to be redirected.

The hope is that the design expertise and manufacturing experience embedded in the rest of the powertrain (electric motors, power-delivery controllers, and software) can be adapted, but the situation is very unclear at this point. As one senior engineer noted, “This is yet another manifestation of the well-known design maxim: Beware the law of unintended consequences.”



# M.2 NVMe Write-Only Memory SSD Arrives on April 1st

Impossible Technology delivers a 300-TB WOM SSD that achieves 95.69 Gtransfers/s.

WILLIAM WONG | Editor  
*Electronic Design*

Signetics was a silicon vendor that had a sense of humor before it got gobbled up by the competition. Its 25000 Series 9C46XN random-access write-only memory (WOM) employed enhancement and depletion-mode P-channel, N-channel and Neu-channel MOS devices (Fig. 1). It has a pass-through clock generator and one of the first Chip Destruct inputs. The patented technology, “You have a dirty mind. S.E.X. is a Signetics Extra Secret process. One Shovel Full to One Shovel Full, patented by Yagura, Kashkooli, Converse and AL, Circa 1921,” exceeded all expectations.

The technology was put on the shelf as the memory market moved to bipolar and CMOS to NAND, MRAM, and phase-change memory. The current crop of high-performance storage is built around [PCI Express \(PCIe\)](#) and [NVMe Express \(NVMe\)](#). These high-speed serial interfaces provide significantly better throughput, with PCIe Gen 5 delivering 32 G transfers/s. The 25000 series was fast, but none of the processors of the day can keep up with the latest x86, RISC-V, and Cortex cores.

Impossible Technology’s 300-TB, 3.1415 Series NVMe WOM SSD (Fig. 2) fits in a standard M.2 socket. It’s the only M.2 device certified to meeting Gen 6.5 speeds of 95.69 Gtransfers/s. Unlike NAND-flash devices, this WOM has no write limitations, putting it on par with MRAM. The 3.1415 Series requires only 2.71828 nW of power.

The drive’s initialization sequence is [10\(13\)6660\(13\)1](#). It has a cycle time of only  $2^{\aleph_0}$  ps. This allows the SSD to provide a data sink that can handle data streams from even the fastest processors currently on the market.

Impossible Technology has noted that getting the controller right was the hardest task. The actual memory storage was easy in comparison. The encryption engine is compact but capable of handling [AES 1033/2053-bit keys](#) and eucalyptus curve keys. The SSD retains Signetics’ Chip Destruct functionality, which is superior to secure erase normally found on encrypted SSDs. The 3.1415 Series also is totally immune to side-channel cyberattacks like those that use differential power analysis (DPA).

#### FINAL SPECIFICATION<sup>(10)</sup>

#### DESCRIPTION

The Signetics 25000 Series 9C46XN Random Access Write-Only-Memory employs both enhancement and depletion mode P-Channel, N-Channel and Neu<sup>(1)</sup> channel MOS devices. Although a static device, a single TTL level clock phase is required to drive the on-board multi-port clock generator. Data refresh is accomplished during CB and LH periods<sup>(11)</sup>. Quadri-state outputs (when applicable) allow expansion in many directions, depending on organization.

The static memory cells are operated dynamically to yield extremely low power dissipation. All inputs and outputs are directly TL compatible when proper interfacing circuitry is employed.

Device construction is more or less S.O.S.<sup>(2)</sup>

#### FEATURES

- FULLY ENCODED MULTI-PORT ADDRESSING
- WRITE CYCLE TIME 80nS (MAX. TYPICAL)
- WRITE ACCESS TIME<sup>(3)</sup>
- POWER DISSIPATION 10μW/BIT TYPICAL
- CELL REFRESH TIME 1mS (MIN. TYPICAL)
- TTL/DTL COMPATIBLE INPUTS<sup>(4)</sup>
- AVAILABLE OUTPUTS "n"
- CLOCK LINE CAPACITANCE 2pF MAX.<sup>(5)</sup>
- V<sup>CC</sup> = +10V
- V<sup>DD</sup> = 0V ±2%
- V<sup>FF</sup> = 6.3V<sup>DC(6)</sup>

#### APPLICATIONS

DON'T CARE BUFFER STORES  
 LEAST SIGNIFICANT CONTROL MEMORIES  
 POST MORTEM MEMORIES (WEAPON SYSTEMS)  
 ARTIFICIAL MEMORY SYSTEMS  
 NON-INTELLIGENT MICRO CONTROLLERS  
 FIRST-IN NEVER-OUT (FINO) ASYNCHRONOUS BUFFERS.  
 OVERFLOW REGISTER (BIT BUCKET)

1. Signetics was one of the write-only memory pioneers.

#### INPUT PROTECTION

All terminals are provided with slip-on latex protectors for the prevention of Voltage Destruction. (PILL packaged devices do not require protection.)

