



## Department of Computer Applications (MCA)

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# Newsletter

## TECHNICAL NEWS

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## HOW PHARMA WILL SOON USE BLOCKCHAIN TO TRACK YOUR DRUGS

The pharmaceutical industry in the U.S. is under the regulatory gun to bolster its ability to accurately track and trace the drugs it manufactures and ships to store shelves and healthcare facilities.

Those regulations include tracking medications that are returned by stores and healthcare facilities for resale. currently, the industry uses a patchwork of central databases based on the Electronic Data Interchange (EDI) standard that features point-to-point connections between manufacturer and distributor; that system is costly and makes large-scale interoperability almost impossible. The central database approach is also cumbersome and leaves open the risk of diversion, counterfeit and a trust gap between siloed systems.

One reason the Pharma industry is advancing blockchain is because of increased regulatory scrutiny resulting from a 2012 meningitis outbreak caused by tainted drugs manufactured by the New England Compounding Center. The meningitis outbreak resulted in more than 100 deaths. So in 2013, Congress passed the Drug Quality Security Act (DQSA), which over a 10-year period increases tracking and security around pharmaceuticals – including unique identifiers on each unit sold.

By 2023, the DQSA will require an electronic interoperable system that can pass serial numbers between trading partners. Similar regulations have been adopted by the European Union, in Asia and in South America. beginning Nov. 27, the U.S. pharmaceutical industry will be required under the DQSA to ensure all prescription medicine returned to distributors has unique product identifiers verified with the manufacturer before it can be resold and so the drugs can be accurately tracked.

Additionally, the Drug Supply Chain Security Act – part of the 2013 DQSA – outlined steps for the pharmaceutical industry to build an electronic, interoperable system to identify and trace prescription drugs. The goal: better equip the U.S. Food and Drug Administration (FDA) to protect consumers from counterfeit, stolen, contaminated products.

As a result, the Healthcare Distribution Alliance (HDA) two years ago began developing The MediLedger Project, a blockchain-based network created to meet the track-and-trace demands of DGSA regulations. The network combines a "Look-Up Directory" accessed through distributed ledger technology (DLT) with a permissioned messaging network that allows companies to securely request and respond to product identifier verification requests.

The HDA's members include multibillion-dollar pharmaceutical companies such as AmerisourceBergen Corp., Genentech, McKesson Corp. and Pfizer Inc. In June, the HDA demonstrated the MediLedger network had a response time of 100ms or less within the same region and 400ms for coast-to-coast verifications of look-up requests.

Today, MediLedger is being piloted by nine of the top 20 global pharmaceutical companies and two of the top three U.S. wholesaler distributors. the MediLedger Project is hosted by Chronicled, a San Francisco-based company that runs a verification system that provides a synchronized and secure method to manage an "industry phonebook" of Global Trade Item Numbers (GTINs). That system enables trading partners to know exactly where to execute a verification request.

Blockchain eliminates the need for individual wholesalers to manage large volumes of product lists and manufacturer addresses, complying with DQSA regulations while reducing errors and providing savings to the entire supply chain.

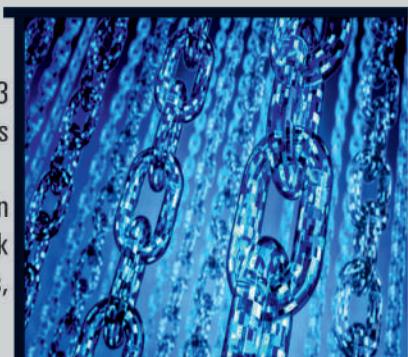
AmerisourceBergen is currently in a "staging environment" with the MediLedger blockchain, where it's beyond a proof of concept but just short of production user testing.

"By mid-October, we'll be doing user testing. After that, we're in production," said Heather Zenk, the senior vice president of replenishment and manufacturer operations at Pennsylvania-based AmerisourceBergen.

"We're basically using the blockchain to route communications between companies," Zenk continued. "If we all aren't on blockchain as an industry, every time Pfizer changes its phone number and serial number, they'd have to go to each and every [partner] and provide them the new information. So, we're basically using [MediLedger] as a phone book."

AmerisourceBergen manages more than 50,000 pharmaceutical products, and it ships more than 3 million SKUs daily from distribution centers that represent more than 130,000 deliveries to pharmacies and healthcare facilities.

