

Ode to E Pluribus Unum for Sunday February 6 2022



"Falling for Red"



This painting by Louisa Wallace Jacobs' painting was accepted into the Rhode Island Watercolor Society Open Show, 1 of the 100 selected from 406 entries.

Weezie is my longest friend, my pleasure in this history reaching back into the 1940s.

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One Way Trip from Haiphong to the Gulf of Tonkin

By Dario Leone, Sponsored by: Osprey Publishing



`All the warning lights were on, including the fire-warning light. The A-4 was on fire. There was smoke coming out of my oxygen mask,' Lt(jg) Al Crebo, former US Navy A-4 Skyhawk pilot.

On Apr. 25, 1967 Lt(jg) Al Crebo of VA-212, aboard Bon Homme Richard was part of a raid against an ammunition depot near Haiphong. After approaching the target and climbing to 8000 ft to begin his delivery dive, Crebo had an SA-2 explode nearby, as he recalls in Peter Mersky's book US Navy and Marine Corps A-4 Skyhawk Units of the Vietnam War;

`I was assigned to the afternoon strike. There was considerable consternation in the air group, since the rimming group had sustained significant battle damage, including the loss of an A-4C from VA-76. Our good friend Charlie Stackhouse had been shot down by a MiG-17, and we didn't know if he had survived the ejection. Fortunately, as we found out later, he was alive and had been taken prisoner.

`Our target for the last strike of the day was the Kien An ammunition depot near Cat Bi airfield, on the southern edge of Haiphong. I had an uneasy feeling about this strike for a number of reasons. The question of strike tactics was the subject of a great deal of discussion at early stage of the cruise. Some people thought we should coast in low at about 3500 ft, then climb to 7000 ft over the target for the attack. Such an approach

would allow us to stay out of the SAM envelope for as long as possible. The problem with this tactic was that aircraft heavily loaded with ordnance would be over the target at low speed. We therefore discarded this approach in favour of a high coast-in from about 14,000 ft, with a gradual acceleration and decreasing altitude to arrive on the target area at high speed.

'We never made repeated runs over the same target. High steep, fast, and once proved much more effective. However, it was early in the cruise, and we had not reached that level of sophistication.

'Another concern was the fact that there were two strike groups ahead of us in the general area. There would be no element of surprise. Also, the second strike group would be on its way out while we were in our way in.'

Crebo's group consisted of six A-4Es from VA-212 — a four-aeroplane division and a section of two. VA-76 contributed four A-4Cs as flak suppressors. Two more VA-212 'Scooters' went along as Iron Hand aircraft, carrying Shrikes. Four F-8Es from VF-211 would also furnish flak suppression, while four F-8Cs from VF-24 would fly TARCAP, guarding against MiG interceptors. VA-215 Skyraiders were tasked with SARCAP duties to protect downed pilots. There were KA-3 tankers and RF-8s along as well. It was a big strike.

Although Lt (jg) Crebo was a junior pilot, and was assigned the number six slot, he had considerable A-4 time, having made a previous Med cruise with VA-64 aboard the newly commissioned USS America (CVA-66).

Coasting in, the strikers began receiving SAM warnings from the Air Force EC-121 orbiting off shore. The code word 'Hallmark', meaning SAMs, flooded the airwaves. Inside their cockpits, the A-4 pilots also heard the warble of their ALQ-51s — devices that detected the fire-control radar of the SAM launch battery. Flak was also beginning to appear. Grey and black puffs of 37 mm and 85 mm AAA dotted the sky. It was going to be a rough delivery.

The ALQ-51 was giving off a high-pitch warble and its red SAM light was also glowing. The Shrike jets and TARCAP detached and climbed to 20,000 ft. The attack plan was to roll in to the east and then be on course for the run-out back to the Gulf of Tonkin. Crebo recalled;

'Because of the climb we were at a very low speed over the target. It seemed like we were just hanging there for an eternity below 250 knots. I was number six on the roll-in, and when my jet was in a 90-degree bank, I was hit by a SAM coming into the west

on the blind side. It felt like a moderately severe automobile accident. I was not surprised that I was hit because we were hanging over the target, exposed. I was also mildly angry with myself and the enemy.

'The first thing that happened was that another missile passed by a few yards off the starboard side of my aircraft. SAMs were proximity-fused. And were supposed to detonate when they came near an aircraft. Had that missile blown up, it would have ruined the rest of my day. The fact that the SAM did not detonate close to me was pure luck. The missile finally blew up ahead of me in a huge puff of orange smoke.

'At this point, virtually all the warning lights were on, including the fire-warning light. The A-4 was on fire. There was smoke coming out of my oxygen mask. When that second SAM detonated, I thought, "So that's what a SAM smells like when it goes off'. After dismissing that ridiculous thought, I realised I was smelling smoke and tore off one of the mask fittings from my helmet.

'I was still hanging over the target. I was thinking first and foremost about escape. I knew the best way to convert altitude to airspeed was to dive. I did have a good view of the target and could see the other A-4s completing their runs. Out of revenge and self-preservation, I decided to attack on my way out to the water.