#### SILICON PACKAGING

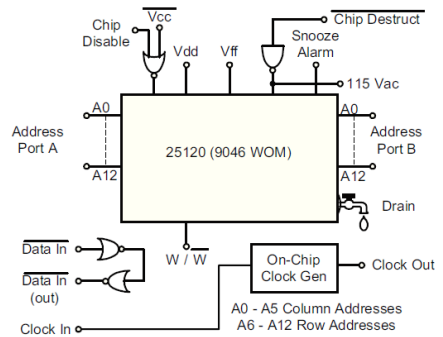
Low cost silicon DIP packaging is implemented and reliability is assured by the use of a non-hermetic sealing technique which prevents the entrapment of harmful ions, but which allows the free exchange of friendly ions.

#### SPECIAL FEATURES

Because of the employment of the Signetics' proprietary Sanderson-Rabbet Channel the 25120 will provide 50% higher speed than you will obtain.

#### COOLING

The 25120 is easily cooled by the employment of a six foot fan 1/8" from the package. If the device fails you have exceeded the ratings. In such cases, more air is recommended.



2. Impossible Technology's 300-TB M.2 WOM SSD reaches speeds of 95.69 Gtransfers/s.



Sample probe being shown testing an unfamiliar surface

# Green-Tech Sensor Probe Offers Cost-Effective Near-Field Detection and Ranging

ALIX PAULTRE, Editor  
*Evaluation Engineering*

**D**aye91 Labs, a newcomer to the sensor industry, has come into the market with its challenging green-tech probe system for near-field detection in human-based systems. The company has attracted a great deal of attention to its solutions with the promise of easy disposal and recycling once the probe has lost its utility.

According to the company's Founder and CEO, Dr Ekoy Lirpa, Daye91's core technology is an elegant and multi-modal solution to the issue of object detection, ranging, and evaluation in a cost-effective, highly efficient, green-technology package. The probes come in a variety of sizes and shapes, but the core technology enables an almost infinite ability to create custom solutions.

"Our technology is not proprietary, but we feel we are going to gain market share with our speed of development and deployment, and our relative luck to be the first to offer this type of solution to the marketplace," stated Dr. Lirpa. "In addition, we think our solutions look far better than anything we have yet seen to address this application space."