"We ship to 34% of U.S. retail pharmacies, 65,000 community practices and reach 95% of hospitals in the U.S.," Zenk said. to understand the scale of what the industry is doing, don't think pill bottle, think pallet. And on every pallet, think cases of drugs. Each case, for example, may contain 24 pill bottles, each with its own serial number. Additionally, each case carries a tracking number as well.



## INFOSYS USING AI, AUTOMATION TO TRANSFORM CLIENTS' BUSINESS, SAYS NILEKANI

Infosys, the country's second largest software exporter, is relying on Artificial Intelligence and automation to transform the businesses of its clients, says chairman Nandan Nilekani.

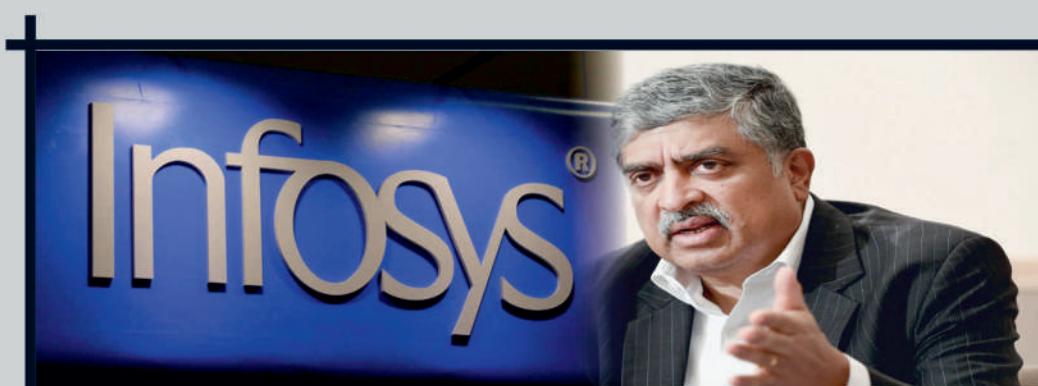
"We are relying on extreme automation to free up our people to focus more than ever on solving client challenges, mentoring their teams and investing in continuous learning," Nilekani said.

Infosys' Chairman Nandan Nilekani was addressing the firm's shareholders, board of directors and employees, at the company's 38th Annual General Meeting on Saturday.

"The novel approach means focusing on personal growth, nurturing zero-latency in processes, ensuring just-in-time data for decision-making, driving hyper-productivity and facilitating learning to instil new patterns of behaviour," he said.

He added that the company ensures that its clients have instant access to ideas emanating from Infosys so as to leverage their best when they interact with them. Nilekani said that the management was working for ensuring client improvement through building and transferring digital skills, expertise, and ideas for businesses to deliver performance and achieve ultimate customer satisfaction.

"Our work across industries, value chains and geographies gives us keen insights into the pattern of changes transforming the fundamental wiring across a diverse set of businesses. We know that with this understanding, we are uniquely positioned to assist our clients in picking the right signals and to discover what's next," he stated further.



## ASTEROID BIGGER THAN SOME OF THE WORLD'S TALLEST BUILDINGS WILL FLY BY EARTH

**A**fter Asteroid 2006 QQ23 zipped by Earth last month and Asteroid 2010 CO1 flew past just a few hours ago, another asteroid is set to safely pass our planet on September 14. NASA has confirmed that the Asteroid 2000 QW7, will zip by Earth at 7:54pm EDT on September 14 (5:24am IST on September 15). The space agency has underlined that although the asteroid will make its closest approach to Earth, it won't impact the planet.

Unlike 2010 CO1 that is relatively smaller in size, the Asteroid 2000 QW7, which is estimated to be sized between 950 to 2,100 feet (290 to 650 metres), is a less frequent visitor of Earth. According to the data available with NASA JPL, the asteroid was close to Earth last time back on September 1, 2000. The next time it is believed to fly past the human world on October 19, 2038.

To recall, the Asteroid 2010 CO1 safely passed Earth this morning at 9:12am IST (11:42pm EDT, September 13).