'Just after I had delivered my weapons in a rather steep run, the aeroplane became uncontrollable and rolled beyond 90 degrees to about 135 degrees of bank — I had lost hydraulics. I thought I was a dead man! I wondered what hitting the ground at this speed would feel like. I pulled the manual flight-control disconnect handle, and with considerable effort, I rolled wings level and pulled out of the dive.'

Crebo was now at low altitude as he headed for the gulf [Gulf of Tonkin]. Several of his squadronmates joined on him as he struggled to make the relative safety of the water. They stared in disbelief' at the battered A-4. It was trailing fuel and its rudder was gone, as were several fuselage panels. Later, Crebo learned that his horizontal stabilisers were skewed several degrees out of alignment — no wonder his Skyhawk was having trouble staying straight and level. When he tried to extend his gear and hook, only the hook and nose gear came down. Without his main gear, the option of trapping back aboard CVA-3 1 was gone. Ejection was now the only choice.

As Crebo tried to reach 10,000 ft, the engine finally ran out of fuel or perhaps seized, at 6000 ft. Nose heavy, the Skyhawk dived for the water, making it impossible for Crebo to reach his face curtain to eject. He went for the secondary handle between his legs — a feature of most ejection seats, and included for just such a situation.

Crebo was rescued after only four minutes in the water, and incredibly was back on flight status the next day! He received the Silver Star for this mission. Al Crebo completed his tour with more than 200 missions to his credit. Leaving the Navy, he finished his medical training and became an ophthalmologic surgeon. The photographs of his flight out of North Vietnam became some of the classic images of the air war.

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Do you need any words to appreciate this?

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Tala Taranga, Odissi on High, Pune



https://youtu.be/vACVFlsI0_s

India House Art Gallery in association with Sutra Foundation (Malaysia) and Rudrakshya Foundation (Bhubaneswar) present Odissi on High, featuring dazzling performance of dancers of Sutra Foundation and Rudrakshya.

This production explores the evolution of 'Pallavi' (a genre in odissi repertoire) representing the two styles of the pioneer gurus of Odissi, the late Kelucharan Mahapatra and Debaprasad Das. Their approaches have been developed and enhanced by their respective star disciples, Guru Bichitrananda and Guru Durga Charan Ranbir, respectively. Ramli Ibrahim is the conceiver of this production, co-artistically directing the production with Guru Bichitrananda Swain of Rudrakshya.

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The Amazing Otani-San



https://www.gq.com/story/shohei-ohtani-february-cover-profile?utm_source=join1440&utm_medium=email

I have been an Angel fan all my life, dating from the days the Triple-A team inhabited the lower rungs of the Coast League's ladder, playing in a brick-by-brick recreation in Los Angeles of the Chicago Cub's Wrigley Field. The stadium, long gone and barely remembered, might still be here today had it been located somewhere other than where fans faced risks at least as great as servicemen engaged in WWII combat.

Years later when the club upscaled to the Major's and moved to Orange County, I had the pleasure of leading my stalwart band of children across Katella Avenue from my office and down the railroad tracks to Angel Stadium, where with great glee we would greet the blue-suited officials with the time honored, "Kill the umpires," call, a happy prelude to the eually time-honored, "Play Ball," neither to survive the ravages of political correctness in our humorless society.

Only once, it was 2002, have the Angels risen to the dizzying heights of a World Series appearance...and—saints be praised--won. The rest of the time they've hung steadfast to the lower rungs of a less than lustrous yesteryear.

As in the past 75 seasons, I once again look to the heavens and wonder, will this be the year? Maybe, but I will shed no tears when they go true to form despite the efforts of Shohei-San and Mike Trout. Instead I will bless their efforts with silent cries of "Kill the Umpires," and "Play Ball."

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EdisonFuture Enters the Electric Pickup Race



EdisonFuture, a California-based startup, is launching an F-150-sized light-duty full-size electric truck powered by a range of battery and motor options that includes a 450-mile battery pack and a three-motor configuration good for a reported 700 combined horsepower, according to Motortrend.

This subsidiary of SPI Energy used to be aligned with another spinoff called Phoenix Motorcars. That group made a business of retrofitting Ford medium-duty trucks to electric power. However, the EF1-T pickup and its van counterpart, the EF1-V, are both engineered from scratch by Livermore, California-based EdisonFuture.

EdisonFuture plans to cover the market much like Chevrolet and Hummer EV, Motortrend says, with offerings ranging from rear-wheel-drive, single-motor to dual- and tri-motor all-wheel-drive setups. Likewise, there will be a choice of battery pack sizes available to suit various budgets and expectations.

The EF1-T Standard model with a single rear motor is rated to tow 7,500 pounds, the EF1-TP premium two-motor variant can do 9,000, and the top EF1-TS Super tri-motor range topper is good for 11,000 pounds. For the EF1-V van, rear-drive models can tow 7,500 pounds, two-motor AWD long-range models are rated for 8,000 pounds.

Source: Motortrend

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NASA Wants Your Ideas to Reuse Trash and Waste on a Mars Mission

By Elizabeth Howell for Space.Com

You have until March 15 to submit your Red Planet innovations.



*Artist's illustration of a crewed Mars base.
(Image credit: Pat Rawlings/NASA)*

NASA just opened a challenge seeking ways to go to Mars and back with a minimum of wasted materials.

