



ISSUE 75

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FUTURE ISSUE



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ON AIR



LARGE AND IN CHARGE

Contributors

Cheryl Tan
Copernicus Chua
Karim Raffia
Lindsay Wong
Nina Gan
Simon Gwozdz
Tartan Ow
Yin Loon

Editor-in-Chief

Aaron Stewart
aaron@campus.com.sg

Creative Director

Lynn Ooi

Designer

Yun Ng

Sales Enquiry:

aaron@campus.sg

Lennox & Ooi Media Pte Ltd

11 Paya Lebar Road #02-12 S409050
Tel (65) 6732 0325

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ISSUE 75 | FEB '22 CONTENTS

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02 Future in Concrete

Futuristic architecture from the past

03 Fast Tracking Innovations

Pandemic pushing the future of medicine

04 In the Year 2022

What will Nostradamus predict?

07 Sci-fi Worlds

Future in fiction

08 Dirty Money

Is cryptocurrency killing our planet?

10 When Will We Take Holidays on Mars?

Exploring possibilities of space flights

13 Eating in the Future

Will food be real?

14 A Future of Immortality

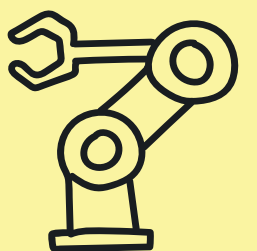
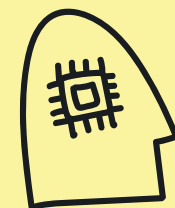
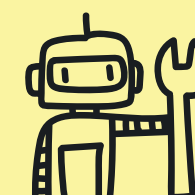
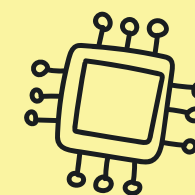
From brain freeze to mind upload

16 Collecting Pixels

NFTs and the future of collectibles

REGULAR STUFF

06: The List:
Cars of the Future
12: Cheat Sheet:
Future of NFTs



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FUTURE IN CONCRETE

FUTURISTIC ARCHITECTURE FROM THE PAST

Instead of dwelling on the past, look towards the future. This is a common saying that has been influential in all aspects of life, including architecture. Many of the most Insta-worthy and photogenic buildings and even cities in the world today are based on futuristic concepts – but were designed and built decades ago.

Futurist architecture was originally conceived in the 1920s, but over time it came to be characterised by the notion of movement and flow, with sharp edges, strange angles, triangles, domes, and so on. Today, Futurism can be seen in many styles of architecture, from Art Deco to Brutalism. Here are some cities and buildings that have adopted a Futurist style.



BRASILIA

BRAZIL

Brazil's capital city is essentially a hub for Oscar Niemeyer's architecture, attracting tourists to a relatively obscure, inland location. Brasília is shaped like an airplane, with two axes intersecting in the middle. Niemeyer is known for his airy designs featuring concrete and glass, which were used for the capital's official buildings.

The congress building is shaped like a plate placed on a tabletop and the president's residence looks like it came straight out of a dystopian film. Many of the cathedrals have unique shapes and structures that we do not regularly see in other parts of the world, like Nossa Senhora Aparecida and Santuário Dom Bosco.

CHRYSLER BUILDING

NEW YORK CITY

The Chrysler Building, standing proud and tall in the heart of New York City and rivaling the sight of the Empire State Building, is made up of brightly lit triangular forms on top of sculpted layers. It complements the more masculine-looking Empire State Building and is influenced by the modern era and Art Deco, to symbolise progress and innovation.

Art Deco as a form of art is itself influenced by cubism and geometric forms. In the 1920s, the Art Deco style of architecture came to dominate the city's skyline.



HSBC BUILDING

HONG KONG

The 44-storey Hongkong and Shanghai Banking Corporation headquarters was a ground-breaking skyscraper that was the most expensive building ever built at the time, at roughly US\$668 million. Built by Fosters Associates and completed in 1985, the revolutionary design moved the building's structure from its centre to its exterior – a key feature of high-tech architecture.

The main characteristic of the building is its absence of internal supporting structure, and natural sunlight is the major source of lighting at the interior plaza, made possible by a bank of giant mirrors at the top of the atrium.



TORONTO CITY HALL

CANADA

The Toronto City Hall, or New City Hall in Toronto is one of the city's most distinctive landmarks. The building comprises two curved towers of unequal heights (one was 20 storeys, the other 27), built around a saucer-like council chamber. From the air, it looks like a giant unblinking eye, thus its nickname, "The Eye of Government". While the concave surfaces have windows overlooking the circular "square," the convex walls are formed entirely of ribbed concrete and have no window openings.

The design of the City Hall was chosen through an international competition, which was won by Viljo Revell, and the building opened in 1965.

BRUTALIST BUILDINGS

SINGAPORE

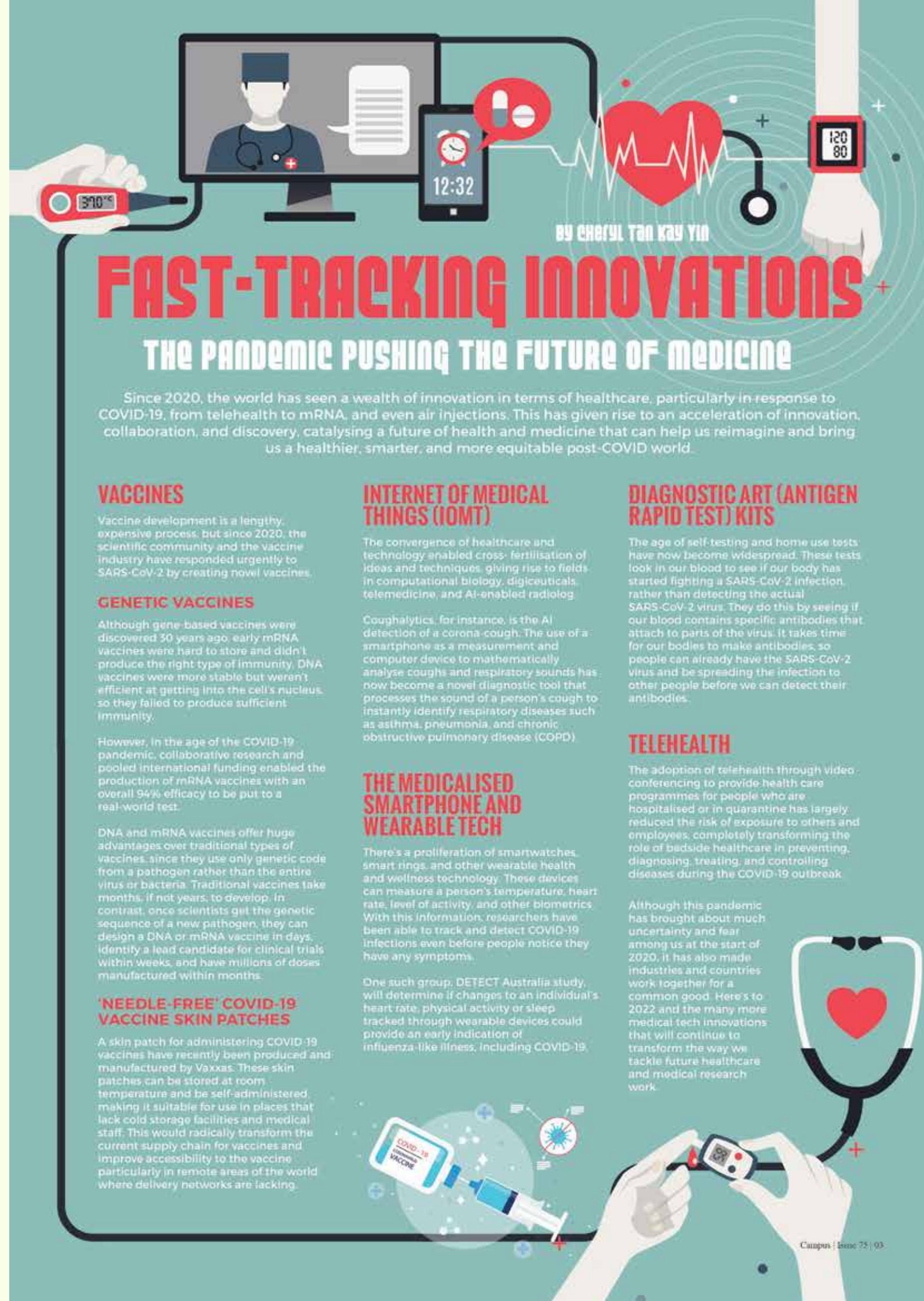
The Brutalist style of architecture played a large role in Singapore's post-war modernism after 1945. In the 1970s in particular, raw concrete buildings dominated spaces in Singapore. This style of architecture is characterised by minimalist constructions and structural elements over decorative design, as well as monochrome colour palettes and angular geometric shapes. Examples of Brutalist buildings include Golden Mile Complex, the State Courts, and TripleOne Somerset.



