



**KIET**  
GROUP OF INSTITUTIONS

## Department of Computer Applications (MCA)

Tech**E**dge

# Newsletter

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Alumni section

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Digital Twin : The perfect “Jugalbandi” of simulation, ML, & IoT.

I feel like sitting in a primary classroom and writing an essay. My title is “What I want to become once grown up”.

*I want to become God.*

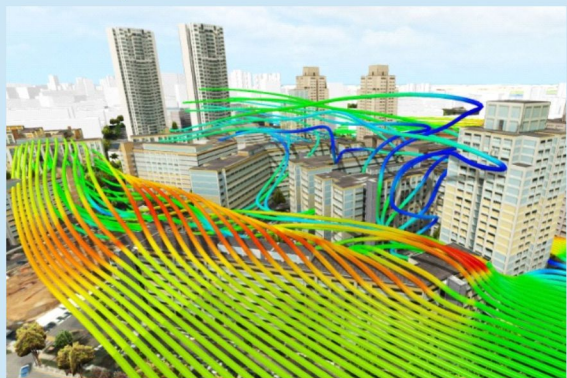
What do I want to do once I become God?

I want to manage this world from my smart room and want to make people's lives better. I want to experiment with new ideas and design this world in a more and more progressive way.

I am not ready to get disheartened. I have one life and I want to become everything that I want to.

Let's start today's topic of discussion.

I am mayor of a large metro city and want to check out how this new highway project and SEZ is going to affect my people. I don't want to test it on excel sheet, I want it in a more realistic way. I want my model to react in the same way it should do once these projects come to reality.



Yes, you guessed it right. I should build my city on a simulator.

Now I can play with my simulated city by just tuning the data points.

NAAAA!!!

I am getting bored. I am not feeling like God. It's just a video game with 3D graphics. I want more thrill.

OKAY!!

What if they are simulating a real smart city where all the buildings have infrared sensors, noise sensors, pollution sensors, number of vehicles, traffic sensors, weather sensors, heat sensors and 100s of other IoT sensors all around. New age smart cities are exactly the same.

My simulation game is not a video game anymore. It is getting changed with real data. It is a big 3D visualization.

What if I can change the parameters in my simulation and the same parameters change the real city also. I can manage traffic lights, I can manage electricity timings and trains and what not.

Wouldn't it be disrupting for my people living in the city?

Yes, it is.

So, let's build another small city in some open area and put similar sensors there and then start working on my dream highway project and SEZ project simultaneously. My machine learning model is getting data from my Urban Twin city, and my Real Metro Twin city, both.



My model is hypertuning the parameters and suggesting a plan that can minimize the impact of this new highway project and SEZ project.

Welcome to this new world of Digital Twin. Where we are creating a digital simulator that can provide realtime data analytics with the help of Machine learning and IoT sensors.

The definition says

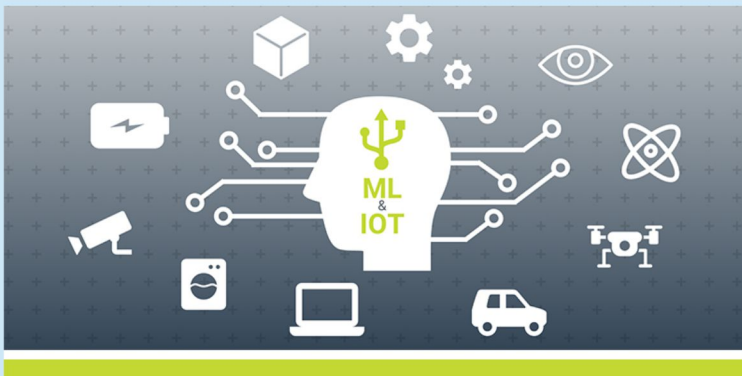
Digital Twin is the ability to take a virtual representation of the element and dynamics of how it works with the help of IoT devices. It represents the complete lifecycle of production.

