VOLUME 9

DJCSI

PROTOCOL

CSI STUDENT CHAPTER, D.J.S.C.E

FROM THE PRINCIPAL'S DESK

The CSI student chapter committee of the college has always kept a keen eye on the ever changing world of technology and fast changing business practices. I am glad to note that, with this new edition of the magazine, they have kept it up by highlighting the important trends that are currently relevant and applicable in various aspects of technology. Even as technology allows us to take a momentary glimpse into the near future, we can anticipate and imagine our future lives, which are surely to be heavily affected by it. Transport, entertainment and the way we socially interact with one another are radically changing and it's important to keep pace with it. With this 9th edition of Protocol, the committee has captured these elements and the advances in these fields perfectly. I hope this magazine proves to be an interesting read for the budding engineers of our college and wish the DJ-CSI committee the very best in all their future endeavours. *-Dr. Hari Vasudevan*

FROM THE BRANCH COUNSELOR'S DESK

Dear students, I am proud to present the 9th volume of Protocol. An engineer is a technical problem solver, who designs, builds, operates and manages systems and services. He can do so only if he is allowed to independently put together all aspects of learning to solve a practical problem. Education is the main instrument a nation has to achieve progress. Unless you can give back to your school or college at least a small part of your life, it is difficult to strengthen such institutions for the sake of future generations. I want to congratulate the team of DJCSI for the efforts they have put in this year. I want to thank our Principal, Dr. Hari Vasudevan, Prof. A. C. Daptardar, Vice Principal (Admin.) for their motivation and constant support. I also thank the faculty members of IT department.

-Dr. Abhijit Joshi

FROM THE EDITOR'S DESK

Understanding the future of technology and being aware of the social relevance of a neutral net are amongst the highest principles carried in this magazine. With this edition, we aim to highlight these principles amongst many more advances that the past year in technology has brought about.

FROM THE COMPUTER SOCIETY OF INDIA COMMITTEE

My tenure as the chairperson of DJCSI was eventful. Through all the ups and downs, I am grateful for every opportunity I was presented with. I learned many lessons that I will carry with me. Working with the talented, ambitious members of this team made every step of the way easier. I wish all the success for the future of CSI.

-Soham Mehta, Chairperson DJCSI

ACKNOWLEDGEMENTS

CSI Editorial Committee wishes to thank Dr. Abhijit Joshi and Prof. Mrs. Neepa Shah for all the help and constant support we receive from them. We are extremely grateful to them and the entire DJSCE faculty for their presence throughout.

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DJCSI Family

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Engineer's Enigma

Completing the second year in college is tantamount to being pronounced as a Half-Engineer. However, it does not even stand close to saying that the job is half done. The most vital year with its paramount importance stands right ahead. What makes it prodigious is not only the foundation nature of its studies but also everything around it. It is a year in which you decide the path which will take you to the pinnacle of your success. People decisively boil down to just three paths namely: Placements, MBA or Masters. They condone the fact that there is a plethora of options and fields waiting for them.

So as the significance of the year is clearly visible, it is important to know how to approach it. Simply studying will not suffice the need of the time. What makes the year so compelling is the number of opportunities a person is exposed to, including doing an internship, being an ambassador, being a part of a committee-be it a student chapter, cultural committee, technical committee, fest organizing committee or even student council.

The main question is should you take up any of these discretionary responsibilities instead of preparing for the year? The answer would be a definitive "Yes". Your grades only prepare you to reach an interview, but what happens next is dependent on everything apart from it. When you take up a responsibility, whatever it may be, it will make for the toughest test of your life. You are prepared to handle any job as you have already faced the tougher task of working and studying together.

More than the exposure, these extra-curricular activities provide you with a sense of identifying opportunities. Your life is completely dependent on how well you grab the opportunity that knocked on your door. And once you know how to identify them it has a domino effect, taking you to your desired path. Do not be shy while taking a decision regarding your career path. And predominantly, do not restrict your scope within some fields as a world full of opportunities are awaiting you.

So come what may, do not take this year lightly. It only creates a path for your success and shapes your future! Learn new skills, take up challenges, participate in competitions, take up responsibilities, have some fun and most importantly -

"Love what you do and do what you love".

SOHAM MEHTA
TE IT

Net Neutrality

Unless you've been living under a rock, you must have at least vaguely heard about Net Neutrality and Free Basics (Internet.org) through some or the other social media platform. Net neutrality, in essence, aims to removes any sort of discrimination on the web. Every website gets an equal opportunity to do business and no particular company or website has an upper hand in this.

It all started in 2014, when Bharti Airtel planned to charge customers on the basis of their usage of OTT (WhatsApp, WeChat etc) and VoIP (Skype, Viber etc) services. This move of theirs was met with a severe backlash from a vast majority of internet users in India.The only defense that they mustered to come up with was that big internet giants such as Facebook and Google make large profits based on small investments, whereas it is the ISPs (Internet Service Providers) that have to pay for maintaining the network infrastructure.
This incident made Telecom and Regulatory Authority of India to look into enacting laws regarding net neutrality.

In February 2015, a new player entered into the Net Neutrality debate- Facebook. Facebook launched Internet.org, a platform which allowed free access to 38 websites through an app. Users could only access specific websites through Internet.org, essentially violating the basic principles of Net Neutrality. Conscious netizens of India raised their voices against what they perceived was ruining the democratic nature of the Internet.

In March 2015, TRAI released a paper to the public for feedback on Net Neutrality and over the top services. The famous Indian comedy group AIB made a grand entry at this point, and started educating and rallying the youth on the issue of Net Neutrality.

To understand why the movement against Net Neutrality started at all, we see the issue through the perspective of telecom companies. The biggest selling point is the zero-rating services. Such services provide data for frequently visited applications or websites (e.g. Wikipedia Zero, Google Free Zone), as opposed to regular charges as the consumer uses data. This provision of data is often sponsored by the service in an effort to bring more users to it as well as the internet.

In February 2016, however, TRAI ruled in the favour of Net Neutrality by prohibiting telecom companies from charging varying rates on the basis of type of data usage. Net Neutrality clearly emerged as the winner in India as it did in Brazil, Chile and Netherlands. While the Telecom companies and Facebook have heavily invested in this venture, this debate would surely take more than one ruling to die out.

NAJEEB QAZI , SALONI MEHTA
TE COMPUTERS , TE IT

Quantum Computing

At some point or the other in our lives we have come across the word quantum. Quantum physics, quantum mechanics and maybe even quantum of solace. However, associate the word quantum with computing and a whole new world unleashes through. Yes, quantum computing, a seemingly unheard of term, yet a powerful invention which could forever change the face of computers. A new technology which is being heavily invested in by the US, the military and other countries. All done in an effort to develop quantum computers for civilian uses, business, trade and national security purposes.

So, one may ask, what is so special about all this.

Well, scientists were looking closely at life on an atomic or sub-atomic level. They started noticing some inconsistencies with traditional physics. Particles seem to behave predictably on a large scale but on a nanoscale, in layman's terms, it was particles gone wild.