Sized between 400 feet and 850 feet (120 to 260 metres), the Asteroid 2010 CO1 is one of the frequent visitors to Earth -- with its last close approach recorded just on September 11 last year. It is also expected to fly by the blue planet again on September 16 next year and continue its annual visits until 2023, as reported by Space.com.

Space agencies, including NASA and the European Space Agency, closely track and monitor asteroids to notify humans about their moves and strikes well in advance. However, rocket company SpaceX founder and technology entrepreneur Elon Musk last month raised concerns over the lack of defence against asteroid collision.

"Great name! Wouldn't worry about this particular one, but a big rock will hit Earth eventually & we currently have no defence," Elon Musk tweeted in response to a tweet about asteroid 99942 Apophis that was initially believed to hit Earth in 2029, though further observations removed that possibility.



## BRAIN-INSPIRED COMPUTING COULD TACKLE BIG PROBLEMS IN A SMALL WAY

While computers have become smaller and more powerful and supercomputers and parallel computing have become the standard, we are about to hit a wall in energy and miniaturization. Now, Penn State researchers have designed a 2D device that can provide more than yes-or-no answers and could be more brain like than current computing architectures.

"Complexity scaling is also in decline owing to the non-scalability of traditional von Neumann computing architecture and the impending 'Dark Silicon' era that presents a severe threat to multi-core processor technology," the researchers note into online issue of *Nature Communications*.

The Dark Silicon era is already upon us to some extent and refers to the inability of all or most of the devices on a computer chip to be powered up at once. This happens because of too much heat generated from a single device. Von Neumann architecture is the standard structure of most modern computers and relies on a digital approach -- "yes" or "no" answers -- where program instruction and data are stored in the same memory and share the same communications channel.

"Because of this, data operations and instruction acquisition cannot be done at the same time," said Saptarshi Das, assistant professor of engineering science and mechanics. "For complex decision-making using neural networks, you might need a cluster of supercomputers trying to use parallel processors at the same time -- a million laptops in parallel -- that would take up a football field. Portable healthcare devices, for example, can't work that way."

The solution, according to Das, is to create brain-inspired, analog, statistical neural networks that do not rely on devices that are simply on or off, but provide a range of probabilistic responses that are then compared with the learned database in the machine. To do this, the researchers developed a Gaussian field-effect transistor that is made of 2D materials -- molybdenum disulfide and black phosphorus. These devices are more energy efficient and produce less heat, which makes them ideal for scaling up systems.

"The human brain operates seamlessly on 20 watts of power," said Das. "It is more energy efficient, containing 100 billion neurons, and it doesn't use von Neumann architecture." The researchers note that it isn't just energy and heat that have become problems, but that it is becoming difficult to fit more in smaller spaces.

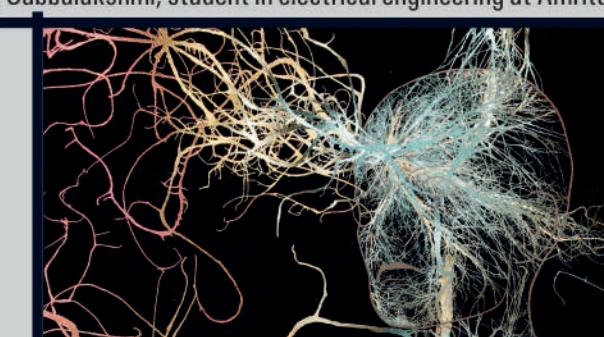
"Size scaling has stopped," said Das. "We can only fit approximately 1 billion transistors on a chip. We need more complexity like the brain."

The idea of probabilistic neural networks has been around since the 1980s, but it needed specific devices for implementation. "Similar to the working of a human brain, key features are extracted from a set of training samples to help the neural network learn," said Amritanand Sebastian, graduate student in engineering science and mechanics.

The researchers tested their neural network on human electroencephalographs, graphical representation of brain waves. After feeding the network with many examples of EEGs, the network could then take a new EEG signal and analyze it and determine if the subject was sleeping.

"We don't need as extensive a training period or base of information for a probabilistic neural network as we need for an artificial neural network," said Das. The researchers see statistical neural network computing having applications in medicine, because diagnostic decisions are not always 100% yes or no. They also realize that for the best impact, medical diagnostic devices need to be small, portable and use minimal energy.

