AUG
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AN INSIGHT INTO CSE

BUFFERED READER V3.1

INDIAN SCHOOL OF MINES

CSE SOCIETY

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From the HOD's DESK

Dr. Chiranjeev Kumar

"Success doesn't have a conventional way. Have it your own way! "

It gives me immense pleasure to bring forward the unstinted contribution of the Editorial Sodality in the form of our fifth edition of the magazine, *BufferedReader*. I foresee unlimited opportunities ahead for all those who have been smitten by the charm of a career in technology. This edition of *BufferedReader* gives a glimpse of the myriad streams of activities being pursued by the CSE Department of ISM Dhanbad. I hope these peeks into the world of technology at ISM Dhanbad are tantalizing enough to draw readers to enter it, become part of it and draw on its wellsprings. The magazine has significantly grown from a toddler to a mature adult in the past two years and I hope it will do well in future. Our main aim is to make the students analyze the narrow gap between being intelligent and being intellectual. So, the purpose of the magazine is to help the students flourish in all possible dimensions and take giant strides for their better future.

The department tries to ensure intellectual, ethical and social development amongst the students. It helps the students to cope up with the post placement dilemma by providing a self sustaining atmosphere. This world is full of obstacles. This magazine gives an insight into the not-so-fascinating world of challenges and enlightens the path to counter the obstacles in the best possible way. This time, our magazine is based on the Project Ara theme that has gained a lot of attention in recent times. Ara is the codename of Google's upcoming modular Android smartphone technology, which is highly customizable according to user's preferences and requirements. This edition of the magazine shares with us the vision of Google, along with it's impact on the industrial trends in times to come. The magazine also provides an insight to the departmental news and also about the recent advancements in the technological arena.

I would now like to express my heartfelt appreciation to the leaders (my faculty colleagues) and the innovators (my students) who graciously and generously provided words of wisdom to share with our readers by working day in and day out. It is my great good fortune to enjoy such incredible support from the Editorial Team.

There's nothing like the so called "Innovator's Path" because I am not a believer of the fact that innovation has a convention. We don't need to follow the exact same route to success. Quite the contrary each of us must have a unique way forward. Yet it is also evident that whatsoever be the path that we are on, most of us will encounter similar challenges. Uniqueness lies in the way we counter the challenges. And maybe that is what this edition is all about- paving a unique way to success!

I appreciate honest and frank feedback on the quality and contents of the magazine so that we can improve and reach new heights. Do write to me at cse@ismdhanbad.ac.in .

Happy Reading!

EDITORIAL

As we chug along the tracks of time, change is inevitable. Amidst the deluge of these myriad changes, a very few things remain constant. One of them is the age old adage: 'The pen is mightier than the sword'. Words that are penned down are indeed the most singularly powerful force available to humanity. They have the matchless ability to heal, to hinder, to help, to heal and to humble. We, at *BufferedReader*, have tried to achieve an ideal combination of these intrinsic assets to satiate your hunger with a unique blend of technology and literature.

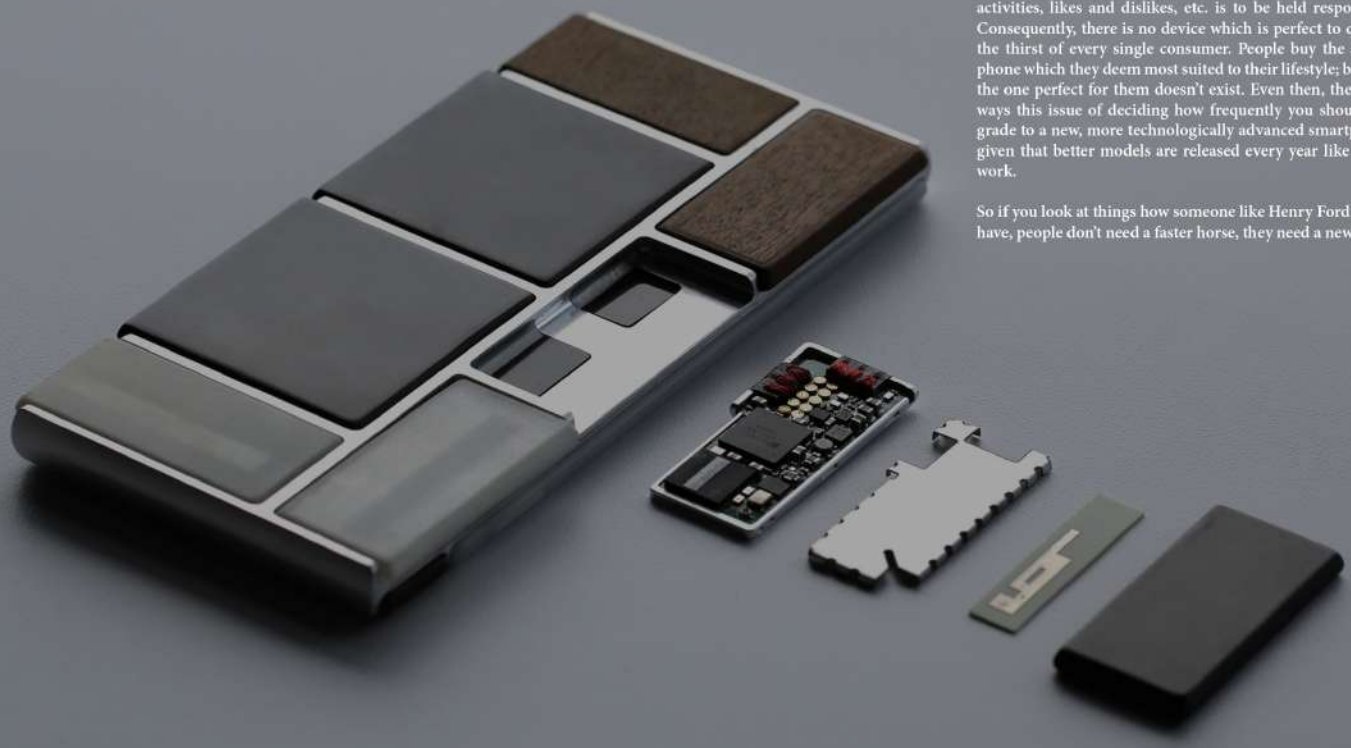
This time, the focus is on the mysterious Project Ara, the codename for the unnamed, upcoming modular smartphone, which would incidentally be the first ever phone that Google is making. With the original dream for Ara being modularization of everything from the screen to the processor to the camera, it promises to change the face of the smartphone market.

The faculty article written by Dr. Sachin Tripathi, ponders upon the scope of dynamic network architecture to meet the networking requirements posed by evolving computing trends. The concept of Software Defined Network (SDN) comes as a solution to meet the computational needs. The article talks about a futuristic approach that deals with the technicalities and challenges in implementing a successful SDN.

Besides the ceremonial offerings of Tech Milestones and Confluence, this edition also highlights the first Hackfest in the institute and the biennial international conference, RAIT, both of which united to take the department to heights never reached before. Coming to the alumni, we are thankful to Dr. Sanjay Kumar Biswash, Ph.D. of 2012 batch for his illuminating words on the immensely debatable topic of user experience in cellular communication.

The fact that *BufferedReader* has endured the test of time for the third successive year, uninterrupted by the constant state of flux that surrounding world so annoyingly finds itself in, is an ode to the efforts of the HoD, our teachers and our seniors. Our continuous effort is as much an attempt to honour their indelible legacy, as it is an endeavour to make *BufferedReader* greater than before.