Digital Twin provides the largest open data bank that provides analytics at every step and these analytics are

1. Real
2. Operational
3. Quality Rich
4. Predictable
5. Federated

I am leaving reference here and I feel that I am successful in igniting the interest for this new tech reference:-----

- <https://www.youtube.com/watch?v=HftDI09LVIO>
- <https://www.youtube.com/watch?v=RaOejcczPas>
- <https://www.youtube.com/watch?v=i12kObBpz-E>



## Queen Elizabeth prize for engineering honour magnet pioneer



Neodymium-iron-boron is the strongest permanent magnet material in wide-scale use today

The Queen Elizabeth prize for engineering hopes our awareness and appreciation will be raised by making Masato Sagawa its 2022 laureate. The Japanese scientist invented the neodymium-iron-boron (Nd-Fe-B) magnet. This is the strongest permanent magnet in wide-scale use today, found in everything from cars to computers.

Nd-Fe-B is one of those indispensable materials, without which everyday life would be a lot less efficient.

And the magnet's centrality is only going to increase as the green revolution takes hold. That's because the

material will be at the operational heart of many renewables systems, such as wind turbines. The market for Nd-Fe-B magnets is expected to be worth some \$20bn by the middle of this decade.

The QEPrize has traditionally been a biennial award but has now become an annual event. It's been called the "Nobel for engineering" and the recipient gets a cheque for £500,000, along with a trophy that is presented by the Queen or her representative.

Dr Sagawa has won many awards for his innovation but he said this one topped the lot.

"This is the biggest prize that I have received so far," he told BBC News. "As you may know I have previously received the Japan Prize, which is a very big award, but the QEPrize has influence around the world and that makes it very important."



Dr Masato Sagawa regards the QEPrize as his greatest award

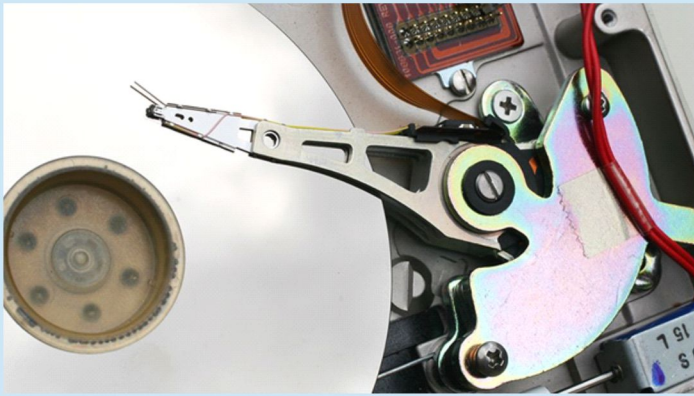
Dr Sagawa made his breakthrough in the early 1980s. At the time, a samarium-cobalt (Sm-Co) combination produced the strongest permanent magnet. But cobalt metal is a rare resource and the scientist recognised that if a solution could be found based on iron, it would provide for a much cheaper and more useful product.

This he managed by combining iron with neodymium, which is the third most abundant rare-earth element - a set of 17 metals found in the Earth's crust that have diverse applications. The addition of the element boron raises the so-called Curie temperature - the point at which magnetic properties are lost.

This is important in motor cars, for example, where conditions can get very hot, especially in an engine compartment.

Indeed, vehicles are among the biggest uses for magnets. From the pump that pushes screen wash on to the windscreen to the sensor that enables an anti-lock braking system - a magnet is being used either as part of a motor or to initiate an electric current.





Magnets help sweep the read-write arm across a computer's hard storage disk

Away from the automotive sector, the Nd-Fe-B technology has been critical to the rise of personal computing. The strength of the magnetic field that can be delivered in a compact volume was fundamental to the development of lightweight hard disk drives. Nd-Fe-B magnets are part of the mechanism that sweeps the read-write heads across the disk.

But many everyday items within easy reach will very probably have Nd-Fe-B magnets inside them - from mobile phones and electric power tools to jewellery clasps and door latches.