Das and colleagues call their device a Gaussian synapse and it is based on a two-transistor setup where the molybdenum disulfide is an electron conductor, while the black phosphorus conducts through missing electrons, or holes. The device is essentially two variable resistors in series and the combination produces a graph with two tails, which matches a Gaussian function. Others working on this project were Andrew Pannone, undergraduate in engineering science and mechanics; and Shiva Subbulakshmi, student in electrical engineering at Amrita Vishwa Vidyapeetham, India, and a summer intern in the Das laboratory.



## INDIA TO SURVEY THE ENTIRE COUNTRY WITH DRONES, ARTIFICIAL INTELLIGENCE AND BIG DATA

India has initiated a project to digitally map the country with a resolution of 10 centimetres, using drones and technologies such as Artificial Intelligence and big data, a senior government official said on Monday.

The herculean task was taken up by the Survey of India, part of the Department of Science and Technology, a few months ago and is planned to be completed in two years, the Department's Secretary, Prof Ashutosh Sharma said.

"...now we are equipping them (Survey of India) with the latest technologies like drones, Artificial Intelligence, big data analytics, image processing and continuously operated reference system", he told reporters on the sidelines of an event here.

Once the project is completed, the data will be available to citizens and to Gram Panchayats and local bodies, empowering them to use it in decision making and planning process.

The survey is currently in progress in Karnataka, Haryana, Maharashtra and the Ganga basin. "The entire Ganga basin from the beginning to the end, 25 km from either sides of the banks is being mapped with an accuracy of 10 cm," said Prof Sharma.

He stressed the need to have such a digital map. "Even today we don't have a digital map of India of sufficient accuracy, but this (the new digital map being prepared) is (going to be) the basis for everything you do, whether we have to lay down train tracks, lay a road, put up a hospital, cleaning up Ganga, cleaning up Cauvery or any kind of development and planning," he said.

The official clarified to a question that the Indian Space Research Organisation (ISRO) was not part of the programme. "This is a different technology. Satellite produces image, but this one is based on drones. This is based on two technologies because you get higher resolution with that. It is not just getting an image by flying the drone. A map is different from an image. We have to produce a map which takes into account the curvature," Prof Sharma said.

Speaking about the continuously operated reference system, he said the Survey of India has a reference point at every 20 km. "Now with the digital technology, each of these points you put actually a beacon...a stick...a digital station... with the help of these digital stations, whose coordinates are well-established, even using your smart phones you can do your mapping with an accuracy of 10 cm," according to him.

Digital map is different from GPS (Global Positioning System), he noted.

While the GPS may have an accuracy of a few metres, the planned digital map — with these reference points at every 20 km — increases the accuracy manifold. "So you can do mapping as you go up and down, walk around with a resolution of 10 cm or better," the official said.





## LINUX FOUNDATION EXEC BELIEVES EDGE COMPUTING WILL BE MORE IMPORTANT THAN CLOUD COMPUTING

**A**ccording to Arpit Joshipura, The Linux Foundation's general manager of networking, edge computing will overtake cloud computing by 2025.

Once upon a time, back when we all had mainframes and then servers in our offices, we had [edge computing](#). Our compute power was literally down the hall. Then, along came the cloud, and all that changed. Computers were hundreds of miles but milliseconds away. Now, with the rise of IoT, 5G, and our never-satisfied need for speed, edge computing is coming back with a vengeance. Indeed, at his keynote at [Open Networking Summit](#) in Belgium, Arpit Joshipura, [The Linux Foundation](#)'s general manager of networking, said "edge computing will overtake cloud computing" by 2025.

When Joshipura is talking about edge computing, he means compute and storage resources that are five to 20 milliseconds away. He also means edge computing should be an open, interoperable framework. This framework should be independent of hardware, silicon, cloud, or operating system. Open-edge computing should also work with any edge-computing use case: Internet of Things (IoT) edge, a telecom edge, cloud edge, or enterprise edge, whatever, "Our goal here is to unify all of these."

This is being done via [LF Edge](#). This Linux Foundation organization seeks to bring all edge computing players under one umbrella with one technology. Its purpose is to create a software stack that unifies a fragmented edge market around a common, open vision for the future of the industry.

To make this happen, Joshipura announced two more projects were being incorporated into LF Edge: [Baetyl](#) and [Fledge](#).

