



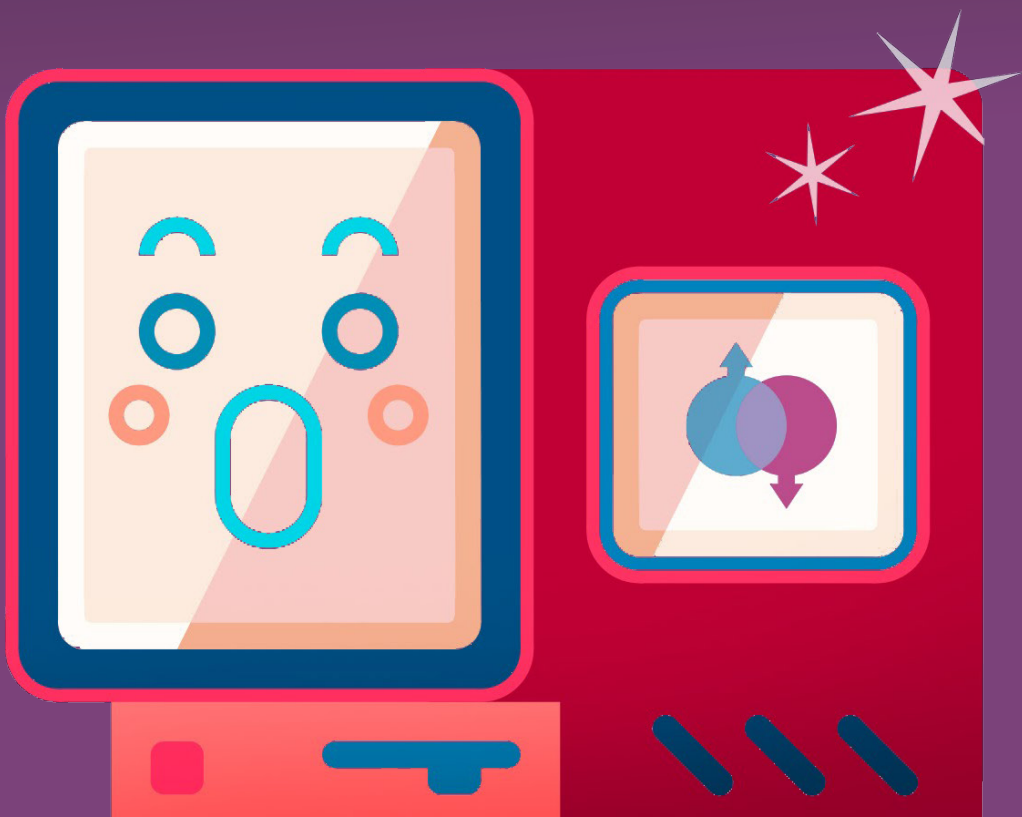
CSI
VESIT

ISSUE: 2017

QUANTUM COMPUTING

PHI SIGMA

From Nothing to Everything



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The Editor's desk

At the confluence of two eras that we never expected to witness, we stand in awe of our own capabilities; watching qubits replacing the ever-reliable bits and witnessing the birth of computing that is probabilistic. As aptly summarized by Seth Lloyd, "A classical computation is like a solo voice—one line of pure tones succeeding each other. A quantum computation is like a symphony—many lines of tones interfering with one another." We have moved forward and have introduced computing which vastly improves on that which is currently the norm, allowing us to move forwards and tackle even bigger problems. Quantum algorithms are faster than their traditional counterparts but the kicker lies in the fact that they have opened the floodgates to problems which were, thus far, unsolvable. However, we have much to do to make quantum computing the norm.

Meanwhile, in the present, the US elections will now answer the question "Is Orange the new Black?". Jokes apart, this election is all set to elect the individual who will become the "Leader of the free world". As we come to terms with the advancing of computing, a few of us will also ponder over the election affecting higher education abroad, especially after the disaster that is BREXIT. We, the Editors of CSI VESIT bring to you the latest edition of 'Phi Sigma: Nothing and Everything' with the theme 'Quantum Computing'. With this magazine, we hope to kindle curiosity towards breakthrough advancements in technology amongst our readers. We sincerely thank all our readers, for their constant and enthusiastic participation that helps us come up with bigger and better events year after year. Lastly, we would also like to extend our heartfelt gratitude to our Staffs-In-Charge for their unconditional and irreplaceable support. A big thank you to the entire Council for their tireless efforts that made the past semester a great success!



