



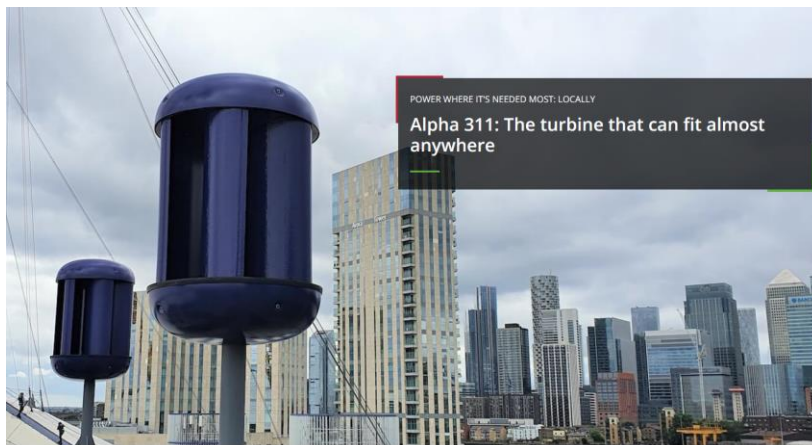
Show Notes February 2, 2024

Story 1: This small turbine can harness the power of passing cars.

Source: CNN

Story by Jacopo Prisco

Link: <https://www.cnn.com/world/small-turbine-harness-power-of-passing-cars-scn-climate-spc-intl/index.html>



See video here:

<https://www.bing.com/videos/riverview/relatedvideo?&q=This+small+turbine+can+harness+the+power+of+passing+cars&&mid=344076B344FA66151EA7344076B344FA66151EA7&&FORM=VRDGAR>

- On the roof of the [O2 Arena](#), one of London's largest indoor venues, there's a small cluster of very peculiar wind turbines.

- They look nothing like the tall, imposing ones that are increasingly deployed both inland and offshore around the world — at less than six feet (1.8 meters) in height, they're a fraction of their size, and produce much less energy.
- But being small gives them a strategic advantage: they can be deployed almost anywhere, and were designed to be retrofitted onto existing streetlights, where they can be powered not just by the wind, but also by the artificial breeze created by passing vehicles.
- Barry Thompson, CEO of [Alpha 311](#), the company that designed the turbines noted, *"If you stand next to the road and a bus comes past, you feel that airflow. Why is nobody harnessing the energy that cars are generating when they drive past?"* ***Wait!!! See side note below***
 - Side note – we covered a story long ago about a similar solution applied in Turkey. According to an article by The Independent, Istanbul has installed wind turbines that generate electricity using the air turbulence generated by traffic. The turbines, [known as ENLIL](#), are vertical and can harness air currents created by moving vehicles to generate energy while also absorbing solar power. They have been placed on roadsides in Turkey's largest city to soak up the wind generated by passing vehicles. See video here: <https://www.youtube.com/watch?v=1nqp09nFQZA>
- Now, after the successful trial at the O2, Alpha 311 is preparing to launch a refined version of the turbine that will be suitable for commercial installations.
- Made of carbon fiber each turbine is 5.9 feet (1.8 meters) tall and weighs about 88 pounds (40 kilograms), but the section that actually turns only weighs just over 30 pounds.
 - Thompson says *"We designed a wind turbine that is very, very light. It turns so much more easily than a heavier glass fiber or metal wind turbine. And we use streetlights for the road installation because the pole is already connected to the grid."*
- He adds that because the cabling in streetlights was designed for traditional lighting fixtures, which required far more energy than current replacement LED bulbs, the infrastructure necessary to handle the electricity produced by the turbine is already in place. The energy can be used immediately to power the

streetlight, and the excess can be sold back into the grid, providing a revenue stream for the local authority that manages or owns the road.