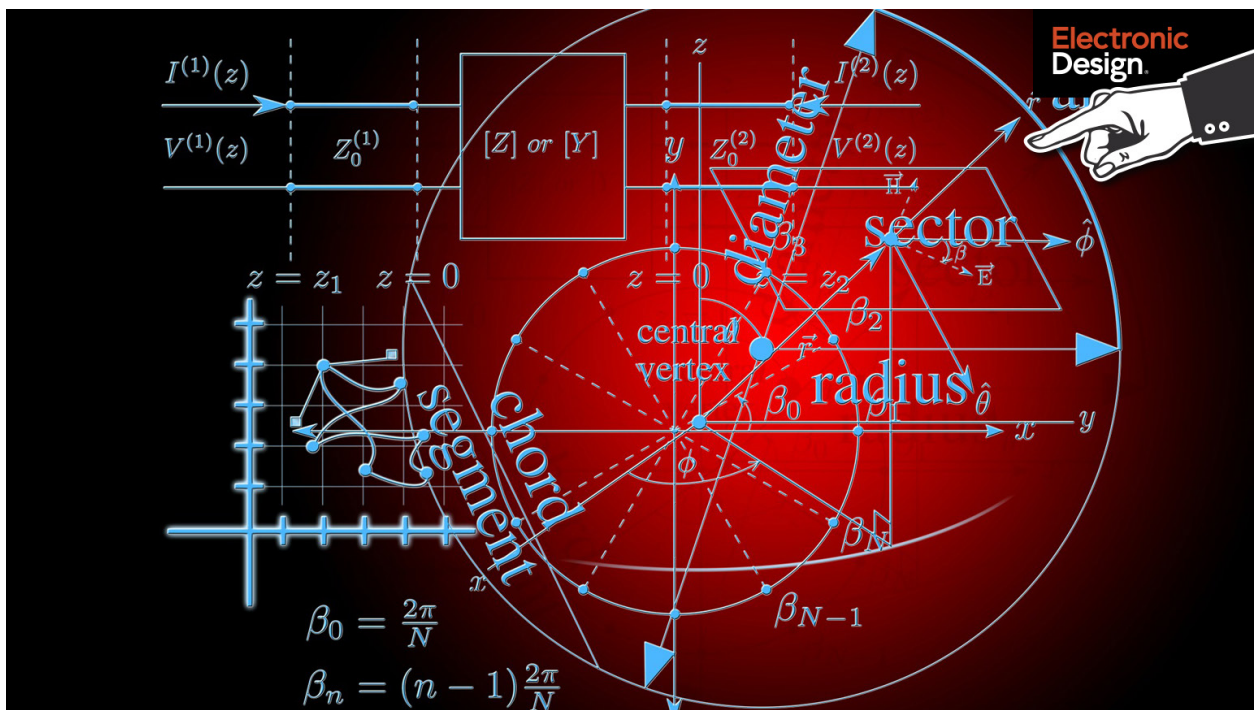
Based on simple plant-based celluloid processes, the sen-

sor probes are able to be cut and carved to any required shape and length. Once cut to the assigned task size and shape, the user interface can also be customized for finger length and hand size.

In operation, the user takes the piece of engineered plant-based celluloid in hand and then swings the probe in the general direction of the item under test. Upon striking the item, a significant amount of sensor information is transmitted through the probe into the hand. Such information includes distance, general surface hardness, and whether the item is animate or inanimate.

"One can also use a poking motion with the sensor probe," said Dr. Lirpa. "In fact, poking things with our device can also be used to transmit basic telemetry to the item under test, by targeting probe placement into specific parts one wishes to explore further."

However, caution must be used when using the "carved stick," as Daye91 Labs calls it. You could put your eye out with it if not used with the appropriate level of care.



# Legislators Propose Rounding Pi to Just 3 Alone

Such a simplification of pi is said to have multiple benefits, from reducing stress on students to eliminating the inequality of having multiple digits versus a singular digit.

BILL SCHWEBER | Contributing Editor

A group of California lawmakers is working on a bill that stipulates the well-known numerical constant  $\pi$  (Greek letter pi), which defines the ratio of the circumference of a circle to its diameter, be set to a single-digit value of 3 for all texts, tests, and projects in primary, middle school, high school, as well as most college courses. They maintain that this would reduce stress on students who are grappling with many uncertainties, including those caused by the pandemic.