Down there, particles-little balls of solid matter-act like waves. Hence they can exhibit some really cool properties. For example, they can teleport from one place to another just like harry potter or the spy kids. They can also become "entangled", making it impossible to separate them. Something that happens quite often with our headphones too! In a quantum state, particles can even achieve something called superposition, where they exist in multiple states simultaneously. In contrast classical computer's prowess is limited. There are some problems so difficult that even if all the computers in the world worked on the problem in unison it would still take them a very long time to solve it.

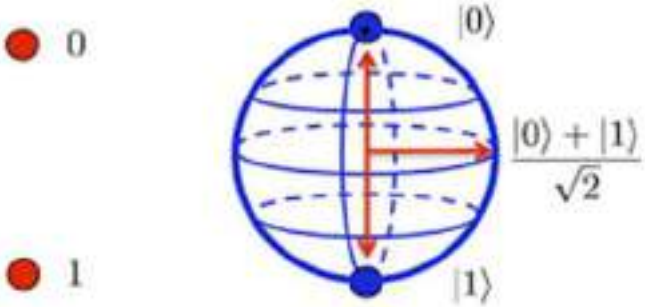
Now, this is where things get really interesting, the scene where the hero of our story – quantum computer enters. Quantum computers do not work with the classical 1 or 0, they instead run on quantum bits, or qubits. Because of the mind- bending properties of a quantum state, like superposition, a qubit can exist as a 1 and a 0 at the same time. And this is what gives a quantum computer its superior computing power. Let me explain further. If one qubit as a combination of (1 +0), can do two calculations, then two qubits can do four, four can do sixteen and thus in this way computing power has grown exponentially!

In general, a quantum computer with qubits, can be, in an arbitrary superposition of up to different states ,

simultaneously. In comparison to this, a normal computer can only be in one of these states at a time.

Now, if a quantum computer were to have 300 qubits then the amount of information it could hold would be 2^300, which is even greater than the number of particles in the universe! Such is the potential of quantum computing. Measuring a qubit changes the composition of it, so measurement is sometimes also considered to be a quantum gate. A gate as we know takes in a different input and gives a different output. So measuring a qubit has implicitly created a quantum gate. If originally, in the state of superposition, a qubit contained more of 1 then chances of measuring a 1 are more. This mind bender is called qubit manipulation.

There are various kinds of quantum gates. Like the measurement gates or the SWAP gate. The SWAP gate takes two qubits and swaps them. The Pauli-X gate is a lot like the classical NOT gate. It takes a qubit as input and flips it in the complete opposite direction. There are also some control gates too.



CLASSICAL BIT QUBIT

Essentially, quantum gates make up a quantum computer. A quantum computer operates with a fixed sequence of quantum logic gates. The sequence of gates to be applied is called a quantum algorithm. In other words, algorithms and gates exists at the quantum level too!

In a nutshell, a quantum computer works by manipulating an input of superposition's, rotating probabilities and producing another superposition at its output. The best part is one gets the entire lot of calculations that are possible, all done at the same time. Moreover, with long strings of qubits performing computations, problems that would take today's computers eons to solve could be tackled in the time it takes to grab a cup of coffee! So kudos to quantum computing. This concept, hence has many takers and finds its applications in fields such as machine learning, medicine, chemistry, cryptography, materials science and engineering. It could allow humans to understand and control the very building blocks of the universe.

All that being said, there is still a long way to go for quantum computers. This field is still young. Quantum computers are difficult to control and manufacture on a large scale, but progress is being made. One can never undermine the power of technology. When the classical computer was invented, it took up the whole room. But as of today some are as thin as paper. No-one ever thought that computers would become such an integral part of our lives. Hence prepare for the future! Who knows, quantum computers might make its way into our lives, sooner than we think.

SHWETA SUNDER KRISHNAN
SE COMPUTERS

Open Sourced AI

Artificial Intelligence (abbreviated as AI) is the name of the academic field which studies how to create computers and computer software that are capable of intelligent behavior. The field was founded on the claim that human intelligence can be so precisely described that a machine can be made to simulate it.

Open Source Artificial Intelligence, as the name suggests, refers to the fact that its source code has been made available with a license in which the copyright holder provides the rights to study, change and distribute the software to anyone and for any purpose. In the last few months, many companies have developed AI that is now being made available to the public as open source. The most notable open source AI amongst these are as follows:

Google's TensorFlow – In November last year, Alphabet Inc.'s Google division open sourced TensorFlow, an AI toolkit, under the Apache 2.0 open source license. As given on its official website, www.tensorflow.org, *"TensorFlow is an open source software library for numerical computation using data flow graphs...the flexible architecture allows you to deploy computation to one or more CPUs or GPUs in a desktop, server, or mobile device with a single API."* It was expected that Google would sell access to its deep learning engine. Instead, they open sourced that engine, sharing the underlying code with the world at large! For free!

Microsoft's DMTK – Shortly after Google released Tensor Flow, Microsoft researchers at the Microsoft Asia research lab made the Microsoft *Distributed Machine Learning Toolkit* available on GitHub under an MIT license.This toolkit includes three key components – the DMTK Framework, LightLDA (an extremely fast and scalable topic model algorithm) and Distributed (Multisense) Word Embedding.Any success that the DMTK is going to have will come from how good it is at computing big models fast and this is something that cannot be predicted.

IBM's SystemML – Recently, IBM announced that its proprietary artificial intelligence program known as SystemML will soon be freely available to share and modify through the Apache Software Foundation.IBM decided to open SystemML's source code to attract a wider community of programmers and accelerate its development. SystemML language, Declarative Machine Learning (DML), comprises of linear algebra primitives, statistical functions, and ML-specific constructs that make it easier to express ML algorithms.

Facebook's Big Sur – On December 10, 2015, Facebook open-sourced its AI hardware design called 'Big Sur' to the Open Compute Project. Big Sur is an Open Rack-compatible GPU-accelerated hardware designed for AI computing at a large scale. It incorporates eight high-performance GPUs of up to 300 watts each, with the flexibility to configure between multiple PCI-e topologies. Big Sur is twice as fast as its previous generation.

OpenAI – Founded on December 11, 2015, OpenAI is a non-profit artificial intelligence research company, associated with Tesla Motors' CEO Elon Musk and Y Combinator's Sam Altman, which aims to carefully promote and develop open-source friendly AI in such a way that is beneficial rather than harmful, to the human race as a whole. The main agenda of this ambitious project is to develop something new, do it well, then let others build on the design.

While private conglomerates have business secrets to protect, the open-source model will allow researchers to join forces with those outside of the company, as they have nothing to hide. OpenAI will also allow development from those who are not associated with the company, giving the team a rare opportunity to learn from unthought-of uses of their own technology.

