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POSSIBLE SOLUTIONS TO SECURITY CONCERNS

IMAGINATION-THE NEW CHALLENGE FOR AI

WIFI INTO ELECTRICITY

RAJAGIRI SCHOOL OF ENGINEERING & TECHNOLOGY

ON CREATIVE DESK

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Imagination- The New Challenge for AI

- Saritha S (HOD)

"Imagination is more important than knowledge. Knowledge is limited. Imagination encircles the world." – Albert Einstein

Artificial intelligence is the "electricity" of our age, transforming industries across a wide spectrum of areas, from autonomous driving to voice activated virtual personal assistants. However, these successes of AI, powered by data science and deep learning, may not be sufficient for AI to be capable of matching human capabilities in the long run. Researchers are now focusing specifically on one core capability – imagination –for the continuing success of AI in the coming decades. Imagination has been defined as the capacity to mentally transcend time, place, and/or circumstance. Much of the success of AI currently comes from a revolution in data science, specifically the use of deep learning neural networks to extract structure from data. The ability to coax patterns out of large datasets, such as computer vision, speech recognition, and high-performance game playing, has led to significant successes of machine learning in a variety of real-world tasks, particularly using deep learning approaches.

The development of a new field called imagination science is in progress, which extends data science beyond its current realm of learning probability distributions from samples. The fundamental difference between data science and imagination science is that the latter extends to realms far beyond the former: for example, imagination science addresses the problem of generating samples that are "novel", meaning they come from a distribution different from the one used in training. Imagination science also addresses the problem of causal reasoning to uncover simple explanations for complex events, and uses analogical reasoning to understand novel situations.

Can computers produce novel art like painting? Recent work on a variant of

Creative Adversarial Network) shows that computers can be trained to produce images that are both art, as well as differ from standard styles. While CANs are a useful step forward, their architecture is currently specific to art, and not general enough to provide a computational framework for imagination. However, it does suggest one possible avenue to designing an Imagination Network architecture. Other extensions of GAN models, such as CycleGAN, are at present tailored to visual domains, and even in that circumscribed setting, only capable of specific generalizations like turning watercolour paintings into what look like digital photographs of the original scene.

Most machine learning is based on the discovery and exploitation of statistical correlations from data. Correlation, is not causation, however, and causal reasoning is one of the primary hallmarks of human imaginative reasoning. A self-driving car that gets involved in an accident may be required to provide an explanation of its behaviour, much as a human driver would, and such explanations often take on a causal form. A hallmark of imagination is the ability to reason about counterfactuals Humans seek causal explanations because they want to understand the world in simple "cause-effect" relationships. They make analogies to interpret strange worlds, like the interior of an atom, in terms of worlds they understand, like the solar system, even though such analogies are imperfect.

Hence the general architecture for imagination architecture for machines are yet to evolve from imagination science, thus paving the way for imagination machines in the future.

Possible Solutions to Security Concerns

- Jiby Jose George

All the new technologies, platforms and services gobble up massive amounts of data. More often than not, this data is not very well protected. For the past few years, we have seen thousands of data breaches. The 2017 data breach of Equifax low point was surpassed by the Aadhaar breach in March, 2018. It affected more than a billion people!

Unfortunately, 2019 not be any different. The more devices we connect to the internet, the more data we create, the more security breaches we will see. IoT devices are remarkably insecure, thereby continuing to threaten our privacy. Consumers are well aware of this. Some polls show that 90% of consumers lack the confidence that their IoT devices are secure.

As long as organisations that develop internet connected devices do not take security seriously, and develop products such as cardiac devices that can be hacked or CCTV cameras with serious bugs, this trend will only get worse. However, not onlyIoT devices are prone to hacks. Large organisations such as Uber or Verizon were hacked in 2017. Even Apple's latest security feature, Face ID has already been easily bypassed several times. We have reached a point in time where any organisation can and will be hacked, and if you are not hacked, you are simply not important enough.

Fortunately, there was a bit of light at the end of the tunnel last year. With the hype around blockchain, start-ups have been

working on a new technology called Zero Knowledge Proof (ZKP).

Zero Knowledge Proof is a method used in cryptography to prove ownership of a specific piece of knowledge without revealing the content of that knowledge. Zero Knowledge Proof enables trust-less transactions that safeguard users' privacy using mathematics. As such, ZKP improves verification processes to such an extent that one party can prove to another party that a given statement is true, without revealing any information about that statement.

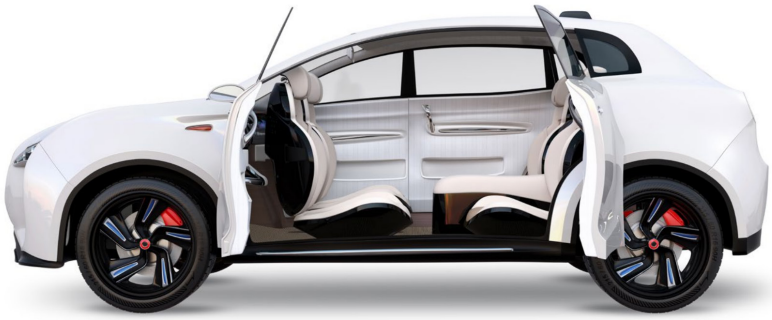
For a Zero Knowledge Proof to be sound and thorough, it has to have three characteristics; completeness, soundness, and zero knowledge.

Completeness: assuming the statement is true, an honest verifier who is faithfully and correctly following the protocol will be rightly convinced of the fact sought by the actions of an honest prover which is faithfully and correctly following the protocol.

Soundness: Falsification by the prover must be impossible. There should be no way for the prover to falsify knowledge and falsely convince the verifier. That is to say- the verifier cannot be deceived given the perimeters of the ZKP.

True Zero Knowledge: If it is the case that the statement is true, the verifier can learn nothing other than the truth of the statement.