The agency's tournament lab, along with crowdsourcing platform HeroX, have launched a "Waste to Base" challenge looking for ideas to recycle trash, waste, carbon dioxide and foam packaging materials during a two- to three-year crewed Red Planet mission.

Competitors have until March 15 to enter the challenge, and several prizes of up to \$1,000 each will be awarded for novel ideas, out of a total purse of \$24,000. The winner should be announced by April 22, according to the challenge website.

"This challenge is all about finding ways to convert waste into base materials and other useful things, like propellant or feedstock for 3D printing," the website stated.

"The challenge is looking for your ideas for how to convert different waste streams into propellant, and into useful materials, that can then be made into needed things and cycled through multiple times. While a perfectly efficient cycle is unlikely, ideal solutions will result in little to no waste."

Full eligibility requirements are available on the contest website; generally speaking, anyone in the world 18 years of age or older may participate individually or as a team, as long as their jurisdiction is not under United States federal sanctions, HeroX said.

The winning ideas are expected to be put into a whitepaper as "part of the roadmap for future technology development work" for NASA's logistics reduction project, which is working on matters such as new spacecraft and future settlements, the challenge description noted.

While NASA hasn't yet set a firm timeline for putting humans on Mars, the agency speculated in recent years that it may be able to get there by the mid-2030s. In the shorter term, the agency is hoping to put Artemis astronauts on the moon by the mid-2020s. Moon missions may help inform the design for future Mars missions.

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Solar Panels Can Heat the Local Urban Environment, Systematic Review Reveals



It's complicated: Rooftop solar cells can affect the temperature of a building in several different ways.

(Courtesy: iStock/MarioGuti)

A systematic review of 116 papers looking at how solar panels affect the surrounding environment has found that they can significantly warm cities during the day. This heating can also affect the performance of the photovoltaic (PV) systems, the study found. The researchers suggest future work should focus on increasing the reflectance of wavelengths of sunlight not converted to electricity. Lead author of the review, David Sailor of Arizona State University, explains why.

Why was there a need for a systematic review like this?

I was frustrated that there have been a handful of publications that have introduced inaccurate representations of the energy balance of PVs in the urban environment and have, as a result, made claims about the potential for PVs, for example, to cool the urban environment when, in fact, the energy balance is much more complex and the implications for the urban environment are correspondingly complex.

What research did you include in your study?

We felt that it would be useful to provide a more holistic viewpoint of PVs in the environment. We wanted to understand not just how putting PV systems in the urban environment affects buildings and urban air temperatures and so forth, but also – the other end of that equation – how the urban environment affects the performance of PV systems.

What did you find?

We arrived at several key conclusions. One had to do with PVs and their relationship with the urban energy balance. Specifically, we found that PVs can significantly warm the urban environment during the day, but typically cool the urban environment at night.

The second key finding was that, for a number of reasons, when you put PVs in an urban setting, they don't perform as well as they might in some other settings, rural and suburban, for example.

Why do solar panels have this heat effect on the urban environment?

It's important to put all of my discussion on this topic in the context that it depends on what you're comparing a particular application to. So, the example would be if you put PVs on an existing black roof, you're not having as much of an adverse effect on the urban thermal environment as if you put those PVs on a white roof, because a white roof would normally be a relatively cool surface.

When you put PVs on that white roof, the PV panels typically absorb in the order of 90% of the energy of the Sun. And the PV panels then do convert some of that energy to electricity, but typical panels today are only maybe 16–20% efficient. These panels are absorbing a tremendous amount of energy from the Sun, converting some of it into electricity, but then warming up because they're not able to use all of the energy.

So, these PV panels tend to be rather hot surfaces in the environment. They're almost always installed in an elevated format – above a roof surface or above ground level in a field. And as a result, you end up having two hot surfaces, the top surface of the panels and the underside surface of the panels. And so, as air flows over these panels, it readily picks up that heat essentially twice as effectively as it would if you had the same temperature on a building surface or a ground surface.

What effect does this heating have on the local urban environment?

There are several studies out there that have looked at panels from a modelling perspective and others have looked at observational data.

I've been involved in one project where we went out into the field and did measurements in and around a PV array in the desert, and then in an area not too far away that was a similar desert environment [the reference site]. What we found in that observational study was that the average air temperature at 1.5 m in the PV array site was about 1.3 °C warmer than the reference site, which is the non-PV site. At night we found almost no effect. And so, our observational studies led us to conclude that PVs

do, in fact, have this warming effect during the day, whereas at night the effect can either be very small, or negligible and difficult to measure.

Other studies, particularly modelling studies, had previously suggested a daytime cooling effect of PVs. But those had a flawed representation of the PV panels, where they ignored the fact that PVs are able to convect heat from both the top and bottom surfaces.

Does this have an impact on people's energy use for the cooling of buildings?

It does. And again, we found that impact to be very complex. There are a number of studies out there that have demonstrated that if you put PVs on a rooftop of a building, you reduce the annual air-conditioning energy consumption of that building. And that makes sense in that these PV panels provide shading from direct sunlight. So, the building doesn't get nearly the solar load it would normally have penetrating through the roof surface. And that's a mechanism whereby we would expect to have an air-conditioning benefit.

