VIDYAVARDHINI'S COLLEGE OF ENGINEERING & TECHNOLOGY
AFFILIATED TO MUMBAI UNIVERSITY

ETA NEWS BULLETIN

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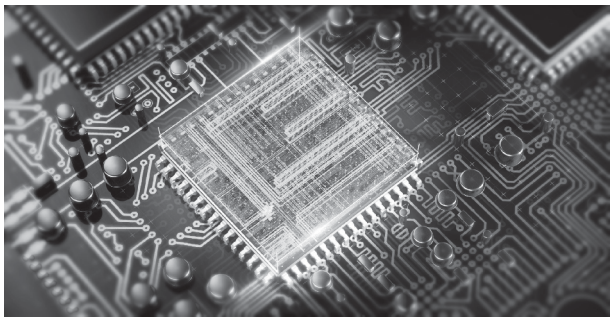
QUANTUM COMPUTING

Far off, from when we started learning computer science and technology, we have learnt about logical devices and their truth tables. Tables which contains zeros and ones related to And / Or, or switching On/Off. This all has been so conventional that any new development in this field has been so vital and significant. But to everyone's awe, now what if these is 0's and 1's are congenially be co-existing into a superposition state and driving in a drastic and dramatical change into these upcoming years into the industry. Yes, you got it right! This brainstorming experience is served by the title "Quantum Computing".Now let's peep into this exuberant topic.

What is Quantum Computing?



The chief executive officer of Microsoft corporation, Satya Nadella states that Quantum Computing is one of the three emerging technologies that will drastically reshape the world, along with artificial intelligence and augmented reality. Well, it is thoughtful to describe about the potential importance of Quantum Computing, because it barely exists now than to say what it is. Understanding quantum mechanics, whose principles underpin quantum computing, involves a lot of mental mountain climbing.

What's their appeal?

Today's fastest computers are as mere as Abacus in front of Quantum Computers. Tasks that seem far away and out of reach are creating more efficient chemical catalysts, optimizing the risk and return of financial portfolios, creating less data-hungry machine learning models, improving supply chains and helping discover new drugs. Artificial Intelligence can be made more powerful, bets Google.

What can quantum computers do that normal ones can't?

A quantum computer is any device used for computation that makes direct use of distinctive quantum mechanical phenomena such as superposition and entanglement to perform operations on data. These unique features make them really well suited to solving particular mathematical problems like finding very large prime numbers. The power of quantum computers like Integer factorization is believed to be computationally infeasible with an ordinary computer for large integers that are the product of only a few prime numbers (e.g., products of two 300-digit primes). If large-scale quantum computers can be built, they can do wonders! Infact, they will be able to solve certain problems exponentially faster than any of our current classical computers. Researchers

P.T.O.

are also excited about the prospect of using quantum computers to model complicated chemical reactions, a task that conventional supercomputers aren't very good at .

Quantum computers will be a safe way to keep our online information secure. In particular, most of the popular public key ciphers are based on the difficulty of factoring integers including forms of RSA. Quantum Computing protects and secures Web pages, encrypted email, and many other types of data. Breaking these would have significant ramifications for electronic privacy and security. Because of these risks, researchers are already trying to develop technology that is resistant to quantum hacking and on the flipside of that, it's possible that quantum-based cryptographic systems would be much more secure than their conventional analogues. Many national government and military funding agencies are involving into Quantum Computing for the development of the nation!

How far away are quantum computers?

Google seemed quite ambitious up till now. In a Nature article published in March 2017, the search giant set out ambitious plans to commercialise quantum technology in the next five years. Shortly after that, Google said it intended to achieve something it's calling 'quantum supremacy' with a 49-qubit computer by the end of 2017. IBM has gone further than Google in making quantum computers commercially available. Since 2016, it has offered researchers the chance to run experiments on a five-qubit quantum computer via the cloud and at the end of 2017 started making its 20-qubit system available online too.

How are different projects trying to make Quantum Computers?