Formerly known as [Baidu OpenEdge](#), Baetyl is meant to seamlessly extend cloud computing, data, and services to edge devices, thus enabling developers to build light, secure, and scalable edge applications. Its target audience is IoT edge device developers who need cloud computing, data, and services.

Why did Baidu, China's answer to Google, contribute the code to LF Edge? Watson Yin, a Baidu VP, explained: "[Baidu] decided to donate Baetyl, the intelligent edge computing framework, to the community, hoping to reciprocate the open-source community while continuously contributing cutting-edge technologies to the global technology ecosystem."

In short, Baidu, like so many other companies, believes that open source helps its business.

Fledge, once known as FogLAMP, is an open-source framework and community for the industrial edge. Its focus is on critical operations, predictive maintenance, situational awareness, and safety. Fledge is designed to integrate Industrial Internet of Things (IIoT), sensors and modern machines by sharing a common set of administration and application APIs with industrial "brown field" systems and the cloud.

Like Baidu, Fledge's creator, [Dianomic Systems](#), brought its project to LF Edge because the company believes both the program and the business will be the better for it.

Tom Arthur, Dianomic Systems' CEO and co-founder, stated: "The LF Edge's efforts for an open, interoperable framework for the edge is especially needed for the industrial factory, plant, and mine -- where almost every brown field system, piece of equipment, or sensor uses its own proprietary protocols and data definitions."

That all sounds well and good for edge computing users and companies, but why does Joshipura think that edge computing will overtake cloud computing? After all, Gartner estimated [the total worth of the public cloud market](#) in 2019 will be \$214.3 billion, with a growth rate of 17.5%. For that, you need to take a close look at [LF Edge's view of edge computing](#).

In it, the LF Edge sees industrial, enterprise and consumer use cases in complex environments spanning multiple edges and domains (a.k.a pretty much everywhere). Edge computing also has killer apps. These include video content delivery, autonomous vehicles' augmented and virtual reality, 5G, and gaming.

There are two reasons you haven't heard more about important edge computing is going to be. The first is that edge computing efforts have often been at cross-purposes. The LF Edge's primary reason for existence is to bring unity to edge computing. The other reason is that most of edge computing's killer apps aren't here yet.



## OXBOTICA CLAIMS SELF-DRIVING CAR SOFTWARE ANALYSES 150 VEHICLES-PER-SECOND

The Oxford-based company is using its software system in cities, mines, airports, quarries and ports. This software can run on everyday computer hardware similar to an average desktop, the firm claims.

It's trialling five fully autonomous vehicles in London as part of the Driven consortium, a £13.6 million project researching the challenges of self-driving vehicles – insurance, cyber-security and data privacy .

The company says implementing machine learning throughout the trialling process in London has ensured the software will be safer "around the globe".

A live demonstration of the software will take place in London later this month.



## RIGHT TIME TO BUILD IOT IN INDIA: BHARTI AIRTEL

Bharti Airtel has said that India is currently a very good place to be a builder of the Internet of Things (IoT) ecosystem. To unlock the opportunity, Airtel is adopting applications and partner-based approach to grow its IoT business in India, besides ensuring consistent investments towards developing the narrowband IoT (NB-IoT) ecosystem in the country.

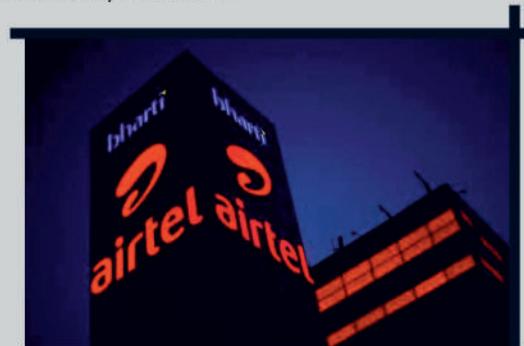
"...we will always go with what the GSMA and 3 GPP bodies are talking about, and NB-IoT is one of those technologies that will help. We definitely will be investing there, we are also looking into what the customers also need in terms of specific use cases," Sundi Raman, head (digital products & IoT), Airtel Business, told ET.

Airtel is focusing on enabling connectivity, building applications and providing a platform for developers to build the new use cases. "India is a very good place right now to be a builder of IoT".