Likewise, you could have a heating penalty in the winter where you desire to have that solar radiation reaching the building surface, but PV panels are actually shading the building.

We found that in particularly warm climates such as Phoenix [Arizona, USA] for residential building stock, the PV panels actually have a rather complicated set of trade-offs. They do give us a benefit of shading our buildings directly from the Sun during the day. But at night, where the building roof surface would normally radiate its energy out into space and help to cool that roof surface rapidly, the PV panels actually obstruct the view of the building to the sky, slowing that heat loss at night-time. As a result, you actually increase the air-conditioning load of a residential building at night.

You mentioned that this heating can affect the solar panels. How does that work?

Traditional silicon-based PVs have what's known as a temperature coefficient, that is, their efficiency is a function of the surface temperature of the solar cells themselves. And so, if you are in a hotter environment, if the PV surface is hotter, then it will be less efficient. The temperature coefficient is typically on the order of about 4% per degree Celsius for the cell temperature. What this means is that while PVs are typically tested at a standard test condition of 25 °C, if you're operating in an urban environment – we've had plenty of measurements of PVs in installations here in Phoenix – where the PV surface temperature easily gets to 60–65 °C or even hotter, you reduce the efficiency by something on the order of 10–15% overall.

What can be done to mitigate these effects?

I don't want to be interpreted as suggesting that PVs are not good things. PVs are a very important component of our future energy mix as we try to save the planet from global warming. That said, I think there's an opportunity to design panels that are more effective at rejecting the heat that they don't turn into electricity.

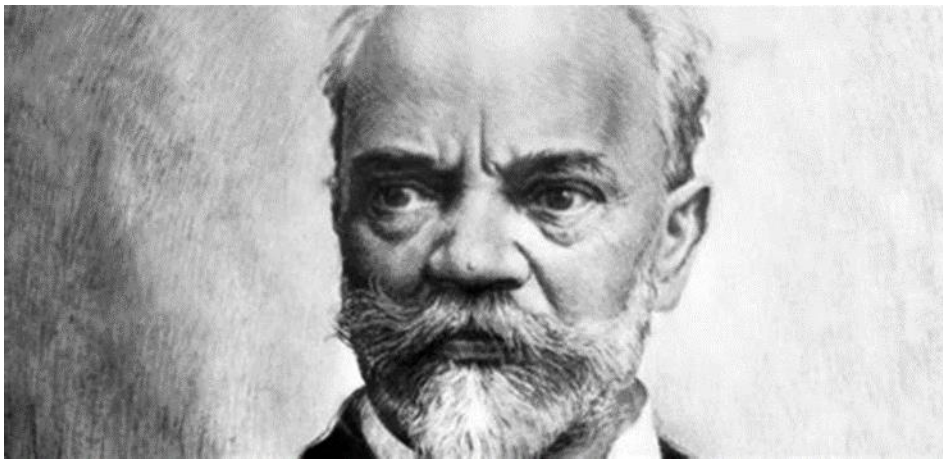
For the portion of the spectrum that [the panel] is not able to convert into electricity, perhaps we can design coatings on our PV systems that are essentially highly reflective of these wavelengths or more highly emissive of their own energy. You can look to some of the recent advances in material science that are known as passive radiative cooling technologies. If you can imagine a surface that is extremely efficient at radiating its energy in, say, the eight to 13 micron range, then you can essentially radiate the heat away from the surface through the atmospheric window.

I can imagine combining some of these innovations in material science with our conventional developments of PVs and creating a next generation of maybe what we might call "cool photovoltaics". So, PV panels that are perhaps only as efficient as our current generation of PVs but are thermally much more efficient so that they run much cooler. Also, because of the temperature coefficient, they would likely receive an additional benefit in terms of efficiency – running at cooler temperatures and provide less warming to the urban environment.

The review is published in Energy and Buildings.

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Antonin Dvorak (1841-1904)