Has the age of Quantum Computing arrived?

POOJA DEEPAK MORE (D12-B)

With computers breaking barriers and leaving all conventional laws behind, Pooja More from T.E CMPN, the first prize winner of the article writing competition, explains what quantum computing has to offer.

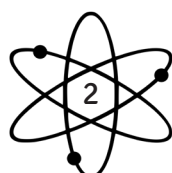
Have you ever imagined life without computers? Some of us would be baffled by this thought. With every passing day, a new concept is being introduced and one such that will be the most revolutionary of all is 'Quantum Computing'. Quantum computing brings in a breakthrough of energy efficient computing and is being talked about and researched since ages. A normal computer that we use today works on binary digits i.e. 0 or 1, the state can be either on or off but with quantum computers we would be able to save more complex information in a single state rather than just a 1 or 0.

In 1971 Intel's first microprocessor was made up of 2,300 transistors. Intel now produces microprocessors with more than 5bn transistors. However, they're still limited by their simple binary options. But, with quantum computers the bits, or "qubits" as they are known, afford far more options owing to the uncertainty of their physical state. In the subatomic realm of quantum physics, particles can act like waves, so that they can be a particle or a wave or both particle and wave. This is what's known in quantum mechanics as superposition. Thus quantum computing takes the advantage of the subatomic particles existing in more than one state at a time. As a result of superposition, a qubit can be a 0 or 1 or 0 and 1. That means it can perform two equations at the same time. Two qubits can perform four equations and three qubits can perform eight, and so on in an exponential expansion. That leads to some unimaginably large numbers. Computation

in quantum computers work when the qubits interact with each other and so for a whole computer to function it needs to have many qubits. Scientists have already built basic quantum computers that can perform certain calculations, but a practical quantum computer is still years away.

Quantum computers could one day replace silicon chips, just like the transistor once replaced the vacuum tube. But for now, the technology required to develop such a quantum computer is beyond our reach. Most research in quantum computing is still very theoretical. The most advanced quantum computers have not gone beyond manipulating more than 16 qubits, meaning that they are far from practical applications. However, the potential remains that quantum computers one day could perform, quickly and easily, calculations that are incredibly time-consuming on conventional computers. Several key

advancements have been made in quantum computing in the last few years and it is a mind-bending concept with the potential to change the world and bring in a new era of computers.





The People of VESIT

SEJAL GIANANI

Sejal Gianani, our senior editor, allows us a peek into the cogs that make the organization that is VESIT work all the way behind the scenes.



I guess the major thing that has played a part in who I am today has been my school-not one but all seven of them. What with the ever changing job scenario my dad had, I had a quite the colourful childhood. Confused is a word I've often heard people use to describe me, I like to believe that it's more like broad visioned or something. In every situation I have seven different perspectives and methods to tackle the problem and all right in its own terms, what exactly would you expect me to do then?

I am working in this college since nine and a half years. I love this college and the garden is very beautiful. "For how many years more do you wish to work here?". I will work here till my hands and legs are fine and till there is strength in me. I thank God for whatever he has given me. My son has completed his engineering but he does not have a job. Shouting at him and scolding him is of no use. I will always support him in every possible way. If not today, but someday I believe he will find his way and make me proud.





It has been a month that I started working here. The company keeps shifting me from one place to another. At first I had my duty outside Sunil Shetty's bungalow. Then I started working at D.Y Patil stadium and now I am here, at VESIT.

Early in the morning, the children were rushing into the college as fast as they could with books in their hands. They had their semester examinations. I shouted "ID peh-no!". Half of them ran away. I caught hold of a student and told him to show his ID card. The student said frustrated, "Uncle itna subhe VESIT me kaun exam dene ayega?. I am from VESIT only!". I wondered whether to laugh or to be mad at him. I giggled and let him go. Students get mad at me. I understand their problem but I am just doing my duty.



If only Modi had read Hayek

UTSAV DAS

As the debate rages on whether demonetization will benefit us all, in the long or short run, good intentions or bad, well thought out or not, our junior editor Utsav Das from S.E. INFT provides an opinion.