- The turbine can capture the wind, but it's intended to harness the air movement of passing vehicles. Thompson says that a small car passing the turbine at 50 miles per hour displaces air at 12 miles per hour, enough for the turbine to rotate. On a highway installation, each turbine can produce 30 times the power of a 300W solar panel, on average, and the equivalent of about 14 panels while on a building.

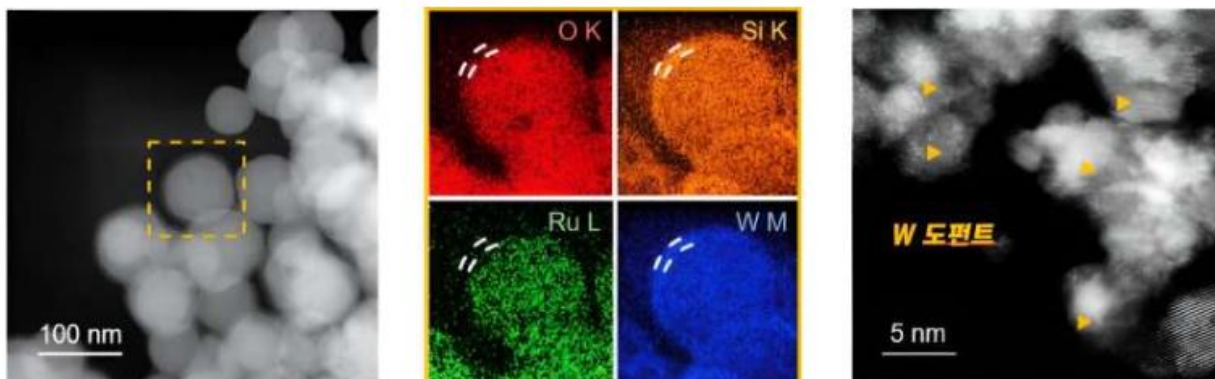
Story 2: Discovery enables cost-effective and eco-friendly green hydrogen production.

Source: TechXplore

Story by JooHyeon Heo

Link: <https://techxplore.com/news/2024-01-discovery-enables-effective-eco-friendly.html>

See also: Study [published in the journal Advanced Materials](#)



Schematic image showing the characteristics of RuSiW. (Left) Dark-field STEM, (Center) E...

- First, we need to set the stage for this very geeky news:
 - This story has to do with one of the challenges of using water to produce green hydrogen. In specific, the cost of the currently used catalysts in the water electrolysis process used to create hydrogen.

- Water electrolysis is a cutting-edge technology that produces hydrogen through the process of electrolyzing water. It is considered a key technology for achieving a carbon-neutral society as it enables the production of environmentally friendly hydrogen without carbon emissions.
- **Side note, what is water electrolysis?** The process of decomposing water (H_2O) into hydrogen (H^+) and hydroxide (OH^-) ions by passing an electric current through it is called electrolysis. The ions move to the opposite electrodes to liberate pure hydrogen (H_2) and oxygen (O_2) gases. Source: <https://www.chemistrylearner.com/electrolysis-of-water.html>
- **But here's the problem** – water electrolysis to produce hydrogen to date typically uses expensive precious metal catalysts like platinum and iridium. This news story has to do with a breakthrough water electrolysis technology that has been developed that offers an alternative to precious metal catalysts.
- **Here's the big news** - Led by a professor at South Korea's School of Energy and Chemical Engineering at [UNIST](#) [a technical university] and a professor from the Department of Materials Science and Engineering at [KAIST](#) [The Korea Advanced Institute of Science and Technology], the team has developed an alternative catalyst approach that enables the production of green hydrogen in a more cost-effective and environmentally friendly manner, bringing us closer to a carbon-neutral society.
- The joint research team has successfully developed a **bifunctional water electrolysis catalyst** for the high-efficiency and stable production of high-purity green hydrogen.
 - Side note, to learn more about what's involved with a bifunctional water electrolysis catalyst see: https://drive.google.com/file/d/1mG0zZ7xIqbURH1Q_E265aLzVEkKzrNmL/view?pli=1
- The newly developed catalyst exhibits exceptional durability even in highly corrosive acidic environments.