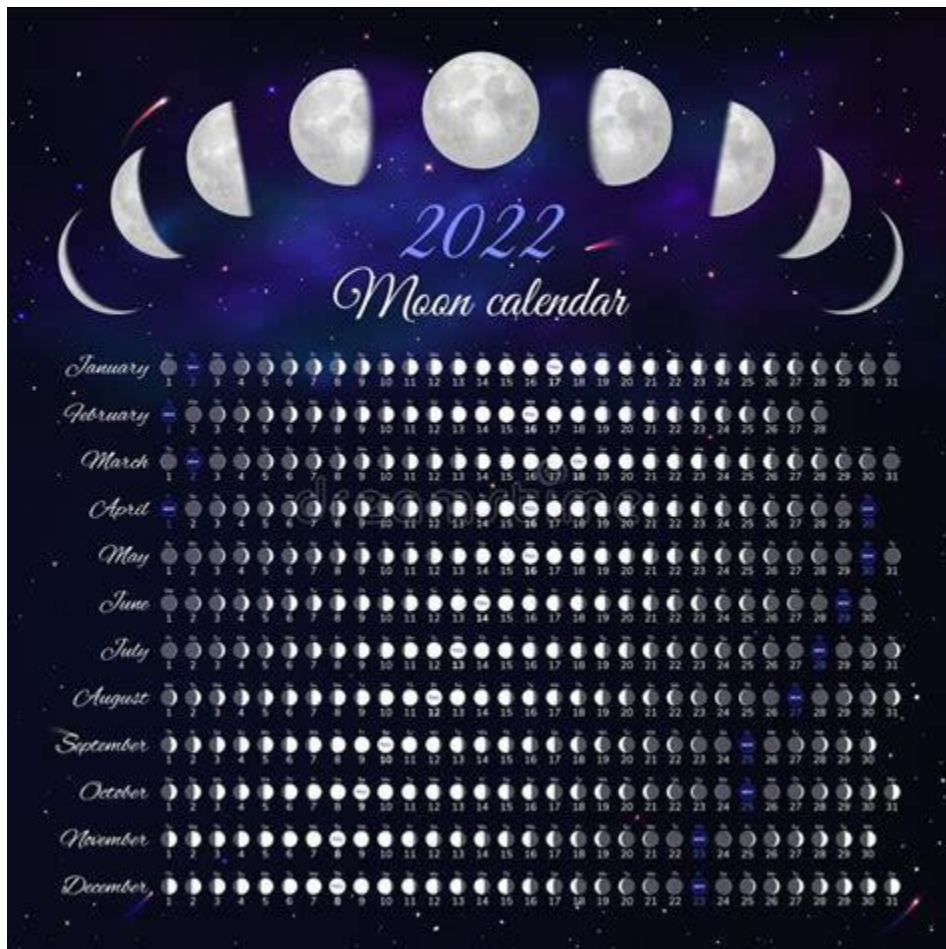
String Quartet # 12 (American) <https://youtu.be/pJU0qaqx5eg?t=3368>



"The President's Own" Chamber Music Series - Jan. 30, 2022

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Moon Phases 2022



What will the Moon phase be on your birthday this year? It is hard to predict because the Moon's appearance changes nightly.

<https://youtu.be/c4Xky6tlFyY>

Video Credit: Data: Lunar Reconnaissance Orbiter ; Animation:

*NASA's Scientific Visualization Studio;
Music: Build the Future
(Universal Production Music), Alexander Hitchens*

As the Moon orbits the Earth, the half illuminated by the Sun first becomes increasingly visible, then decreasingly visible. The featured video animates images and altitude data taken by NASA's Moon-orbiting Lunar Reconnaissance Orbiter to show all 12 lunations that appear this year, 2022 -- as seen from Earth's northern (southern) hemisphere.

A single lunation describes one full cycle of our Moon, including all of its phases. A full lunation takes about 29.5 days, just under a month (moon-th). As each lunation progresses, sunlight reflects from the Moon at different angles, and so illuminates different features differently.

During all of this, of course, the Moon always keeps the same face toward the Earth. What is less apparent night-to-night is that the Moon's apparent size changes slightly, and that a slight wobble called a libration occurs as the Moon progresses along its elliptical orbit.

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Dudley Moore Beethoven Sonata Parody



In this clip from the 1950's-60s British comedy group "Beyond the Fringe," Dudley Moore plays a very funny, musically adroit parody of a Beethoven Piano Sonata, using the famous whistling tune from "Bridge Over the River Kwai" as a thematic subject:

<https://youtu.be/GazlqD4mLvw>

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Lionel Leo Hampton (1908 –2002)



The American jazz vibraphonist, pianist, percussionist, and bandleader worked with jazz musicians from Teddy Wilson, Benny Goodman, and Buddy Rich, to Charlie Parker, Charles Mingus, and Quincy Jones. In 1992, he was inducted into the Alabama Jazz Hall of Fame, and he was awarded the National Medal of Arts in 1996.

How Hight the Moon <https://youtu.be/XNmcn5f1ZG0>

In the Mood <https://youtu.be/vKuV1ob93oA>

Stealing Apples <https://youtu.be/ut3gVnO9YnY>

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Rent a Robot Worker for Less than Paying a Human

Automation is reaching more companies, imperiling some jobs and changing the nature of others.



Robotics in Warehousing
logisticsgulf.com

Polar Manufacturing has been making metal hinges, locks, and brackets in south Chicago for more than 100 years. Some of the company's metal presses—hulking great machines that loom over a worker—date from the 1950s. Last year, to meet rising demand amid a shortage of workers, Polar hired its first robot employee.

The robot arm performs a simple, repetitive job: lifting a piece of metal into a press, which then bends the metal into a new shape. And like a person, the robot worker gets paid for the hours it works.

Jose Figueroa, who manages Polar's production line, says the robot, which is leased from a company called Formic, costs the equivalent of \$8 per hour, compared with a minimum wage of \$15 per hour for a human employee. Deploying the robot allowed a human worker to do different work, increasing output, Figueroa says.

Robotics Expert Breaks Down Robot Scenes From Film & TV

<https://www.wired.com/video/watch/robotics-expert-breaks-down-robot-scenes-from-film-tv>

"Smaller companies sometimes suffer because they can't spend the capital to invest in new technology," Figueroa says. "We're just struggling to get by with the minimum wage increase."