On the evening of November 8th, most of the urban Indian elite were languishing in front of their TV screens, lamenting about how it would affect the economy (the Indian one, you know, because we really do care!) if Donald Trump were to win. They were really biding their time as all the seemingly authoritative news outlets were already printing 'Madame President' front pages.

But our venerable prime minister had a trump card of his own that evening. Determined not to be outshone by his future American counterpart, he launched an 'unprecedented' initiative to demonetize 500 and 1000 rupee notes. The introductory speech by our leader on that evening was that this measure would wipe out black money and fake currency notes. The rhetoric eventually changed that the 'surgical strike' was to fast-track India's growth towards a cashless economy. 98% of consumer transactions happen in cash in the country, by the way.

So 1000 rupee notes worth over 6.85 billion and 500 rupee notes over 17.16 billion were mere paper now. Now this is where India proves it is really India. As pointed out by finance expert Vivek Kaul, author of the Easy Money trilogy, the Finance Ministry had hoped that people holding large sums of black money would destroy them instead of depositing them into their accounts as that would generate a paper trail for the Income Tax greyhounds to chase. So they hoped that untaxed money to the extent of 3000 billion rupees would be destroyed. This is why there is such widespread support for the initiative till this day especially by those who haven't stood in queues for anything longer than 5 minutes.

However, by November 27th itself, 53% of the demonetized currency had already been deposited in banks, and latest reports by independent sources suggest that more than 11 lakh crore had already made it back into bank accounts, three weeks before the December 31st deadline.

This huge amount forcing itself into the banks lowers interest rates and ensures that less black money is destroyed and the initiative looks all the more ill-thought out.

What exactly happened, then? The government became a victim of what the economist Friedrich Hayek has called the knowledge problem. As he wrote in a seminal article called The Use of Knowledge in Society, "The economic problem of society... is a problem of the utilisation of knowledge which is not given to anyone in its totality."

This basically means that whenever the government makes a big decision like demonetisation, it thinks that it has all the knowledge required. But it never does. As Matt Ridely writes in The Evolution of Everything: "The knowledge required to organise human society is bafflingly voluminous. It cannot be held in a single human head".

This is precisely where the government got caught out. It didn't realise that the people will figure out various ways of turning their black money into white. This is the knowledge that Hayek talked about. Smaller merchants simply handed over their black money to their employees and asked them to deposit it, into their bank accounts. The merchants will adjust this against the salaries of their employees in the months to come.

Bank managers being dismissed show that the ones holding large sums of black money have converted it to white.

Still others have been encouraged by former tax officials as well as chartered accounts to deposit their black money into their bank accounts, show it as the income for the current year, and pay tax on it. If the Income Tax department has a problem with it, they can litigate. And we all know the speed at which our judicial system works. Now, only if Mr Modi had read Hayek. It would have saved all of us from so much trouble.

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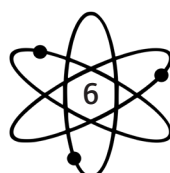
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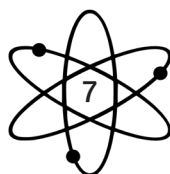


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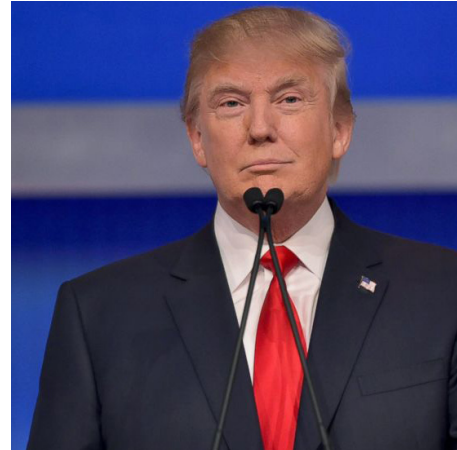
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Hillary VS Trump

SACHEE NENE - D12B



With the presidential polls scheduled to shake up the trees of politics, minorities and trade, Sache Nene from T.E CMPN, the first prize winner of our article writing competition highlights how the nominees will impact the tech world should they win.

Hillary Clinton and Donald Trump have been on opposing sides since the U.S. presidential race began. Their clashing views and agenda are evident in their debates, and the two politicians' technology and innovation initiatives are not an exception.