Happy reading!



The Dawn of a New Era

PROJECT ARA

Parichaya Walia B.Tech 2017
Ashish Verma B.Tech 2018
Aditya Sood Dual 2020

Smartphones have become a fundamental part of our lives and even Jon Snow knows that. They have come a long way from their simple call-only functionality. Clicking pictures, music playback, watching videos or playing arcade games; their features have not only superseded many mainstream devices such as portable music players and point-and-shoot cameras; but they have also restricted our usage of personal computers by providing a decent and smooth Internet browsing experience. Further, with the ability to access the Internet, smartphones can now perform a host of functions; from booking movie tickets and calling a cab to mobile banking and what not.

However, if you would ask the smartphone users whether they are satisfied with their devices, nine times out of ten out of ten you'd get an emphatic "No!" in response. Most users have complaints: pitiable camera results, insufficient battery back-up, or inadequate speakers, to name a few. But this shouldn't come across as a surprise. The unbelievably large diversity among consumers in terms of requirements, daily activities, likes and dislikes, etc. is to be held responsible. Consequently, there is no device which is perfect to quench the thirst of every single consumer. People buy the smartphone which they deem most suited to their lifestyle; because the one perfect for them doesn't exist. Even then, there's always this issue of deciding how frequently you should upgrade to a new, more technologically advanced smartphone; given that better models are released every year like clockwork.

So if you look at things how someone like Henry Ford would have, people don't need a faster horse, they need a new mode of transportation. Consumers don't need a better smartphone; instead, they need the one which can be customised repeatedly to suit their varying requirements.

Enter Project Ara: Google's vision for making truly customisable smartphones. A smartphone which, barring a few basic features such as the processor, memory, Wi-Fi antenna and primary screen; could be built to have exactly those features which are desired by the consumer. Not just that, it could be modified time and again to suit subsequent requirements of the user.

If there's one thing that we know for sure about the current smartphone market, it's that there's no such thing as 'One device, suits all'. However, having a device with bits that we can swap out and replace definitely takes us one step closer. Project Ara could conceivably become the next best thing, enabling us to effectively build a phone which would largely meet our specifications and requirements.

What is Project Ara?

Project Ara is the codename for an unnamed, upcoming modular Android smartphone that consists of a central module board in the form of a base frame (called 'endoskeleton', or 'endo' for short), with slots for individual modules on the back that can be connected. The modules are similar to small tile pieces, and provide functionalities such as a secondary display, camera or an extra battery; and which can be attached as per the user's discretion.

The project was originally headed by the Advanced Technology and Projects (ATAP) team within Motorola Mobility while it was a subsidiary of Google. Google had retained the ATAP group during its sale of Motorola to Lenovo in 2014; and placed it under the division responsible for Android and Chrome, which was at the time headed by then Senior Vice President (and the present CEO) Sundar Pichai. The project has since been separated from ATAP and is presently an independent division within Google; a clear indication that the tech giant believes its venture would be going places.

With such a high degree of customisability, Google hopes to reach more of the billions of people in the world who don't own a smartphone yet. Simultaneously, it aims to create a new hardware ecosystem wherein anyone can build a module for the smartphone. While Google will be the sole approver and retailer of these modules, the absence of any licensing or royalty fee would level the playing field for small time hardware manufacturers to take on the handful major smartphone manufacturers; eventually making the hardware ecosystem analogous to the software ecosystem, where the performance and quality of the products will trump the scale of big time manufacturers, and it would be the end consumer who would call the shots.

As it turns out, the company has been hard at work to release a device; and is thus frequently revising many aspects of the Project to find the most viable combination of features for it. The company discussed its progress at Google I/O conference in May 2016, apprising the world about the fact that it is remarkably close to completion.

How does Project Ara work?

The current Project Ara device starts with the 'endo', with some basic functionalities such as a primary screen, memory, processor, sensors, Wi-Fi antenna and a tiny battery; and with slots on the back for attaching modules. This makes the 'endo' a very basic phone on its own having exposed slots to hold modules on the back.

The connectors of the modules use a shape-shifting 'nitinol memory alloy', which contracts when current is passed through it, to lock the modules into position. Thus, in the event of a fall, the connectors will firmly hold onto the modules despite the impact; provided it drops from a reasonable height and not from an airplane over 30,000 ft in the air!

A user can attach up to six plug-and-play components. Cameras, secondary displays, speakers and many more hardware can all be added as modules, creating a scope for more varied applications. There will be smaller and larger frames in the future based on the cost and use. Ultimately, you'll be able to find just the right module that complies with you and doesn't turn heavy on your pocket.

The Modules

Although the core internals won't be interchangeable, Project Ara will still allow a number of key hardware modules to be removable. You'll be able to choose from different camera modules, add on multiple loudspeakers, expandable storage and even snap on a more powerful battery. The most important feature of the modules is that they're 'hot-swappable'. That means you'll be able to remove them, and swap in new ones without having to reboot the phone; much like flash drives into the computers.

The company has created an app, called the 'Ara Manager App', which will provide users with detailed information on all the modules currently attached to their device; and also an option to unlock the module, so that it can be slid out and another one be connected instead. You could also eject them using vocal commands.

All of these modules run and communicate seamlessly, thanks to a new piece of software in the Android stack called Greybus; which according to Google, "supports instantaneous connections, power efficiency and data-transfer rates of up to 11.9 Gbps".

As for the physical construction, Project Ara has progressed from a loose magnetised approach (which reportedly didn't prove tough enough in early tests) to a system of "durable latches and connectors". In fact, Google says that the connectors are capable of lasting 10,000 swap-out/in cycles without dying. The modules themselves connect through the open UniPro standard.

Google is teaming up with a number of hardware partners to produce these modules, including Panasonic, TDK, iHealth, E Ink, Toshiba, Sony Pictures Home Entertainment, and Samsung. All will build their disparate modules to Google's common set standards, which means you'll be able to upgrade components over the subsequent years. Let's look at some common modules specifications.

Camera

One of the modules with the most potential for personalisation is the camera. The recently launched promotional video by Google exhibits a smartphone without a camera module. If you're an avid photographer who always keeps a dedicated camera in hand, you needn't waste space or money on a camera module. Further if you require a high resolution camera and you don't have one, all you need to do it to just replace one of the modules with the camera module.

Secondary screen

Their is a small square screen that can be slotted onto the back of the Project Ara device - possibly utilising low-energy, high-visibility E-ink display technology. This would fulfil the basic needs of a screen display for miniscule usages like checking the phone for time or temperature.

Kickstand

From the high-tech to the decidedly low-tech, the Google video shows off a kickstand module that will be handy for those who like to prop their phones up for media or group selfie purposes.

Speaker

One of the most visually (and audibly) striking modules is the small loudspeaker unit, which occupies one of the rectangular slots on the frame. As Google exhibits, the final image is of an Ara device with a couple of larger speaker modules attached alongside one of those smaller ones. Presumably the idea is that the phone can act as some sort of portable public media player.

The Cost

Back at the beginning of 2015, Google was aiming for the cost of materials of a basic entry-level model to be in the range of 3.5k to 7k rupees. Meanwhile, the modules were to cost along similar lines; according to earlier statements made by hardware partner Toshiba. However, as the company is frequently making changes to the Project, these costs are estimates at best.

Applications and Future Aspects

If Ara becomes just as popular as the present mainstream smartphones, it would disrupt the entire 'smartphone ecosystem'. Tech companies will have to rethink the way they manufacture and market their devices. Instead of advertising minor upgrades about once a year, they will need to put more emphasis on new core components in the 'endo' frame which can't be changed/upgraded by the users. That future looks more like the world of Windows PCs, which can be built with any number of mixed-and-matched components.