Baidu's Warp-CTC – On January 14, 2016, China's leading Internet search company, Baidu, released key artificial intelligence (AI) software under an open-source Apache license. Baidu's code, called Warp-CTC, is basically an improved application of a deep-learning algorithm developed previously that's been designed to run very quickly and efficiently on the latest computer chips. Baidu's code was recently used to build an extraordinary speech-recognition system called *Deep Speech 2* which is better than most humans at identifying speech correctly! The WARP-CTC C library and optional Torch bindings are now available on GitHub, by way of Baidu Research's Silicon Valley AI Lab (SVAIL).

AI systems today have remarkable but narrow capabilities. It seems that we'll keep attempting to overcome various constraints associated with AI, and in the extreme case we'll be able to develop AI systems that will reach human performance on virtually every intellectual task. With AI systems being open sourced, it's hard to comprehend how much human-level AI could benefit society, and it's equally hard to imagine how much it could damage society if built or used erroneously.

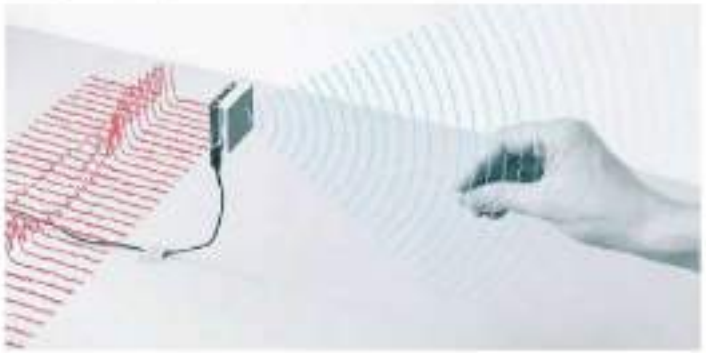
RHEA SANGHVI
SE IT

Project Soli

Human-device interaction has evolved in a big way from touch to 3D touch tech and also the advancement in the field of gesture control has been taken to the next level. Forget swiping screens and hitting the wrong keys with your thumbs; in a world which is driven by virtual reality and the 3D touch technology all the tech experts are working on a new concept of **"Radar to Gestures"**. Google has an upcoming project which has developed a gesture technology so precise, it works on even the smallest of displays.

Google has named the project- **"Project Soli"**, the system identifies subtle finger movements using radar built into tiny microchips. This project uses invisible radio waves emanating from a microchip to recognize movement, velocity and distance. It works using 60 Ghz radar spectrum at up to 10,000 frames per second. These movements are then translated into commands that mimic touches on a screen.

The biggest advantages of this are the following : the portability and the integrated chip that can be embedded into any wearable, giving the user the best possible gesture experience in thin air. At the basic level, motion controllers are premised on the idea to change the user's traditional touch approach to control devices to touch free control using the human senses, making devices highly user interactive. The radar technology that it uses captures micro motion. It may seem like fiction but capturing the finest possibilities of hand movement has become a reality using a single chip.



It works on a simple principle of capturing wave frequency on the panel which is then transferred to computer circuit, which in turn detects the change in wave movements. The use of radar technology has been taken to the next step, hoping to make the world touch free and more gesture controlled.

HARSH DOSHI
SE IT

Our Partner

Shapoorji Pallonji

HCI And UX

It has probably been said a million times but there can be no denying the fact that computers and smartphones have changed our world forever. From database management to navigation to sharing moments of our daily life to the way in which people are connected, the interaction between humans and computers is ever growing. Maybe our generation of aspiring engineers can best identify this impact that the smartphone technology has had on the entire concept through Human Computer Interaction.

Meaning of HCI:

Human-computer Interaction (HCI) is concerned with the study, design, construction and implementation of human-centric interactive computer systems. A user interface, such as a Graphical User Interface, is how a human interacts with a computer, and HCI goes beyond designing screens and menus that are easier to use.It includes the way people interact with computers having input devices to store, retrieve, search and process information.

Origin of HCI:

The arrival of personal computing made everyone in the world a potential computer user, and vividly highlighted the deficiencies of computers with respect to usability for those who wanted to use computers as tools.

At just the point when personal computing presented the practical need for HCI, science presented people, concepts, skills, and a vision for addressing such needs.

Beyond the desktop:

One of biggest design ideas of the early 1980s was the so-called messy desk metaphor, popularized by the Macintosh.People everywhere were soon double clicking, dragging windows and icons around their displays, and losing track of things on their "desktop" interfaces just as they did on their physical desktops.

As HCI developed, it moved beyond the desktop in 3 distinct senses. First, it's fine to directly represent a couple dozen digital objects as icons, but this approach quickly leads to clutter. HCI professionals and everyone else realized that search is a more fundamental paradigm than browsing.

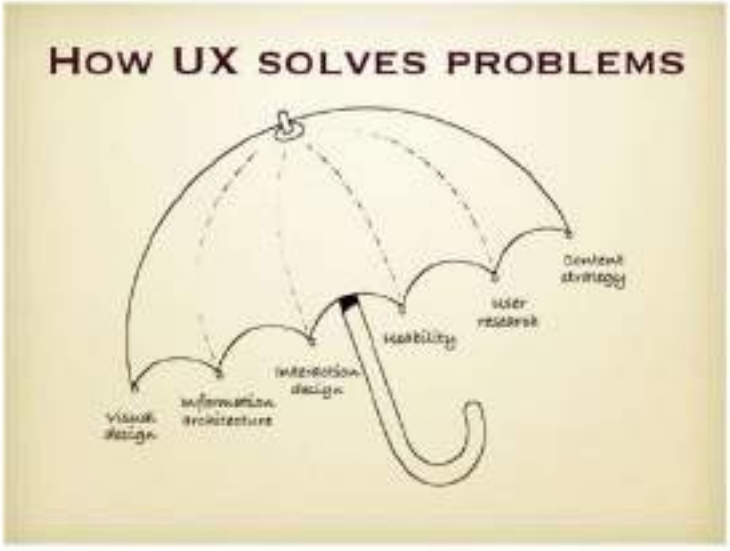
The second sense in which HCI moved beyond the desktop was through the growing influence of the Internet on computing and on society. E-mail made computers and networks into

communication channels; people were not interacting with computers, they were interacting with other people through computers.

The third way that HCI moved beyond the desktop was through the continual, and occasionally explosive diversification in the ecology of computing devices. One frontier today is ubiquitous computing: The incorporation of computing into human habitats — cars, home appliances, furniture, clothing, and so forth.

USER EXPERIENCE:

The features that make an app stand out involve maintaining a better design, understanding the needs of the people and catering to those specific needs with innovative solutions. Bright interactive websites are always preferred to dull, non-interactive websites with poor user interface. Making modifications in the app or website in response to feedback of the people is also important.



An important subset of HCI is value sensitive design. What makes a piece of technology usable? Simplicity, Accessibility, Usefulness.Discovering the app or website should be fun for the user and not a tedious process. For example, ignoring the costs – if the iPod has a more intuitive and simple interface than another MP3 player with a complicated interface, most people will prefer to buy the iPod.