2018 saw continued development of Zero-Knowledge Proof, making our society a little bit more private again. ZKP still has some (technical) challenges to overcome, not the least of which is cultural. Not having to show your government-issued identity to proof your age will require many people to get used to and at first, many will remain sceptical. Nevertheless, a society where trust is created using Zero Knowledge Proof is a more private society.



Autonomous Vehicle

- Reshma Mathai

In the past five years, autonomous driving has gone from "maybe possible" to "definitely possible" to "inevitable" to "how did anyone ever think this wasn't inevitable?" to "now commercially available."In December 2018, Waymo, the company that emerged from Google's self-driving-car project, officially started its commercial self-driving-car service in the suburbs of Phoenix. The details of the program—it's available only to a few hundred vetted riders, and human safety operators will remain behind the wheel—may be underwhelming but don't erase its significance. People are now paying for robot rides.

And it's just a start. Waymo will expand the service's capability and availability over time. Meanwhile, its one-time monopoly has evaporated. Smaller start-ups like May Mobility and Drive.ai are running small-scale but revenue-generating shuttle services. Every significant automakers is pursuing the tech, eager to re-brand and rebuild itself as a "mobility provider" before the idea of car ownership goes kaput. Ride-hailing companies like Lyft and Uber are hustling to dismiss the profit-gobbling human drivers who now shuttle their users about. Tech giants like Apple, IBM, and Intel are looking to carve off their slice of the pie. Countless hungry start-ups have materialized to fill niches in a burgeoning ecosystem, focusing on laser sensors, compressing mapping data, setting up service centres, and more.

This 21st-century gold rush is motivated by the intertwined forces of opportunity and survival instinct. By one account, driver-less tech will add $7 trillion to the global economy and save hundreds of thousands of lives in the next few decades. Simultaneously, it could devastate the auto industry and its associated gas stations, drive-thrus, taxi drivers, and truckers. Some people will prosper. Most will benefit. Many will be left behind. It's worth remembering that when automobiles first started rumbling down manure-clogged streets, people called them horseless carriages. The moniker made sense: Here were vehicles that did what carriages did, minus the hooves. By the time "car" caught on as a term, the invention had

how humanity moves and thus how (and where and with whom) humanity lives. This cycle has restarted, and the term "driver-less car" will soon seem as anachronistic as "horseless carriage." We don't know how cars that don't need human chauffeurs will mould society, but we can be sure a similar gear shift is on the way.

Just over a decade ago, the idea of being chauffeured around by a string of zeros and ones was ludicrous to pretty much everybody who wasn't at an abandoned Air Force base outside Los Angeles, watching a dozen driver-less cars glide through real traffic. That event was the Urban Challenge, the third and final competition for autonomous vehicles put on by Darpa, the Pentagon's skunk-works arm.

At the time, America's military-industrial complex had already thrown vast sums and years of research trying to make unmanned trucks. It had laid a foundation for this technology, but stalled when it came to making a vehicle that could drive at practical speeds, through all the hazards of the real world. So, Darpa figured, maybe someone else—someone outside the DOD's standard roster of contractors, someone not tied to a list of detailed requirements but striving for a slightly crazy goal—could put it all together. It invited the whole world to build a vehicle that could drive across California's Mojave Desert, and whoever's robot did it the fastest would get a million-dollar prize.

Most self driving cars have features including Cameras which is great for spotting things like lane lines on the highway, speed signs, and traffic lights. Some developers think that, with better machine vision, they can use cameras to identify everything they see and navigate accordingly. Lidars-The spinning thing you see on top of most self-driving cars is lidar (that's "light detection and ranging"). It fires out millions of laser beams every second, measures how long they take to bounce back, and uses the data to build a 3D map that's more precise than what radar offers and easier for a computer to understand than a 2D camera image. It's also crazy expensive, hard to manufacture at scale, and nowhere near robust enough for a life of potholes and extreme temperatures. Good thing dozens of start-ups and tech giants are pouring millions of dollars into fixing all that.Machine Learning - At its simplest, this artificial intelligence tool trains computers to do things like detect lane lines and identify cyclists by showing them millions of examples of the subject at hand. Because the world is too complex to write a rule for every possible scenario, it's key to have cars that can learn from experience and figure out how to navigate on their own. Maps - Before a robocar takes to the streets, its parent company will use cameras and lidars to map its territory in extreme detail. That reference document helps the car verify its sensor readings, and it is key for any vehicle looking to know its own location, down to the centimetre—something standard GPS can't offer. Radars-A regular presence in cars since the late 1990s, radars bounce radio waves around to see their surrounding and are especially good at spotting big metallic objects—other vehicles. They're cheap, reliable, and don't sweat things like fog, rain, or snow.

Air Flight

- Rahul Gautam

Boeing tested a prototype of its electric autonomous passenger drone,the company officially announced on Wednesday.
Designed by Boeing subsidiary Aurora Flight Sciences-(partnered with Uber),the PAV (passenger air vehicle) performed a controlled ascent,
hover and landing during its maiden flight,which took place at Manassas, Virginia.
From a conceptual design to reality in just over a year,the aircraft measures 9.14 metres in length and 8.53 metres in width,and is powered by an electric propulsion system with a range of up to 80 kilometres.
These EVTOL(electric vertical takeoff and landing) aircrafts are dubbed "flying cars" because they would carry a similar number of passengers as a car
and cover similar sorts of journeys, while they earn the moniker "passenger drones" for borrowing their propeller-driven style of flight.
EVTOL vehicles are considered by some to be the future of urban mobility, with their vertical take-off and landing feature theoretically enabling door-to-door transport.

The reason Boeing's efforts here are notable is because, simply put, there are no electric-powered aircraft, or even gas-electric hybrid aircraft, in commercial operation today.

Flying requires an incredible amount of energy, and present battery technology just doesn't offer the power-to-weight ratio needed to achieve lift-off.
Most experts predict that it will be years, if not decades, before the technology catches up.