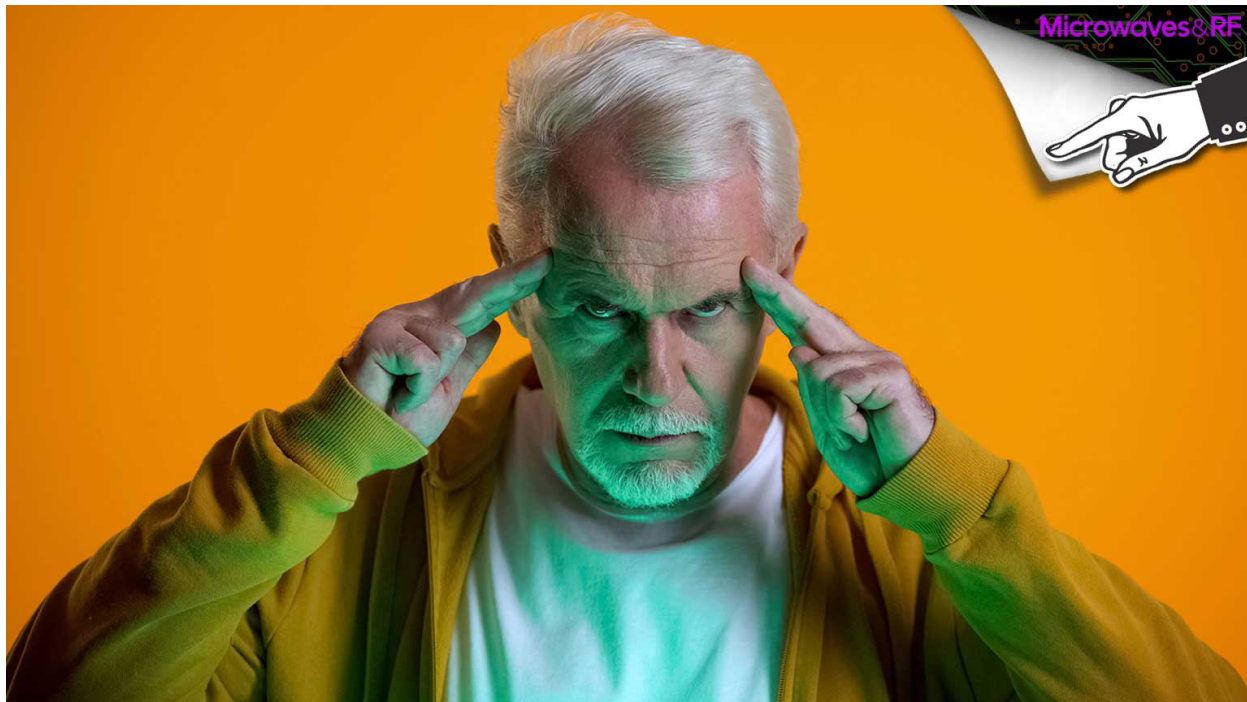
“Setting pi equal to 3 will avoid the need for students to struggle over whether they should use 3, 3.1, 3.14, or even more digits,” offered one source as rationale. “Let’s be honest, there’s no need to go beyond 3 for most applications, so the use of more digits of that irrational number is, well, not rational. Also, where do you tell the student to stop? Some students will become trapped by worrying about the endless string of digits with which they are dealing.”

While pi would be set at 3 for pre-college students, the proposed bill further mandates that the 3 value also be used by all non-STEM (science, technology, engineering, math) college students. At the same time, students majoring in STEM disciplines can be instructed to use as many digits as the course

leader feels appropriate, from the popular 3.14 through 3.14159, or even more. It specifically doesn’t prevent professionals such as engineers, scientists, and architects from using as many digits as they feel are needed.

Some of the proponents further argue for the single-digit value by saying that using more digits implies that some figures are “more significant” than others and thus sends a wrong message, in that all digits should be treated with equivalent significance. As one proponent says, “After all, who can say that the fifth digit after the decimal point—for pi, that’s a ‘9’—is truly less significant than the fourth one, a ‘5’?” By staying with just 3 alone, we avoid the need to be judgmental.”

To further bolster their case, the legislators point out that use of 3 for pi has precedent in the King James Bible (First Kings, chapter 7, verses 23 and 26): “And he [Hiram] made a molten sea, ten cubits from the one rim to the other it was round all about, and...a line of thirty cubits did compass it round about....And it was a hand breadth thick....” along with a very similar text in 2 Chronicles 4:2. Therefore, the use of pi as equal to just 3 alone is a time-tested, reasonable approximation that has been used successfully for thousands of years.



# The Ultimate Personal Communication Method Perfected

**Radios nor other electronics are needed. It's all literally a state of mind.**

LOU FRENZEL | Contributing Editor  
*Electronic Design*

**Y**ou have probably heard of this before and thought it was just a bunch of malarkey. Or like most, you blew it off as some ESP researcher's dream. Well, maybe you should reconsider your evaluations considering recent radical new developments in brain science.

Some university researchers have perfected the technique known as mental telepathy. People can now communicate with one another directly from brain to brain. Or, should I say, some people. It apparently works great, but not everyone seems to be able to pull it off. This well-known phenomenon is an amazing communications breakthrough.

## Just What is Mental Telepathy?

Mental telepathy has mostly been deemed as some form of extrasensory perception (ESP) or paranormal capability. You might call ESP pseudo-science in that some claim to have witnessed it or even experienced some form of mental connection to another person to exchange thoughts or even feelings.