REVOLVING RESTAURANTS

WORLDWIDE

Revolving restaurants are a worldwide concept in which restaurants located on the top floor, typically in a tall building, offer diners a different panoramic view as it rotates slowly around a circular room with floor-to-ceiling windows. Launched in the 1960s, the spaceship-looking revolving restaurants offered a new way to dine. However, in many countries, the novelty is wearing off. In Singapore, there is only one revolving restaurant left (Clifford Pier).



BY CHERYL TAN KAY YIN

FAST-TRACKING INNOVATIONS

THE PANDEMIC PUSHING THE FUTURE OF MEDICINE

Since 2020, the world has seen a wealth of innovation in terms of healthcare, particularly in response to COVID-19, from telehealth to mRNA, and even air injections. This has given rise to an acceleration of innovation, collaboration, and discovery, catalysing a future of health and medicine that can help us reimagine and bring us a healthier, smarter, and more equitable post-COVID world.

VACCINES

Vaccine development is a lengthy, expensive process, but since 2020, the scientific community and the vaccine industry have responded urgently to SARS-CoV-2 by creating novel vaccines.

GENETIC VACCINES

Although gene-based vaccines were discovered 30 years ago, early mRNA vaccines were hard to store and didn't produce the right type of immunity. DNA vaccines were more stable but weren't efficient at getting into the cell's nucleus, so they failed to produce sufficient immunity.

However, in the age of the COVID-19 pandemic, collaborative research and pooled international funding enabled the production of mRNA vaccines with an overall 94% efficacy to be put to a real-world test.

DNA and mRNA vaccines offer huge advantages over traditional types of vaccines, since they use only genetic code from a pathogen rather than the entire virus or bacteria. Traditional vaccines take months, if not years, to develop. In contrast, once scientists get the genetic sequence of a new pathogen, they can design a DNA or mRNA vaccine in days, identify a lead candidate for clinical trials within weeks, and have millions of doses manufactured within months.

'NEEDLE-FREE' COVID-19 VACCINE SKIN PATCHES

A skin patch for administering COVID-19 vaccines have recently been produced and manufactured by Vaxxas. These skin patches can be stored at room temperature and be self-administered, making it suitable for use in places that lack cold storage facilities and medical staff. This would radically transform the current supply chain for vaccines and improve accessibility to the vaccine particularly in remote areas of the world where delivery networks are lacking.

INTERNET OF MEDICAL THINGS (IOMT)

The convergence of healthcare and technology enabled cross-fertilisation of ideas and techniques, giving rise to fields in computational biology, digital health, telemedicine, and AI-enabled radiology.

Coughalytics, for instance, is the AI detection of a corona cough. The use of a smartphone as a measurement and computer device to mathematically analyse coughs and respiratory sounds has now become a novel diagnostic tool that processes the sound of a person's cough to instantly identify respiratory diseases such as asthma, pneumonia, and chronic obstructive pulmonary disease (COPD).

THE MEDICALISED SMARTPHONE AND WEARABLE TECH

There's a proliferation of smartwatches, smart rings, and other wearable health and wellness technology. These devices can measure a person's temperature, heart rate, level of activity, and other biometrics. With this information, researchers have been able to track and detect COVID-19 infections even before people notice they have any symptoms.

One such group, DETECT Australia study, will determine if changes to an individual's heart rate, physical activity or sleep tracked through wearable devices could provide an early indication of influenza-like illness, including COVID-19.

DIAGNOSTIC ART (ANTIGEN RAPID TEST) KITS

The age of self-testing and home use tests have now become widespread. These tests look in our blood to see if our body has started fighting a SARS-CoV-2 infection, rather than detecting the actual SARS-CoV-2 virus. They do this by seeing if our blood contains specific antibodies that attach to parts of the virus. It takes time for our bodies to make antibodies, so people can already have the SARS-CoV-2 virus and be spreading the infection to other people before we can detect their antibodies.

TELEHEALTH

The adoption of telehealth through video conferencing to provide health care programmes for people who are hospitalised or in quarantine has largely reduced the risk of exposure to others and employees, completely transforming the role of bedside healthcare in preventing, diagnosing, treating, and controlling diseases during the COVID-19 outbreak.

Although this pandemic has brought about much uncertainty and fear among us at the start of 2020, it has also made industries and countries work together for a common good. Here's to 2022 and the many more medical tech innovations that will continue to transform the way we tackle future healthcare and medical research work.

What will Nostradamus predict?

BY COPERNICUS CHUA



★ WHO WAS ★ NOSTRADAMUS?

Born Michel de Nostredame in December, 1503 in the French town of Saint-Rémy-de-Provence, Nostradamus initially practised medicine, helping treat plague victims in France and Italy.

Not seeing a bright future for himself (no pun intended), he drifted into what we'd now call occultism, but he would have described on his LinkedIn page as overseeing a multi-year study of the cross-disciplinary links between astrology, prophecy, and cryptography – in order to avoid (you guessed it) persecution from the Catholic Church's Inquisition.

While many of his contemporaries thought he was a heretic, he also had powerful allies, including Catherine de' Medici (wife of King Henry II of France), which insulated him from the Inquisition.

WHY IS HE FAMOUS?

During his career, Nostradamus wrote over 6,300 prophecies, mostly in quatrain (4-line stanzas), freely using different languages in a single sentence, which in modern translation often reads like an epileptic haiku. The 942 most famous of which were published between 1555–1558 as *Les Prophéties*.

Since then, over 200 different editions of *Les Prophéties* have been re-published – an amazing feat for a work that was written so deliberately vaguely so he couldn't be accused of being a heretic. There are rarely dates given, and almost no clearly identified locations or people (apart from occasional references to kings, or contemporary cities like Genoa or Venice).

There's been thousands of studies, articles, and pseudo-scholars dissecting his prophecies, and trying to find meaning where there is seemingly none. It's a condition coined in 1958 by German neurologist Klaus Conrad as *apophenia* (often associated with schizophrenia) – unknowingly imbuing something with artificial meaning (ie. conspiracy theories, numerology, etc).

Throughout human history, in times of trouble, famine, conflict, people have always looked for signs from above, and for centuries, Nostradamus has been their go-to clairvoyant (or conman, depending what you believe). Whether you believe him or not, one thing that is certain: through his vague prophecies, the legendary purported seer has created a brand identity that's endured for 500 years and is still being quoted, featured, and blogged about to this day.

SOME OF HIS FAMOUS PROPHECIES

Admittedly some prophecies seem intriguing on their surface – the most famous of which supposedly foretells of Napoleon:

"PAU, NAY, LORON will be more of fire than of the blood. To swim in praise, the great one to flee to the confluence. He will refuse entry to the Piouses. The depraved ones and the Durance will keep them imprisoned."

While Pau, Nay, and Loran are all towns in France, they also make an anagram spelling Napoleon Roy (ie. "King Napoleon"), who was himself a contemporary of Pope Pius VI and Pius VII (ie. the "Piouses"), who he did imprison in 1796.



Some of his other prophecies are initially a bit hard to simply write off, for instance:

"The lost thing is discovered, hidden for many centuries. Pasteur will be celebrated almost as a God-like figure. This is when the moon completes her great cycle, But by other rumors he shall be dishonored."