"This is what revolution looks like, and it's because of autonomy," said John Langford, president and chief executive officer of Aurora Flight Sciences.
"Certifiable autonomy is going to make quiet, clean and safe urban air mobility possible.
"It's a significant step toward a future in which autonomous, electric "flying taxis" zip from skyscraper to skyscraper, bearing passengers and cargo in service of an entirely new form of urban mobility. Boeing is just one of dozens of companies that are pursuing some form of urban air taxi service.

Rival Airbus tested its version of the PAV, known as Vahana, at the start of 2018, and German start-up Lilium reached the milestone a few months earlier.
British aerospace company Rolls-Royce has its own eVTOL vehicle in development, while Uber has been perhaps the most ardent pursuer of the flying-car dream, revealing concepts for sky-ports and taxis,

and partnering with NASA.

Boeing has been designing and manufacturing aircraft for 102 years, since 1916. The company's NeXt division is dedicated to experimental technologies, and is currently focusing on autonomous flight and advanced propulsion. Among its other projects is an unmanned cargo drone that can carry loads of up to 227 kilograms. This was tested indoors last year and will move to outdoor testing in 2019.

According to Boeing, future flights will test forward, wing-borne travel, as well as the transition phase between vertical and forward-flight modes, which is considered to be the biggest engineering challenge for this type of aircraft.

Blockchain for Smart Cities

- Amritha S Menon

Blockchain (BC) technology is the distributed storage of information with high security. BC can store data on transactions such as from who it was received, to whom it was sent, and the amount of concurrencies transferred. Currently, Blockchain has attempted to apply to manage smart cities, conduct energy trading, 'connect' Wireless Sensor Networks (WSN) and Internet of Things (IoT), create smart contracts and others. BC is completely protected from the substitution of information in existing blocks of the chain. This property makes the BC technology able to protect the information that is transmitted from various sensors and mobile devices.

Smart Cities have developed considerably with the development of the Internet of Things. Smart cities are based on autonomous and distributed infrastructure that include intelligent information processing and control systems of systems

infrastructure, and sensors involving millions of information sources. Due to the continued growth of data volume and number of connected IoT devices, concerns such as high latency, bandwidth bottlenecks, security and privacy, and scalability arise in the current smart city architecture. Designing an efficient, secure, and scalable distributed structure by bringing computational and storage resources closer to users is needed to address the limitations of present smart city networks

There are many possible applications of blockchain to smart cities. In this article a few of them will be discussed. Blockchain powered products help smart cities manage their energy use, incentivize responsible practices and advance the supply chain for clean energy optimization.

Neighbours in the Brooklyn Microgrid project are empowered to produce, consume, and purchase power within their community with a blockchain enabled transactive energy platform. It moves towards a distributed energy supply system that is highly based on renewable-based sources such as solar energy generation for a more resilient, low carbon and customer-driven economy.

Indeed, the deployment of microgrids sets the stage for an energy future consisting of networks of energy sources that Blockchain can support. Peer-to-peer business deals are very cost efficient and have great potential.

The Australian government has launched BC solutions for energy grid management [2]. The project is focused on smart cities and aims to use BC technology to create more efficient usage of water and electricity.

By combining data analytics with a decentralized platform for energy grids and water systems, Australia aims to create smart cities with a reduced carbon footprint. The project will have a large solar power installation and rainwater treatment plant connected to commercial buildings, electric vehicle charging stations, and residences using blockchain technology.

Turning to smart transportation and smart healthcare which are considered essential applications in a Smart City. In 2015, the United Nations (UN) announced 17 Global Goals to achieve a better world. A sub-goal aims to reduce the number of road traffic injuries and deaths in 2020 by 50%. It is found that the total number of road traffic injuries and deaths amount to more than 50 million annually. The annual expenditure of the injuries is more than $500 billion. Besides, traffic accidents are the top leading cause of death in the age group between 15 and 29. It is predicted that traffic accidents will become the seventh leading cause of death by 2030 if there is no prevention scheme.

Real-time monitoring of humans' status to give an early alert could be considered as the most effective method on preventing traffic accidents. For example, if a candidate is identified as abnormal (such as the candidate is drunk) before driving, prohibiting an engine start can protect all other drivers and pedestrians. The reviews on traffic accidents indicated that drowsy driving and drunk driving are the two major causes of traffic accidents. More than half of professional drivers feel sleepy and more than 30% of drivers fall asleep while driving. Nearly one person is killed by drunk driving

every hour. Therefore, real-time detection scheme on both drowsy driving and drunk driving renders a signification reduction on traffic injuries and death. It is estimated that $50 billion can be saved from the traffic accidents.

The conventional detection schemes are divided into three types, namely, (1) image-based detection, (2) behaviour-based detection and (3) bio-signal based detection. It is worth noting that image-based detection and behaviour based detection cannot achieve the purposes of providing pre-warning before driving and high measurement accuracy at the same time while bio-signal based detection does. Image-based detections identify the features of drivers' head motion and eye blinking with the use of image processing. However, image-based approaches are usually unreliable in practical situations. Behaviour based approaches compare driving behaviours under normal conditions and abnormal conditions. The driving behaviours reflect on vehicle moving path such as lateral position, change in velocity, and turning angle. In other words, the approaches are not able to provide pre-warning to abnormal drivers before they drive. Recently, wireless and wearable healthcare sensors have been raised in the market. The emerging wireless technologies facilitates the network expansion by connected all various kinds of devices, sensors, algorithms, and applications together. Therefore, a huge number of wearable sensors such as smart watches, headbands, chest straps etc. have been developed recently. The integration of those wearable sensors is usually defined as Wireless Body Area Network (WBAN). WBANs are a new kind of personal area communication networks that consist of smart sensors placed inside, on, or around the human body, typically consists of a collection of low-power, miniaturized, and lightweight devices with wireless communication capabilities.