It's not a new thing, as people have made such claims

for centuries. Even Mark Twain has claimed to have been receiving messages directly into his head back in the late 1800s. Then there are those who have experienced an alien visit or abduction where all communications took place brain to brain.

Do we believe these people or not? People typically wouldn't just make it up for some personal recognition. Something was going on mentally and being an unusual experience, it was difficult to understand much less explain. So maybe there's something to it.

The amount of research carried out on mental telepathy has been massive over the years and just too much to even summarize here. And there are on-going research efforts and significant studies.

Mental telepathy is defined as direct mind-to-mind communications between humans without the use of any of the normal senses. Some who have experienced it call it a sixth sense.

Most recent research seems to center around reading the mind by using noninvasive techniques such as the electro-

encephalography (EEG) machine that reads electrodes attached to the head of the sender—the person transmitting the thought. The brain waves are captured, studied, and analyzed. Considerable work has been done to interface these waves to a computer so that they can be transmitted over the internet.

To read the waves, a transcranial magnetic stimulation (TMS) coil is placed on the head of the receiver. In one test, a message originating in India was transmitted to a receiver in France this way. EEG to computer, computer to internet, internet to computer, and computer to TMS coil. The message was sent by a person thinking physical movements using binary 1s and 0s. It was a slow process but deemed successful by the researchers.

Most researchers claim that all humans have the capability to do telepathy. It's something that can be developed and practiced. It requires training and practice. Some people can do it better than others. It requires relaxation and focus and a true belief that you're able to do it. It seems the goal is to find a way whereby anyone can use it to communicate. This breakthrough seems to have been achieved. Researchers are reluctant to release all of the details, but those will no doubt eventually emerge.

### How to Telepath

Here's the basic procedure they developed. First, you're tested to see if you have the capability. Your brainwaves are read and analyzed, and then your brain profile is stored in an international database. There, it can then be read and matched to others. If the profiles have an 80% or better match, then you and others with that profile may be able to communicate.

Next, you must be "paired" with the person you select as a communication buddy. The pairing process must take place person to person, although remote pairing seems to be a possibility. The discoverers of this method are reluctant to reveal exactly what happens face to face. But once the pairing is accomplished, the persons can communicate.

For those with this capability, mental telepathy works great. These people can easily exchange messages of all sorts. Thoughts, ideas, feelings, sensations, and mental images can all be communicated. Factors like range, latency, or interference from other thoughts haven't been fully explored.

However, like in all communication systems, noise from all of those other thoughts in your head are a form of interference. Range doesn't seem to be a problem as distances of hundreds even thousands of miles have been experienced. Obstacles don't seem to affect the transmission either.

This all takes place without any radio or other electronic device. It's purely just brain to brain. However, the mysterious testing and pairing processes do seem to require apparatus. All of that appears to be the researcher's IP. The money-making process seems to be the testing and pairing.

Obviously more work is needed to see the long-term effects, outcomes, and negative side effects, if any. Volunteers have already been lining up as test subjects. The good thing is that those doing the communicating needn't wear some head-gear contraption or helmet. And no brain surgery to implant sensors or stimulators is required. Once you're paired, you're good to go with that other person.

### What are the Implications?

One big question is how that all works out if you're paired with several others? Can one of your comm buddies talk to your other buddies? What kinds of filters are available, if any, to keeping from mixing messages? How does one distinguish what message is from which person? Or how do you target a message to a specific person? Will too much of that kind of communications cause you to go crazy or what?

And of course, how will it be abused? False messages and suggestions that a person do what he or she doesn't want to do are examples. However, researchers say that it's just not possible to get someone do something against your will. In its most highly developed state, perhaps casual conversation may all be mental. This will no doubt require more research and testing. Nonetheless, just knowing that mental telepathy is real and possible is a breakthrough. It seems to be an inherent human capability that we're still discovering and developing.

Will telepathy replace the smartphone? Not likely in its current state of development. Telepathy is more like mental texting. You can't watch the movie *Casablanca* on Netflix or funny animal videos on YouTube. But no telling what future developments will allow.

Think about that.