- By utilizing ruthenium, silicon, and tungsten, the catalyst is more cost-effective compared to conventional platinum or iridium catalysts. Furthermore, it emits significantly fewer greenhouse gases, making it an eco-friendly alternative.
- The research team focused on finding alternatives to precious metal catalysts like platinum and iridium, which do [in their favor] have the quality of exhibiting stability in acidic conditions.
 - Ruthenium has gained attention as an eco-friendly metal [candidate catalyst] due to its relatively low production cost and significantly lower greenhouse gas emissions compared to platinum and iridium. However, it has faced challenges in commercialization due to its lower catalytic activity compared to platinum and lower stability compared to iridium.
- To overcome these limitations, the Korean research team developed a catalyst based on ruthenium, silicon, and tungsten.
- By enhancing the function of the ruthenium catalyst, which has lower stability in both the hydrogen evolution reaction (HER) and the oxygen evolution reaction (OER), the team demonstrated the catalyst's potential as a bifunctional catalyst.
 - *My comment – I interpret this to mean the team found a way to overcome Ruthenium's lower stability issue, which, to date had ruled it out as a viable catalyst.*
- One of the team's lead professors stated, "The development of this three-element catalyst is significant as it has the potential to replace expensive platinum and iridium simultaneously. It is expected to be applied to high-purity green hydrogen production systems, such as PEM [Proton exchange membrane] electrolyzers, as it can be easily and stably synthesized even in highly corrosive acidic conditions."



Story 3: World's first electric flying passenger ship could drastically cut commute times

Source: The Cool Down

Story by Jeremiah Budin

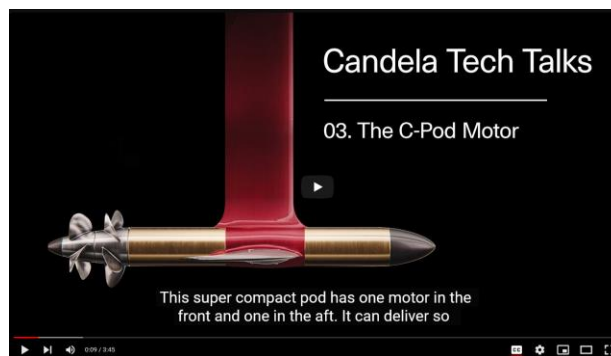
Link: <https://www.msn.com/en-us/travel/news/world-s-first-electric-flying-passenger-ship-could-drastically-cut-commute-times-it-will-revolutionize-how-we-travel/ar-BB1hu2T4>

Watch video on the company's website: <https://candela.com/>

See YouTube video here: <https://www.youtube.com/watch?v=XSkjdfaHxhw>



And a [YouTube video that covers the company's motor technology](#):



- A hydrofoil electric ferry is set to begin transporting passengers in Sweden later this year, transforming a 55-minute commute from the suburb of Ekerö to Stockholm's city center into a much more exciting and speedy 25-minute commute.
- The vehicle, from Swedish tech company [Candela Technology AB](#), has completed testing and is now set to enter the production phase. The Candela P-12 shuttle can transport 30 passengers at once, reaching maximum speeds of 30 miles per hour, with a range of 50 miles.

- Hydrofoil boats use a specially shaped hull to lift the boat off the surface of the water as it gains speed, reducing drag and enhancing speed and fuel efficiency. As such, they have become favored by some manufacturers who are seeking to create the most energy-efficient possible watercraft.
- As a result of the technology, the boats are essentially flying just above the surface of the water.
- According to a driver during a video released by Candela that shows the boat in action – he noted, “When you have space in front of you and you throttle up and take off, you are subject to the same physical principles as an airplane during flight. It’s like riding a magic carpet, basically.”
- According to Candela, the Candela P-12 can use 80% less energy than traditional vessels when moving at speeds in excess of 21 miles per hour. Combined with the fact that the boats run on electricity instead of gas, this type of hydrofoil could well be the water vessel of the future.