But that's a very large if. It's unclear whether the average buyer is interested in this type of device. Every fall, shoppers line up outside Apple stores to snag the latest iPhone, which also happens to be the least customisable smartphone you can buy. For any given iPhone iteration, you can choose between two physical sizes, three storage sizes, and a small handful of color options. While some Android phones allow owners to swap out the battery or add extra storage space, Apple doesn't enable any such tweaks. Consumers might embrace a new cornucopia of smartphone component options or they might balk at an overly confusing list of possibilities. How they react to the concept will have a major influence on the phones of the future.

The 'endo' base frames are expected to have a life of five to six years – far longer than your current smartphones. Instead of updating your phone every two years, you save up for the latest modules. The goal is that when a better processor or camera comes out in the market, it will be available as a module for the Ara smartphone owners to purchase. Furthermore, if any of the modules gets damaged; it can be easily replaced by a new one without much hassles.

Ara is not limited to only entertainment purposes. It proposes endless possibilities when it comes to development. Owing to the significant ease in the sale of modules, there will be an explosion in both the quality and variety of functionalities which a smartphone offers. Hardware manufacturers who have never associated with smart-phone industry will now manufacture modules for these phones. It wouldn't be surprising if in the future you have speaker modules manufactured by Beats, camera modules by Nikon or Cannon, or even a portable reading light by Philips. Medical modules, such as glucose meters for diabetic individuals and potability checkers for water are also on the cards.

The biggest advantage and a challenge at the same time for project Ara is that it is future proof. It is exceptionally flexible and adaptable to the technological developments of the future. It will transform into any fancy gadget you like. However, there are possibilities that it will bring a steep fall in the smartphone market turnovers. If successful, Ara will establish Google's autonomy over the smartphone markets; and history stands witness to the fact that such an absolute autonomy is never in the best interest of the end consumer.

But at the same time, Ara has the power to transfigure the ways the world has been following till now for its computational needs. Ara is advancing to create a 'truly modular computing platform' and it will implement reusability the best possible way, and will provide the efficient solution to the problem of e-waste generation. Ara is promising. It certainly is building a bright future ahead.

The above article was published on 27 August, 2016. Google latter re-scheduled it's launching of project. ■

SOFTWARE DEFINED **NETWORKS**

Dr. Sachin Tripathi Assistant Professor

The explosion of mobile devices and content, server virtualization, and advent of cloud services are among the trends driving the networking industry to re-examine traditional network architectures. Many conventional networks are hierarchical, built with tiers of Ethernet switches arranged in a tree structure. This design made sense when client-server computing was dominant, but such a static architecture is ill-suited to the dynamic computing and storage needs of today's enterprise data centers, campuses, and carrier environments. Some of the key computing trends driving the need for a new network paradigm include rise in cloud services. Big data handling, and changing traffic pattern for applications that commonly access geographically distributed databases and servers through public and private clouds require extremely flexible traffic management and access to bandwidth on demand. Further, users are increasingly employing mobile personal devices such as smartphones, tablets, and notebooks to access the corporate network. IT is under immense pressure to accommodate these personal devices in a fine-grained manner while protecting corporate data and intellectual property and meeting compliance mandates. In order to meet the networking requirements posed by evolving computing trends, network designers find themselves constrained by the limitations of current networks such as adding or moving devices and implementing network-wide policies that are complex, time-consuming, and primarily manual endeavors that risk service disruption, discouraging network changes, inability to scale, and vendor dependence. Hence, to meet the current trend of computation the Software-Defined Networking (SDN) comes as one of the solutions.

The key idea behind the SDN is to separate the forwarding data plane from the control plane while providing programmability on the control plane, as illustrated in Figure 1. SDN is an emerging architecture that is dynamic, manageable, cost-effective, and adaptable making it ideal for high-bandwidth nature of today's applications that are dynamic. This architecture decouples the network control and forwarding functions enabling the network control to become directly programmable and the underlying infrastructure to be abstracted for applications and network services. The OpenFlow protocol is a foundational element for building SDN solutions.

The SDN architecture is:

- Directly Programmable: Network control is directly programmable, as it is decoupled from forwarding functions.
- Agile: Abstracting control from forwarding lets administrators dynamically adjust network-wide traffic flow to meet changing needs.
- Centrally Managed: Network intelligence is (logically) centralized in software-based SDN controllers that maintain a global view of the network, which appears to applications and policy engines as a single, logical switch.
- Open standards-based and vendor-neutral: When implemented through open standards, SDN simplifies network design and operation because instructions are provided by SDN controllers instead of multiple, vendor-specific devices and protocols.

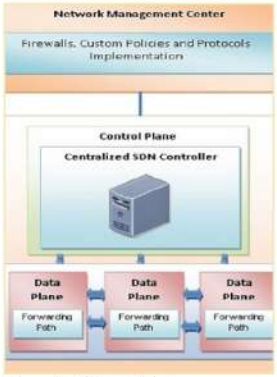


Figure 1: SDN Architecture

ARCHITECTURAL COMPONENTS

SDN Application

SDN Applications are programs that explicitly, directly, and programmatically communicate their network requirements and desired network behavior to the SDN Controller via a northbound interface (NBI). In addition they may consume an abstracted view of the network for their internal decision making purposes. An SDN Application consists of one SDN Application Logic and one or more NBI Drivers. SDN Applications may themselves expose another layer of abstracted network control, thus offering one or more higher-level NBIs through respective NBI agents.

SDN Controller

The SDN Controller is a logically centralized entity, in charge of translating the requirements from the SDN Application layer down to the SDN Datapaths and providing the SDN Applications with an abstract view of the network (which may include statistics and events). An SDN Controller consists of one or more NBI Agents, the SDN Control Logic, and the Control to Data-Plane Interface (CDPI) driver. Definition as a logically centralized entity neither prescribes nor precludes implementation details such as the federation of multiple controllers, the hierarchical connection of controllers, communication interfaces between controllers, nor virtualization or slicing of network resources.

SDN Datapath

The SDN Datapath is a logical network device that exposes visibility and uncontested control over its advertised forwarding and data processing capabilities. The logical representation may encompass all or a subset of the physical substrate resources. An SDN Datapath comprises a CDPI agent and a set of one or more traffic forwarding engines and zero or more traffic processing functions. These engines and functions may include simple forwarding between the datapath's external interfaces or internal traffic processing or termination functions. One or more SDN Datapaths may be contained in a single (physical) network element—an integrated physical combination of communications resources, managed as a unit. An SDN Datapath may also be defined across multiple physical network elements. This logical definition neither prescribes nor precludes implementation details such as the logical to physical mapping, management of shared physical resources, virtualization or slicing of the SDN Datapath, interoperability with non-SDN networking, nor the data processing functionality, which can include OSI layer 4-7 functions.

SDN Control to Data-Plane Interface (CDPI)

The SDN CDPI is the interface defined between an SDN Controller and an SDN Datapath, which provides at least programmatic control of all forwarding operations, capabilities advertisement, statistics reporting, and event notification. One value of SDN lies in the expectation that the CDPI is implemented in an open, vendor-neutral and interoperable way.