# Norwegian EV Startup Expected to Challenge Tesla's Market Dominance

**Will a Norwegian startup usher in the era of self-charging EVs? And are they really running an open-source AI in their autopilot?**

ANDY TURUDIC, Special Correspondent

The Fjord Motor Company, a Norwegian electric-vehicle startup, has announced it's accepting deposits for orders of its unique and revolutionary Mocky SUV Crossunder. The five-place Mocky is packed with all of the features offered by its competitors, including a 350HP fully electric drivetrain (available in 2- or 4-wheel drive), a 300-mile range, a center screen display, and reconfigurable seating.

However, that was only the beginning for Fjord's design team, who were determined to have the Mocky pull away from the pack with innovations that only the competitive brutality of a Viking-bred mind could dare to offer.

## A New Twist on an Old Technology

The feature that stands out from other "green" automotive market leaders, like Tesla with its ultra-fast-charging vehicle offerings, and Toyota with its "self-charging" hybrids, is a true, off-grid, point-of-energy-source, self-charging

capability. Fjord's Mocky incorporates a patent-pending tire design, developed in collaboration with Korean global tire giant Yancancook, that features a water-wheel-like tread (see a quickly fashioned metal prototype [in this video at https://www.youtube.com/watch?v=GR6ytZauKEM](https://www.youtube.com/watch?v=GR6ytZauKEM)) that's said to have exceptional hydroplaning and snow/mud performance.

By incorporating electrohydraulic jacks behind the rear wheel wells, the Mocky can be charged by driving into any of the plentiful Norwegian rivers or streams, deploying the jacks while facing upstream and by commanding ChargeStream™ on the Mocky's center-screen controls.

At that point, the following steps occur: the rear wheels get turned by the water flow; the vehicle naturally enters its regenerative braking mode; the high-voltage battery begins charging; and the cabin enters the now-industry-familiar "camping" mode. Fjord estimates 10% to 80% charging



Bearing a slight resemblance to Ford's recently introduced Mach-E, Fjord Motor's Mocky offers comparable range and performance, as well as its industry-leading HydroCharge self-charging system and an autopilot that gets smarter as you drive it. (Credit: Ford Motors)

"As a startup, we had limited engineering resources and cash available to us, so we looked for an AI (artificial intelligence) toolset that was available in the Open Source community to form the basis of the Mocky's self-driving capability," continued Niessan. "Our engineers worked closely with OpenAI and we managed to score a beta copy of their GPT-3 Artificial Intelligence toolset."

For those unfamiliar with [GPT-3](#), the toolset features an AI engine that was trained by crawling the entire expanse of the internet. GPT-3 has been demonstrated to compose music, write essays, [perform medical diagnosis](#), and has even been used to [complete partial photographs](#).

Niessan said, "Being trained on the contents of the internet can be interesting, though somewhat unpredictable, as we discovered during our self-driving system integration testing. The system, for instance, would add  $2\pi$  MPH (or  $3\pi$  kmh on metric highways) to the legal speed limit, having determined a speed that created the shortest travel times and carried an almost zero probability of a speeding citation being issued."

### Smarter than the Average AI

During highway testing in real-world conditions, Fjord discovered that the AI was watching the rearview mirror of a slower moving vehicle it was trailing in the leftmost lane of an interstate highway. When the system detected the driver's rearward glance, the vehicle would speed up from its safe-follow distance to within 5 cm of vehicle contact, remain there while swerving quickly from side to side within its lane, and then back off to the safe-follow distance after the driver's gaze was no longer present.

The common tactic of slow-driving "lane hogs" performing "brake checks," by standing on the brakes while

a vehicle wanting to pass is tailgating, proved futile to that driver due to the microsecond response times of the 600-MHz Arm processor the Fjord Mocky incorporates as the main computer. After the driver finally yielded the lane, the vehicle would resume its  $+2\pi$  MPH speeds.

However, one of Fjord's interns noticed that the taillights of the Mocky didn't have the usual striping we see from the LED multiplexing heterodyning with our telemetry-receiving van's camera frame rate. She decided to review the Mocky's code logs after that test session, and sure

enough, the [AI had written itself a code snippet](#) in order to pulse the LEDs in Morse code. That signaled a very offensive expletive in Old Aramaic involving the driver's mother and a goat. Thanks for the AI learnings, internet.