WBANs enable different applications and they provide real-time feedback to the user and medical personnel without causing any discomfort. WBANs are expected to cause a dramatic shift in how people manage and think about their health. WBAN facilitates real-time monitoring humans' status in numerous applications such as worker safety and patient tracking. The wearable healthcare sensors measure bio-signals. Among all the bio-signals, a survey on the non-intrusive driver assistance system reported that Electrocardiogram (ECG) has the highest accuracy on real-time measurement.

The Huawei executive said that BC in healthcare is apparent for the secure exchange of value and information between medical specialists, or between patients and medical specialists, and between patients and the pharmacy. It is also between the MRI scanner and the application server that processes the medical images, or between the medical specialists that use the PC or computer and the medical imaging database.

In this article, few potential applications of blockchain to smart cities have been discussed. It looks that it can provide a very positive outcome in the near future.

Films

- Febin Micheal Antony

Over the past century, film has changed humankind.

Over the past century, film has changed humankind. From the earliest fragments of captured movement, it has allowed us to watch, document, educate and depict ourselves in untold ways using just the mechanics of light, lenses and chemistry.

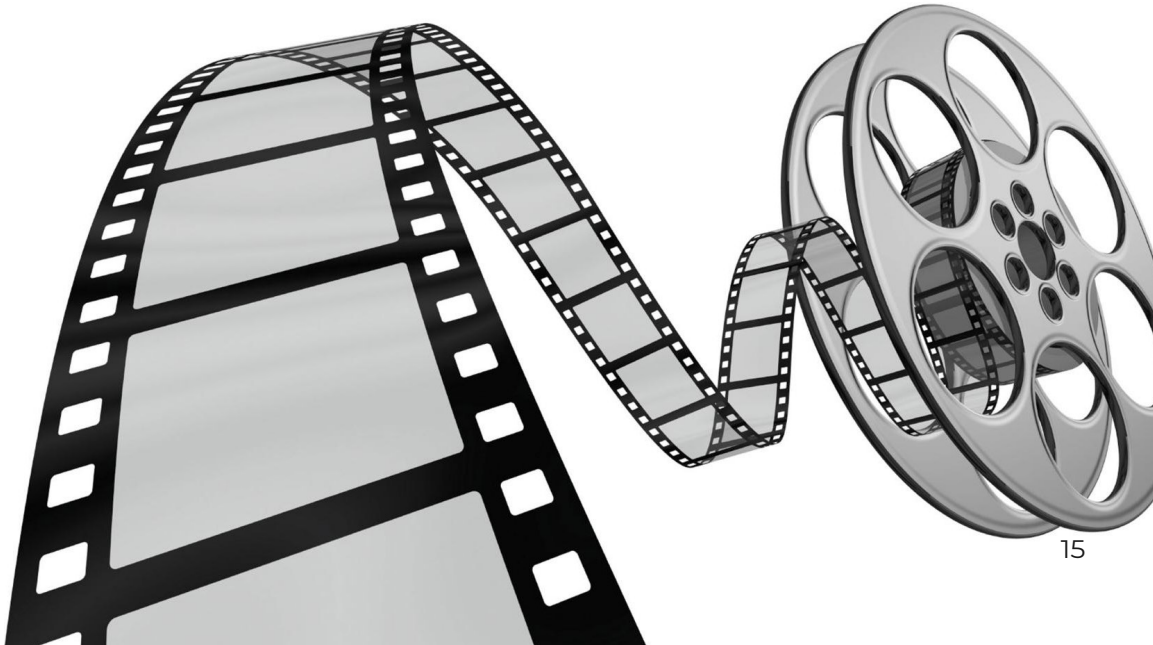
It is one of our greatest inventions, the art form of the 20th century. Film is a beautiful, physical and robust medium that keeps the light within its fabric and holds in its emulsion the imprint of time. It is our cultural and historical memory: a place of imagination, poetry, art and life. *It is the Rosetta Stone of our time.*

Now we are on the point of losing it.

With the advent of digital, the medium of film is gravely threatened and might, unless action is taken, simply disappear. Its obsolescence will result in untold tragedy in all that we will no longer be able to see and experience, and also in what we will no longer be able to make, because we will have simply lost the technology to do so.

We cannot allow this to happen.

The debate around film versus digital has been the wrong debate. It has been discussed as one of technological determinism (where only one medium can survive) often for financial, rather than artistic reasons.



"Film has a history and that history doesn't begin with digital formats. It begins with film . . . And that's part of the art form – the light meets the emulsion and extraordinary things happen. So yes, I believe it is essential to preserve that choice."

- Martin Scorsese

"I gave a speech some years ago where I was asked to defend film, and I said that I felt like a stonemason defending marble. It's ridiculous. This is why we're all here. It's what we do. This is film."

- Christopher Nolan

Film and digital are different mediums, in that they differ materially and methodologically in their artistic rather than technological use, and so make different cinema and different art. They have their own unique disciplines, image structures and visual qualities. Their co-existence is essential to keep diversity and richness in our moving-image vocabulary. The ascendance of one does not have to mean the capitulation of the other, unless we allow this to happen.

Most endangered of all, and nearly at the point of extinction, is the projection of film in cinemas. We must fight to keep the experience of watching a film, which was made on film, projected as film in at least one cinema or film museum in as many major cities and in as many countries as we can. We must act quickly to safeguard the future of the film print by supporting cinemas that choose to continue projecting 35mm film prints alongside digital projection and persuade distributors to permit delivery of prints when cinemas and audiences desire them.

There are many prominent people in the art, museum and conservation communities, alongside those in the cinema industry, who are reaching the consensus that such cultural irresponsibility cannot be allowed to take place in what is seen as a critical moment in film's survival. The situation has become so grave, so rapidly, that we are coming together as a body to raise awareness at the highest international level in order to find a way to guard our ability to manufacture, shoot, process, print, make, preserve and project film.

It is now clear that film will not survive if it is left to rely solely on the market. Its commercial viability has been wholly undermined by an industry intent on replacing it. It is time to insist our national and international institutions recognise this fact, and the reality of film's imminent death, by taking steps to subsidise and protect it. Recognition of this kind might give sufficient hope to those in the photochemical industry to stop the end of knowledge and embolden stock manufacturers and laboratories to persevere.