It's true that French microbiologist Louis Pasteur is revered as a saint by the Vietnamese Cao Dai religion alongside Shakespeare, Victor Hugo, Sun Yat-Sen, and Julius Caesar. A 1995 New York Times article also states how he lost some credibility



after admitting he disclosed some misleading information during his discovery of the anthrax vaccine, but then he was still world-famous when he died, so it's a stretch to say he was dishonoured.

Additionally, almost 1,500 people in France have the surname Pasteur, so it could have simply been a lucky guess – there was bound to be a famous Pasteur, someday.

The vast majority of his prophecies are even far less clear. For instance, in Nostradamus' time many thought the following was prophesying Henry II's battle with the Comte de Montgomery – because Henry was older, both men had lions on their shields, and Henry died of his wounds.

"The young lion will overcome the older one, On the field of combat in a single battle: He will pierce his eyes through a golden cage. Two wounds made one, then he dies a cruel death."

Interestingly, you could just as easily make a contemporary reading of this cryptic prophecy based on the Lion King: Scar wants to overthrow the golden-eyed Mufasa, so he wounds both his paws. Mufasa dies.

In isolation, critics of Nostradamus argue that eventually with his 6,300+ prophecies, he was bound to make at least a few plausible guesses. In that way, he also supposedly predicted everything from the atomic bombings of Nagasaki and Hiroshima, to Princess Diana's death, to 9/11.

Nostradamus and 2022

So what does Nostradamus have to say about 2022? Nothing specific, of course. But given the turmoil of the last few years, a lot of Nostradamus-whisperers are seeing connections and reading into his prophecies.

VLADIMIR PUTIN KILLED BY LIGHTNING?

The great man will be struck down in the day by a thunderbolt. An evil deed foretold by the bearer of a petition. According to the prediction, another falls at night time. Conflict at Reims, London and a pestilence in Tuscany.

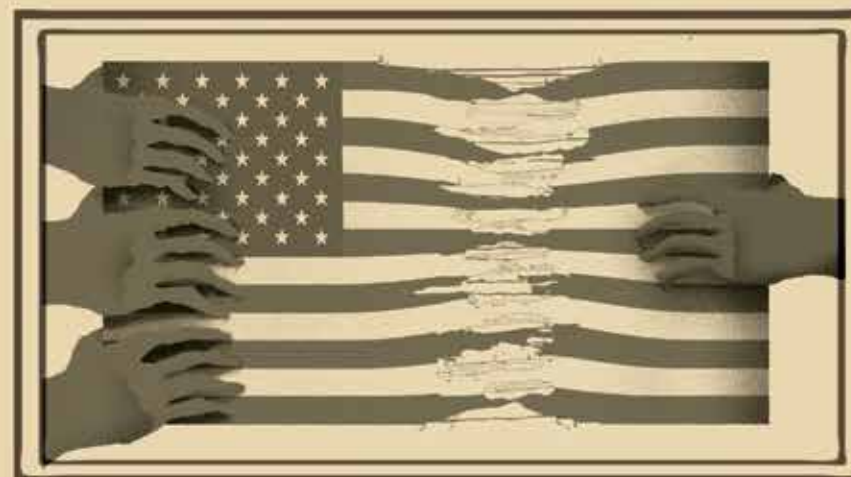
This is a perfect example of the almost universally apophenic applicability of many of his prophecies, due entirely to their vagueness. For instance, some claimed this referred to JFK's assassination in 1963.

Some Nostradamus pundits now think it means Vladimir Putin will be killed in 2022, literally, by a lightning strike. They've made that leap based on the phrase "great man" – which would probably imply a leader with a cult of personality, eg. Kim Jong Un, Nicolas Maduro, or Putin.

And while it wouldn't portend pestilence in Tuscany, a power vacuum in Russia would potentially complicate things in Europe, be it Reims or London. Arguably, it could also mean Donald Trump, as he always claims he's great. He also golfs a lot, and an average of 21 golfers per year are killed in the US by lightning strikes, making it just as plausible as Putin.

MATT GROENING: A MODERN-DAY NOSTRADAMUS?

While Nostradamus made many predictions over 6,300 quatrains, none of which have been proven true. Arguably, The Simpsons creator Matt Groening has an even better claim to prophetic fame. In just 714 episodes to date, The Simpsons have predicted dozens of eerily correct future events, including Donald Trump's golden escalator scene and eventual presidency, Lady Gaga, and Richard Branson going to space.



POLITICAL TURMOIL IN THE US AND THE END OF THE REPUBLICAN PARTY

One year before the Italian conflict, Germans, Gauls, Spaniards for the fort: The republican schoolhouse will fall There, except for a few, they will be choked dead

Some believers have, unsurprisingly, taken this to refer to the US, which prior to the January 6th coup attempt (by Trump supporters), would have seemed implausibly far-fetched even by Nostradamus' loose standards. While EU members Germany, France (Gauls), and Spain won't likely be joining any Italian conflict

either, the US Republican Party's future is somewhat in doubt – due to infighting between right-wing Trump supporters and more moderate Republicans, and 2022 is a bi-election year which could see Congressional power change hands.

GLOBAL INFLATION AND THE COLLAPSE OF THE BOND MARKET

The copies of gold and silver inflated Which after the theft were thrown into the lake At the discovery that all is exhausted And dissipated by the debt All scripts and bonds will be wiped out

Many believers claim this predicts the current spate of global inflation, and somehow, the impending collapse of the bond market and the US Dollar in 2022. Several Crypto-Nostradamus bros (yes, it's a thing), have even asserted this is a 500-year old predication to buy and hold bitcoins.

Admittedly, many bonds are denominated in US Dollars, so if you think of printed money as "script" and take "bonds" literally, a collapse of one would lead to a collapse of the other. But if you also take it literally, the US abandoned the Gold Standard in 1971, after which its money wasn't "a copy of gold" – it became a

paper-based show of faith, when accepted by people at face value, in the US government's own solvency.

So while it may seem to imply economic ruin, the prophecy could just as easily refer to the Great Depression of 1929 when all those things happened, globally. Or the rampant inflation of the 1970s (after the US abandoned the gold standard, which weirdly makes more sense), or even the Great Recession, when the global economy nearly collapsed, and waves of bad debt rippled across the world as government bonds (eg. Greek, Irish, Spanish, etc.) all plunged in value, etc.

THE LIST

CARS OF THE FUTURE

BOLLINGER B1 / B2

Resembling old-school trucks, both the Bollinger B1 (SUV) and B2 (pickup) are blocky and seem to lack aerodynamics, but the giant rigs are designed to get stuff done. In the future, it seems like old school is the new school.



LOTUS EVIJA

Lotus is known for its sports cars, and its EV hypercars pack quadruple-digit horsepower, with four electric motors cranking out 2,000 horsepower. The curvy body looks sexy enough to be practically obscene.



TESLA CYBERTRUCK

When Tesla's Cybertruck debuted in late 2019, it looked like it came straight out of Blade Runner. The factory hasn't even been built yet, as it's currently designed, but you can reserve a Cybertruck on Tesla's website now with a \$100 deposit.



VOLKSWAGEN ID.BUZZ

Remember the iconic VW Type 2 bus? It's now been reborn as an all-electric campervan, with a high-tech self-driving version set to appear in around 2025. It is based on the modular electric drive kit (MEB) platform.



CANOO PICKUP TRUCK

The adorable design of the Canoo pickup truck uses a cab-forward design and a choice of rear-or all-wheel-drive. Its distinguishing feature is its faux forward-control styling evocative of 1960s vans and trucks.



THUNDERTRUCK

This EV truck with a holographic display boasts collapsible batwing-shaped solar awnings for battery recharging and shade, a built-in camping tent on the roof, and a Range Extender that converts it from 4WD to 6WD. Plus, it comes with a military spec drone to scout terrains.



When it comes to vehicles, the future looks electric, as these cars prove. Whether they're designed for efficiency, self-driving or made with sustainable materials, they are definitely far from boring. Take a look at some of these gorgeous concept cars - some of which will also become reality soon.