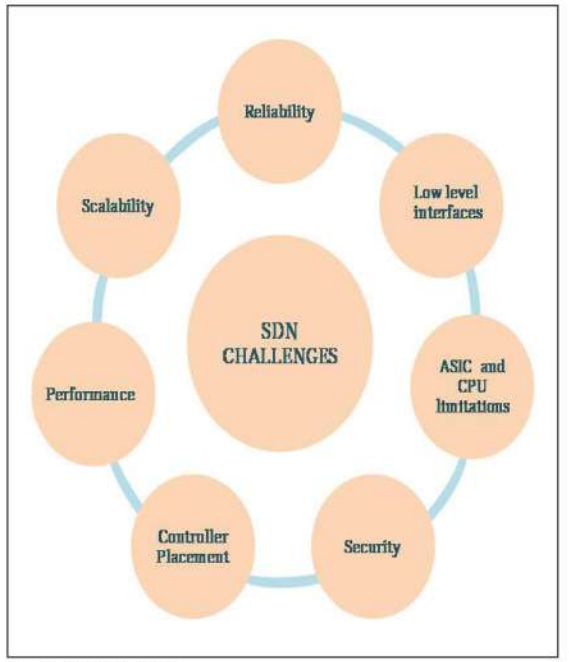


Figure 2: SDN Challenges

SDN Northbound Interfaces

SDN NBIs are interfaces between SDN Applications and SDN Controllers and typically provide abstract network views and enable direct expression of network behavior and requirements. This may occur at any level of abstraction (latitude) and across different sets of functionality (longitude). One value of SDN lies in the expectation that these interfaces are implemented in an open, vendor-neutral and interoperable way.

SDN Deployment Models

Proactive Vs Reactive: If flows arrive at a switch, a flow table lookup is performed. Depending on the flow table implementation this is done in a software or in hardware. In the case when no matching flow is found, a request to the controller for further instructions is sent. In reactive mode, the controller acts after these requests and creates and installs a rule in the flow table for the corresponding packet if necessary. In proactive mode, the controller populates flow table entries for all possible traffic matches possible for this switch in advance. This mode can be compared with typical routing table entries today, where all static entries are installed ahead in time. Following this, no request is sent to the controller since all incoming flows will find a matching entry. One major advantage in proactive mode is that all packets are forwarded in line rate (considering all flow table entries in TCAM), and no delay is added.

In addition, there exists a hybrid mode that follows the flexibility of a reactive mode for a set of traffic and the low-latency forwarding (proactive mode) for the rest of the traffic.

SDN is becoming popular due to the interesting features it offers that unlock innovation in how we design and organize networks. However, there are still important challenges to be solved before realizing successful SDN. ■

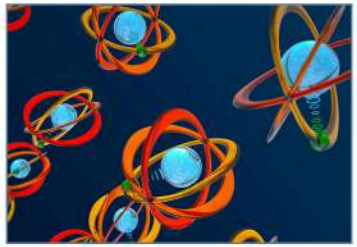
TECH MILESTONES

Vaasudev Narayanan B.Tech 2018
Urvashi Tomar M.Tech 2017

01

SpaceX Reusable Rockets

Rockets which were typically destroyed on their maiden voyage can now make an upright landing and be refueled for another trip, setting the stage for a new era in spaceflight. Thousands of rockets have flown into space, but not until 2015 did one return like this: it came down upright on a landing pad, steadily firing to control it's descent, almost as if a movie of its launch were being played backward. If this can be done regularly and rockets can be refueled over and over, spaceflight could become a hundred times cheaper.



02

Gigantic Ultrafast Spin Currents

Scientists are proposing a new method for creating extremely strong spin currents. They are essential for spintronics, a technology that could replace today's electronics. In our computer chips, information is transported in form of electrical charge. Electrons or other charge carriers have to be moved from one place to another. For years scientists have been working on elements that take advantage of the electrons angular momentum (their spin) rather than their electrical charge. This new approach, called "spintronics" has major advantages compared to common electronics. It can operate with much less energy.

03

Philips and Green sense farms

This year, Green Sense Farms (GSF), a vertical-agriculture project in Indiana, achieved a monumental goal: It outproduced a traditional farm of comparable size for the first time. By using Philips LEDs, indoor farmers can grow all year round—and researchers are working on customizing light spectrum and intensity for each crop. Because the lights are cool, they can sit close to plants, ensuring uniform illumination even when crops are grown vertically, enabling farms to plant more per acre.

04

LG Display Flexible OLED

Long have we lived with the promise of truly flexible displays, and long have the nuances of material design kept it from becoming reality. Earlier this year, LG introduced the first large-size mass-producible flexible OLED display. Thanks in part to a bendable polyimide film (instead of hard plastic) on the back-plane panel, the 18-inch high-resolution screen can roll into a one-inch-wide tube. The company expects to develop an ultra-HD flexible monitor that's greater than 60 inches by 2017.

05

Android Instant Apps

A lot of companies are trying to improve the browsing experience in mobile, chiefly by circumventing the open web. There's Facebook's Instant Articles and Google's own AMP, but Google announced a novel approach loading parts of apps even if you haven't installed them. It's called Android Instant Apps. In the demo, when you click on a BuzzFeed link, Google Play grabs the parts of the BuzzFeed app it needs, and plays a video. In another demo, it runs a parking meter payment app without installing it. Google says it will take developers "less than a day of work" to modularize their apps for the program and that it will be rolling out to users later this year.

06

Daydream - Google's VR platform of the future

Google now has a mobile virtual reality platform. It's called Daydream, and it's built on top of Android N. That means it's not going to compete with the likes of the PC-powered HTC Vive or Oculus Rift (at least not yet, anyway), but looks much more powerful than Cardboard and represents a huge step in the push to advance VR out of its early stages. Daydream is a lot like Android for VR. It's a backbone of software inside Android N (simply known as "VR Mode") that provides users with an entire ecosystem to play around in. There will be a home screen with apps, and Google has apparently already created special VR versions of its own apps like YouTube, Street View, Google Photos etc.

07

Gene circuits in live cells can perform complex computations

Researchers have developed a technique to integrate both analogue and digital computation in living cells, allowing them to form gene circuits capable of carrying out complex processing operations. The synthetic circuits, presented in a paper published in the journal Nature Communications, are capable of measuring the level of an analogue input, such as a particular chemical relevant to a disease, and deciding whether the level is in the right range to turn on an output, such as a drug that treats the disease.

08

Watermill - Air Into Water

Johathan Ritchey has invented the Watermill, which is an atmospheric water generator. It converts air into fresh water. This latest technology invention produces fresh water at a cost of about 3 cents a liter (1 quart). Originally designed for areas that do not have clean drinking water, the Watermill is for households that prefer an eco-friendly, cost effective alternative to bottled water. Atmospheric water generators convert air into water when the temperature of the air becomes saturated with enough water vapor that it begins to condense (dew point).

09

Ingestible Origami Robot

Researchers from MIT have designed a new ingestible 'robot' that could one day be used to patch internal wounds, deliver medicine, or remove accidentally swallowed objects from the stomach. The design consists of a specially folded sheet of dried pig intestine (usually used in sausage casing) and a tiny magnet. Folded up, this capsule can be swallowed by a patient. It then hits the stomach and unfolds in the acidic juices, where it can be guided to complete certain taks using external magnets.

RAIT 2016

Rishabh Mehta B.Tech 2017
Soham Satyadharma B.Tech 2018

It's only when the unfathomable, at times perplexing talents of Lady Ada Lovelace died with her premature death at the tender age of 37, that the world came to know about her now famous notes on the Analytical Engine and Computer Science, as a subject, was born. More than a century and half after Lady Ada wrote the first computer program, computers have spread their overarching tentacles so far and so wide that it is almost impossible, to imagine life without them. Surely, Lady Ada would be proud to know how far her notes have shaped the world we know today.