Film is bulky But it will never provide the image quality that a photochemical film can. We are ignorant of the fact and we are satisfied with the present technology. Artists and filmmakers should see the importance of preservation of film stock. Film has a huge legacy and we just can't let this happen in front of our eyes. The medium of film shouldn't be just for the museums or film festivals it should be mainstream. If we look at the production cost even after the arrival of digital camera it hasn't gone lower the cost will only get higher.

I could tell you everything about celluloid films but it would be just mere facts and figures. You, reading this article is the Mary in the black and white room. You should walk out of your couch and experience film in its true sense.

The thought experiment was to show the difference between a film and a digital medium. Don't get me wrong I'm not a conservative I embrace technology but not technology for the sake of technology.

The theatre going habit should be restored

The artist or filmmaker intents to show his work go up on-screen

This should not be disruptive technology

Bio Computers

- Sneha Sasikumar

Biological computers are special types of microcomputers that are specifically designed to be used for medical applications. The biological computer is an implantable device that is mainly used for tasks like monitoring the body's activities or inducing therapeutic effects, all at the molecular or cellular level. This is made up of RNA, DNA and proteins and can also perform simple mathematical calculations. This could enable the researcher to build an array or a system of bio-sensors that has the ability to detect or target specific types of cells that could be found in the patient's body. This could also be used to carry out or perform target-specific medicinal operations that could deliver medical procedures or remedies according to the doctor's instructions.

Biological computers are a kind of bio-sensors which have emerged as an interdisciplinary field that draws together molecular biology, chemistry, computer science and mathematics. The highly predictable hybridization chemistry of DNA is the ability to completely control the length and content of oligonucleotides and the wealth of enzymes available for modification of the DNA and make use of nucleic acids an attractive candidate for all of these nano-scale applications. These are mainly used for monitoring body's activities by inducing therapeutic effects at molecular and cellular level.

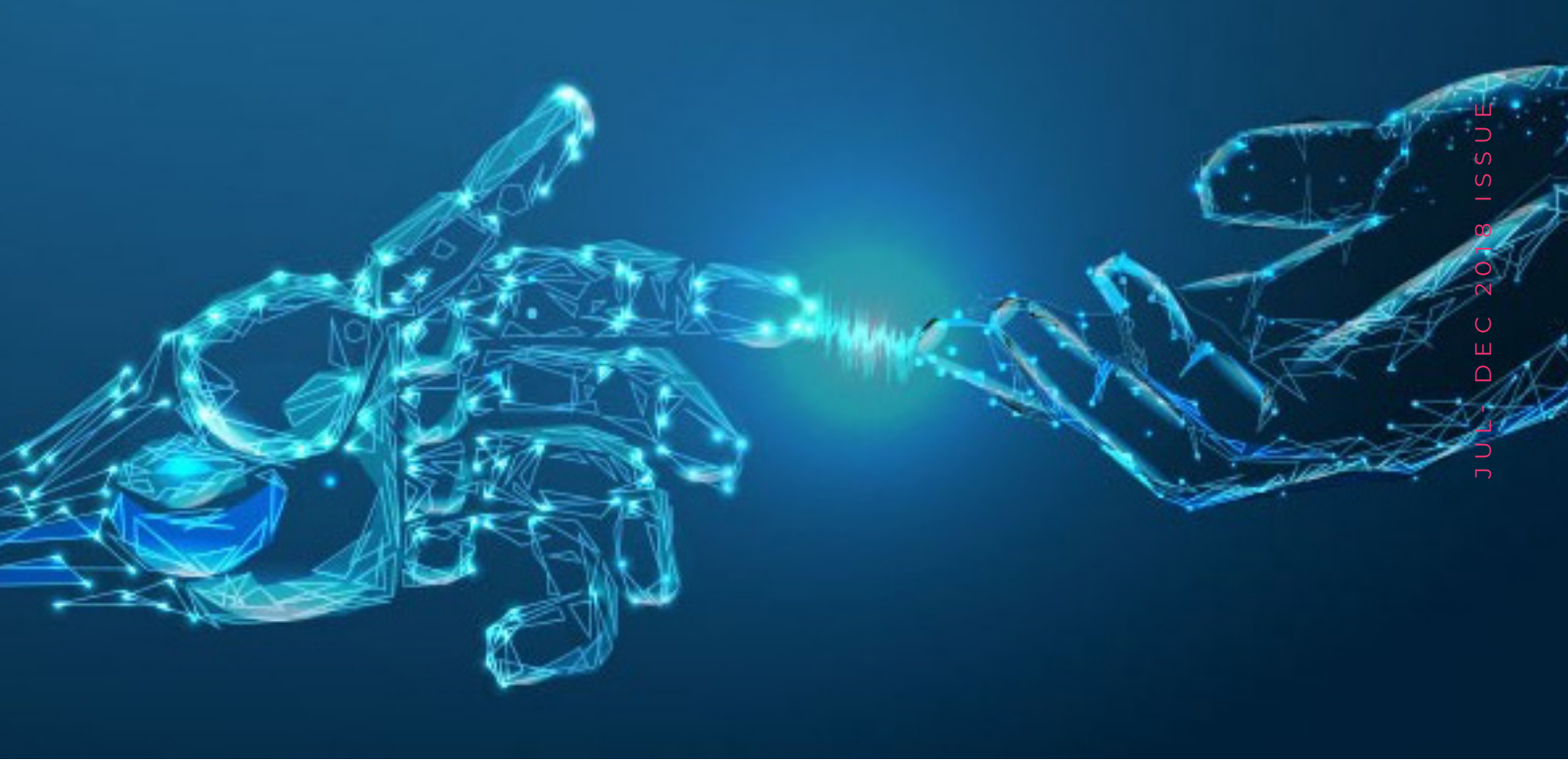
Biocomputing is one of the new fields in research which deals with computer science and biology but doesn't fit to both. A 'DNA computer' has been used for the first time to find the only correct answer

from over a million possible solutions to a computational problem. Before one can turn living organisms into computational systems, Biocomputing researchers need a way to create and connect multiple "circuits" switches, clocks and so forth within a single cell.