Story 4: Gene therapy administered via virus cures deafness in 11-year-old boy

Source: Futurism.com

Story by Sharon Adarlo

Link: <https://futurism.com/neoscope/gene-therapy-virus-deaf-boy>



- An 11-year-old boy with congenital deafness can now hear sound after he received groundbreaking gene therapy that replaces a mutated gene with the correct version, The New York Times reports.
- "There's no sound I don't like. They're all good" said the 11-year-old boy Aissam Dam via interpreters to the New York Times.
- Dam's deafness was due to a mutation to a gene called otoferlin, according to the news outlet. The gene makes a protein that's a key component in relaying sound between the inner ear and brain, but a mutated version of the otoferlin gene impedes this process, impacting around 200,000 people across the globe.
- In early October last year, Dam was the first person in America to receive the otoferlin gene therapy as part of a clinical study by pharmaceutical company Eli Lilly and [Akouos](#), a gene therapy business Eli Lilly bought in 2022.
- At the Children's Hospital of Philadelphia, researchers injected into one of Dam's ears liquid containing a benign virus carrying functional copies of the otoferlin genes. Specifically, they squirted the normal genes into his cochlea, a spiral-shaped hollow in the inner ear that's filled with liquid and lined with hair cells that send sound information to the brain.
- It took a short time — mere days — for the gene therapy to do its miraculous work. Dam's father said his son was picking up traffic sounds with his treated ear, and now its ability to hear is "close to normal."
- With Dam's newfound hearing, the New York Times reports that researchers are going to continue the study and enroll younger patients.
- Even though this particular type of gene therapy targets a rare type of mutation in the inner ear, it also opens up the possibility of treating other forms of congenital deafness.
- For more on gene therapy for deafness see: [New Genetic Treatment Successfully Lets Deaf Children Hear](#)

Honorable Mentions:

Story: MIT's breakthrough self-powered sensor harvests energy from the air

Source: Interesting Engineering

Story by Rizwan Choudhury

Link: <https://interestingengineering.com/innovation/mits-breakthrough-self-powered-sensor-harvests-energy-from-the-air>



- For decades, the limitations of batteries have constrained how and where we monitor critical infrastructure. Imagine a scenario where sensors embedded within [for example] a ship's engine provide real-time data without cumbersome wires or battery replacements. This seemingly futuristic vision is one step closer to reality thanks to a groundbreaking advancement by researchers at MIT: the development of a completely self-powered sensor.
- MIT researchers have developed a sensor that can harvest energy from its surroundings without needing a battery or a wired connection. This sensor could be used to monitor the performance and efficiency of machines in hard-to-reach places, such as inside a ship's engine.

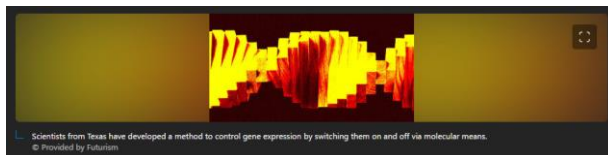
- The sensor is a temperature-sensing device that can clip around a wire that carries electricity, such as the one that powers a motor. The sensor can then capture the magnetic field energy generated by the current in the wire and use it to measure the motor's temperature.
- According to Steve Leeb, the senior author of the paper and a professor of electrical engineering and computer science and mechanical engineering at MIT, "This is ambient power — energy that I don't have to make a specific, soldered connection to get. And that makes this sensor very easy to install,"
- The paper, featured in the January issue of the [IEEE Sensors Journal](#), describes the design principles and challenges of creating such a battery-free, self-powered sensor.

Story: Scientists Say They've Invented a Way to Turn Genes On and Off Like Light Switches

Source: Futurism

Story by Sharon Adarlo

Link: <https://futurism.com/neoscope/genes-therapy-switches>



- Advances in gene therapy have come a long way since the 1960s and 1970s, when scientists first conceptualized the idea of modifying genes in patients who

suffered from debilitating congenital conditions such as sickle cell anemia and hemophilia.