The simple and more accessible technology becomes, the easier it will be to integrate it in our day to day lives.The focus of HCI was and is the concept of usability. This concept was originally articulated in the slogan *"easy to learn, easy to use"*. HCI manages innovation to ensure that human values and human priorities are advanced, and not diminished through new technology. This is what created HCI; this is what led HCI off the desktop; it will continue to lead HCI to new regions of technology-mediated human possibility. This is why usability is an open-ended concept, and can never be reduced to a fixed checklist. The continuing success of the HCI community in moving its meta-project forward has profound implications, highlighting that HCI and research in the field of HCI would continue to grow in coming decades.

"Design creates stories, and stories create memorable experiences, and great experiences have this innate ability to change the way in which we view our world." –Christian Saylor

SAGAR SHRINGARPURE
SE COMPUTERS

Future Of Gaming

"Five minutes mom, just let me finish this level!" is something all our mothers have heard every time they've told us to stop playing. An hour later, we are still glued to our screens enjoying our brief escape from reality. Reading *"Thank you Mario. But our princess is in another castle!"* encouraged us to demolish level after level in our quest to rescue the digital princess. Video games, as we know them, have evolved to a great extent. From Mario and Pac-Man to Grand Theft Auto and Call of Duty, these games have kept us entertained.Though the gaming industry has seen its fair share of technological evolution, the best is yet to come and this is reinforced by the following astounding ideas:

Virtual Reality

Virtual Reality (VR) has started infiltrating the gaming scene where a person can experience being in a three-dimensional environment and interact with that environment during a game. This has been made possible using bio-sensing. It detects a player's presence in a game and provides data to a computer which translates his movements onto a screen thus providing the player with an 'immersive experience'.

The upcoming *Oculus Rift*, a VR Head-Mounted Display (HMD) is rapidly becoming a topic of interest amongst gamers. Its various features include a quick-response (ultra-low latency) head-tracking system, massive field view (107 degrees) and immersive stereoscopic 3D rendering capabilities.

Secondary screens

There has been an urgency to invent a secondary device for gamers. The recently launched *Wii U GamePad* has a built-in touchscreen that acts as an add-on for games. Another similar product is Microsoft's *Xbox SmartGlass* application that acts as a supplementary tool for gamers. Also, Sony has launched *PS Vita* that enables players to switch gaming devices (stop playing on one device and resume on another) using its innovative Cross-Play feature.

Augmented Reality

This concept deals with the interaction of the gamer with his surroundings in real time.Recently, lots of buzz was generated by the news of *Pokémon GO* which is an upcoming augmented reality game for mobile phones developed by *Niantic*, scheduled to be released in 2016. The game will be released alongside the Pokémon Go Plus, a small wearable device

developed by Nintendo, which uses a Bluetooth connection to notify users when a Pokémon is nearby with a LED and a light rumble. The game will allow players to capture, battle, train and trade virtual Pokémon who appear throughout the real world!

Cloud Gaming

With the arrival of more dependable net connections, the gaming industry now has the opportunity to make games freely available and as easy to download. The revolutionary *NVIDIA GRID* cloud gaming technology will enable the gamer to stream video games from the web. When service operators use *NVIDIA GRID* as the foundation for their on-demand *Gaming as a Service* (GaaS) solution, the gamer experiences tremendous advantages over traditional console gaming systems.

Wearable gaming

With the launch of smart watches and glasses, wearable games could soon make gaming more portable. Wearable consoles will become extensions of gaming consoles. Eventually, we may even have a gaming session with wearable UI like *Google Glass* where the gamer doesn't even need to hold up a console and playing a game would almost feel like he is in the gaming realm!

Open- Source Gaming and Development

The future of games is headed in the direction of being Open Source. Independent game developers do not have to purchase a costly Software Development Kit (SDK) to create games and release them to the market. The gaming console itself is to be used as the software development kit, thus making game development easier and inexpensive. Games of the future may no longer be dominated by major game developers.

The gaming industry is heading towards unmapped territory. Virtual Reality is the next big thing and there may be a scenario in the future where the player becomes a part of the game itself, similar to the plot of the movie *"Spy-Kids"*! A gaming revolution is headed our way and all we can do is meet it head on!

RHEA SANGHVI
SE IT

Interview

For the annual interview conducted by the team of Protocol, this year's interviewee is Pratik Tandel. Pratik was a student of D J Sanghvi College of Engineering and has since worked at Facebook, Cue and is currently at Twitter. Here's what he had to say:

How have your four years at D J Sanghvi College of Engineering been influential to your life?

I'm really glad that I was able to find a good mentor (Varun Jalan) thanks to the session Neepa Shah organized. This was probably the most important event in my programming success. I'm also really glad that the principal (Hari Vasudevan) was really supportive of this cause. It helped me and my ACM ICPC team-mates attend and excel at many contests.

What are the skills that companies look for while hiring college graduates?

It really depends on the types of companies you are looking for. Startups and product-oriented companies like Google, Facebook and Twitter value technical strength but also the ability to learn new things. For entry-level, candidates are very much focused on coding strength and, competitive programming definitely gives you an edge.

Do you believe your experience and skill in competitive coding was a factor in your success? Would you recommend it to students?

I'd definitely recommend everybody to try it. I understand that it's not for everybody but if you do like it and are good at it then it will definitely be life-changing.

How was your experience at the ICPC World Finals?

The experience at the world finals Harbin, China was amazing. It was very cold and the ice festival was spectacular. Seeing the best collegiate programmers from all around the world was amazing. The contest itself was really difficult and I wish we did a bit better.

How is the industry different from the perceptions most people have of it?

I think most students would definitely benefit from taking on more practical projects and tasks. You are entirely measured predominantly on ability to ship projects; you can only do this if you are very technically strong, confident about your abilities and play well with others.

How did you grab an internship at Facebook?

The year before I competed in some important programming contests like

ACM-ICPC and applied online to Facebook through their Careers website. I knew it was a bit of a long shot but I finally got an interview call. There were 2 phone screens where I solved a programming problem. I was thrilled when I learned that I managed to bag an internship.

What kind of projects did you work on during your tenure as an intern?

I worked on improving frontend performance for the NewsFeed team. It was a really interesting and impactful project which improved the experience for hundreds of millions of users. I learned a lot about working in a fast-moving company with hundreds of engineers.

Which previous jobs and experiences have guided you to your present position?

After graduating I joined a startup called Cue (previously known as Greplin). Working at a startup was a lot harder and challenging than I anticipated. I learned a lot technically but it was really important from a character building perspective too. After a great year at CueUp, I decided to move to Twitter. Twitter was a lot larger so things were a little different. I benefitted significantly from the resources that Twitter Engineering provides. It was really great from learning about the technical stack at Twitter and the engineering challenges of building something at a scale as large as Twitter.

If you can tell us about your project at Twitter regarding organic Tweet analytics, what was your role in it?