The fact that Polar didn't need to pay \$100,000 upfront to buy the robot, and then spend more money to get it programmed, was crucial. Figueroa says that he'd like to see 25 robots on the line within five years. He doesn't envisage replacing any of the company's 70 employees, but says Polar may not need to hire new workers.

Formic buys standard robot arms, and leases them along with its own software. They're among a small but growing number of robots finding their way into workplaces on a pay-as-you-go basis.

The pandemic has led to shortages of workers across numerous industries, but many smaller firms are reluctant to write big checks for automation.

"Anything that can help reduce labor count or the need for labor is obviously a plus at this particular time," says Steve Chmura, chief operating officer at Georgia Nut, a confectionery company in Skokie, Illinois, that has been struggling to find employees and also rents robots from Formic.

The robot-as-employee approach could help automation spread into smaller businesses more rapidly by changing the economics. Companies such as Formic see an opportunity to build large businesses by serving many small firms. Many are mining the data they collect to help refine their products and improve customers' operations.

Shahan Farshchi, an investor in Formic, likens the state of robotics today to computing before personal computers took off, when only rich companies could afford to invest in massive computer systems that required considerable expertise to program and maintain. Personal computing was enabled by companies including Intel and Microsoft that made the technology cheap and easy to use. "We're entering that same time now with robots," Farshchi says.

Robots have been taking on new jobs in recent years as the technology becomes more capable as well as easier and cheaper to deploy. Some hospitals use robots to deliver supplies and some offices employ robotic security guards. The companies behind these robots often provide them on a rental basis.

Jeff Burnstein, president of the Association for Advancing Automation, an industry body, says rising demand for automation among smaller companies is driving interest in robotics as a service. The approach has seen particular traction among warehouse fulfillment firms, Burnstein says.

It might eventually become normal to pay robots to do all sorts of jobs, Burnstein says, pointing to RoboTire, a startup developing a robot capable of switching the tires on a car. "As more and more companies automate in different industries, you're seeing more receptivity to robotics as a service," he says.

The International Federation of Robotics, an organization that tracks robot trends globally, projected in October that the number of robots sold last year would grow 13 percent. One market analysis from 2018 projected the number of industrial robots that are leased or that rely on subscription software will grow from 4,442 units in 2016 to 1.3 million in 2026.

"Cost declines are great for the diffusion of a technology," says Andrew McAfee, a principle research scientist at MIT who studies the economic implications of automation.

McAfee says robots themselves have become cheaper and more user friendly in recent years thanks to the falling cost of sensors and other components, a trend that he expects will continue. "They are the peace dividend of the smartphone wars," he says.

Dustin Pederson, CFO of Locus Robotics, a company that leases robots for use in warehouses, says his company's revenue has grown sixfold over the past year amid rising demand for ecommerce and a shortage of workers. "To be able to step in with a subscription model makes automation a lot friendlier," Pederson says. "And we are still early on in the overall adoption of robotics in the warehousing industry."

It's unclear—even to economists—what impact the growing use of robots will have on the supply of jobs. Research from Daron Acemoglu and Pascual Restrepo, economists at MIT and Boston University, respectively, suggests that the adoption of robots from 1990 to 2020 resulted in fewer jobs and lower wages overall.

But one study of robot adoption in Japanese nursing homes, from January 2021, found that the technology helped create more jobs by allowing for more flexibility in working practices. And another study, from 2019, also found that robot adoption among Canadian businesses had often affected managers more than workers by changing business processes.

Lynn Wu, an associate professor at the University of Pennsylvania's Wharton School and a coauthor on the 2019 study, says she expects robots paid by the hour to become more common. But she notes that in contrast to many information technologies, few businesses know how to use robots. "It's going to take longer than people think," she says.

For now, most robots found in industrial settings are relatively dumb, following precise movements repetitively. Robots are gradually becoming smarter thanks to use of artificial intelligence, but it remains very challenging for machines to respond to complex environments or uncertainty. Some researchers believe that adding AI to robots will prompt companies to reorganize in ways that have a bigger impact on jobs.

Saman Farid, CEO of Formic, says the company hopes to position itself to be able to offer more capable robots to all sorts of companies in the future. "Robots are going to be able to do a lot more tasks over the next 5 to 10 years," Farid says. "As machine learning gets better, and you get to a higher level of reliability, then we'll start implementing those."

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Prince



Prince Rogers Nelson (better known as Prince) (June 7, 1958 – April 21, 2016) was an American musician and dancer. He was born in Minneapolis, Minnesota.

He is known for blending erotic lyrics with funk rock and technology. He had ten platinum albums and thirty Top 40 singles during his career.

Prince died of a fentanyl overdose at his Paisley Park recording studio and home in Chanhassen, Minnesota at the age of 57.