Speaking of the unfathomable, the fact that a department offering fullfledged courses in Computer Science was started in one of the best mining institutes on this planet is testimony to the fact that Computer Science, as a research field, is here to stay. This is exactly what happened, when, with almost no ado in 1998, the Department of Computer Science and Engineering, Indian School of Mines, Dhanbad, embarked on its chequered, but mostly fruitful journey. With intentions of imparting a thorough knowledge in the field to interested, and more importantly, eligible candidates, the department, despite its infancy, left no stone unturned to ensure that the graduates it produced could compete with on an even keel with the rest of the country.

Almost a decade later, with the department standing firmly on its feet, it needed an identity, a distinguishing mark, to prosper further. That is exactly what Recent Advances in Information Technology (RAIT) 2007 did. Conducted as a national seminar, RAIT 2007 did the enviable job of bringing together researchers, academicians, IT professionals, people from the industry and valued users on a common platform to discuss the global scenario in the vast world of information technology, thereby ensuring that the next Lady Ada Lovelace would not be lost for the want of a platform. After the resounding success of RAIT 2007 and its sequel RAIT 2009 the event raised the stakes and went international in 2012. The response was staggering indeed, and RAIT 2014 followed. RAIT 2016 conducted from March 3, 2016 to March 5, 2016 was the third avatar of the conference and fulfilled its envisaged role with aplomb. The General Chair and Program Chair of the conference was Dr.

Chiranjeev Kumar, the Head of the Department while Dr. Haider Banka, Associate Professor of the Department, was the Program Co-Chair. Dr. S. Mukhopadhyay, also an Associate Professor of the Department, was the Organizing Chair of the conference.

Just like its predecessors, the vision of RAIT 2016 was to provide awareness about the recent advances in information and communication technology, through tutorials, keynote addresses and prereviewed research paper presentations. Another endeavor of this conference was to collate and present the latest developments in IT/Computer along with realistic assessment of the current status and trends. In terms of technical paper submission, the conference received an overwhelming response from academicians and researchers from almost all renowned Institutes of India such as IIT Kharagpur, IIT Indore, ISI Kolkata, IIIT Delhi, Jadavpur University and IIEST Shibpur and also from several reputed R&D Organizations and Software Industries. In total, 344 papers were received and after critical review from international and national reviewers around 38% of the papers i.e., 130 were accepted and 122 were presented during the 17 technical sessions of the conference. All the accepted papers were compiled in two volumes of the proceedings. In addition to the technical sessions, the conference also included two keynote addresses, 2 tutorials and 10 invited talks from industry and academia such that contemporary issues related to recent advances in information technology were addressed.

RAIT 2016 started with the inaugural ceremony on March 3, 2016, which was presided over by Prof. D.C. Panigrahi, the Honorable Director of ISM Dhanbad. Padma Shri Prof. Sankar K. Pal, former Director of ISI Kolkata was the Chief Guest of the function, while Mr. Sushil Chandra, Head of BioMedical Engineering, INMAS, DRDO was the Guest of Honor. After the traditional lighting of the lamp by the guests on the dais, Dr. Chiranjeev Kumar delivered the welcome address, emphasizing the aims and expectations of the conference. Prof. Panigrahi talked about the startling transformation from the good old days when IT was seen as an anathema in the Indian society to the current scenario, where the field of ICT receives the highest funding from the government. Mr. Chandra, who was visiting ISM for the first time, mentioned the exotic fields of robotics and neuroinformatics, and remained optimistic of India, riding on outstanding research in IT, becoming a superpower by 2023. Prof. Pal, was highly enthused by the conference and said that, every discipline to be discussed in RAIT deserved a conference of its own. He suggested that the conference should at least span four days and encouraged young researchers to work hard, keeping China as the benchmark. The vote of thanks by Dr. Haider Banka, Associate Professor of the Department, brought the ceremony to a close.

Keynote addresses by Prof. Pal, and Mr. Chandra followed the ceremony. While Prof. Pal discussed about the trending topic of fuzzy sets, Mr. Chandra spoke about the cognitive applications of virtual reality and how trending research is conducted in the labs at DRDO. Experts from premier academic institutes of the country like ISI Kolkata, IIT Kharagpur, IIT Indore, IIIT Delhi, Jadavpur University, IIEST Shibpur, VNIT Nagpur, national laboratories and industries delivered 10 invited talks. The talks covered all burning areas of research in the field of information technology, to the tune of cryptography, deep learning, radio networks, electronic nose, NP complete problems and information & communications technology research.

Besides the inaugural session and the keynote addresses, the first day witnessed two tutorials on cognitive radio networks and QoS aware VoIP communication by Prof. Iti Saha Misra from Jadavpur University and patterns of big data and analytics adoption by Mr. Siddharth Srivastava, Oracle Corporation. The first invited talk on challenges and problems in information and communication technology research by Prof. A K Tripathi, IIT(BHU) Varanasi, was also held on the first day. Technical sessions on machine learning and cryptography were also conducted on the first day. The cultural program saw brilliant performances by the talented students of the department.

On the second day, technical sessions were held on diverse topics like communication, soft computing, image and video processing, IT in Geo Sciences and Mining Engineering, signal processing, VLSI design and real time systems. These were in addition to invited talks on cryptographic techniques for authentication by Dr. Donghoon Chang, IIIT Delhi, content based image retrieval emphasis on the Bag of Visual Words by Prof. Jaya Sil, IIEST Shibpur and Deep Learning by Dr. Pabitra Mitra, IIT Kharagpur. The excellent Raktima Mukherjee and her band rounded off the long and tiring day with her melodious voice.

The third day saw the technical sessions on topics like artificial intelligence, cryptography and network security, software engineering and information retrieval. Mainly, the discussions on the day were confined to invited talks on polynomial solvability of NP complete problems by Prof. Narendra S Chaudhari, Prof. at IIT Indore and Director at VNIT Nagpur, channel allocation on cognitive radio networks by Prof. Bhabani Prasad Sinha, ISI Kolkata, electronic nose by Dr. Nabarun Bhattacharya, CDAC Kolkata and using technology to facilitate healthcare for citizens in rural areas by Prof. Nabendu Chaki, University of Calcutta. The other highlight of the day were the invited talks by Mr. Naveen Mehra from Fortinet about the challenges in Network Security and Mr. Manish Ranjan, from Hewlett Packard Enterprise, who talked about the oft underrated topic of Industry Academia Collaboration.

No event of this scale is possible without generous participation of sponsors and RAIT 2016 was no exception. Many reputed organizations, including IEEE, IEEE Communications Society Calcutta Chapter, Department of Electronics and Information Technology (DeITY), Ministry of Communications and IT, Government of India, Hewlett Packard Enterprise, Fortinet, Ruckus Wireless, AIPL, ACPL, Department of Science and Technology (DST), Government of India, Council of Scientific and Industrial Research (CSIR), Defense Research and Development Organization (DRDO), Infosys, R K Mediatech Pvt. Ltd. came forward with financial support and helped make this conference truly international.