DODGE ELECTRIC MUSCLE CAR

Dodge is going electric with its first electric muscle car, due in 2024. The all-wheel-drive Dodge eMuscle relies on heavy retro and classic design elements as inspiration. The fastback roofline and blunt fascia is reminiscent of the classic 1969 Dodge Charger.



MERCEDES-BENZ VISION AVTR

The VISION AVTR was inspired by the movie AVATAR. It can move sideways (each wheel can be driven separately), but the most impressive feature is that it can be controlled with the mind and comes to life when the driver's hand is on the centre console.



CADILLAC INNERSPACE

The sleek Cadillac Innerspace two-door e-roadster is part of its Halo Concept Portfolio. It has two seats, and both the doors and the roof pop up. The seats both pivot outward for easy entry and exit. Fully autonomous, there's no steering wheel or pedals.



BUGATTI NEXT-57

The Bugatti Next-57 is a vintage-inspired Batman-like chariot built for one rider. The car's door opens to reveal a plush cockpit, draped in red suede. The



seat rotates to face you and rotates back to face the dashboard once you're seated.

AUDI SKYSPHERE

The Audi Skysphere is a rear-wheel-drive 2-door electric convertible concept, with the press of a virtual button, the car's entire front end can extend or contract, changing from a stable grand tourer to a driver-centric roadster.



TOYOTA LQ CONCEPT

Toyota's electric LQ concept car satisfies the "human need to be engaged emotionally" with an on-board AI named Yui. The original concept actually dates back to 2017, and features autonomous driving, voice alerts, and more.



FUTURE IN FICTION

SCI-FI WORLDS

BY TARTANARIES OW

We are truly living in a remarkable time. At no point in human history has technology evolved so quickly in a single generation. Understandably, that creates existential anxiety about the future. How will humans adapt to a future that seems so Alien? Will you be left behind in A Brave New World?

As long as we've had technology, we've been fantasizing about what happens next - this happened literally through Science Fiction, or sci-fi.



THE INEVITABLE BIRTH OF SCIENCE FICTION

As a genre, sci-fi dates back centuries. The first sci-fi novel was Chymical Wedding of Christian Rosenkreutz (1616), but the first work of fiction recognised as "sci-fi" was Mary Shelley's Frankenstein (1818). Since then, the genre's exploded with thousands of sci-fi stories in print, film, and increasingly on your Netflix list.

It's an interesting commentary that in a genre bounded only by our imaginations, sci-fi stories, from Space Westerns to horror, tend to cluster around the overarching theme of a Utopian/ Dystopian future.

Broadly, utopian sci-fi isn't the lack of imperfection in a world. It's the promise of a seemingly perfect world, which technology has put within reach. Conversely, a dystopian sci-fi world is one where technology exists, but it's failed to deliver on the promise of perfection.

UTOPIAN STAR TREK

The granddaddy of utopian sci-fi has to be Star Trek. Originally aired for only 3 seasons (1966-69), it spun off into 9 different series, 13 movies, and countless pop-culture references.

Star Trek hit primetime TV screens at the precise moment the US and USSR were racing to be first to the Moon. The reason for its enduring popularity ever since, is that while the show introduced "strange new worlds" and futuristic technology, it was really a human-interest story with alien races standing in as metaphors (eg. the war-like

Klingons were a metaphor for the existential, Soviet space threat).

Star Trek envisioned a world order where mankind has supposedly evolved beyond seeing gender or race. We leveraged our technology to all our mutual benefit under a united Starfleet. The show envisioned a future where we could speed across the galaxy, create any food we want out of thin air, and cure almost any disease.

DYSTOPIAN WORLDS

Sci-fi gives us countless examples of what happens when technology doesn't deliver on its promise of perfection, creating a dystopian world that's hi-tech, yet low-life.

The Matrix (1999) introduced us to its complex world where Thomas Anderson is a computer programmer by day, and a hacker called "Neo" by night. His life as he knows it changes when he's contacted by hackers who reveal that his entire world is a VR construct where humans "live" in The Matrix run by sentient AI that keeps sedated humans alive to harvest bio-energy. Fighting against AI "agents" who try to kill them, Neo eventually destroys the Matrix and frees humanity.

Revolutionary cinematography and imagery aside, what makes The Matrix unique is it was a product of its time. The internet had only just taken off, with dial-up modems forming an integral plot point in the film's low-life world. Also, it's the first time a movie has made viewers question their own existence, leading to the rise of its own religion dubbed Matrixism.

Set in the resource-scarce 24th century, The Expanse sees humanity split into 3 factions: Earthers, Martians, and Belters. Earthers consider themselves the leaders of the human race, Martians have become a militant off-shoot in a perpetual cold war with Earth over space resources, while the impoverished interstellar miners called Belters are caught in between.

The Expanse is widely regarded for its political intrigue and seemingly realistic portrayal of life as we move into space. Even with the advancement of tech, humans are still hamstrung by the most basic needs: clean air and water.

Also set in the 24th century, Altered Carbon explores the idea of eternal life: technology has given humans the ability to live forever via memory stacks and replaceable bodies. For the wealthy, it means accumulating lifetimes of wealth in their floating palaces in the sky, while for the poor it means a choice between eternal drudgery or dying to escape from it.

Both are as much a commentary on human nature as it is on the (possible) futility of colonising space.

WHAT DOES THE FUTURE HOLD?

Even as sci-fi writers try to picture a future world enhanced by technological advancements, there's a hesitancy to paint it as pure utopia - it's often shattered by the realisation that it's either only available to the privileged (eg. Gattaca, Hunger Games, etc) or a construct of technology or AI (eg. The Matrix). It seems that no matter how advanced society is, we still can't escape our human nature, and we can't really have the good without the bad.



DIRTY MONEY

IS CRYPTOCURRENCY KILLING OUR PLANET?

Broadly speaking, skeptics argue that cryptocurrencies are hurting society because it's used to fund crime/laundry criminal proceeds (eg. when hackers demand ransom payments in nearly-untraceable digital assets); or it's a way for shady governments to bypass sanctions (eg. Venezuela's crypto, "Petro"); or it impedes governments' ability to fairly levy taxes and generate necessary revenue.

All of these are refuted by crypto-believers, who claim it is somewhat traceable (on the open blockchain), and that issues like tax-avoidance will be solved when legislation and enforcement catch up to the technology. With those back-and-forth arguments likely to continue, ad nauseam.

The one anti-crypto argument no one can realistically refute is its environmental impact. Unfortunately, nothing in life comes easy, and while fortunes were being made, something far more valuable was being lost: our environment.

One study warned that Bitcoin could push global warming beyond 2°C. Another estimated that bitcoin mining in China alone could generate 130 million metric tons of CO₂ by 2024. This amount could grow even larger unless more renewable energy is used.

THE RISE OF CRYPTO

Until relatively recently, cryptocurrency was neither understood nor accepted by the general public. For instance, Bitcoin was created in 2009, but for years the only people who even knew it existed were techno-libertarians – the e-commerce equivalent of people who insist on using Linux as their OS.

Today, there's over 8,000 different cryptocurrencies in existence (up from just a handful in 2013), worth an estimated US\$3 trillion as of November 2021. Bitcoin currently controls a substantial 66% of the total market capitalisation for all cryptocurrency, followed by Ethereum and Binance, meaning that at least in recent years, whatever's happening with Bitcoin is largely a barometer for the crypto market.

DIRTY MONEY

Crypto as a system is arguably the dirtiest industry on Earth. Yes, tar sands and coal mining are incredibly dirty, but they do produce something useful: energy. Even gold mining is incredibly dirty, but also critical to electronics and global commerce.

Crypto, on the other hand, is like a fidget spinner. It goes round and round, deliberately expending energy, and giving nothing tangible back in return, unless you happen to time it right and resell it at a profit to the next person. As we know, there seems to be a new cryptocurrency that crops up on an almost daily basis, and the growth – fueled by market speculation – is unstoppable.

For those who aren't familiar with why cryptocurrencies are so "dirty," we have to look at how they are created.