I worked on multiple teams at Twitter starting on the Web component for Twitter Cards (the previews that you see when you share links on Twitter). After that I worked on Tweet Analytics for any user to see how their tweets are reaching people. I also built a very simple but useful tool for advertisers to quickly create ads from tweets. Some of the techniques we applied were very cool. I am since then working been working on products for advertisers - the most recent one was Ads Editor which now manages a really large portion of our revenue.

Any key points you would like to emphasise on while preparing for job interviews?

Preparation for job interviews isn't something you do overnight or in a week. Writing a lot of code is very important when preparing for job interviews and it's a long process. That being said it's never too late to start it; there is a lot of emphasis on academic knowledge in the way Mumbai University structures its syllabus. This often leaves the students disconnected from the practical realities of outside the school.

Apart from academics, what other skills would you advise the students to acquire during their college days, which would help them in their future?

I'd encourage people to definitely gain more hands-on experience. Algorithmic coding is the most approachable and practical alternative. There are definitely other alternatives that you can pursue but I've found that competitive programming was the most objective way to measure yourself. It sets a very strong foundation for future success in the industry (or even if you have purely academic pursuits).

SANYA SHAIKH
SE COMPUTERS

◀ CSI Events ▶

CODESHASTRA 2.0

This was the flagship event of DJCSI and was held on 23rd and 24th Jan within the college premises. There were 130 participants present for the 2-day event. The theme of the event was "Swachh Bharat" and was organized in association with CSI Mumbai. With this Techno-Social event, DJ-CSI aimed to provide a platform for city-wide NGOs to receive aid in the form of mobile applications and websites. At the same time, the students got exposed to the concept of a hackathon and worked in teams to develop useful services. Various NGOs including CRY (Child Rights and You), Amcha Ghar, Trishul NGO, GreenCiti and WSD (The Welfare of Stray Dogs) provided the participants with the technological problems faced by their organization. The teams developing these feasible solutions comprised of students from the IT, Computers and EXTC departments as well as students from other colleges.

CSI WEEK

• To celebrate the membership drive, DJ-CSI conducted a series of consecutive workshops and seminars to educate and inspire students. The first event, conducted on 27th Jan, was a seminar on Big Data and Cloud Computing by industry professionals.

• Following that, a workshop was conducted by founder of Infotech Academy, Ibrahim Rumani, on Wordpress using the WooCommerce platform on 28th Jan.

• On 29th Jan a workshop was conducted by current DJ-CSI members Soham Mehta and Riken Shah on HTML using Bootstrap.

• The concluding event of CSI Week was a 2-day workshop over the weekend of 30th and 31st Jan conducted by DJ-CSI member Paren Desai. It was a workshop on Gaming using Python.

CODE TO CREATE:

Apart from these events, DJ-CSI also collaborated with the college festival Trinity towards the end of the term to conduct Code to Create, which had consecutive workshops on Android as well as Photoshop conducted by DJCSI member Parth Hebra in the duration of the festival.

INDUSTRIAL VISIT

DJCSI organized an industrial visit on 5th Feb. The visit was to the campus of Infosys Limited, Pune. Approximately 90 students and 4 teachers travelled together to Hinjewadi, Pune for the visit. At the campus, the students were introduced to the company and interacted with the employees. One employee, Seema Acharya, conducted a technical session on Analyzing Big Data and a brief talk on Internet of Things. She discussed the topic well and her session was then followed by a quiz in which the students participated. They were also given a tour of the entire campus of the company.

TEDxDJSCELive

For the event on 18th Feb DJ-CSI was able to air exclusive content from the prestigious TED (Technology, Entertainment and Design) Conference in Vancouver, Canada. It was an event in which ideas of technology were discussed by luminaries from various scientific and artistic fields and the committee was able to stream it live in the college premises. Some of the speakers at the event were founder of Linux: Linus Torvalds, the founder of Airbnb: Joe Gebbia, Travis Kalanick-the founder of Uber, the Head of Google's research and development facility, X: Astro Teller, A. R. Rahman and creator of several successful TV shows, Shonda Rhimes. These speakers imparted their wisdom, brought everyone up to speed on some advances in technology and told stories from their lives for the audience to remember.

DJ ASCII

In a new initiative set up by the faculty of the IT and Computers departments of the college, DJCSI collaborated with the DJ ACM committee of the college to conduct DJ ASCII - a state-level project competition. This event, taking place on 2nd April, saw participation from several colleges, including participants from our own college, wherein students presented technical projects built by them, posters created for their projects and had papers published for their chosen topics.

OTHER COLLABORATIONS

Amongst other events, DJCSI has additionally collaborated with the IEEE and ACM committees of the college to present a workshop on Parallel Computing with GPUs. DJCSI is also the proud technical partners for DJ NSS. Lastly, CSI assisted the faculty of the college alongside ACM as a short term training program was conducted for participants from the faculty as well as the students on the topic of Cloud Computing.

Future of Transportation

Ever wondered what the future of transportation would be? Is it possible to have smart self-driving cars?The real question is, can we do away with drivers in general and have safe driverless cars available to everyone? Could these vehicles really be as smart as humans and be programmed to improvise in all terrains?

"When it comes to going from point A to point B,the ultimate selling point is SPEED"

It simply takes less time by an airplane than by train.The increasing number of domestic flight travellers will create a huge problem for the airline industry in future.What if we have high speed Maglev trains connecting major cities across the country, and we can reach in less time than an airplane?In Shanghai, a 19 mile trip to Pudong airport that takes 1 hr by car takes only 7 mins by Maglev.

So the future of transportation doesn't only consist of driverless cars but also of ways to make transport quick.The internal combustion engine has dominated the automotive landscape for over 100 years.It does not have an infinite future in its current guise though,as it remains largely reliant on non-renewable fossil fuels.

THE ELECTRIC CAR :

An electric vehicle is an automobile that is propelled by one or more electric motors, using electrical energy stored in rechargeable batteries or another energy storage device.They are also around 3 times as efficient as cars with an Internal combustion engine.

Automation :

We're also going to see cars become far more automated.It seems that the hurdles to driverless cars are now largely legal rather than technical.

Tesla has earned a lot of attention when it comes to driverless cars, and it may well lead the pack to achieving a fully autonomous vehicle.Tesla's CEO Musk has announced a suite of "autopilot" capabilities that came via software update in 2015 to the company's signature Model S.Musk stated that the new features could in theory allow the car to drive itself from parking lot to parking lot on long drives throughout much of the U.S.,but for now,it will be limited to highway driving due to the legal obstacles in place.

SAGAR SHRINGARPURE
SE COMPUTERS

Women in Tech

More often than not, we've found ourselves immersed in the all pervasive debate about the superiority of one's gender. The topic often shifts to contribution of women to the tech industry. In such a scenario, who should aspiring females look up to? Whose example do you present in an argument with your arrogant male counterpart? The answer -- Grace Brewster Murray Hopper.