The event culminated with the Valedictory function on 5th March, 2016, which was presided over by Prof. Upendra K. Singh, Professor, Department of Mining Engineering, ISM Dhanbad, in the absence of the Honourable Director of the institute. Prof. Narendra S Chaudhari, Director, VNIT Nagpur served as the Chief Guest, while Prof. Bhabani Prasad Sinha , Professor, ISI Kolkata was the Guest of Honour. Dr. Chiranjeev Kumar, highlighted the key points of the conference and read out the recommendations for the future versions of RAIT. Mentioning the rapid strides that information technology is taking, Prof Singh expressed hope that one day, the farmers in the heart of the country would be greatly benefited by IT. Prof. Chaudhuri spoke about how IEEE, the technical sponsor of RAIT, provided a great platform for budding researchers and that young researchers should work hard to overcome challenges and build a better tomorrow. Prof. Sinha, who had attended every edition of RAIT organized by the department, remarked that the quality has been improving since 2007 and anticipated that RAIT would reach great heights in the future. The event concluded with the vote of thanks by Dr. Haider Banka. ■

HACKFEST ISM

Shantanu Mishra B.Tech 2017
Aditya Thakre B.Tech 2019

For the sake of visualization, wipe your memory off all that you have learned about how Corporate world looks like and the skills you require to get into a good company during internships and placements. Now try and put yourself into the shoes of a curious young mind who is just about to take up Computer Science as his/her major in college, and is probably daydreaming about it. Now what you presume might depend on what has been fed to you through movies, sitcoms or media of any form, but a common theme would be a dark shade of room, speakers crying out rock music at full capacity, a shabby looking guy/girl sipping his/her coffee, not caring to move an inch away from the black and green screen in front of their, and practicing what movies call as "Hacking" their way through a secure portal.

Once you get mature enough, you realize that there is a fine line between what novices term as hacking and what it actually is. Hacking is essentially devising new ways to solve existing problems and manipulate the natural behavior of a system or a program to pay heed to our needs. In the first such event organized in Indian School of Mines, Dhanbad, the Computer Science & Engineering Society hosted the annual Hackathon from March 4th to March 6th in the Penman Auditorium. The fest inaugurated with the esteemed presence of Dr. Chiranjeev Kumar, Head of Department of Computer Science & Engineering, Mr. A C S Rao, Assistant Professor(CSE), Dr. Soumen Bag, Assistant Professor (CSE), Dr. Abhishek Singh, Assistant Professor(Applied Mathematics) and Dr. Mritunjay Kr. Singh, Associate Professor (Applied Mathematics). Addressing to an electric crowd of mostly the first timers to a hackathon, Dr. Chiranjeev Kumar talked about how big a step the event is for upbringing an atmosphere where plenty of students take up product development as their interest and showcase their creative and intellectual prowess, getting all the resources they require to carry out their projects through the event itself. The fest bore witness to a plenty of intriguing ideas born out of students' creative minds. A total of 52 teams, consisting of 1-5 members each, took part in the mega event that extended over 3 days. The projects ranged from web development, chip testing and geoposition detectors to Virtual Reality and Big Data Clustering. The students ended up surprisingly well despite not getting even a minute of sleep for 2 nights straight as they took the term 'Code and Caffeine' way too literally to work on their projects.

The event was sponsored and judged by a team from Atkins Systems which brought a few projects of their own to see if they can be completed by the willing teams within the time span of the event. Among the projects which stood out were an Obstruction detector for blind people developed by the team Tech.Trust using bluetooth sensors, Disaster Management portal developed by the team DeFaulting which alerted all nearby NGOs of people affected by a disaster and an IC chip tester developed by team TechWizard which displayed configuration and details about IC chips put to test with the device. On the final day the students presented their ideas among rousing audience and the judges displaying their final product and giving a talk on the same. The presentation was followed by a speech from Dr. Soumen Bag who reiterated how hacking is much more than gaining unauthorised access to systems and products. The speech was followed by an award ceremony by the team of Atkins to the most innovative ideas and girls-only teams to congratulate their efforts. Soon after, the moment everyone anticipated arrived and the top 3 rank holders were announced by Dr. Chiranjeev Kumar which quite fittingly the whole auditorium showed their support to.

In its very first edition, HackfestISM effortlessly bonded with the students, thanks to giving students the liberty to work on their ideas without getting obstructed by financial troubles and getting their time diverted towards other activities. The event laid a foundation stone of what may lead to much more enthusiasm among the students to work on their own projects, thereby raising the contribution of ISM in technical research areas. With that, the torch passes to the upcoming batches to not only live up to the expectations that HackfestISM has manifested, but also bring the efforts and innovations a notch higher. ■

OVERVIEW

Event Span
4 Mar, 2016, 10:00 PM IST to 6 Mar, 2016, 11:00 AM IST

Prizes
Total worth over INR 2,00,000 along with hiring opportunities.

Other Attractions
T-shirts, free food and snacks.

JUDGES

Sumanto Mukherjee
Microsoft specialist in C#, HTML5, CSS3 and JS.

Ayan Choudhury
An open source enthusiast and an Entrepreneur.

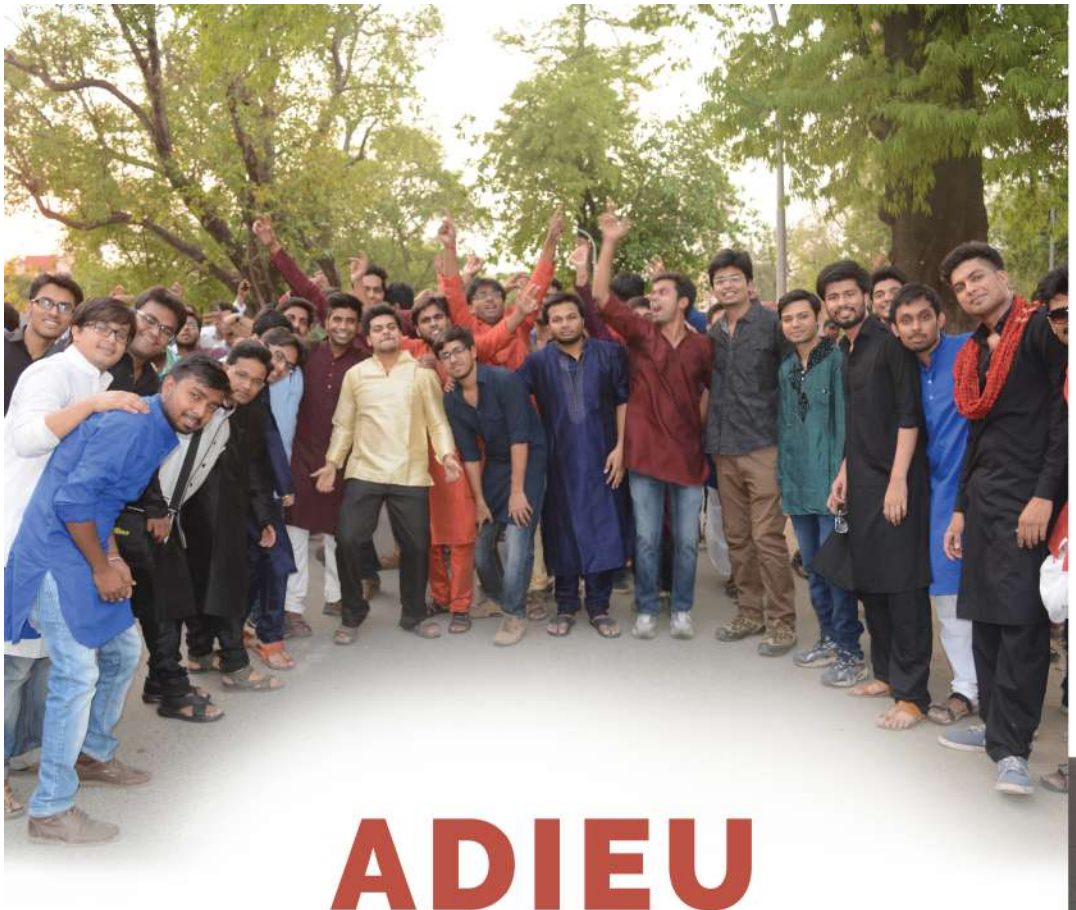
Vaishak Shanbhag
Sr. Digital Developer Team Lead in Atkins.