Few projects use tiny loops of superconducting wire, some others are using semiconductors while some like IBM, D-Wave and Alphabet Inc.'s Google use a combination of both semiconducting and superconducting materials. Some scientists have created qubits from the spin of electrons, trapped ions or pulses of photons. Microsoft is trying to twist elusive subatomic particles called Majorana fermions ,a braided shape that would keep qubits in a quantum state longer. Temperatures 180 times colder than those found in deep space, are the favourable temperatures choose by the qubits.

Ref: https://www.wired.co.uk/article/quantum-computing-explained

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ETA congratulates the following students for achieving great heights in their classes in the university exam held in year 2017-18.

BE (2017-2018)

TOPPERS NAME	CGPI	RANK
Baurai Anurag	9.06	1st
Mhatre Mayuri	8.89	2nd
Shetty Nishita	8.89	3rd

TE (2017-2018)

TOPPERS NAME	AVG	RANK
Negi Pratik	9.87	1st
Patelia Vrutika	9.69	2nd
Akre Sanchit	9.635	3rd

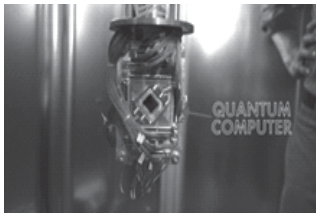
SE (2017-2018)

TOPPERS NAME	AVG	RANK
Garg Garvit	9.805	1st
Dubey Alok	9.64	2nd
Dodiya Mital	9.605	3rd

CONGRATULATIONS !!!

APPLICATIONS OF QUANTUM COMPUTING

ARTIFICIAL INTELLIGENCE



Quantum computers will help, artificial intelligence expand to more industries and help technology become much more intuitive very quickly.

CRYPTOGRAPHY

Quantum computing in cryptography provides a safe conduit to send data through. With certain implementations, keys used to encrypt data will instantly stop working if anyone attempts to uncover them, leading to inherent security.

FINANCIAL MODELLING

D-wave, a company deployed its first commercial quantum computer. This system could be used for complex financial modeling and risk management within the financial industry as well. It could be used to find "new ways to model financial data" and isolate "key global risk factors," according to IBM.

WEATHER FORECASTING

Quantum computers will help us build better climate models, as it analyze data all at once. The sooner we know how things are expected to shift, the better we will be able to prepare and respond to climate change and its impact.

MEDICINE & MATERIALS

Quantum computers can review multiple molecules, proteins and chemicals simultaneously, they make it possible for the chemists to determine viable drug options quicker. Quantum computing would allow a persons genes to be sequenced and analyzed much more rapidly.

MACHINE LEARNING

There is an intersecting area where quantum computers implement machine learning algorithms and traditional machine learning methods are employed to assess the quantum computers. This area of research is developing at such blazing speed that it has spawned an entire new field called Quantum Machine Learning.

Ref: https://www.sciencedaily.com/terms/quantum_computer.html

DID YOU KNOW?

- You might remember IBM's Deep Blue was the first computer to defeat a world chess champion, Garry Kasparov in 1997. The computer did so by examining 200 million possible moves per seconds. Far from human brain ability! But, if it was a quantum machine, it would have calculated 1 trillion moves per second, 4 trillion moves in 2 seconds, and 9 trillion moves in 3 seconds.

- To measure the distance between two large vectors of 1 Zettabyte size, a conventional computer with a GHz clock rate will take hundreds of thousands of years. Whereas, a GHz clock rate quantum computer (if build in the future) will take only about a second after vectors are entangled with the ancillary qubit.

Mr. Hari Narayan.

Vellore Institute of Technology,
Masters Degree, Automotive Electronics, 2016.
Mumbai University,
B.E., Electronics and Telecommunication, 2013.

Senior Engineer,
Robert Bosch Engineering LTD.,
Jul 2018 - Present.

Sr. Software Test Engineer,
Valeo,
Apr 2018 - Jun 2018.

1.What are the essential skills required to be a testing engineer?