Biological computers used to produce input; output and "software" are all composed of DNA, the material of genes, while DNA-manipulating enzymes are used as "hardware." The newest version's input apparatus is designed to assess concentrations of specific RNA molecules, which may be overproduced or under produced, depending on the type of cancer. Using pre-programmed medical knowledge, the computer then makes its diagnosis based on the detected RNA levels.

In response to a cancer diagnosis, the output unit of the computer can initiate the controlled release of a single stranded DNA molecule that is known to interfere with the cancer cell's activities, causing it to self-destruct. This can be a type of bio-sensors which has the ability to detect or target specific types of cells in human body.

Humans use a variety of gadgets without realizing how the gadgets could be working on a pattern which is already patented and perfected by Mother Nature. Living organisms also carry out complex physical processes under the direction of digital information. Computers and software are no exception in this contrast. DNA was recognized as the most important molecule of living nature. The ability to store billions



of data is an important feature of the DNA and hence to biological computing.

Biological computers are made inside a patient's body. The mere information of the patient's body is called a blueprint along which lines the biological computer would be manufactured. Once the computer's genetic blueprint has been provided, the human body will start to build it on its own using the body's natural biological processes and the cells found in the body. Through Boolean logic equations, we can easily use the biological computer to identify all types of cellular activity and determine whether a particular activity is harmful or not.

The cellular activities that the biological computer could detect can even include those of mutated genes and all other activities of the genes found in cells. As with conventional computers, the biological computer also works with an output and an input signal. The main inputs of the biological computer are the body's proteins, RNA, and other specific chemicals that are found in the human cytoplasm. The output on the other hand could be detected using laboratory equipment.

The implantable biological computer is a device which could be used in various medical applications where inter-cellular evaluation and treatment are needed or required. It is especially useful in monitoring inter-cellular activity including mutation of genes. The main advantage of this technology over other like technologies is the fact that through it, a doctor can focus on or find and treat only damaged or diseased cells. Selective cell treatment is made possible. Biocomputers made of RNA strands might eventually serve as brains for producing biofuels from cells, for example, or to control "smart drugs" that medicate only under certain conditions.

The future for biological computing is bright. Biological computing is a young field which attempts to extract computing power from the collective action of large numbers of biological molecules. CPU being replaced by biological molecules remains in the far future. Biological computer is a massively parallel machine where each processor consists of a single biological macromolecule. A part of the system can be made of biological and the other using current or new hardware that may become available. This would give us the combined benefit of both systems.

Actual biological organisms provide some useful insight into statements of the form Biological computers can't do. Biological organisms routinely convert data about the macroscopic world gathered by senses in to a form that influences biology at molecular level. It seems like a good idea to look to real biological systems for solutions to particular problems. A computational micro-architecture based on membrane justifies the name biological as opposed to merely molecular computing.

Mobile Phone Clon-ing

- Harsha Prasad

Mobile phone cloning is copying the identity of one mobile telephone to another mobile telephone. Usually this is done for the purpose of making fraudulent telephone calls. The bills for the calls go to the legitimate subscriber. The cloner is also able to make effectively anonymous calls. A phone can be cloned by cellular thieves and can capture ESN/MINs using devices such as cell phone ESN reader or digital data interpreters (DDI).The ESN/MIN pair can be cloned in a number of ways without the knowledge of the carrier or subscriber through the use of electronic scanning devices. Cellular thieves can capture ESN/MINs using devices such as cell phone ESN reader or digital data interpreters (DDI).The ESN/MIN pair can be cloned in a number of ways without the knowledge of the carrier or subscriber through the use of electronic scanning devices. After the ESN/MIN pair is captured, the cloner reprograms or alters the microchip of any wireless phone to create a clone of the wireless phone from which the ESN/MIN pair was stolen.

The methods to detect cloned phones are, Direct detection:-The network sees the same phone in several places at the same time. Reactions include shutting they all off so that the real customer will contact the operator because he lost the service he is paying for, or tearing down connections so that the clone users will switch to another clone but the real user will contact the operator. Velocity trap:-The mobile phone seems to be moving at impossible, or most unlikely speeds. For example, if a call is first made in Helsinki, and five minutes later, another call is made but this time in Tampere, there must be two phones with the same identity on the network. Radio frequency:-finger printing is originally a military technology. Even nominally identical radio equipment has a distinguishing fingerprint, so the network software stores and compares fingerprints. For all the phones that it sees.

This way, it will spot the clones with the same identity but different fingerprints. Usage profiling: - Profiles of customers' phone usage are kept, and when discrepancies are noticed, the customer is contacted. Credit card companies use the same method. For example, if a customer normally makes only local network calls but is suddenly placing calls to foreign countries for hours of airtime, it indicates a possible clone. Call counting- Both the phone and the network keep track of calls made with the phone, and should they differ more than the usually allowed one call, service is denied. Pin codes:- Prior to placing a call, the caller unlocks the phone by entering a PIN code and then calls as usual. After the call has been completed, the user locks the phone by entering the PIN code again. Operators may share PIN information to enable safer roaming.

The impact of cloning includes, the mobile phone industry loses millions of dollars in revenue because of the criminal action of persons who are able to reconfigure mobile phones so that their calls are billed to other phones owned by innocent third persons. Many criminals use cloned cellular telephones for illegal activities, because their calls are not billed to them, and are therefore much more difficult to trace. This phenomena is especially prevalent in drug crimes. Drug dealers need to be in constant contact with their sources of supply and their confederates on the streets in the same way, criminals who pose a threat to our national security, such as terrorists, have been known to use cloned phones to thwart law enforcement efforts aimed at tracking their whereabouts.