In her newly released agenda, Clinton appears to be leaning in favour of Silicon Valley, which is expected given the Democratic presidential frontrunner's ties with the industry and its power players. Trump, meanwhile, has gone out of his way to offend the tech sector.

Today it's hard to imagine running a political campaign without an online presence. Online AMAs are more common, national conventions are live streamed on various mediums. Many are even calling this the first "Snapchat election."

Trump has 10.1 million followers on Facebook and 10.6 million on Twitter. Clinton has 5 million on Facebook and just 8 million on Twitter. According to the media analysts, the sentiment of mentions for both candidates is largely positive and thus their tech policy plays an important role.

Tech policy is expected to focus on:

1. Education and building human talent pipeline for the 21st Century
2. Investing in the world class digital infrastructure
3. Net Neutrality
4. Immigration
5. Access to personal information
6. Patent reform

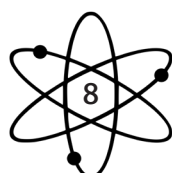
Hillary Clinton's Agenda for Tech Policy

The former secretary of state's agenda titled "Initiative on Technology & Innovation" promotes more investment and diversity in computer science and STEM education. The U.S. has this policy where the country offers advanced STEM education to highly skilled people from other countries.

After they get their degrees, the American government makes them leave. Clinton wants to change that by providing them with green cards so they can practice their professions in the U.S.

Clinton plans to improve the country's broadband access through her infrastructure program worth \$275 billion. She wants high-speed internet in every American household, free Wi-Fi for the public and improved 5G mobile technology.

Clinton also supports net neutrality and the Federal Com-



munications Commission's bid to impose an open internet system.

Net neutrality allows every website and content on the internet to run at the same speed, which means start-ups can compete with big corporations.

While far more in favour of immigration than her Republican rival, there's very little to suggest that Clinton will be giving the technology industry free reign to bring in workers from overseas. She wouldn't pander to their desire for more high-skilled visas for foreign workers. However, there's been no talk of walls, banning people of certain religions, or pausing the issuance of Green cards, especially to foreign students.

Other parts of the Clinton initiative are the promotion of cyber-security both in the U.S. and abroad. Clinton also pushes for a more competent copyright policy and a national commission on digital security and encryption.

Clinton also focuses on improving the Obama Administration's patent system and reward the innovators.

Donald Trump's Agenda for Tech Policy

Trump, meanwhile, has no love for the tech sector and is often criticizing the group. Unlike Clinton, Trump doesn't care about improving STEM education and is planning to eradicate Common Core standards. The Republican nominee also wants foreign employees to only get entry-level

IT jobs with the lowest possible income, and to obligate U.S. companies to only hire American employees.

Trump speaks about closing up the Internet to curb radical extremism. He has been largely silent on the topic of broadband access.

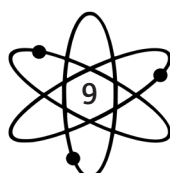
Trump is against net neutrality by saying it would be used as a tool for censorship. His perception is that net neutrality is the Fairness Doctrine and will target conservative media.

Trump talks about creating more high-paying tech jobs for Americans, mostly by cracking down on corporate abuses of the H-1B visa program by allowing entry-level IT jobs to go to foreign workers receiving the lowest possible wage. He calls for raising the prevailing wages paid to such H-1B visa holders to force U.S. companies to hire American workers instead of flying in cheaper workers from overseas.

During Apple's encryption hubbub with the FBI, Trump called for a boycott of Apple products until the tech giant cooperated with the Justice department's demand that it help unlock the iPhone of one of the San Bernardino shooters.

Trump has said nothing on the patent reforms. It's not addressed on his campaign website either.

In a few months from now, we will see which "tech policy" think tank comes to the power....





Lifi : The Lightning Future of Wireless Communication

SHAUNAK BARADKAR

In a world where the faster downloads get, the slower it seems, our junior editor Shaunak Baradkar from S.E. INFT provides us a glimpse of what could very well be the future of data transfer.

Internet has become a fundamental aspect in our daily lives and has most astonishing effect on us. Most of us have wifi at our home to provide enormous amount of data at definite amount of speed. German physicist Harald Haas during a TED Talk outlined the idea of using lightbulbs as wireless routers. A year after his TED Talk, though, Haas, a professor of mobile communications at the University of Edinburgh, created pureLiFi with a group of people who had been researching the technology since 2008.