"I'm a real fan of magnets. I actually wanted this to be the prize-winner last year," said Ilya Marotta, the marine engineer who led the Panama Canal expansion project and who sits on the QEPrize judging panel.

"Sometimes, we take things for granted. People may relate to magnets as the little souvenirs that you stick to the refrigerator door. But magnets are far more impressive than that, and neodymium magnets have enabled a lot of technologies to move forward."

It's impossible to laud the achievements of Dr Sagawa without also mentioning Dr John Croat. The American independently arrived at the same material solution at the same time when working with General Motors. And Sagawa and Croat will share the Institute of Electrical and Electronics Engineers' (IEEE) 2022 Medal for Environmental and Safety Technologies.

But Lord Browne of Madingley, who chairs the QEPrize, said Sagawa's manufacturing process gave him the edge - in the view of the judges.

His powdered, or sintered, process is more expensive than the American's melt-spun and bonded product and doesn't have quite the same versatility of application, but the end magnet is significantly stronger, unit for unit.

"You can have a great idea on paper but to be successful you have to prove you can make something at scale, and at a price that people will get behind," Lord Browne told BBC News.



The electrical generator in a wind turbine will use strong permanent magnets

"The essence of engineering is that you have to deliver. Scientists come up with lots of great ideas, the Higgs Boson, fantastic. But engineering must do something, and Sagawa's innovation did this very successfully."

The 78-year-old continues to hone his technology. He's currently trying to reduce the amount of another rare-earth element that is used in trace amounts. This is dysprosium (Dy), which further improves a magnet's resistance to heat. But Dy is very scarce.

"We want to lower dysprosium's use to less than 1% of composition, and preferably not use it at all," Dr Sagawa explained.



"If we can do this, it will see neodymium magnets applied even more widely into the marketplace, especially around electric vehicles."

The magnet pioneer will be formally honoured at a special ceremony later in the year. His QEPrize trophy, as for past laureates, has been designed by a young competition winner. This year it is Anshika Agarwal, aged 17, from India.



This year's trophy has been designed by 17-year-old Anshika Agarwal from India





## Google Meet gets live translated captions feature – How to activate it

Google's video conferencing software is getting a live translated captions feature after a few months of testing. The feature works on mobile and web clients of Google Meet, but is still a bit limited, meaning it will only translate four languages into English: French, German, Portuguese and Spanish. "Translated captions help make Google Meet video calls more inclusive and collaborative by removing language proficiency barriers," Google shared in a Workspace blog post announcing the new feature.

Google says that when users consume content in their own language, it helps them equalize information sharing, learning and collaboration and ensures that meetings are as effective as possible for all the participants. The feature is designed to be useful for meetings with teams located around the world. It can also be useful in terms of educational purposes. The feature was first announced at Google's I/O developer conference in 2021. To utilize this feature, users need to turn on subtitles in settings and set them to English before turning on translated subtitles below. Let's find out how to turn on live translated captions in Google Meet in a step-by-step guide.

### How to Activate Translated Captions in Google Meet

1. Open Google Meet on your computer
2. From a meeting, click More Options (three-dot menu)
3. Go to Settings > Select Captions
4. Turn on "Translated Captions."
5. Select language (French, German, Portuguese and Spanish)

Google Meet is one of the famous video conferencing software today, competing with competitors like Microsoft Teams and Zoom. The app rose to prominence after the COVID-19 pandemic sent users around the world indoors in 2020. Since then, many businesses and schools have adopted Google Meet as their standard tool for hosting virtual meetings and classes. Since 2020, Google has improved Google Meet quite a bit, adding helpful features that make the experience easier and more instinctive at a time when physical contact isn't ideal.



## 3G network shutdown: what you need to know

The mobile world is changing, as not only is 5G coverage rapidly improving, but networks are looking to retire older 3G services.

This is true in the US, the UK and Australia, among other parts of the world, and it's a move that's likely to be a good thing in the long run, but if you're still reliant on 3G coverage then you might understandably be concerned.