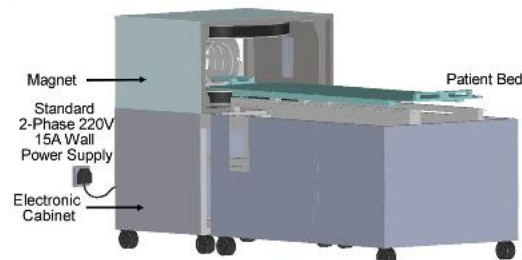
Let's Go Crazy <https://youtu.be/aXJhDltzYVQ>

The Bird <https://youtu.be/BGV2uN2s2uk>

Nothing Compares 2 U <https://youtu.be/1NarDEEhOsM>

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Ultralow-Field MRI Scanner Could Improve Access to Neuroimaging



*Prototype of a low-cost, low-power, shielding-free, ultralow-field brain MRI scanner.
(Courtesy: CC BY 4.0/Nat. Commun. 10.1038/s41467-021-27317-1)*

A compact ultralow-field (ULF) brain MRI scanner that does not require magnetic or radiofrequency shielding and is acoustically quiet during scanning has been developed at the University of Hong Kong. The scanner's low manufacturing and operating costs

reinforce the potential of ULF MRI technology to meet the clinical needs of hospitals in low- and middle-income countries, as well as point-of-care medical facilities such as surgical suites and emergency rooms.

MRI is the most valuable clinical tool used for assessing brain injuries and disorders, but according to the Organisation for Economic Co-operation and Development (OECD), approximately 70% of the world's population has little or no access to it. High-field superconducting MRI scanners (1.5 T and 3.0 T) are expensive. In addition to acquisition costs of around \$1–3m, such scanners are costly to install due to infrastructure requirements, and have high maintenance costs. All of these factors represent a major roadblock in MRI accessibility.

MR imaging using ULF technologies offers the promise of accessible healthcare with scanners that are simple to onboard, maintain and operate. Led by Ed X Wu, Lam Woo Professor in the Laboratory of Biomedical Imaging and Signal Processing, the Hong Kong team developed a permanent magnet-based, low-cost, low-noise, low-power and shielding-free ULF brain MRI scanner.

The prototype system, described in *Nature Communications*, is based around a compact two-pole 0.055 T permanent samarium–cobalt (SmCo) magnet, with dimensions of 95.2 x 70.6 x 49.7 cm and a front opening of 29 x 70 cm for patient access. The scanner has a footprint of approximately 2 m² and can be operated from a standard AC power outlet. The team estimates that the machine could be built in quantity with material costs under \$20,000.

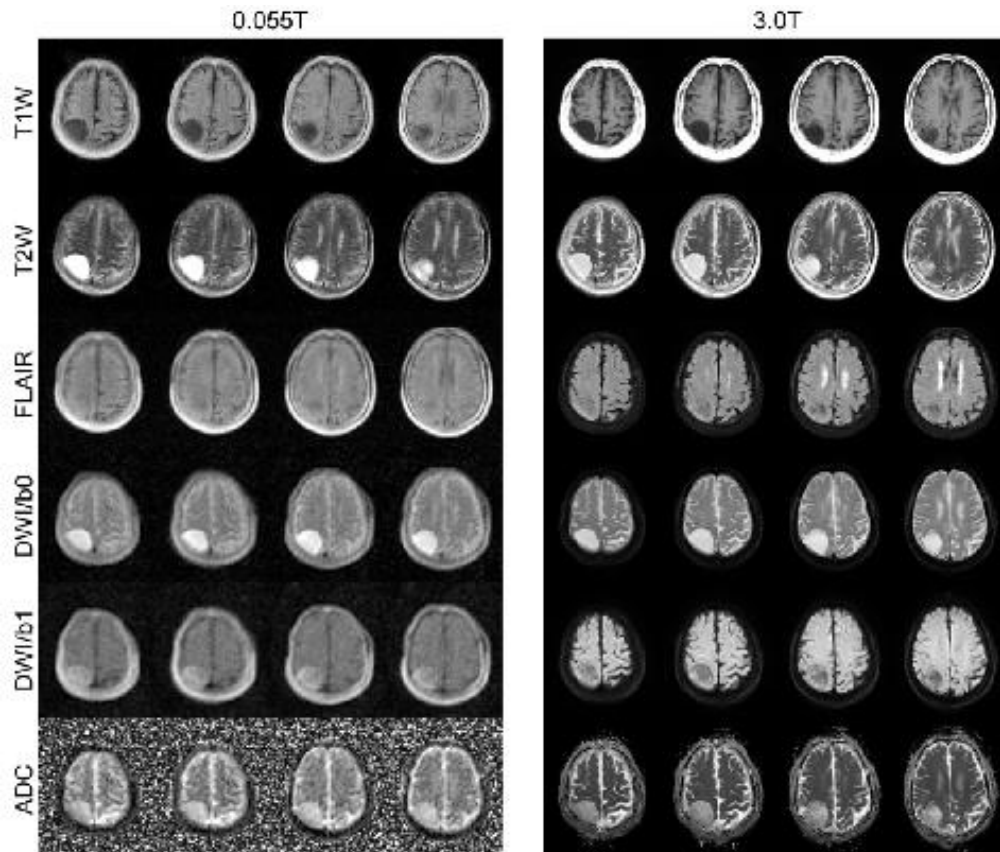
The scanner configuration allows the formation of images using various universally adopted protocols for clinical brain imaging, including fluid-attenuated inversion recovery (FLAIR)-like and diffusion-weighted imaging (DWI). By building upon the methodologies developed for high-field MRI scanners, the ULF system provides a high level of flexibility for the development of future ULF MRI protocols.