Grace was born in 1906, and was very curious as a child, a trait that stayed with her all her life. At the age of seven she decided to determine how an alarm clock worked, and dismantled several alarm clocks before her mother realized what she was doing. Grace was admitted to Vassar College, from where she graduated Phi Beta Kappa in 1928 with a bachelor's degree in mathematics and physics and earned her master's degree at Yale University in 1930. In 1934, she earned a Ph.D. in mathematics from Yale, and became the first woman to do so. It was around 1950 when she initiated her original compiler work, and by 1952, she had the world's first fully operational compiler ready. The compiler was known as the A compiler and its first version was A-0. Yes, programmers who are overly sexist, none of it would've been possible and as easy, had a WOMAN not come up with the idea of a compiler. A few years later, Hopper and her team even released some of the first compiler-based programming languages, including MATH-MATIC and FLOW-MATIC.

Hopper's belief that programs should be written in a language that was close to English (rather than in machine code) was captured in the new business language, COBOL, and in its creation, Hopper served as a technical consultant to the committee. COBOL went on to be the most ubiquitous business language to date. Hopper also developed validation software for COBOL and its compiler as part of a COBOL standardization program for the entire Navy.

Grace Hopper was a woman with almost unmatched skills and a very affable personality. It was her, who made the terms "bug" and "debugging" popular, when she used them as her team discovered a moth in her computer, which was impeding their operations, and had to remove it. Hopper passed away on the first of January, 1992, leaving behind much more than just her memories. Truly, behind every successful compilation of your program, there is a woman. And now, you know her name.

ZAID MERCHANT
SE COMPUTERS

Drone Technology

Drones have been there for a long time, yet they were far away from the civilian masses. They may have gained control over the skies for firing missiles at unsuspected militants and killing innocents, but these "killer vehicles" are now moving away from military barrier to the civilian airspace. Welcome to the drone era, this is the beginning of drones for the masses. You may soon see drones, drones and more drones buzzing around your home helping you in fetching your things from the nearby shops. Drones are all set to become the defining feature of the century. But, wait! Before entering the golden era of drones, let us see what exactly these vehicles are.

A drone, in its technical dictionary refers to the unmanned aerial vehicles (UAV). They are basically, flying robots which can be remotely controlled from the control system which is based on a ground location.

A UAV is needless to say, light-weighted and has a sleek body structure to help it glide through the air. The construction of a UAV can be subdivided into 2parts.

- The drone system
- The control system

The control centers are made to operate the drone. These are located miles apart from the destination location but are yet efficient in tracking the location of drones. These drone system are controlled by trained combat pilots.

How and where the drones are used?

Drones today, have escaped the chains of military warfare, and are now deployed in various other activities. Recently, Dominos pizza made use of their drone Domicopter to help them in delivering hot delicious pizzas to their customers. Thus, drones can act as your little helpers, helping you in delivering other things too. Let us explore the other non-dangerous uses of drones-

•The drones are a boon for aerial photography and filming.The Phantom2 Vision+ is a drone popular with the professional cinematographers.

• The farmland game can now be more than just a virtual game. With drones, large areas of farms can be aerially viewed and they can also be used for spraying pesticides and fertilizers, reducing the manual labor.

• From replacing servers at restaurants, to monitoring crops, drones are perhaps the way of the future, making mundane tasks a little less boring.

• TinkerBell, Mary Poppins, and Aladdin may soon find some more companions in the Disney's aerial skies. The Walt Disney Co. plans to use drones in their theme parks and are seeking FAA permission.

• Scientists are always looking for new ways to probe and investigate severe weather. For obvious reasons, they prefer to do their research without risking their lives. That's where UAVs come in. UAVs are actively helping the scientists to track and study the inner workings of hurricanes and predicting storms, thus revolutionizing the weather forecasting techniques.

• Immediately after a natural disaster, authorities need to perform damage assessment, so that they know how many people are affected and how widespread the chaos might be. Drones are a cheap, efficient way to put many sets of digital eyes in the sky.

Drones have not only captured the skies, but have also allowed us access to the under waters. Instead of flying, the OpenROV drone swims and gives controllers on dry land the experience of exploring the deep ocean secluded world. With this expanding technology, drones are assigned to perform bigger task too i.e. to fix an entire city. Yes, you read it right ."fixing the city." An idea has taken birth where drones will be able to identify and repair everything from potholes to street lights to utility pipes. So, in short drones find application in surveillance and for finding more information about places which cannot be accessed easily by humans. Finding children lost in large forest lands can also be made easy by drones.

However, with all its pros, it also comes attached with cons. The main disadvantage being that the privacy is being easily invaded. There were reports of one such drone flying over the White House. Many other cases have also been reported regarding the drones interfering the privacy. Also, the air traffic has to be severely managed with the increase in number of flying vehicles. The aerial strikes have also caused huge harm, killing large number of civilians and causing a great outrage over their use.

With the intense heat of competition turning up between the top notch companies, in response to Amazon's "PRIME AIR" Google has recently announced to introduce the drone services by 2017. Under the project titled "THE PROJECT WING" headed by the project leader Davis Vos, it plans to deliver goods/packages through drones. What earlier seemed like a sci-fiction movie is now coming a bit closer to reality. With Google taking highly competitive measures to have an edge in the market, we will have more companies following suit. The question here is, how they plan to keep the drones' safe, in terms of security and also from people – who might not return the drones after it lands right in front of their doorstep. Thus, issues will rise as we find more drones on our doorstep while we finally step into drone age.

SANYA SHAIKH
SE COMPUTERS

◀Smart Sense Tech▶

'Ever wondered what will the future tech world will look like a few years down the line?' is the question to be thought of with the technology becoming ubiquitous, accessible, cheap, connected and always available. Our mobile phones are probably the best example of ubiquity of sensor/data/communication platforms. It seems to be fiction, but it will be the life lead by sensing technology in the very near future. The basic idea behind this technology is to give human power to the computer. For example, we can understand one's emotional state by analyzing their facial expression. If we add these perceptual abilities of human to computers, we would enable these computers to work together with human beings as intimate partners.

Just imagine if computer could have a nose to smell? While it may sound strange, the upcoming technology **'C2 SENSE'** aims at creating a chip that would smell and detect food that has become stale. Whenever a fruit ripens it releases some amount of ethylene gas. This chip detects the smallest possible trace of ethylene gas that even a human would not be able to smell. The concept of this technology is to give an artificial nose to the computer which allows it to sense the trace of ethylene and control the spoilage of food using its sensors. This sensory smelling chip with carbon nanotubes works well with the detection of four major compounds: carbon dioxide, ethylene, humidity amount and biological amines. As far as environmental crises are concerned this technology is set to make a mark.