Below we'll detail why this is happening, why it should ultimately be a good thing, how it might affect you, and what the timeline is for the shutting down of 3G networks.

In the US, AT&T plans to end 3G services in February (2022), Sprint on March 31 of this year, T-Mobile on July 1, and Verizon in December, which is quite a delay for Verizon as its original plan was to stop supporting 3G in 2019.

In the UK, EE plans to retire 3G by 2023. The UK's other networks haven't revealed when they'll switch 3G off, but they've all agreed to do so by 2033, and we'd expect in reality they will do so much sooner.

In Australia, Telstra has said that it will shut down its 3G network in June 2024, and while no other operators have yet confirmed dates, we'd expect they all will over the coming years.





## Award-winning medical robotics paper aims to improve access to bladder cancer detection

**B**ladder cancer is the sixth most common form of cancer in the U.S. and estimated to be the most expensive to treat. A major reason for the high cost is that once a person has had bladder cancer detected or treated, frequent checkups are needed to monitor for recurrence.

Research by ME graduate students Andrew Lewis and Chen Gong aims to increase access and lower costs related to bladder cancer by improving the capabilities of specialized cameras used to detect and monitor it. Their paper, titled “Real Time Localization of Cystoscope Angulation in 2D Bladder Phantom for Tele cystoscopy,” impressed colleagues so much, the team was awarded Best Paper at the 2021 International Symposium on Medical Robotics.

The winning paper describes a new method for precisely navigating a camera within the bladder to find and monitor bladder cancer. Though nearly 84,000 new cases of bladder cancer occur every year in the U.S., the type of camera used to look for bladder cancer, known as a flexible cystoscope, is very specialized and requires a trained urologist to operate it. As a result, anyone with bladder cancer who's located farther from an urban center must make regular long trips for their procedures. Lewis and Gong's work envisions a future where a nurse at a smaller clinic can administer a cystoscopy while a urologist operates it remotely.

To make that vision a reality, urologists need a robotically-controlled cystoscope that they can carefully maneuver and accurately know its location in the body even though they aren't the ones physically performing the cystoscopy procedure. The new paper that impressed medical roboticists at the recent symposium details innovations that could help make so-called telecystoscopy possible.

“As someone new to this field, this surgical robotics project has been very exciting,” says Gong, who recently completed her Ph.D. studies in ME. “We're able to apply our engineering skills to contribute to solving real clinical and patient issues.”

The UW research team also included ME Research Professor and Director of the UW Human Photonics Lab Eric Seibel, Urology Professor and Chief of Urology at VA Puget Sound Michael P. Porter, and Electrical & Computer Engineering Professor Blake Hannaford. The team received support from UW CoMotion.





## UW researchers developing miniaturized imaging device to treat heart attack, stroke

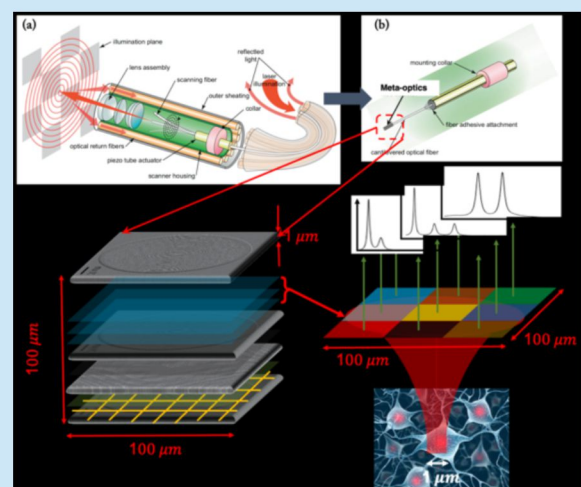
Cardiovascular diseases (CVDs) are the leading cause of death in the U.S. and around the world. According to the World Health Organization, an estimated 17.9 million people die from CVDs each year. The vast majority of these deaths are due to heart attacks and strokes.