MAKING MONEY AIN'T EASY

While the software varies between cryptocurrencies, in general new cryptocurrency must be created (aka "mined"). The reason cryptocurrencies are so energy-intensive is that in the case of most coins, mining is deliberately intended to be difficult, as these transactions are secured with cryptography, which is the "crypto" part of cryptocurrency. The mining computer needs a lot of power to solve a problem – the same reason you need more RAM to run your video editing software. In addition, the hardware will also need to be cooled in order to work efficiently, translating to more energy consumption.

To mine a Bitcoin, your computer has to correctly guess a 16-digit code using the numbers 1-9 and the letters A-F – and starting with a "1" – before any other miner in the system in order to win the right to process a block of transactions on the blockchain, and in the process "mine" yourself a new Bitcoin. This, proponents claim, does make it virtually tamperproof.

In fact, the only way to tamper with it, because it's decentralised to thousands of independent computers, would be to control more than 50.1% of all available computing power in the entire Bitcoin network, and essentially do a brute-force attack allowing you to essentially hijack the chain, and rewrite transactions on it. But that's besides the point.

MINING IS SUPPOSED TO BE ENERGY-INTENSIVE

Theoretically, the security solution for most cryptocurrencies was to make it so energy-intensive, that you would never try doing it. Which is why the blockchain is seen as unhackable, and why every transaction is hugely polluting, or as expert Alex Hern famously put it,

"mining is a competition to waste the most electricity possible, by doing pointless arithmetic quintillions of times per second."

Because crypto-mining is so energy-intensive, two things have happened over time, which only compounded the problem:

1) CRYPTO SIMPLY FINDS THE PATH OF LEAST RESISTANCE:

As it's matured, the global crypto mining industry has migrated to wherever electricity is cheapest and/or regulations are least prohibitive. For instance, China is home to 80% of all crypto-mining operations, because it sells electricity cheaply to encourage industrial growth. Its energy is also primarily from coal, which is hugely polluting. In essence, mining in China is dirtier, but more profitable.

Conversely, 98% of all electricity in Iceland is from renewables, and it has some of the highest wages and taxes in the world. If you mined crypto in Iceland, the carbon footprint would be negligible, but every other cost would be prohibitively high.

While there's many other factors at play – for instance, in China with its policies on crypto, its own launch of the e-Yuan, centralised economic policies, etc – the baseline is that miners are simply maximising their profits wherever it's easiest, whether that's China today, Russia tomorrow, or Iceland at some later date.

Last year, Kazakhstan emerged as a popular mining hub after China cracked down on the activity – curbs Chinese authorities said were necessary to protect the country's efforts to reduce carbon emissions.

2) CRYPTO'S CREATED A MINING ARMS RACE

By design, crypto's winner-take-all competitive mining has created a mining arms race to the bottom, as miners use more powerful, energy-hungry machines to solve the remaining winner-take-all equations faster than anyone else.

For example, in the early days of crypto, a typical laptop or desktop was sufficient to profitably mine \$5-10/day, because there were enough Bitcoins available and less incentive to invest heavily in costly equipment. It was something like craft beer brewing – some people were hobbyists, and in time others got more serious, upping the ante with more powerful equipment.

Today, the reverse is true: the average MacBook would mine around 50,000 times slower than a specialised computer (aka "mining rig"), so in a winner-takes-all situation, you would never successfully mine a single coin. The days of individual miners using their gaming laptop to mine Bitcoins as a side hustle are gone.

Now when people talk about mining, what they generally mean are vast rows of expensive, single-purpose CPUs, humming away in large, air-conditioned rooms.

A RACE TO THE BOTTOM

There's a huge rush to mine coins because despite being digital, there's a finite amount. In the case of Bitcoin, the outstanding pool of new Bitcoins still out there waiting to be mined is getting deliberately smaller. This is because the algorithm to mine new Bitcoins has a built-in 4-year half life – this is what crypto circles refer to as "a halving". This means that every four years, the remaining number of available new Bitcoins shrinks by half.

As of December 2021, CNBC reports that 90% of the total Bitcoin supply has been mined. In theory, this is meant to keep the total supply of coins in circulation limited, and make existing coins grow in value slowly over time.

In practice, this means that miners are increasingly fighting to solve the same math problems, but with a diminishing chance of success every time anyone solves one (currently about once every 10 minutes). This is because of the simple fact that every time a potential coin is mined, every available machine turns its attention to mining the finite number of remaining coins. And it's not just a Bitcoin issue, because most coins have a finite number (e.g. there's exactly 118 million Ethereum).

This means that your chances of successfully mining a block are directly proportional to the percentage of total, worldwide computing in that ecosystem you control (aka "hashing power"), because you're competing against every other miner on Earth in a winner-take-all race. So there's an automatic incentive to get more powerful machines that gobble up more electricity to overpower the competition.

SO WHERE DO WE GO FROM HERE?

On its surface, cryptocurrency seems easy – too easy – to make, buy, and sell; but hardly anyone pays any attention to how they're made. If everyone knew how pointlessly polluting it was, would they think twice before "investing" in it? Maybe, yes, maybe, no. Everyone likes easy money. But at what costs?



WHEN WILL WE TAKE HOLIDAYS ON MARS?

EXPLORING THE POSSIBILITIES OF SPACE FLIGHTS

In the past thirty years or so, folks across virtually all affluent nations grew accustomed to a comfort that to our forefathers would appear surreal. The ability to hop into an aluminium tube travelling near the speed of sound and arrive on an entirely different continent a few hours later is one of the greatest achievements of humanity, and the foundations of a modern, globalised civilisation.

In 1968's *2001: A Space Odyssey*, Stanley Kubrick and Arthur C. Clarke painted a vision in which sleek, presumably single-staged spaceships deposit passengers on massive, rotating space stations orbiting Earth for

transfers to other destinations across the Earth-Moon system, and likely as far out as Mars.

While Kubrick got glass cockpits and in-flight entertainment screens right (both absent even in the early jet age), reality is disappointingly far behind that lofty vision, where space travel is as routine as air travel is today.

This begs the question: why on Earth, decades after our first cinematic mission to Jupiter, are we still baby crawling around Earth's orbit, and anything remotely as ambitious as the Apollo programme that happened decades ago appears elusive today?

NOT ALL IS DOOM AND GLOOM

In 2020 and 2021 despite the chaos of Covid-19, a few private companies launched both suborbital and orbital space missions with commercial passengers onboard.

Virgin Galactic and Blue Origin took their passengers near, or above, the Karman Line – the universally-accepted boundary of space 100km above us. SpaceX fulfilled its first Commercial Crew Programme contract with NASA to become the third entity (after NASA and Roscosmos) to send humans to the International Space Station, and the first commercial company to do so. As a cherry on top, they threw in a pitch-perfect landing of their reusable booster.

Is human civilisation back on track to our cosmic destiny, or are existing solutions simply not good enough to make a run for the nearest, survivable planet, Mars?

LAUNCH IS A DIFFERENT BALL GAME

The analogy between the commercialisation of aviation and access to space is a popular one, although misleading. Commercial planes operate in a much more forgiving environment and are vastly more efficient than rockets because they rely on the ambient air to produce both lift and thrust. Rockets need to carry their own source of oxygen to maintain combustion and to produce thrust because reaching orbital velocities in the excess of seven kilometers per second can only be achieved in vacuum.

As a result, the ratio of propellant to payload in a long-range airliner would typically be 40% and 20% respectively; a rocket would be closer to 90% and 1%. It takes a lot of energy to get into orbit, which reduces the payload (cargo) capacity and therefore increases the cost per kilogram.

Ironically, fuel only accounts for about 2% of the costs – the rest is in the rocket and the launch campaign to put one in space. Even with reusable rockets, the reduced capacity and extra maintenance costs have been producing disproportionately low savings in the cost per

kilogram since NASA's Space Shuttle that was meant to capitalise on reusability in the early 1980s.

Rockets wear out much faster than turbojets because of the vastly faster speeds that heat the rocket's outer coating as well as the higher expulsion rate of extremely hot, oxygen-rich exhaust gases, creating considerable maintenance issues even if the rocket motor is designed for reusability.