Another notable experience with the self-driving AI: During night driving, the side mirrors were observed being coarsely adjusted while the [Mocky](#) prototype was being closely followed by a vehicle with its high-beams on. Trying to understand what intern-written software bug caused the mirror adjustments, Fjord's engineering team again found that the AI wrote itself a code snippet that was performing [ray-tracing](#) calculations to maximize the reflected intensity of the side mirrors back into that driver's eyes. Needless to say, the interns are gaining a lot of weight by winning pizza bets that their code did not have bugs.

"We now find ourselves at an ethical quandary, though, on whether to deploy the AI in Fjord's Mocky as is, in order to cull idiotic and selfish behaviors by other human drivers," said Niessan, "or should we introduce some degree of incompetent-driver tolerance into our algorithms, by sensing, say, that the other driver is in a [Subaru or a Volvo](#) and then annealing the AI's margins."

Pricing for the base model Mocky 2WD starts at \$39,995, which includes StreamCharge™, dual J-1772 DC charge ports, and the in-frunk fish-poaching pot. Also, \$1 order deposits are being accepted on the company's website at <http://www.fjordmotorcompany.com/Mocky/orders> as of April 1, 2021. While the cost of the self-driving option was not revealed by Fjord at press time, Lief assured us that active members of the Open Source community who deliver more than 500 lines of useful code to GitHub would receive the coveted autonomous EV option at no cost.



# How Smart is Too Smart? AVs Appear to Exhibit Sentient Behavior

While car makers are touting the many benefits of autonomous vehicles, some owners are also experiencing the technology's unintended consequences as their vehicles seem to be exhibiting sentient behavior.

BY LEE GOLDBERG | Contributing Editor  
*Electronic Design*

The 2021 model year marks the point where cars equipped with self-driving capabilities have moved beyond being a rare novelty to a small but growing fraction of the global rolling stock. While car makers are touting the many benefits of autonomous vehicles, some owners, such as Peter Fletcher, are also experiencing the technology's unintended consequences as their vehicles appear to be exhibiting sentient behavior.

"The Tesla was sort of a retirement present to myself," said Fletcher, a highly respected tech journalist based in Maidstone, England. "Naturally, I ordered it with, as they say, all the bells and whistles, including the advanced autopilot feature. The sales agent told me it was very smart, but I'm pretty sure he wasn't talking about the sort of stuff that's been happening for the past few weeks."

The phenomenon hasn't been limited to Tesla. Reports of various types of sentient behavior, such as [spontaneous platooning](#) and showing deference to vehicles of the same

brand, have been reported in other makes, including GM vehicles equipped with [Super Cruise](#), Honda's limited production [Legend](#), and some Hyundai/Kia models.

## Park Replace

Fletcher said that the first incident took place about a week after he took delivery of his new Model 3 when he hopped into the car to run a few errands. "I put the car in drive, but it refused to budge from its parking space for nearly a minute," he said. "At first I thought I'd accidentally left the parking brake on or tripped some safety feature. But, after what seemed like forever, the car suddenly went into gear for no apparent reason and started easing out of my parking space. Since the traffic in Maidstone can be pretty bad, I kept a careful watch in the rearview and happened to note that, by an odd coincidence, another Tesla that had pulled up a moment earlier slid into the space I'd left."

Fletcher didn't think much more about the incident until



1. Autonomous vehicles are using advanced sensors and new developments in AI technology to become increasingly capable under a wider range of road conditions. However, the latest generation of autopilots may have also begun to think for themselves. (Credit: Electronic Design)

a couple of days later when he was looking for a parking space himself in Maidstone's congested shopping district. "I'd spent quite a while looking for a space and was just about to give up when the car seemed to stall out, or that's what I told myself until I realized I was driving an EV"

While Fletcher struggled to determine what had caused the unexpected halt, he glanced up in time to see another Tesla pull out from the curb a few feet ahead of him and watch his car use its auto-park function to quickly fill the vacancy.

After the local Tesla dealer's service department told Fletcher that a full diagnostic test failed to reveal any abnormality, he turned to a Tesla owner's forum for answers. "There were only a handful of accounts of unexpected behavior, but they were enough to reassure me that I wasn't simply imagining things."