The methods to prevent cloning include: Service providers have adopted certain measures to prevent cellular fraud. These include encryption, blocking, blacklisting, user verification and traffic analysis. Blacklisting of stolen phones is another mechanism to prevent unauthorized use. An Equipment Identity Register (EIR) enables network operators to disable stolen cellular phones on networks around the world. User verification using Personal Identification Number (PIN) codes is one method for customer protection against cellular phone fraud. Tests conducted have proved that United States found that having a pin code reduced fraud by more than eighty percentage. Traffic analysis detects the cellular fraud by using artificial intelligence software to detect suspicious calling patterns, such as a sudden increase in the length of calls or a sudden increase in the number of international calls. The software also determines whether it is physically possible for the subscriber to be making a call from a current location, based on the location and time of the previous call.

Mobile Cloning Is in initial stages in India so preventive steps should be taken by the network provider and the Government the enactment of legislation to prosecute crimes related to cellular phones is not viewed as a priority, however. It is essential that intended mobile crime legislation be comprehensive enough to incorporate cellular phone fraud, in particular "cloning fraud" as a specific crime. Existing cellular systems have a number of potential weaknesses that were considered. It is crucial that businesses and staff take mobile phone security seriously.

Wifi into Electricity

- Arjun Aloshious

Two-dimensional antenna that converts Wi-Fi signals into electricity

Wireless charging is increasingly common in phones and other devices, but it's still held back by a very short range – usually the device needs to sit on top of a charging pad, which cancels out some of the benefits of going wireless. In a new step towards truly wireless charging, engineers have developed an ultra-thin device that captures Wi-Fi signals and converts them into electricity.

The new system is based on existing devices called rectifying antennas, or rectennas. These capture AC electromagnetic waves in the air – such as Wi-Fi signals – and convert them into DC electricity. But most of them are rigid and, being

made with silicon or gallium arsenide, are best suited to powering small electronics. So the team on the new study set out to develop a new rectenna that's flexible enough to be scaled up to much larger sizes.

For the new design, the team made the rectifier – the component that converts the current – out of molybdenum disulfide (MoS2). This semiconducting material measures just three atoms thick, making it extremely flexible while still holding its own in the efficiency department. The team says the MoS2 rectifier can capture and convert up to 10 GHz of wireless signals with an efficiency of about 30 percent. That's much higher than other flexible designs, and the researchers also say it's faster.

That said, it doesn't quite stack up against other rectifiers, which can reach efficiencies of up to 60 percent. It's also generating a relatively small amount of electricity, producing about 40 microwatts from about 150 microwatts of Wi-Fi power. Although that isn't much, it should be enough to power small wearable or medical electronic devices, removing the need for batteries.

The team hopes that these disadvantages will be outweighed by the other benefits of the new design, including its flexibility and scalability.

"What if we could develop electronic systems that we wrap around a bridge or cover an entire highway, or the walls of our office and bring electronic intelligence to everything around us?" Says Tomás Palacios, co-author of the study.

"How do you provide energy for those electronics? We have come up with a new way to power the electronics systems of the future – by harvesting Wi-Fi energy in a way that's easily integrated in large areas – to bring intelligence to every object around us."

Next up, the team is planning on improving the efficiency and building more complex systems.

Big Data Analytics

- Jim Thomas

The concept of big data has been around for years; most organizations now understand that if they capture all the data that streams into their businesses, they can apply analytics and get significant value from it. But even in the 1950s, decades before anyone uttered the term "big data," businesses were using basic analytics(essentially numbers in a spreadsheet that were manually examined) to uncover insights and trends. However, are speed and efficiency. Whereas a few years ago a business would have gathered information, run analytics and unearthed information that could be used for future decisions, today that business can identify insights for immediate decisions. The ability to work faster – and stay agile – gives organizations a competitive edge they didn't have before.

Driven by specialized analytics systems and software, as well as high-powered computing systems, big data analytics offers various business benefits, including new revenue opportunities, more effective marketing, better customer service, improved operational efficiency and competitive advantages over rivals. Big data analytics applications enable big data analysts, data scientists, predictive modelers, statisticians and other analytics professionals to analyse growing volumes of structured transaction data, plus other forms of data that are often left untapped by conventional business

intelligence and analytics programs. That encompasses a mix of semi-structured and unstructured data -- for example, internet click-stream data, web server logs, social media content, text from customer emails and survey responses, mobile phone records, and machine data captured by sensors connected to the internet of things. The Hadoop distributed processing framework was launched as an Apache open source project in 2006, planting the seeds for a clustered platform built on top of commodity hardware and geared to run big data applications. By 2011, big data analytics began to take a firm hold in organizations and the public eye, along with Hadoop and various related big data technologies that had sprung up around it.

Big data analytics helps organizations harness their data and use it to identify new opportunities. That, in turn, leads to smarter business moves, more efficient operations, higher profits and happier customers. Some of the benefits of big data analytics are as follows:

- Cost reduction. Big data technologies such as Hadoop and cloud-based analytics bring significant cost advantages when it comes to storing large amounts of data – plus they can identify more efficient ways of doing business.
- Faster, better decision making. With the speed of Hadoop and in-memory analytics, combined with the ability to analyse new sources of data, businesses are able to analyse information immediately – and make decisions based on what they've learned.
- New products and services. With the ability to gauge customer needs and satisfaction through analytics comes the power to give customers what they want. Davenport points out that with big data analytics, more companies are creating new products to meet customers' needs.

Edge computing holds the future

- Kevin Thomas

For most parts of century, cloud computing has played a major role in data transfer and storage. But just as human needs keep updating leading to higher expectation, a lot of loopholes and limitations became more and more prominent. That's where edge computing, providing solutions to almost all problems, has made its presence felt.
In the context of IoT, 'edge' refers to the computing infrastructure that exists close to the sources of data, for example, industrial machines (e.g. magnetic resonance (MR) scanner), industrial controllers such as SCADA systems, and time series databases aggregating data from a variety of equipment and sensors. These edge computing devices typically reside away from the centralize computing available in the cloud.