Heart attacks and strokes happen when a buildup of plaque, or fatty deposits, on the inner walls of arteries prevents blood from flowing to the heart or brain. To remove these blockages, surgeons need a real-time, high-resolution view into the artery. But conventional optical elements currently used in endoscopes are too bulky and stiff to reach diseased arteries deep in the heart or brain.

Recently, an interdisciplinary research team at the University of Washington (UW), led by Arka Majumdar, an associate professor of electrical and computer engineering and physics, was awarded \$3.6 million in funding from the National Science Foundation (NSF) to take on this challenge. Using the emerging nano photonics and meta material technology meta-optics in combination with advanced computational post-processing, the team aims to develop a dramatically smaller endoscope to image previously inaccessible areas of the heart and brain.

Unlike the thick glass lenses of traditional cameras, meta-optics are nearly two-dimensional, studded with over a million tiny cylindrical structures that capture and re-emit light at the nanometer scale. The unique geometry and arrangement of these nanostructures determines how these extremely thin optical elements, less than one millimeter thick, interact with light to produce an image.

"Others have attempted to incorporate meta-optics in endoscopes, but never before has machine learning been used to both design the meta-optics and improve image quality on the backend," said Majumdar. "On their own, meta-optics suffer from poor resolution and color aberrations. But by merging meta-optics with machine learning, we will make a miniaturized imaging system that can produce high-resolution, full-color images with an extended field of view."





## Mahindra launches electric three-wheeler tagged at Rs 1.44 lakh

**M**ahindra Electric Mobility said it has launched its new electric 3-wheeler e-Alfa Cargo, priced at Rs 1.44 lakh (ex-showroom Delhi). The launch of the e-Alfa Cargo marks the company's entry into the rapidly growing e-cart segment.

Suman Mishra, CEO of Mahindra Electric Mobility Limited, said, "The last mile delivery segment is seeing excellent adoption of electric 3-wheelers due to significant operating cost advantages versus fossil fuel powered 3-wheelers. We are now launching the e Alfa Cargo e-cart in response to the customer requirements in this segment. With savings of ₹ 60 000.00 over a diesel cargo 3-wheeler, the e Alfa Cargo aims to provide a sustainable, pollution-free solution in the cargo segment"

With savings of Rs 60,000 over a diesel cargo 3-wheeler, e-Alfa Cargo aims to provide a sustainable and pollution-free solution in the cargo segment, he added. The model comes with a payload of 310 kg and can cover a distance of 80 km.

E-Alfa Cargo comes with a peak power of 1.5 kW and can attain a top speed of 25 km/h. With an off-board 48 V/15 A charger, charging e-Alfa Cargo is as easy as charging a mobile phone, the company stated.



**Mahindra**  
**electric**  
*Spark the new*

## Leading Indian business chamber proposes BIMSTEC platform for paperless trade

**I**ndian Chamber of Commerce, one of the leading national chambers of India, organized “Integrating BIMSTEC 2022” in collaboration with the Ministry of External Affairs, on the importance of creating a common platform for BIMSTEC(The Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation ) countries to participate and carry forward paperless trade.

President of Indian Chamber of Commerce, Pradeep Surekha stated how the COVID-19 pandemic and the associated global recession had a devastating effect on international trade. In an attempt to control the spread of the pandemic, countries had to impose drastic measures including lockdowns, travel restrictions, border closures, airport shutdowns, delaying entry for ships etc. These restricted measures affected the global supply chain.

He said, “Though we have seen, the effect of Omicron is not that fatal, however there is no guarantee that a fresh pandemic will not cause any more disruptions. While these cannot be avoided, the effect on the economies of countries can be mitigated by generating appropriate solutions. One way is to strengthen regional trade thereby limiting the physical boundaries of disruptions. BIMSTEC was established to leverage the geographical advantage to strengthen economic & physical connectivity through more trade, investments, travel and exchange among member countries. The current trade among the BIMSTEC members has the potential to grow 5-6 folds.”