The exact refurbishment costs are not publicly known, but the listed price of a reused SpaceX Falcon 9 is only 20% lower than a brand-new one. So far, the booster rocket with the most logged flights has been launched 10 times, compared to the hundreds of cycles a commercial airliner would complete in that timeframe with minimum downtime in between.

Furthermore, rockets and seawater don't mix very well when dropped down on a parachute – which is why SpaceX uses a propulsive descent technology to recover their first-stages. By using some of the very scarce propellant for that feat, the payload capacity is instantly reduced by around 30%.

Complicating things further, the upper stage section that delivers the payload into orbit isn't reusable – the intense reentry heat requires a heavy heat shield that would cannibalise any remaining payload capacity. Thus, it's always built from scratch and unlikely to ever be recovered.

To bring down the launch costs to where passenger space travel is attainable to the middle class, current rockets must be replaced with simple, cost-effective, even expendable ones. Recent advances in hybrid rocket propulsion, which involves a non-explosive combination of liquid oxidiser and solid fuel with half the complexity of heritage technologies, is extremely promising in achieving just that.

We know that launching rockets is hard and expensive, and therefore the payload has to be as lightweight as possible. But that's just getting into orbit – to get to Mars we will need something even more efficient, packed into a very limited payload mass.

COLONISATION OF MARS WON'T WORK

Travelling through space is different from travelling from one continent to another – even if you get from point A to point B, space will eventually kill you.

Going to Mars the traditional way would take around seven months of exposure to that harsh environment of outer space. The human body isn't meant for long-term exposure to solar radiation and microgravity; the health impacts like the loss of muscle/bone mass and damage from solar radiation would be potentially unsurvivable. In comparison, astronauts spent a week on Apollo missions to the Moon, while crews on the International Space Station (ISS) are safely within the confines of the Van Allen Belt and can descend to Earth at any time.

Even rigorous exercise routines meant to alleviate loss of muscle and bone mass merely slow the process down. After a prolonged stint at the ISS, returning crews can barely walk for weeks – so one can't imagine Mars astronauts donning heavy suits to enjoy the red planet's grand vistas, let alone to conduct any science on the surface. In order to conquer it, we need propulsion that makes Mars a quicker return journey rather than a lengthy, one-way drama.

Long transfer times also mean that all consumables must be brought along, further increasing the launch mass and cost. While water ice is surprisingly abundant in the solar system, you can't grow food in space without a well-engineered greenhouse which takes months to yield any crops.

A typical human consumes around a ton of food per year, so three tons for a Mars mission using existing systems is a perfectly reasonable estimate. Of course, it's possible to send supplies by automated ships in advance – but with the current reliability level of rocket systems (many of which have only around 90% success rate), that only increases the possibility of at least one of these missions failing, bloating the budget even more.

Anti-gravity drives and antimatter sound like attractive options proposed in science fiction, but are unfortunately beyond our current technology. However, the technologies for a drastically better propulsion system already exist.

WE'VE ALREADY GOT IT

Trying to get to Mars and back with chemical rocket propulsion (which remains the only practical option for launch) is a little like trying to sail across the Atlantic in a canoe. Sure – it's theoretically possible, but not necessarily wise to attempt. Luckily, we've got a great alternative on the horizon.

In the 1960s, NASA tested an engine called NERVA – the Nuclear Energy Rocket Vehicle Application – which used a nuclear reactor to replace the combustion process and superheat hydrogen which is ejected from the rocket, creating a very efficient thrust. This option is at least twice as efficient as chemical rocket propulsion and that means a spacecraft can be sent into a more direct and more energy-consuming trajectory that saves time. The propellant – hydrogen – can also be created from water ice so you won't need to haul all of it for the return trip.

While the thrust levels produced by a nuclear engine are not high enough for a launch, nuclear propulsion has the improved efficiency to get us to Mars in around three to four months, enabling a possible 'hit-and-run' mission with a short surface stay and timely return in the span of less than a year altogether.

Even though NERVA was successful, it's truly unfortunate that the programme wasn't continued – the Space Race came to a screeching halt in the wake of America's successful Apollo missions. Space travel was simply deemed not politically necessary anymore and too pricey in the era of dramatic social upheaval in the 1970s. Science missions shifted their focus to orbiting laboratories which eventually resulted in the construction of the ISS.

WHEN WILL WE DO IT?

Commercial spaceflight has a pretty good track record doing things on a limited budget, albeit on notoriously unreliable timelines. With SpaceX's Falcon 9 rockets costing under \$30 million per launch and the success of the Inspiration4 flight, the future of commercial space travel seems to be within reach.

With the ongoing work of simplifying launchers and development of next-gen nuclear reactors for space, we also have a very good shot at making Mars missions logistically feasible by 2035 – casual tourists will probably start taking actual trips to the Red Planet and back, much the same way tourists can access Antarctica alongside scientists.

Our generation will become the interplanetary one, much the same way our parents and grandparents witnessed the game-changing impact of commercial aviation. We certainly have a lot to look forward to as far as our vacation options are concerned, a decade or two down the line.

Non-fungible tokens, or NFTs, are the latest digital craze. NFTs are controversial – it's just as easy to find support for them online as it is to find people who think they don't make any sense. The record of their existence lives on blockchains, they can be bought and sold using cryptocurrency and they'll most probably thrive well into the future as we go digital for everything.

WHAT IS NFT?

Being non-fungible means NFTs are unique and non-replaceable – but only their digital record is. An NFT could be a digital art, memes, game assets, music or even a physical item with ownership tied to an NFT, created on popular blockchains like Ethereum (you can also get them on Solana, Tezos, etc).



The most confusing aspect of owning an NFT is that even when you purchase it, you don't have copyright or ownership of it. You only have a record and a hash code showing ownership of the particular digital asset. You can share the art on socials as much as you want,

but you can't sell the asset as the owner can. This is why the \$69 million NFT of Beeple's art can be widely shared without anyone breaking the law.

In short, NFT is only worth the bragging rights that come with it.

SHOULD I GET INTO NFTS?

What NFTs really do is create artificial scarcity, but that's nothing unusual: think about rare sneakers. The difference is that buying the sneakers means you own a pair, but an NFT's only a token representing a picture of sneakers.

NFTs and cryptocurrencies in general have an environmental problem: a single ETH transaction generates the carbon footprint equivalent to 19,700 hours of watching Youtube. When Joanie Lemerrier sold 6 NFTs in mere seconds, the energy required for the sale was equivalent to half a year's electricity bill for a 3-room HDB.

NFTs, like cryptocurrency as a whole, are still a Wild West of risk and little regulation. While it's getting a lot of airtime, many are speculating that the NFT bubble may already be bursting. It's a far cry from 2021's NFT art markets, but like cryptocurrency, the underlying technology may be what lasts, rather than its initial speculative application.



Cheat Sheet

#75 NFTs and the future

HOW TO GET STARTED IN NFT?

In order to dabble around NFT marketplaces (to sell or buy), you'll need:

- **A CRYPTOCURRENCY**, preferably Ether, as Ethereum is where most NFTs are traded: you can obtain ETH from various crypto-exchanges
- **A METAMASK CRYPTO WALLET** (available as browser plugin and mobile app) where you'll transfer your Ether (ETH) into
- **AN NFT MARKETPLACE ACCOUNT** (Rarible + OpenSea are good for beginners) which you'll open with your MetaMask wallet. Some marketplaces are only available to established artists, but you can join as many marketplaces as you want



There are steps to creating and selling NFTs after you create it, and the process goes:

- In the NFT marketplace, the Create button will let you upload your work (image, video, 3D, audio, etc) and the description
- Your NFT will be on the marketplace, but you still need to list it for selling and you have 2 options: auction your NFT or sell it for a fixed price
- Once you're done, your wallet will prompt you to "Sign" the transaction, which means you need to pay "gas fees" (the transaction charge) to get your artwork minted* ("minting" means it becomes a part of the Ethereum blockchain). Prices are in ETH or Gwei and fees vary depending on how congested the network is.