While edge computing isn't new, there are several key drivers making edge computing a more viable reality today:

- Cost of compute and sensors continue to plunge
- More computing power executed in smaller footprint devices (such as a gateway or sensor hub)
- Ever-growing volume of data from machines and/or the environment (e.g. weather or market pricing)
- Modern machine learning and analytics

Cloud computing is an integral part of computer infrastructure and is a software-based model that enables access to collective pools of configurable resources such as application, storage, computer networks and services. Cloud computing involves minimal effort of the management and allow users to process and store data in a private

Edge computing

Cloud computing

or public cloud. Advancement in technology has resulted in the adoption of cloud computing in the education sector. In edge computing, compute resources are "placed closer to information-generation sources to reduce network latency and bandwidth usage generally associated with cloud computing." This helps to ensure continuity of services and operations even if cloud connections aren't steady. This moving of compute and storage to the "edge" of the network, away from the data centre and closer to the user, cuts down the amount of time it takes to exchange messages compared with traditional centralized cloud computing.

Edge computing deployments are ideally suited in a number of situations. One is when IoT devices have insufficient connectivity and it is not feasible for IoT devices to be seamlessly connected to a central cloud. High latency, low spectral efficiency, and non-adaptive machine type of communication are some of the serious challenges of cloud computing framework that is leading to a shift to computing to the edge devices of the network.

Edge computing offers economic benefits for organizations. This is because carrying out computing closer to the edge of the network helps organizations analyse crucial data in real-time. Edge computing is useful for organizations across many industries such as manufacturing, telecommunications, healthcare, and finance among others.

Edge computing and cloud computing are two very different things. One does not replace the other but they can surely complement each other in order to improve the efficiency of both paradigms.

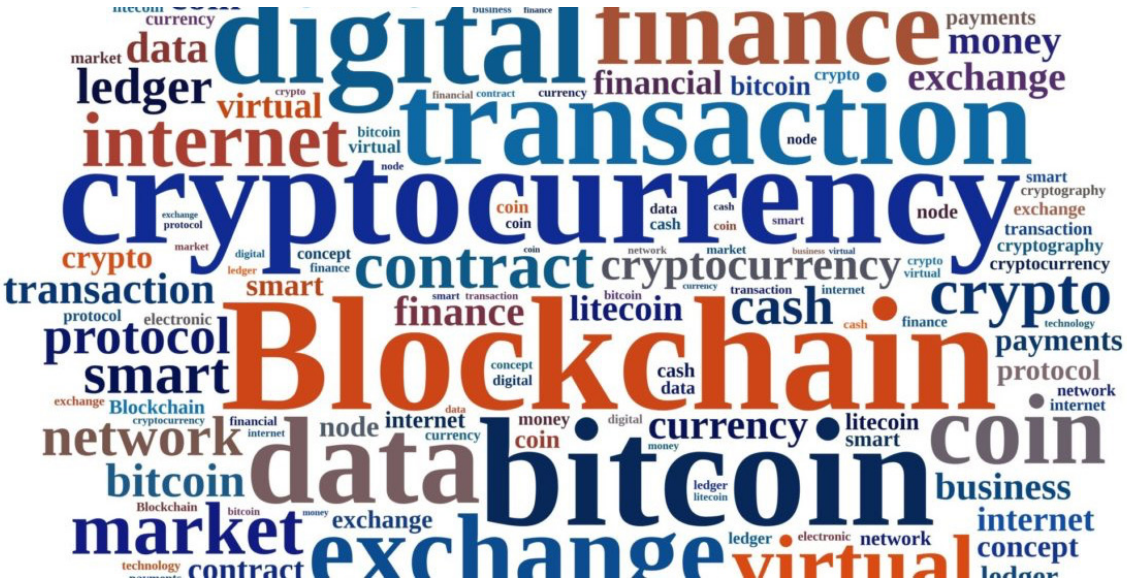
Will criptocurrency be to too mainstream in the future?

- Reesa Susan

Is bitcoin being a major cryptocurrency?

Well, bitcoins are podium carrying money with no links to financial institutions. Cryptocurrency is the red-hot asset which almost no one cared about a few years back and now has taken up the world.

Cryptocurrency actually emerged as a part of another invention as quoted by its inventor Santoshi Nakomoto. He wanted to develop a digital cash system without any central authority with the help of peer to peer networking. They are 'digital gold.' Cryptocurrencies are secure means of digital payment for any economic activity. Blockchain are the databases that record



transactions made by bitcoins and do not share the details with any other third-party authority. They use peer to peer networking, and no one can access the database without fulfilling certain conditions. Blockchains provide great security due to this.

Initial cryptocurrencies invented was Bitcoins. Since then many other designed similar coins, named Alternate coins. It uses a procedure known as the cold storage in which it helps to store the bitcoins in the user's hardware itself offline which prevents others from accessing it. But if the user forgets the way to access it, then the bitcoins stored in the hardware cannot be retrieved back and forever gone. There are many controversies revolving bitcoins but people buy more bitcoins in the hope that it will bring huge profits.

Money is a messaging system; it's how we communicate value to one another and block chains have introduced a new way of doing that," -Ethan erkiletian

Billions of people use cryptocurrency in exchange for money as these do not track the personal transaction details to any third party or a government, neither to banks nor to any financial institutions.

Cryptocurrency has got various reviews from different experts, great computer geeks, and developers stating it to be an experiment which is not going to be permanent also reporting it as a scam. Well, most of them fear it to be a threat to the major financial institutions. One of them suggested principles of cryptocurrency and block chain to be used as file sharing system, auto-updating the computers and also debugs errors as they are peer to peer networking. Cryptocurrencies are most common among business folks in black market. Their transactions can be made at ease as there are no central entities recording it to the government officials.

As growing number of humans have generated interest in investing for bitcoins, thereby engulfing the block chain technology into their business. Virtual currencies may become dominant in the upcoming years because of its prodigious demand.

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