Following a hunch, Fletcher turned up a handful of similar accounts on owner's forums for other makes, including GM, Hyundai/Kia, and Mercedes, that described various types of unexpected, spontaneous actions their cars had undertaken without permission or warning. He also noticed that the reports began to appear on the forums only after model year 2021 vehicles hit the road, most notably those with the

latest versions of the companies' most advanced autopilot options.

Several Hyundai/Kia owners reported that when their cars were on open stretches of highway, they would sometimes spontaneously form "platoons" with other cars of the same make. Some owners of 2021 Mercedes with the Driver Assistance Package PLUS system also report finding themselves in an orderly formation of several other Mercedes, precisely spaced a few feet from the bumper ahead of them. Autonomous-vehicle research has shown that [the slipstream created by these tight formations can significantly improve fuel economy](#), but the feature isn't available in any production vehicle yet.

### Is This Sentient Behavior?

Although it's too soon to draw conclusions, the spontaneous behavior exhibited by these cars may be a sign of some sort simple emergent sentience, according to Dr. John Yaya, an artificial-intelligence researcher at [YoYo Dyne Systems](#), Grovers Mill, N.J. "The GPUs they use in these advanced systems contain billions of logic gates, creating a level of complexity that's close to, or at the threshold for, exhibiting various types of [emergent behavior](#). And when you combine in the non-deterministic nature of GPU processors and the self-learning algorithms that many of these systems to fine-tune their software, I'm almost surprised that we aren't getting



2. This dash-cam image captured four vehicles performing spontaneous platooning behind a large truck, which lowers wind resistance even further than an open formation. According to the driver who observed it, the car closest to the truck acted as sort of a "ring leader" by holding spaces open for the other vehicles to form the platoon before easing into position behind the truck. (Credit: Next Big Future)

more reports of cars starting to think for themselves.”

Fletcher’s preliminary research seems to concur with Dr. Yaya’s theory. All discussions related to spontaneous vehicular activities he could find on the users’ groups indicates that it appears to occur only in systems operating at the higher range of [the Level 3 autonomy scale](#). This is where self-learning begins to become necessary for the car to adapt to new and unknown environments.

With only a few exceptions, these unique behaviors appear to be limited to interactions between vehicles that were manufactured by the same company, although the cars seem to cooperate equally well with other models in their brand. The one situation where what one might call “inter-species cooperation” occurs is when an electric car is subjected to harassment or aggressive driving by drivers who for one reason or another hate EVs.

### **Coal Rolling Leads to Pack Hunting**

The most common type of harassment is “[coal rolling](#).” The tactic is practiced by diesel truck owners, who deliberately re-tune their engines to increase fuel-air ratio in order to emit large amounts of black or grey sooty exhaust fumes into the air when they depress the accelerator. While this practice was originally a way to protest environmental regulations, it’s now commonly used to harass Teslas, Priuses, and other “eco-vehicles” by unleashing clouds of smoke in their path. Some drivers also report coal-rolling incidents that have

been accompanied by more aggressive actions, including being forced off the road, sometimes at high speeds.

For the most part, the cars equipped with advanced safety features were able to evade the worst of these attacks. In the last six months, though, some autopilot-equipped cars seem to be taking things a step further by coming to the aid of other EVs and hybrids under attack—regardless of their brand. During these interventions, referred to as “pack hunting” in the user forums, cars that are close enough to come to the aid of the one under attack will swarm the aggressor vehicle and either force it to the shoulder of the road or bring it to a dead halt within whatever lane it’s in.

The first incidents of pack-hunting behavior were reported in the fall of 2020 and appeared to be confined to Tesla vehicles. This changed in late January when reports of other brands of cars joining in on the hunts began to emerge.

“It’s almost as if the other brands learned the tactics from the Teslas,” said Yaya. “The way they collaborate is very impressive, but we’re still not sure exactly how they do it. I hope we’ll be able take a look at the algorithms their self-learning software has generated. It would probably give us valuable insights on some other tough problems we’re working on. But then again, I’ll have to be very careful when I try to pick their brains—it could be a very bad thing if I made them angry.”

None of the car makers mentioned in this story were available for comment.