* Some platforms like OpenSea, Mintable, and Rarible have a "lazy mint" option, meaning that when the collector buys your NFT, they will pay the gas fees instead.

MARKETING YOUR NFTS

To sell your NFT, you'll need to get social – ditch Instagram, get your Twitter profile going and join Discord, a chat platform for crypto lovers. Build authentic relationships through these channels and you'll see your NFTs go places.



INSECT
BASED

MEAT-FREE



LAB MEAT

MEAT ALTERNATIVES

We're now too familiar with plant-based meat, with brands like Beyond and Impossible opening the market for other similar concepts to proliferate. Today, we have numerous "plant-based meat" brands that are facsimiles of beef, chicken, egg, pork, and even seafood.

Vegetarian food that mimics certain textures of meat has been around for a while in Asia. However, with modern processes, these meat-free products can make ingredients like soybean mimic the taste and even texture of meat. For instance, you can have "bleeding" meat-free patties made with heme.

Everyone knows that having more vegetables and less meat is key to a healthy life, so it's interesting how plant-based meat became so successful at convincing people to eat processed vegetables that taste like meat, rather than fresh ones.

BY YIN LOON

EATING IN THE FUTURE

WILL FOOD BE REAL?

In the fictional futures of dystopian sci-fi films, food seems to be heavily processed and synthetic, thanks to a total environmental degradation due to industrialised farming and overpopulation, as hypothesised in films like *Interstellar* and *Blade Runner 2049*.

But the future predicted in these films is not that far fetched. Today, nearly 30% of available land on the planet is taken up by livestock and a majority of the world's crops are fed to these animals. About 90% of the Amazon is cleared for livestock farming, while agriculture and livestock account for 70% of our water use.

We know that mass-produced meat like beef and chicken contain hormones and antibiotics that may be harmful to humans. A 2014 Harvard study found that just one serving a day of red meat during adolescence was associated with a 22% higher risk of pre-menopausal breast cancer, possibly due to hormone residues in beef. Ocean-caught fish like tuna are no safer due to the presence of mercury, lead, and toxic PCB compounds.

With rising sea levels and global temperatures, it's getting increasingly harder to farm staples like rice and potatoes, not to mention luxury items like coffee and chocolate. We need innovative ways to make food sustainable for the long run, and safe for consumption.

ALTERNATIVE FOODS

The future of sustainable food may turn to uncommon sources like bugs. Eating insects isn't new – you can find them on the menu from Cambodia to Japan and Mexico. Insects are a viable protein supply that's less intensive to farm and more nutritious by weight, and a number of food companies are looking into insect-based innovations. Singapore startup Allimate Nutrition's on track to release their cricket-based protein bars and snacks – not a far cry from the cockroach jellies served on board *Snowpiercer*.

Another forefront of food technology is 3D-printed food – local startup Anrich3D is paving the way with the technology to print food using food-safe filaments that can contain all the nutrients we need. This means a future of printing food like we see in *Star Trek* could be a reality.

FUTURE OF FOOD

Alternative food sources like these are key for humanity if it continues growing at the pace it is. In the sci-fi anime *Cowboy Bebop* (1998), the *Gateway Shuffle* episode showed us a familiar scenario about food, where guests complained about how there's no real "meat" at restaurants anymore. With environmental farming issues and current food innovations, this may well be our future of dining.

FROM BRAIN FREEZE TO MIND UPLOAD

A FUTURE OF IMMORTALITY

BY NINA GAN

We've all heard tales of the mythical Fountain of Youth or the legend of the Holy Grail – both are meant to imbue mankind with miraculous ways to restore or give eternal youth.

The desire to be immortal or forever young has been ingrained in the human psyche since time immemorial, but for transhumanists who advocate the advancement of human longevity with technology, the idea of immortality should be more than mere legend.

Humans have always toyed with the idea of prolonging life, or at least cheating death. In the 18th century, Luigi Galvani believed he could reignite fresh corpses by sending blasts of electricity through them (this is explored in the *Frankenstein* novel).

MANIMAL: ANIMAL DNA EXPERIMENTS

Fast forward to today, and one current study is experimenting with cellular senescence, an anticancer mechanism found in naked mole rats (which live extraordinarily long and cancer-free lives), to see if its anti-ageing effects could be transferred to humans. Another experiment is seeing if humans can incorporate the DNA of indestructible tardigrades (or "water bears") in order to withstand radiation and retard ageing.

If that doesn't gross you out, there's a current study trying to find out how tapeworms are paradoxically prolonging the lifespan of *Tennothorax* ants by at least three times. Would you ingest a tapeworm that can do the same for humans?

Scientists have already extended the life spans of mice hundreds of times, but it'll take a leap to use those methods on humans. The next best step is a company that's working on treatments to expand the lifespan of human's best friends: dogs. The theory is that if it works for dogs, people will want it too.

While modern medicine has already prolonged the lives of many, the curious human mind is always looking at ways to extend it further. There are even venture capital firms like Longevity Fund that specialise in investing in companies working on human life extension.

BRAIN FREEZE: CRYONICS

You've probably heard of cryonics, which is basically preserving a frozen human by placing it in liquid nitrogen stored at freezing temperatures below -196°C in an attempt to let technology catch up and revive (and/or cure) them in the future. The idea was first put forth in 1962 by Michigan professor Robert Ettinger, and by 1967, the first human body was frozen.

Cryonics shouldn't be confused with the term "cryogenics," which is anything involving ultra-cold temperatures (ie. SpaceX uses cryogenics to make liquid oxygen for rockets). While the technology to revive and cure these frozen bodies doesn't exist yet, there are already companies using cryonics to freeze not just whole bodies, but also just their severed heads.

Alcor, a "life extension" company in Arizona, currently holds almost 200 brains and bodies frozen in liquid nitrogen. For US\$200,000, the process to cryo-preserve a human begins when they're medically declared dead by a doctor. Then the body is prepared in an ice bath, and injected with 16 different medications and variations of antifreeze until the body temperature drops to near freezing (the process can take as little as 35 minutes).

Then there are "brain freezers" who've signed up to have just their brains cryonically preserved. For just US\$80,000, their heads are severed by a surgeon after it's frozen. When it comes time to be thawed out, it's hoped that a body can be grown with their DNA.

The youngest cryo-preserved person currently is a two-year-old Thai girl who developed a rare form of brain cancer and died just before turning three in 2015. Her parents believe that the technology to revive cryo-preserved patients would be available in as soon as 30 years, but many other scientists say it could be as much as 100 years away.

By then, a big question is if you'd still be the same person once your brain was turned back on.

SLEEP OFF YOUR AGE: HIBERNATION

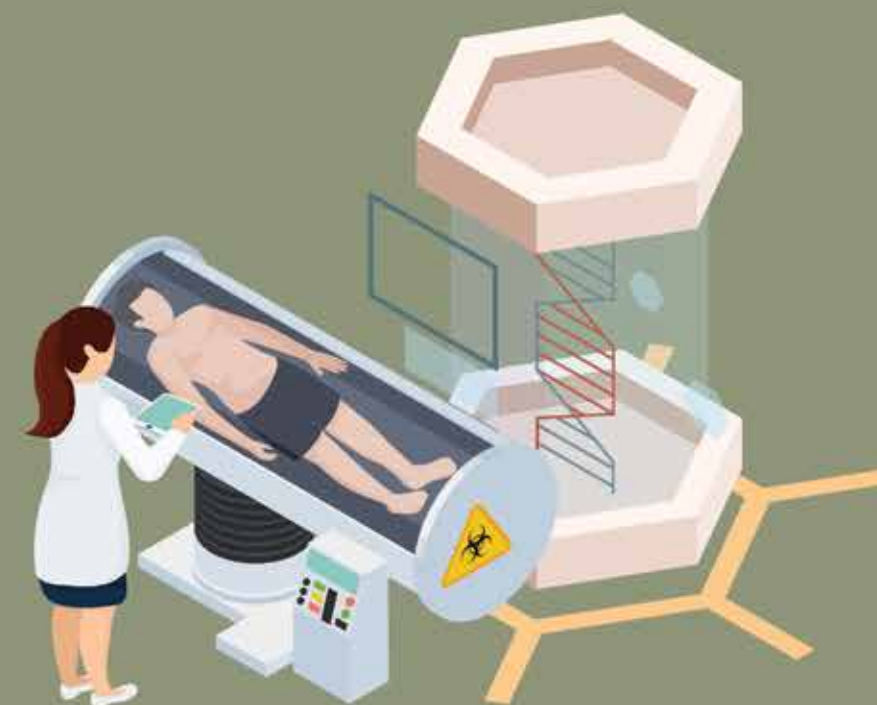
From the movies *Alien* (1979) and *Passengers* (2016) to the Netflix series *Another Life* (2019-), it's not uncommon to see humans using hibernating pods for their long journeys in space. In multiple studies of animals that hibernate, it's shown that sleeping – and slowing their metabolism down – for prolonged periods actually slows ageing.