The new eye tracking device is also set to launch soon. The **'Eye Tribe'** does it all with a single gaze. Just by sensing where you are looking this device employs its optimized sensors to track the exact location of your gaze and finds the (x,y) coordinates. With the active application involving automatic login with eye lock, this can be a reliable mode of hands free playing for the most popular games. The most talked about virtual reality applications are also utilizing this rendering in their system. The concept of 'Big Data' will be on the fly with eye tracking installed in every smart device, as all the researchers would be able to track and analyze the data viewing habits of millions of people. What attracts the eyes of people on web pages? The possibilities of such analysis can revolutionize the market. The huge market of online advertisement is set to change from pay per click to pay per look. We now stand at the door of revolution while the next generation plan on making devices like 9D TVs as most of the tech experts today plan on making interactive devices with the human senses.

HARSH DOSHI
SE IT

LIFI

For a moment let us all close our eyes and imagine sitting in the comforts of our room with our phone in our hand, being able to access all kinds of content seamlessly and effortlessly. No troubleshooting problems or disconnections. Just you and your phone with a 100 TIMES more data transfer speed. Sounds like a fairytale? What if I tell you that all this is perfectly possible? That all of this might happen soon using an awesome, new technology called Li-Fi?

Li-Fi or Light Fidelity is a wireless service just like Wi-Fi, except it works on the principle of light transmission instead of using radio-frequency waves. It can be thought of as light-based Wi-Fi. The term was first used by Professor Harald Haas in his TED global talk on visible light communications in 2011. Li-Fi works with visible light, which in turn gives you a wider bandwidth and an unbelievable speed. The heart of this technology is a new generation high brightness LED. If the LED is ON, then it transmits a digital signal 1 and when OFF, a digital signal 0. We could say that it's like data getting transformed to light energy, then to electrical energy and from there back to data again, thus completing the cycle.

Due to the ever-rising usage of mobile phones, there has been a huge increase in energy consumption on a global scale. Wi-Fi and in general all cellular devices use the radio-frequency part of the spectrum, causing global cellular traffic to spiral up. Li-Fi hence serves as an excellent, alternative solution to this problem. On account of it being visible light-based, it is a much cleaner and a more eco-friendly technology. It is wireless and point to point, and the best part is that it is cheaper.

Li-Fi also has numerous applications. It would work best in hazardous environments like mines or petrochemical industries. In short, places where using radio-waves might cause destructive-interference. For the very same reason it can also be used near MRI machines in hospitals, underwater or in airplanes. Also through the use of Li-Fi, traffic control can be made intelligent and real-time adaptable, especially during peak hours. Hence, one might be able to whizz past western express highway or S.V. road without being stuck for hours. Surely a dream come true! Not just that, every LED light source can serve as a hot-spot, be it in offices, schools or public places. Even while walking on the street one would move from one hotspot to the other. The possibilities are endless!

In layman's terms, we can argue that it makes Wi-Fi look passé. For Li-Fi to acquire market majority it might take a while. The adequate infrastructure for initial installation would require some investment. However once implemented, it would be there to stay and rule.

SHWETA SUNDER KRISHNAN
SE COMPUTERS

An IoT Driven Day

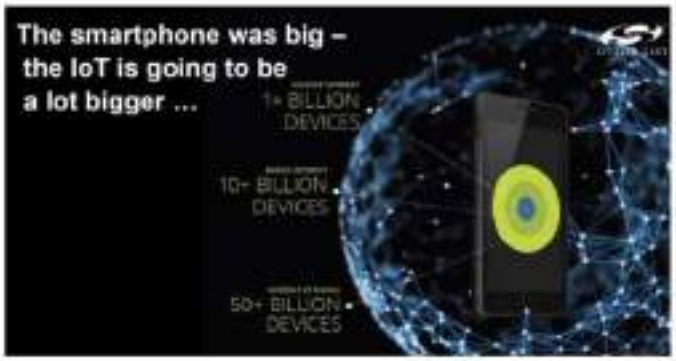
"...Therefore, we may consequently state that: this world is indeed a living being endowed with a soul and intelligence... a single visible living entity containing all other living entities, which, by their nature, are all related."

--Plato, Timaeus, 4th Century B.C.

In all of twenty-five centuries till date, there couldn't have possibly been a more appropriate way to describe the Internet of Things. It's been dubbed as "The Next Big Thing", "The Future", "The Biggest Game-Changer since the Internet itself". IBM has announced that Watson IOT unit's global headquarters will be in Munich, and with this, has made its largest investment in Europe in over two decades -- simply for growth in IoT. The UK Government, in their 2015 budget, allocated £40,000,000 towards research into the Internet of Things. And of course, we've all been bombarded by tons of articles on the Internet of Things. But what is the fuss all about? How will our lives change with the advent of IoT? How different will each day be in our life? Here's how:

The alarm rang out. Softly at first, and then growing louder with every passing second. His watch began vibrating, and John woke up. He knew his alarm had calculated the time it would take for John to reach his office, based on the real-time traffic scenario en route, and given him the maximum time to sleep. In his world, the concept of "I wish I had slept more/less" did not exist.

John's watch had detected the change in the rate of pulses once John was awake. Based on this detection and output, the process of warming the water for his bath had been initiated, conserving huge quantities of energy (if seen on a large scale). As he walked into his bathroom, the sensors detected the signals, based on the Bluetooth Low Energy (BLE) signals constantly given out by his watch, and the lights came on. He got ready and just as he opened his room's door, the coffee machine chugged into gear and the lights came on and went off in the room he entered and exited respectively. He could not help but remember the outdated notion that the IoT world was just a complicated way to sense and take readings. The truth was, objects in the IoT were not only devices with sensory capabilities, but also provided actuation capabilities, and his coffee machine was proof enough.



He sauntered over to the fridge and read the contents of the small screen on it. The screen described the health of the contents of the fridge, which the fridge itself measured smartly. Most of it looked fine, but the apple and carrots were

estimated to go bad in two days' time. With a couple of touches on the same screen, he had ordered for a fresh batch of apples, which would be delivered by evening. He finished his coffee, and placing a currency note at the appropriate position on the table near his door, he headed out. Almost immediately, he was alerted about his friend's birthday. John promptly sent a message to wish him a happy one.

John he drove to work. Yes, he actually drove himself, because automated cars, though a futuristic concept, is still not a concept within the purview of the Internet of Things. He breezed through the electronic toll collection system, which identified his car and automatically debited his account with the required amount, without even requiring John to slow down, another magical advantage of the IoT. As he settled in for his drive, he began thinking about the major problem the IoT faced on its way to where it is now: there being inadequate identifiers for all objects in the IoT. It was estimated that by the year 2020 there would be 26-30 billion objects wirelessly connected to the Internet of Things. As a result there was a need to have unique identifiers for each object and yet not run out of distinct identifiers. It was decided that these devices will use an IP address as a unique identifier. The format in use was the Internet Protocol version 4 (IPv4). However, due to the limited address space of IPv4 (which allows for 4.3 billion unique addresses), objects in the IoT would have to use IPv6 to accommodate the extremely large address space required. It was due to this feature of the IPv6 that this system was able to scale to the large numbers of objects envisaged. The rest of the world's ability to shift and adapt to IPv6 would play a major and adverse role in affecting the time they would take to become "smart"...