- Now there are gene therapies for the two conditions and even for certain cancers — but technical challenges remain, such as making sure the modified genes inside the patients are making enough of the protein their bodies lack.
- That's why it's intriguing that scientists from the Baylor College of Medicine have published research in the science journal [Nature Biotechnology](#) that they say may crack the code on how to safely control these modified genes, switching them on and off with the molecular equivalent of a dinner room light switch dimmer.
- "The ability to control gene expression in mammalian cells is crucial for safe and efficacious gene therapies and for elucidating gene functions," the scientists write in their paper.
- The researchers modified RNA molecules that are meant to produce the needed therapeutic protein that the patient requires, inserting code that's a bit like a "stop sign," the scientists said in a statement. In another part of the RNA molecule, close to the stop sign, they modified a portion of the RNA so it would bind with tetracycline, a FDA-approved antibiotic drug typically used to treat acne.

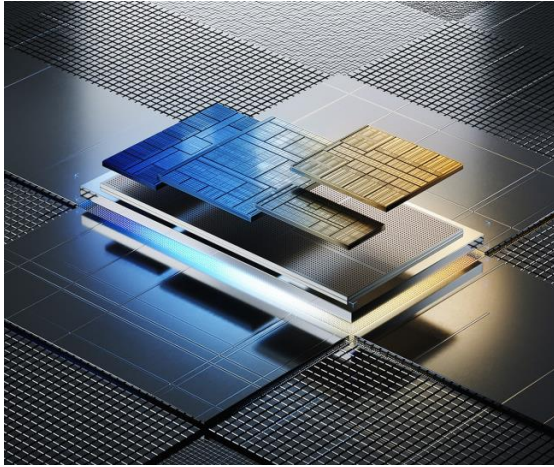
- When that particular RNA portion binds with tetracycline, the stop sign is masked off, so to speak, and the RNA produces the desired therapeutic protein within the patient's body. Take away the tetracycline or reduce the dosage, and the modified RNA will stop making the therapeutic protein or make less of it.
- This modification of RNA also sidesteps an issue that has plagued gene expression control: the body often attacks therapeutic proteins as a foreign body.
- "Although there are several gene regulation systems used in mammalian cells, none has been approved by the U.S. Food and Drug Administration for clinical applications, mainly because those systems use a regulatory protein that is foreign to the human body, which triggers an immune response against it," said Baylor medical research professor and the paper's principal investigator Laising Yen in the statement. "This means that the cells that are expressing the therapeutic protein would be attacked, eliminated or neutralized by the patient's immune system, making the therapy ineffective."

Story: Intel Says It Will Deliver 5x Increase in AI Performance by 2025

Source: ExtremeTech

Story by Josh Norem

Link: <https://www.extremetech.com/computing/intel-says-it-will-deliver-5x-increase-in-ai-performance-by-2025>



- When Intel launched its all-new Meteor Lake CPUs in late 2023, it announced the era of the AI PC had arrived. That's because it has dedicated AI hardware baked into it, and AMD is doing the same with its newest CPUs. Therefore, the race for AI dominance in the CPU world has officially begun, and now Intel is claiming it will achieve a 5X increase in AI performance in the coming years. This signifies that AI performance may become critical when considering a CPU's overall performance.
- The announcement about Intel's AI ambitions came in the company's most recent earnings call and was delivered by CEO Pat Gelsinger. On the call, via Tom's Hardware, he stated that this year's Arrow Lake desktop and Lunar Lake mobile platforms will offer triple the AI performance of Meteor Lake. Those platforms will then be followed up in 2025 by Panther Lake on desktop, which will add another 2X uplift for AI. This is the first time we can recall Gelsinger mentioning the AI performance of upcoming platforms on an earnings call, highlighting how important this metric has become for the company's future.