WINNERS

First: Tech.Trust
Bharti Lala(EI)
Megha Garg(CSE)

Second: DeFaulting
Rishabh Thukral (CSE)
Shril Bharadwaj (ME)
Anirudh Jain (MnC)
Nikita Kapoor (MnC)
Ajeet Singh (MnC)

Third Position: TechWizard
Raj Roushan (CSE)
Rajat Gupta (CSE)
Praveen Kumar (CSE)
Vipul Gupta (ECE)
Yash Patidar (EI)



ADIEU

Rishabh Mehta BTech. 2017
Maheswara R. Chennuru Dual 2018

The Department of Computer Science and Engineering, ISM Dhanbad celebrated its Annual Farewell Program for the 2016 batch on 1 st May, 2016 at GJLT. With the invitations sent out in advance, the final years were, quite unsurprisingly, all ready to celebrate and cherish the moments spent here; to dance, sing, laugh and cry, together for one last time.

The pre final Years tried their best to make the farewell a memorable one for their seniors.They reached their hostel with a dhol and soon enough, the entire hostel echoed with the sound of the beat. Keeping the thoughts of placements, MBA, MS and startups aside, the final years danced their way through the campus premises and to GJLT.It was a sight which no camera could ever capture.

The GJLT itself was lighted up for the occasion. As the final years trickled in, emotions were unmistakable. Eyes slightly wet, smiles slightly wide. Bhavishya Mathur, B.Tech 2017, took the responsibility of hosting the event. Professors were called upon to share their experiences and words of wisdom with the 2016 batch, who were about to step out into a whole new world. The professors were then asked to hand over mementos to the seniors. And amidst all these, many cultural performances by the students set the nostalgic mood to its zenith.

The Head of the Department, Dr. Chiranjeev Kumar, emphasized on contributions made by the students of 2016 batch. He highlighted that only the combined efforts of students and faculties can make the department flourish. He then acknowledged the winners of different events/competitions and other achievements of students of the 2016 batch. The vote of thanks from Maheshwara Reddy, secretary, CSES marked the end of the evening and everyone proceeded for dinner in the GJLT Dome.

Selfies, laughter, photo shoot and writing messages were all that kept people occupied after the event.

> It is the universal truth that we all have to face, whether we want to or not, everything eventually ends. Endings are inevitable. Leaves fall. You close a book. You say goodbye.

Everyone was busy in making memories for they knew the time would never come back. It is the universal truth that we all have to face, whether we want to or not, everything eventually ends. Endings are inevitable. Leaves fall. You close a book. You say goodbye.

Tomorrow, we all will wake up in our lives, full of yet to be realised opportunities, endless possibilities, with all sorts of stories of your experiences, your advices and suggestions, only to find ourselves without your company. We all will be in a strange limbo. Although, we may be separated by time and distance in the interim, nothing will diminish the important role that you have played in our lives.

May the road rise up to meet you; may the wind be ever at your back. May the sun shine warm upon your face and the rain fall softly on your fields. And until we meet again, may god hold you in the hollow of his hand.

We wish you for a mental cosmos where you are confident individuals, not scared to do the most uphill tasks, where you are not confined by the walls of fear, but break the shackles and become real performers, the real doers. The attitude with which you will leave will be the cornerstone of what you become tomorrow. As we stand here on this beautiful day, we wish for you all, attitudes of real performers who dive into turbulent waters with a crazy stubbornness to swim through and survive the fiercest storms.

To have you here with all of us, probably, the last time all together, is a picture all of us will treasure for life time. So, until the next time we gather, dear seniors, farewell for now.You all will be missed, terribly.

All the very best!
Goodbye!

Oh jaane waale, laut kar aana!

CONFLUENCE

Ashay Sinha B.tech 2016
Aditya Sood Dual 2020

"We may not have it all together but together we have it all"

Confluence – 2016, the Annual CSE Alumni meet was organized by the Computer Science and Engineering Society (CSES) of the Department of Computer Science & Engineering, ISM Dhanbad on 11 June 2016 at 7 Biryani's Hotel, Bengaluru. On behalf of the department, Dr. Chiranjeev Kumar (President of CSES & Head of CSE Department), Dr. Amgoth Tarachand (Faculty In-Charge of CSES & Assistant Professor of CSE Department) and about 35 undergraduate students of the department made their presence during the event. One of the major objectives of the program was to strengthen the Alumni base of the Department and bring them under the umbrella of CSES, as the society firmly believes that the Alumni pay a significant contribution to the Department to fulfill its goals.

The event initiated with the heartfelt words by Ashay Sinha (B.Tech 2016) and Tanishk Kithannae (Dual Degree 2020), who addressed all the attendees with a welcome speech. Later, Mr. Ashay took this opportune moment to elaborate more on the overall evolution of the CSE Society between the years 2014-2016. He also highlighted how immense enthusiasm and active contribution by the alumni leads to the overall growth and development of the department. This was followed by a brief introduction session of the alumni.

The session proceeded with Dr. Chiranjeev Kumar, President, Computer Science & Engineering Society and Head of Computer Science & Engineering Department officially welcoming all Alumni to Confluence - 2016. He started by congratulating the Alumni in light of Union Cabinet giving its ex post facto approval to amend the Institutes of Technology Act, 1961 for Conversion of Indian School of Mines (ISM), Dhanbad to an IIT under the law. He also referred to the alumni as part of an institution which will soon be IIT- a remark that received immense applauds. Dr. Chiranjeev briefed them about the first and second alumni get together that were held at Bengaluru (14 June 2014) and New Delhi (13 June 2015) respectively. Like every Confluence event held previously, Dr. Chiranjeev referred to the alumni as gear of an institution, essential for its progress and evolution.

Dr. Kumar also briefed every alumnus about various whereabouts of the department and where it stands today. In the Academics section of his presentation, he focused on the infrastructural improvements, such as new additions to the department building in the form of labs, class rooms, JRF Hall, Seminar Hall, etc. He revealed how ISM campus is soon going to be 4G Wi-Fi equipped. He also mentioned about the surge in the intake of UG as well as PG students, and the number of Ph.D's being rewarded by the department every year. Moving on to the activities section, he elaborated more about various initiatives under CSES like CodeISM, Speak-Up, BufferedReader, CodeMarathon, ACM Student Chapter, Hackfest etc. He encouraged the alumni to read the bi-annual magazine of the department, "BufferedReader" to get timely updates about the Department and its activities. During the event, Dr. Chiranjeev also requested the batch of 2008 to continue the trends of organizing the next CodeMarathon- a proposal that the alumni proudly accepted.

Furthermore, Dr. Chiranjeev took this opportunity to discuss about the presence of CSE department at International Level. He informed about the various MoUs/Data Agreement signed by our department with various universities. He made a request to alumni in helping us to establish more contacts with foreign universities and industries. Dr. Chiranjeev also invited the alumni to be a part of the Annual Day of the department that had been scheduled on 27th August of the current academic session. He urged them to take this opportunity to interact as well as motivate the current students.