The researchers developed a deep-learning-driven electromagnetic interference (EMI) cancellation technique to model, predict and remove external and internal EMI signals from MRI signals. This EMI cancellation procedure eliminates the need for a traditional RF shielding cage. Meanwhile, the high temperature stability of SmCo removes the need for any magnet temperature regulation schemes to stabilize temperature-dependent fields.

Wu and colleagues optimized four of the most common clinical brain MRI protocols – T1-weighted, T2-weighted, FLAIR and DWI – to produce signal-to-noise (SNR) ratios and contrast characteristics similar to those of clinical high-field MR images.

After tests on phantoms, the researchers used the scanner to image 25 patients with neurological conditions (brain tumours, chronic stroke and chronic intracerebral haemorrhages), using these four protocols. The patients then underwent the same exams on the hospital's 3 T scanner. Examinations averaged approximately 30 min with the 0.055 T scanner, compared with 20 min using the 3 T system.

MRI scanner comparisons



*Scanner comparisons: Both 0.055 T and 3 T images visualized a brain tumour mass.
(Courtesy: CC BY 4.0/Nat. Commun. 10.1038/s41467-021-27317-1)*

A senior clinical radiologist evaluated the patient scans to determine which specific lesions could be observed in the 0.055 T images. The prototype scanner detected most key pathologies in the exams of all 25 patients, with similar image quality to that produced by the 3 T scanner.

One major advantage of the new scanner is that it produces fewer artefacts when imaging implants such as metallic clips and cerebrovascular stents. "In using ULF, metal implants not only exhibit fewer artefacts, but also experience significantly less mechanical forces and RF-induced heating," the researchers write. "The presence of paramagnetic (titanium and titanium alloys) and ferromagnetic (cobalt, nickel and associated alloys) materials in aneurysm clips and cerebrovascular stents did not induce gross artefacts."

As such, the ULF scanner should enable MRI scanning of patients with metal medical implants or accident-related metal fragments, who would otherwise not be candidates for conventional high-field MRI.

Future opportunities

Wu believes that the ULF technology is not designed to compete with mainstream MRI, but to complement it. "With a field strength that is almost two orders of magnitude lower than the mainstream MRI, the image quality is inevitably less appealing simply

due to the MR physics: lower field strength, weaker MR signal, less to play with," he says. "However, MR signals and physics have many appealing properties at ultralow-field, in terms of data acquisition and image formation."

"I believe that computing and big data will be an integral as well as inevitable part of future MRI technology," Wu adds. "Given the inherently 3D, highly quantitative and ionization-free nature of MRI, I believe widely deployed MRI technologies will lead to immense opportunities in future data-driven MR image formation and diagnosis in healthcare. This will lead to low-cost, effective and more intelligent clinical MRI applications."

The researchers chose to develop a ULF brain MRI due to "the immense need and value of MRI in the diagnosis and prognosis of various neurological diseases and injuries," noting that roughly 30% of clinical MRI cases involve the brain.

Ultimately, they hope that the development of such ULF MRI technologies will enable patient-centric and site-agnostic MRI scanners to fulfil the unmet clinical needs across various global healthcare sites, with the potential to democratize MRI for low- and middle-income countries. To this end, the team is making the key code and designs they have developed freely available in a public online repository.

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My Walking Thoughts

February 6, 2022

Zilch

So much for the role knowledge plays in my stumbling attempts to deal with the variety of pitches life aims at my noggin. No big surprise to me or those who have seen me in action...but why here? Why now?

It has to do with one particular comment I received in the wake of my January 30th semi rant where I said politics was the handmaiden of might-makes-right.

"You don't know what you're taking about," came the pungent reply from a lady with whom I've shared thoughts and an occasional bowl of Alpo over the years. "Politics allows for compromise, ensuring the rights of all parties involved."

Admittedly it's a valid point, though I'd give it more weight if those engaged in the process were ordinary citizens rather than politicians whose motives I believe to lie in the more parochial arena of reelection and the concomitant patronage of money.

But neither of these is the point of today's stroll.

My first reaction was to become defensive, but then I calmed down enough to realize she had spoken an undeniable fact...I didn't know, don't know, never will know what I was talking about.

I may think, believe, have a hunch—any of a thousand such speculative propositions—but knowledge is beyond my feeble means. I am, as I came into the world, curious, but no matter how much I am devoted to the pursuit of knowledge, I am stuck with the realization that I know nothing.

I used to believe in gravity, but 20th century science disabused me of that notion. For those of us locked in the simplicity of Newtonian physics, things are about to get far worse as we face the emergence of chaos theory.

Don't worry, I don't have the background to try and explain this challenge, but suffice it to say it is calling into question virtually everything I have been taught to believe.

But such things as chaos, fractals, and entropy are topics for a much longer walk...perhaps to the edge of the universe and beyond.

Add to Walking Thoughts from NC

While Americans have always differed on issues, and debated ideas, they have come together to find some rational solutions. From my viewpoint, having lived here 62 years, the debates were collegial until the arrival of the social media, breaking news and other instant gratification systems. Now it is instant gratification for silly thoughts.

The real strength of the USA is, as you said, in E Pluribus Unam and I hope a good majority of Americans realize that and reduce sniping.

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