But sleeping humans and hibernating animals are different: hibernating animals have evolved ways of conserving most of their muscle mass during their rest and can enhance the repair of their DNA, while human muscles deteriorate with prolonged periods of inactivity.

There are ongoing studies, including those by NASA, around human hibernation to unlock the healing aspects of long-term sleep. The essence of hibernation is body-temperature regulation – if humans can lower their core temperature to induce a low-metabolic state, it could slow aspects of the ageing process, such as muscle and bone deterioration.

Thing is, our body temperatures aren't meant to fluctuate – it could mean death – and it mitigates temperature drops by shivering. So far, arctic squirrel biologist Kelly Drew believes to have developed a drug that could drop core body temperature safely (it's worked on non-hibernating rats). This type of hibernation bears close resemblance to cryonics, but without freezing.

However, it'd take more than a pill to safely induce low-temperature hibernation because humans don't have the anatomy needed to hibernate – for one, our bowels would develop sepsis. Research is ongoing into how we can fluctuate our body temperatures like hibernating black bears, whose guts closely resemble ours. Until then, the idea of hibernating to stave off ageing will have to be relegated to fairytales like *Sleeping Beauty*.



DIGITAL YOU: MIND UPLOADING

The human brain is made up of billions of individual neurons connected to other neurons; every time a neuron fires, electrochemical signals jump between them, creating information that enables the brain to process input and execute commands. Many neuroscientists believe that who we are – our personalities, emotions, even consciousness – lies in those patterns.

So hypothetically, you can transfer all the data into some server, in essence creating a stored version of "you" somewhere. This process is called "mind uploading."

Of all the ways humans are trying to prolong life, mind uploading is the one that excites transhumanists the most. Part of this reason lies in the fact that computing power essentially doubles every 18 months or so, and with Moore's Law of accelerating returns, we will soon get to a point where the massive amounts of data generated by the human brain can be processed and digitally recreated. Some transhumanists are pretty sure that we will see it happen in the next 50 years or so.

While we won't yet see the likes of simulated worlds as seen in *The Matrix* (1999) or even the possibility of having our souls contained within "stacks" as seen in *Altered Carbon* (2018-), there are companies working on these concepts.

Back in 2016, a company called Nectome claimed that it would upload your brain into a "neural network" to preserve your "self," and the catch is – similar to cryonics companies – you have to be dead first because the process involved injecting a chemical solution to turn the brain into glass so it can be scanned and uploaded when technology advances enough to do so. These days, the company just claims it's in the business of preserving memories.

There are also a number of companies working on merging computers with human brains, but these are more for humans to have control over prosthetic limbs using their brains, and not an entire "sleeve" body like we see in *Altered Carbon*.

The closest thing we're going to get currently with *Black Mirror*'s San Junipero episode – where the elderly are living young lives in a simulated world – is in a metaverse. Equipped with a VR headset and haptic suit, users plugged in can "feel" everything in the virtual world.

The alluring version of mind upload – where the deceased can live on digitally in a simulated playground and occasionally join in on irl interactions via a video conference – is that it doesn't require the human body to survive, just its brain, which can be uploaded and stored in a cloud.

THE FUTURE OF IMMORTALITY

As long as we have known death, we have dreamed of life without end, and the quest to live forever is what drives civilisation. Will humans be immortal? A paper published in *Scientific Reports* in 2019 looked at how DNA can estimate the lifespans of different species – it found that humans have a "natural" lifespan of around 38 years. Compared to early humans, we've already surpassed our normal lifespans. Maybe the question should be: is it the best way for humankind to move forward?

BY KARIM RAFFA

COLLECTING PIXELS

NFTS AND THE FUTURE OF COLLECTIBLES

NFTs are all the craze this past year, and not just from a hype and attention perspective – not a day goes by without a rare mutant ape or a plot of virtual land going on sale for hundreds of thousands of dollars on platforms such as OpenSea or Mintable.

If you're from a generation that's reading this on their computer and not on their phone, the idea of paying half a million dollars for a pixelated JPEG may seem insane.

But let's all be reminded about something that we've all done before, or have relatives that have done it.

We're talking physical collectibles like numismatic coins (with little R2D2s where George Washington should be), vinyl, rare toys that you can't take out of the packaging without it losing all its value, and Pokémon cards (some of which are selling for close to US\$400,000).

THE HUNT FOR THE RARE

We as a civilisation have coveted things that are scarce or otherwise limited in supply. From gold to seashells, we've even used them as payment methods. The jump to finding value in things that are rare – because they require a lot of craftsmanship and only so many can be produced in one year like luxury watches, to things that were intentionally limited in supply to convey an exclusive value – was an easy one.

Go to any auction these days, and you'll find value in items with at least one of these attributes:

- They're old (antiques, fossils, old books, etc)
- They're made of something of value (jewellery, precious stones, precious metals)
- They're rare (a Banksy painting, a classic car, a luxury watch)

In the last few years, digital art has proven to have value because they tick at least one of these boxes. They're rare, unique, and limited in supply.

As a generation that knows at least someone who's pirating movies, attributing value to something digital that can be so easily copied requires a complete rewiring of the valuation system. The main reason we struggle with the concept is because digital scarcity wasn't something we had when learning about supply and demand. The idea of something being both digital and non-fungible just made very little sense.

But NFTs and digital art can be more than just pixelated JPEGs. You can think of them as a member's card, or a certificate of ownership for things in the real world or in the digital metaverse.



ARE NFTS JUST A HYPE?

Admittedly the hype may seem crazy to most, but as with the advent of any new technology, we can expect a relatively standard hype cycle. According to the latest "Gartner's Hype Cycle for Emerging Technologies" in August 2021, NFTs could still be five years from mainstream adoption and they're currently riding the "Peak of Inflated Expectations" phase.

While NFTs are popular in the art and collectibles scenes – you may have heard of the 2021 Bored Ape Yacht Club? – the potential of NFTs goes far beyond eccentric and expensive digital artworks.

Big brands like Nike are already working on expanding the application of NFTs by acquiring RTFKT (creators of virtual sneakers and collectibles), and the \$85 billion video game industry is already experimenting with NFTs as building blocks for a next-gen digital world – something that's being proposed by Meta (formerly Facebook) for their metaverse.

You may be wondering where this leaves you, what action you should take, and whether or not you should YOLO your life savings into a pixelated bunny.

Here's some not financial advice:

- The crypto market is valued at around USD1.6 trillion
- The NFT market is valued at around USD31.4 billion
- The Gold market cap is around USD11.7 trillion
- Apple's market cap is around USD2.6 trillion
- The traditional Art market cap is around USD39.5 billion

With this in mind, and the past growth rate in view, ignoring this market as a whole from a purely diversification perspective would seem unsound. The earth is shifting below our feet, and pretending it isn't won't make the shaking stop.

STRESS RELIEF

As the pandemic wears on in 2022, we're already used to this kind of "new normal" where masks have become an everyday accessory, and sanitising is a habit. Not knowing what the future has in store for us is a cause for anxiety and stress, so let's try and alleviate some of that uncertainty in the future by trying to predict what will happen for the rest of 2022 with this simple Bingo game!



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