Principle of working:

When a constant current is applied to an LED lightbulb, a constant stream of photons are emitted from the bulb which is observed as visible light. If the current is varied slowly, the output intensity of the light dims up and down. Because LED bulbs are semiconductor devices, the current, and hence the optical output, can be modulated at extremely high speeds which can be detected by a photodetector device and converted back to electrical current. The intensity modulation is imperceptible to the human eye, and thus communication is just as seamless as RF (radio frequency technology). Using this technique, high-speed information can be transmitted from an LED lightbulb.

Li-Fi is much faster than most standard Wi-Fi connections, and, perhaps most importantly, provides a connection

that is significantly more secure. Because Li-Fi relies on light to transmit data, you have to be in the room with your device and the Li-Fi router in order to get connected. That would preclude strangers or literal outsiders from piggy-backing on your connection or eavesdropping on your online activity.

Beyond the widespread Internet access that Li-Fi could help provide around the world, the technology also has applications for reliable systems like smart city networks and Internet of Things connectivity in the smart homes of the future. Li-Fi technology is being developed into a ubiquitous systems technology, consisting of application specific combinations of light transmitters, light receivers including solar cells, efficient computational algorithms and networking capabilities that can be deployed in a wide range of communication scenarios and in a variety of device platforms.

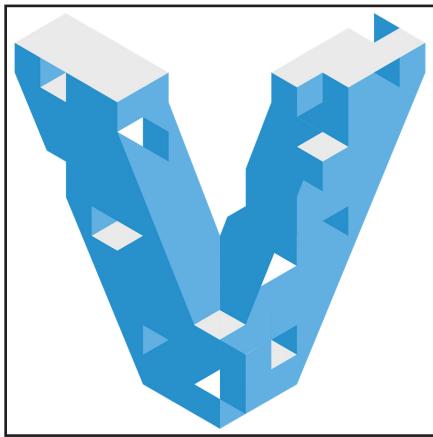
The Internet of Things (IoT) is a revolution that has a lot of experts asking, where will we find the capacity to handle all that data? Li-Fi has proven itself as a viable, efficient and secure solution. A home, office or factory could run its own high capacity network over Li-Fi without adversely affecting public capacity.

Li-Fi can be used to syphon off heavy traffic from cellular and Wi-Fi networks. For example, Li-Fi can be made available in densely populated areas like a shopping mall or sports stadium, allowing users to consume content rich media like videos or live streaming. As the users will be on the Li-Fi network, this will free up cellular and Wi-Fi network capacity in that area. This is because the uplinks require little capacity, it is the downlinks that strain the networks.



Vagrant : A great companion for web developers

ARVIND NARAYANAN



tool to create and configure lightweight, reproducible, and portable development environments. It means that you just have to specify the dependencies and features in a config file and vagrant downloads and sets them up for you. Vagrant uses virtual machines to set up your development environment. It however takes a slightly different approach. While traditional VMs use GUIs for the guest OS, Vagrant powered VMs don't use the same. They remove the unnecessary contents that consume maximum CPU cycles and RAM to boot and function quickly. Setting up vagrant is much similar to npm or composer where we specify the dependencies in package.json or composer.json

So, if you're new to web development or you generally install dependencies on your host machine, try out vagrant for once. It might seem overwhelming at start, but once you get a hang of it, you and your team will consider it as a boon.

In a world where outsourcing is ubiquitous and collaboration is imperative in order to get the best and brightest from around the world in order to contribute in a diverse manner, Vagrant offers a 21st century solution. Arvind Narayanan , our web editor from S.E. INFT, clarifies the situation for us.

Imagine you're developing a php web application with a team of 10 people. Ideally, you'd expect all the 10 people on your team to have the same development environment like you do. But, that's rarely the case. Getting the development environment identically setup would be a mammoth task. Forget development environment, even the operating systems might not be identical. So, one would say, why not use xampp or wamp. Well, that's partially true, but what if you want to switch over from apache to nginx? Or, if you're building a social network, you'd prefer graph databases over mysql. So you're pretty much stuck with the development environment provided by these distributions

So, one of the solutions is to use vagrant. Vagrant is a

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