His thoughts were interrupted by a car whizzing past him at a speed that was easily in excess of twice the speed limit. Sure enough, a short distance away, it triggered the speed-gun, attached to a pole. That car would now be pulled up at the next police checkpoint, which wasn't very far. One can never outpace and outsmart a smart city.

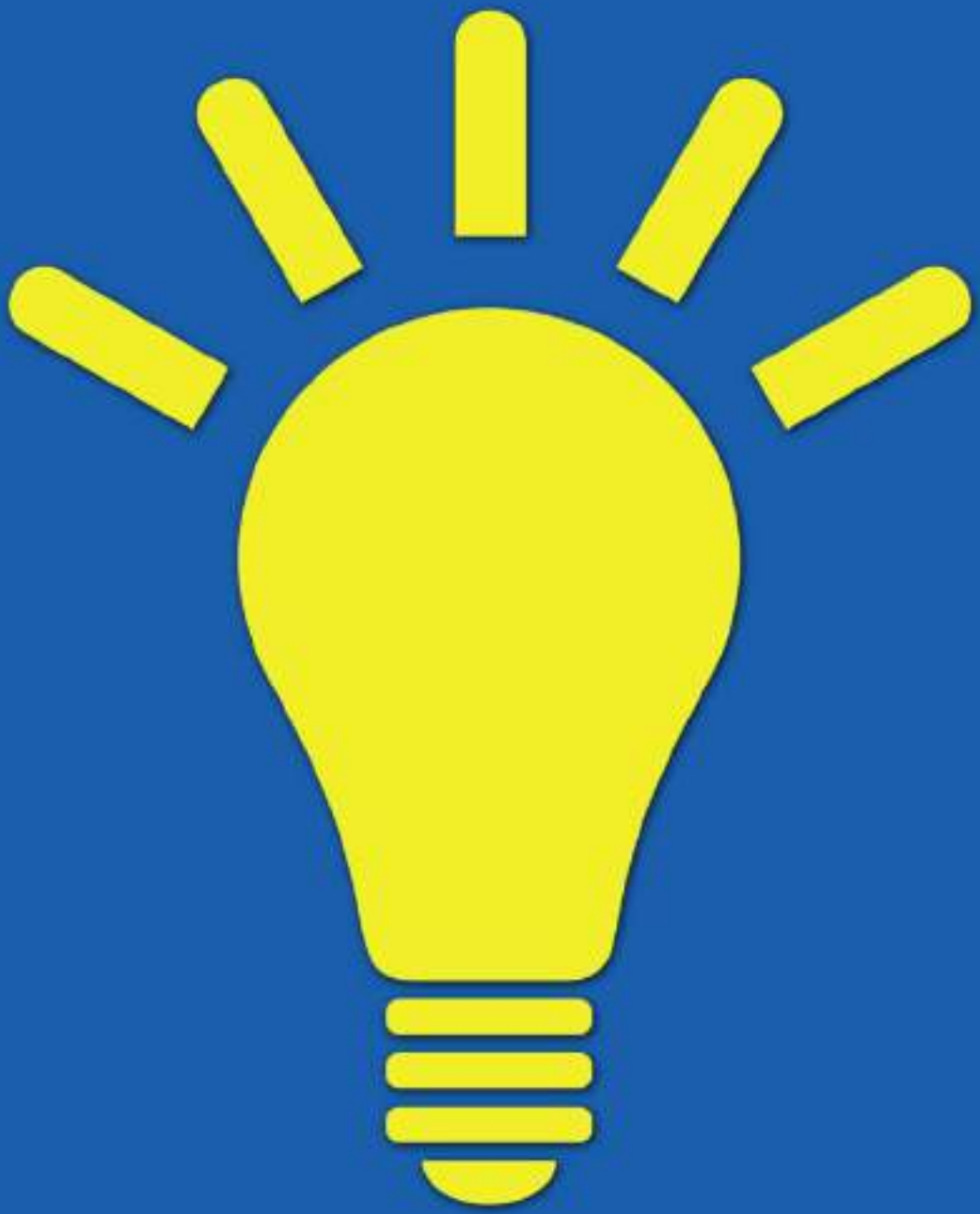
Soon after, he entered the control room of his office with his partner, Frank. The two of them were Team Leads for a specific duration during the day. Their team monitored a particular region of the waterways, in case of emergencies and the like. The waterways were previously just a chaotic path with multiple independent ferry services operating. There were security issues, rescue issues and communication issues that constructed this giant mess. The question that arose was how do you protect a fleet of ships and thousands of passengers every year without an Internet connection? Realizing the impossibility of this, each ferry was given special routers for dynamic internet

access, i.e. continuous internet access, despite the ferries moving constantly. The ferries were also allotted real-time video surveillance equipment. John and Frank had a pretty straightforward day, overseeing the movement of bridges on detecting the arrival of a large ship, and handling traffic as well, all synchronized and automatically executed by this beautifully connected system. The waterways' own Internet of Things. However, an hour before they were scheduled to leave, an emergency popped up. The captain of one of the ferries contacted the control room, alerting them that one of the passengers aboard was having a heart attack. John zoomed in on the particular ferry's immediate surroundings while Frank checked the video feed to confirm the message. The ferry was diverted to the nearest alighting site while surrounding ferries were told to adjust their pace to avoid a mishap. A medical boat was alerted for immediate assistance, as was an ambulance. It was smooth. It was perfect. It was only possible because of the Internet of Things.

En route to tennis after work, John's phone, synced with his doorbell, vibrated. He checked the screen, which transmitted the live feed from outside his door. It was the apples he had ordered earlier. With a few touches, a small window had opened on the side of the door. He watched as the delivery boy put in the bag with the foodstuff through the window, then reached in and took the currency note which John had kept earlier on the table as a tip. From all the way near his tennis court, John closed that window with a touch. Almost instantly, a pop-up on his phone asked for confirmation of the delivery of foodstuff. John confirmed it, and an appropriate amount of money was transferred. The Internet of Things at work again.

John reached home, tired. He wondered why the watch hadn't already informed him that he was tired and advised him to go to sleep. A glitch? It seemed unlikely. He kept the apples in the fridge, and observed keenly as the smart fridge now began to sense, note and display the health of these newly added items. He trudged to his bedroom, and the lights switched on and off in accordance to his movements among the rooms. Just as he was about to sleep, the clock struck twelve, and his alarm clock went off. He looked at it, puzzled. Seconds later, his watch was vibrating and his phone alarm went off as well. The Internet of Things had detected an important event in his life, and was acting accordingly. He rushed to his phone, and stared at the screen in disbelief. He switched off his phone alarm, and the alarm clock and his watch went silent and stable once more as well. With shivering hands, he dialled a familiar number. It was his girlfriend's birthday, and he was going to be a full sixty seconds late in wishing her. Truly, there will always be disasters that the Internet of Things cannot save you from.

ZAID MERCHANT
SE COMPUTERS



"The difference between EXTRAORDINARY and ORDINARY is that little EXTRA"

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