We need to have knowledge about the product life cycle. In automotive industry we use protocols like CAN, LIN, ETHERNET, FLEXRAY. Knowing these things are highly helpful. Also, PYTHON is recommended.

2. Sir, what was your Final Year Project based upon and how did it helped you in your Career?

My final year project was "A MATLAB based tool for Microwave amplifier Analysis". Our tool mainly helped the faculties to show the smith chart as a GUI and help in analyzing the problems of Amplifier impedance matching. We even presented it in the IEEE International conference in 2013 held in Kerala

3. What are the career options for an engineer in the field of testing?

There are different forms of testing in the industry from unit testing, module testing, acceptance testing, system testing, Hardware in Loop testing. Depending on ones comfort he can progress from one to the other.

4. What guarantees a smooth career in corporate world?

Corporate career can be smooth if you start liking the job, be more proactive and show eagerness in learning new things in the initial phase of your career. Try to find an approach that saves your work time. Before beginning the work, a small analysis will be always helpful.

5. Sir, what are your responsibilities as a senior testing engineer and how do you meet them ?

I mainly work for DAIMLER which has its upcoming concept called Driver Assistance System. Bosch is into developing the Basic lower layer controller for the same. My job is to perform SIL based tests and see how the software quality is.

Mr. Tejas Mohite.

National institute of Industrial Engineering,
PGD in Industrial Management, MBA in General Management, 2017.
Mumbai University,
B.E., Electronics and Telecommunication, 2011.

Technical Product Manager,
BHGE MENAT,
Aug 2018 - Present.

IT Manager,
General Electric,
Aug 2017 - Jan 2018

1. Let us know something about NITIE and your experience of learning there.

After 3.5 years of working with TCS, I pursued MBA from NITIE (one of the oldest and most premier educational institutes in the country)which offers various MBA ,Mtech equivalent and Fellowship courses. I opted for the 2 year residential Post Graduate Diploma in Industrial Management course.

2.What role has NITIE played in enhancing your managerial / industrial skills ?

At NITIE, we had regular formal and informal interaction sessions with C class executives of startups and Global giants wherein we worked for solving real life problems which offered us an opportunity to showcase our various skills.

3.Which journal or magazine will you recommend for our students to read?

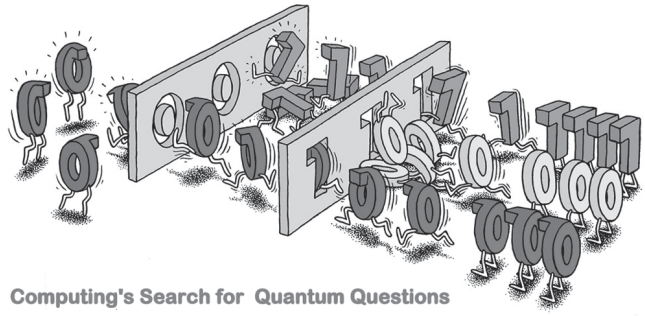
I would regularly read “The Economist”, it provides an unbiased opinion on all the major global issues. Also, I would recommend Coursera, Udemy and Youtube.

4.If you could offer an advice to our students for their growth in corporate life, what would it be?

Never be afraid of anything or anyone, learn to have an opinion and voice it whenever necessary. At no stage of your career would you know “Everything”, learn to learn new things and learn to collaborate with your peers and how to work effectively in a team.

5.What are the things you experienced working as an IT manager at GE ?

In the past 1 and half year, I have worked for 3 different GE businesses in 3 different cities on 3 different set of technologies and teams. Being a quick learner, adapting to changes and delivering outcomes in a short duration of time are key requirements of my job. Along with your technical skills, your soft skill is also equally important.



Computing's Search for Quantum Questions

CONGRATULATIONS !!!

- **Students(Batch 2018-19) placed in INFOSYS : 17**
- **Students(Batch 2018-19) placed in TCS : 5**
- **Amey Prabhakaran (Batch 2018-19) for scoring 105/120 in TOEFL.**