“It can make business transactions more convenient while ensuring regulatory compliances and improving the competitiveness of countries and their industries to move towards paperless chain. It has gained a considerable pace through the development of blockchain based solutions, which is definitely a more cost effective way of trading internationally. However, navigation through multiple platforms, e-filing of documents, to avail tax benefits causes hardships. Hence providing ease of compliance is one of the key objectives of the Govt. In this context the ambit of the current ice gate, Indian customs and electronic gateway and national portal of Indian customs is offering a e-filing service to the trade, cargo carriers and providing a centralized filing system for transactions related to cross border trade, SEZ's etc. so to cover an integrated all related compliance under one umbrella. To summarize trade facilitation is a vital area for all policy makers going forward.”

# BIMSTEC





## How Musk's SpaceX rocket will deliver a crater on Moon on March 4

On March 4, Moon will get a fresh crater thanks to a chunk of a SpaceX rocket that blasted off seven years ago and was abandoned in space after completing its mission and is now on a collision course with the lunar surface. A hefty chunk of a SpaceX Falcon 9 rocket will crash into the far side of the Moon (not visible from the Earth) in a fiery explosion at about 8,000 kms per hour speed.

It was US astronomer Bill Gray who calculated the space junk's new collision course with the Moon. According to ABC News, Gray developed software that keeps tabs on objects whizzing around inside our Solar System, along with a troupe of observers around the world.

They predict the SpaceX junk will crash at 11.25 a.m. AEDT (4.55 p.m. India time) on March 4. The impact will be minor, according to the scientists. The rocket was deployed in 2015 to put into orbit a NASA satellite called the Deep Space Climate Observatory (DSCOVR).

How did a 4-tonne piece of rocket accidentally end up on track to smash on the lunar surface?

Once out of fuel, the first stage typically falls back to Earth quickly. The Falcon 9 engine that's currently en route to the Moon has travelled much further than most other satellite-delivering rockets.

When the first stage ran out of fuel, it dropped off and headed back to Earth.

"The second stage provided the extra oomph needed to steer DSCOVR closer to its operational spot. Its job done, the second stage was jettisoned and left to tumble through space, more than a million kilometers from Earth," according to the report. In the seven years since, the rocket stage has been affected by the Moon, Sun and Earth's gravity, wrangling it in an unpredictable orbit.

Now, the SpaceX rocket stage is set to crash into a 520km-wide crater called Hertzprung on the lunar surface. The Moon has no atmosphere, so the stage won't burn up on its way down. "Instead, it will smash straight into the rock and scatter bits over the lunar surface," Jonathan McDowell, an astrophysicist at Harvard University, told Radio National. "There's going to be a huge spray of moon dust going many miles into the sky above the Moon," McDowell was quoted as saying. It's likely that other objects abandoned in deep space have smashed into the Moon too.



SPACEX

### Tesla will now charge \$12K for 'full self-driving' software: Musk

Tesla CEO Elon Musk said on Saturday that the electric car company is raising the price of its 'full self-driving' (FSD) software to \$12,000. In a tweet, Musk said that the new price, which is an increase of \$2,000, will take effect January 17. "Tesla FSD price rising to \$12k on Jan 17... Just in the US," he posted. "SD price will rise as we get closer to FSD production code release," Musk added.

Tesla charges monthly subscription price of \$199 for FSD software. Tesla began testing FSD in beta in October 2020, priced at \$8,000. It later increased the price to \$10,000. The software does not make Tesla vehicles fully autonomous.

Tesla FSD Beta enables Tesla vehicles to virtually drive themselves both on highways and city streets by simply entering a location in the navigation system, but it is still considered a level 2 driver assist system since it requires driver supervision at all times.

The driver remains responsible for the vehicle and needs to keep their hands on the steering wheel, ready to take control, the report said. Tesla in October last year temporarily pulled back the latest version of its FSD beta software, less than a day after its release owing to false crash warnings and other issues.

In a tweet, Musk said the rollback was due to "some issues" with version 10.3. "Seeing some issues with 10.3, so rolling back to 10.2 temporarily. "Musk later announced the upcoming release of Tesla's FSD Beta 10.4 update.