The telco is focusing mainly on the automotive sector in India, besides making inroads in the country's healthcare sector through its applications centrally partnered with MG Motors to help launch internet-connected car and is currently working with Apollo Hospitals to connect their remote healthcare centres and to manage workforce.

Airtel has already built an independent IoT vertical as part of its Airtel Business, which clocked \$1.7 billion in revenues for fiscal year 2018-19. Its rival Reliance Jio Infocomm is preparing to tap into the IoT market at the pan-India level through its NB-IoT network. Vodafone Idea Ltd (VIL) is also driving its enterprise business by launching commercial NB-IoT services, having conducted pilot programmes in four cities for various use cases, including smart energy metering.

NB-IoT is a new technology standard, designed to broaden the future of IoT connectivity, providing significantly improved and deeper network coverage for communication between machines while lowering power consumption by devices. India's NB-IoT market is expected to grow to Rs 5,000 crore in three years, as per industry estimates.



## DIALOG SEMI'S FOUR NEW HIGH-FREQUENCY, I<sup>2</sup>C-CONTROLLED BUCK CONVERTERS AIM TO SAVE ONBOARD SPACE AND EXTERNAL COMPONENT COUNT

**D**ialog Semiconductor has unveiled a new power management product family of Buck converters consisting of the DA9217, DA9220, DA9121 and the DA9122. The Sub-PMIC family features a 4MHz switching frequency, allowing designers to specify smaller output inductors, saving space, weight, and expense.

Family members offer single outputs of 6 or 10 amps, or dual output of 3 or 5 amps. They offer a smaller form factor than competing devices, enabling developers to fit a 6 to 10 amp power solution into the tight board areas available in today's smartphones, tablets, notebooks, SSDs and DSLR cameras.

The I<sup>2</sup>C interface enables dynamic voltage control, optimizing power savings and performance. Complex system sequencing is simplified with in-circuit digital programmability and configurability, for a seamless interface to the system microcontroller. Most importantly, fault protection features provide overvoltage, overcurrent, and thermal shutdown protection.

### What Is a Sub-PMIC?

The concept of a "sub-PMIC" may not be immediately familiar. It is, as far as we can tell, a proprietary term from Dialog Semiconductor for a power management IC that is more modular and flexible than a traditional, full PMIC.

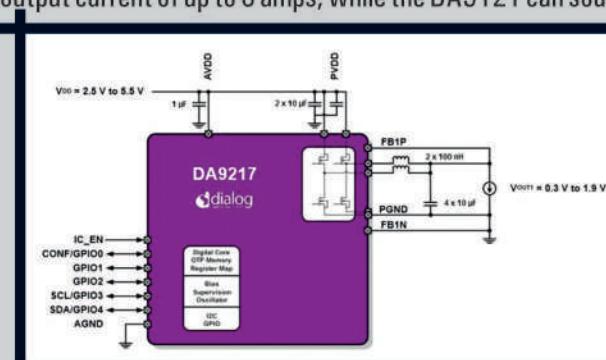
### Commonalities Across the Family of Four SubPMICs

All of the new devices can accept an input power supply ranging from 2.5 V to 5.5 V. This makes them suitable for a wide variety of low-voltage systems, particularly all Li-ion battery-powered applications.

All offer output voltage range(s) chosen from between 0.3 to 1.9 volts, programmable in 10 microvolt increments. A remote differential sensing capacity guarantees high accuracy regardless of the PCB routing scenario opted for. They offer  $\pm 1\%$  static accuracy and  $\pm 5\%$  dynamic accuracy. Finally, all operate over a temperature range of -40 °C to +85 °C and are available in a 2.5 mm x 1.7 mm (0.4 mm pitch) 24WLCSP package.

### The DA9217 and the DA9121

The DA9217 and the DA9121 are both dual phase, single channel output SubPMICs. Each of the separate phases require an external 0.10  $\mu$ H inductor. The DA9217 can source an output current of up to 6 amps, while the DA9121 can source up to 10 amps.



### The DA9122 and the DA9220

The DA9122 and the DA9220 are both dual-phase, single-channel output SubPMIC. Each of the separate phases require an external 0.10  $\mu$ H inductor. The DA9122 can source two 5 amp outputs, while the DA9220 can source two 3 amp outputs.