In the middle of the interaction session, Dr. Chiranjeev talked about the release of a Beta Version of SARC (Student and Alumni Relationship Cell), and encouraged everyone to sign-up in order to help the alumni share their thoughts directly with CSE students at a common platform. A list of members (Lifetime & Annual) of CSE Society was also presented during this session. He urged other alumni to become members of CSE Society and help the department as a member. Following his presentation, Dr. A. Tarachand delivered a brief speech in which he mentioned about the conversion of ISM to IIT and about how ISM fraternity has climbed a tall mountain by efforts of everyone.

Lastly, Dr. Kumar reasserted on the need of strengthening the Alumni base of CSE and their role in shaping the Department. He also ascertained that maintaining such a relationship would foster the growth of everyone - the current and prospective students, the Department, as well as the alumni. He requested the alumni to help in providing the much needed industrial exposure to the students by giving talks on the various technological advancements. On behalf of the students, he also requested the alumni to help in getting more companies in the pool which would help in internships and placement. He also opined that one Alumnus in each company should act as the CSE Ambassador so that they could be the point of contact between the Department and the company. Various suggestions during the event from the alumni side included inviting HRs to Confluence or similar events, launching a technical newsletter with a focus on various trends in the industry, etc. Some of the alumni emphasized on exposing the students to a collaborative project working environment rather than focusing solely on competitive coding skills.

As the event proceeded toward an end, Dr. Chiranjeev Kumar and Dr. A. Tarachand thanked everyone who extended their help and support to make Confluence 2016 a success. He also requested the alumni to contribute in the best possible way to fulfill the objectives of this department for its all-round development. The alumni felt jubilant and heart touched by the event, and opined that such events must continue to be organized in times to come. ■

DEPARTMENT HIGHLIGHTS

DIRECTOR'S MESSAGE

Prof. D. C. Panigrahi (Director, ISM Dhanbad) congratulated the Editorial Board of Department of Computer Science and Engineering on successfully coming up with the fourth edition of *BufferedReader*. He was happy to discern that the magazine pours an insight into everything trending in the world of Computer Science. He expressed belief that the efforts of the Editorial Board, through the magazine, will surely culminate in placing the Department to an unprecedented repute and be a forerunner in bringing pride to the Institute.

Nishit Dabi B.Tech 2018
Aditya Thakre B.Tech 2019

ACHIEVEMENTS

Convocation:-

ISM Gold Medal

Mr. Manvender Sirohi - M.Tech (CSE - 2014)
Mr. Prakhar Rastogi - B.Tech (CSE - 2014)
Ms. Arunima - M.Tech (CSE - 2015)
Mr. Gaurav Pathak - B.Tech (CSE - 2015)

ISM Silver Medal

Mr. Vaibhav Sethi - B.Tech (CSE - 2014)
Mr. Jayant Tiwari - B.Tech (CSE - 2015)
Mr. Ramesh Kumar Huda - M.Tech (CSE - 2015)

ISMAA Best Sports Person

Mr. V. Murahari - B.Tech (CSE - 2014)

Krishna Anisetty-B.Tech(CSE - 2006) won cars.com Excellence in Technology 2015.

Higher Studies in Foreign Universities

Mr. Chakresh Singh (B. Tech. 2010) took admission in the University of Cincinnati with a University Student Scholarship of 10, 932 USD.

Mr. Sunny Raj (B.Tech.2011) took admission in the University of Central Florida in Computer Science for PhD programme with full scholarship.

Mr. Amar Nath Patra (M.Tech 2013) took admission in the University of Nevada, Reno for PhD programme.

Mr. Nikhil Junneti (B.Tech 2014) took admission in Stony Brook University, New York for MS.

Ms. Prachi Chauhan (B.Tech. 2016) took admission in the University of Texas at Dallas for MS.

Higher Studies in India

Ms. Anusha Shenagavarapu (B.Tech.2015) took admission in IIM, Calcutta.

Mr. Mohammad Huzaifa Sabir (B.Tech 2016) took admission in IIM, Ahmedabad.

Mr. P. C. Srinivasa Rao (Research Scholar) has been selected for Post Doc at IIIT Bangalore where he will work on a project which is jointly funded by the University of Twente, Neatherlands and IIIT Bangalore, India.

Mr. Vivek Kukreja (M.Tech – CSE) has been selected for Google Summer of Code (GSOC) this year and the title of his project was 'Improvements in Tracing framework under RTEMS'.

SHORT TERM COURSES

Various short-term courses were organized so as to keep the students updated with technological innovations and their work processes.

Proposals for three short-term courses have been put forth.

03 to 05 March 2016 | Network Protocols and their Simulation using NS-2.

01 to 03 June 2016 | Data Storage and Processing Techiques in Cloud Computing.

13 to 17 June 2016 | Image Processing: Algorithms and Applications.

20 to 24 June 2016 | Algorithms for Wireless Sensor Networks with Recent Trends.

14 to 18 September 2016 | Hands-on session on MONOSEK Real Time Network Packet Processing and Network Session Analysis Tool.

19 to 23 December 2016 | Active Contours and Active Surfaces in Image and Video-Processing.

04 to 07 January 2017 | Data Mining and its Applications.

Mr. Purushottam (B.Tech. 2010) cleared **UPSC Examination.**

RAIT 2016

The Department of Computer Science & Engineering organized its 3rd IEEE International Conference of Recent Advances in Information Advances in Information Technology during 03-05 March, 2016. Padma Shri Prof. Sankar K Pal, former Director of ISI Kolkata was the chief guest of the function, while Mr. Sushil Chandra, Head of Bio-Medical Engineering, INMAS, DRDO was the guest of Honour.

FAREWELL OF DR. SUKOMAL PAL

Dr. Sukomal Pal has been an integral member of CS fraternity since December 13, 2010. He has been the faculty in charge of the *BufferedReader* since its inception. He has been a figure of inspiration during the time he spent with us. Words are not enough to express our gratitude towards him, but still we must do whatever we can, and convey our sincerest regards. Sir, we wish you all the very best for your future.

WELCOME FRESHERS!

Dear Students,

You sure must have made yourself home with this institute and the department by now. It is undoubtedly an interesting time to be in the field of Computer Science & Engineering at ISM Dhanbad, with a lot of positive changes in the landscape of its placements, research scope and having its presence felt at the industrial level. A lot of credit goes to the Computer Science & Engineering Society (CSES) and the ACM Student Chapter of ISM Dhanbad, which together promote the all-round development of students by organizing their respective guest lectures, coding competitions and workshops. The students, through their initiatives such as CodeISM and SpeakUp have also contributed in improving the Coding and speaking skills of the current students. CSES simultaneously is responsible for fostering relationship between the current students, the alumni and the faculty members by organizing various events like Udbhav - the annual day celebration, Confluence - the annual alumni meet, and farewell. The editorial board of CSES brings out the bi-annual departmental magazine *BufferedReader* which presents CSE at ISM inside out. The department wishes good luck to all the bright minds of the country that have joined the ISM CSE family on this endless journey of progress.

New Infrastructure

CSE Lab – IV, JRF Hall, Seminar Hall, and Classrooms have been added to the department building's top floor.

Ph.Ds Awarded

Baijnath Kaushik and Abhimanyu Kumar have been awarded Ph.D. by the Department.

Branch Changer's

This year, while one student chose Dual Degree CSE, a record breaking 81 students changed their branch to B. Tech CSE.

CONDOLENCE MESSAGE

" Death may indeed be final, but the love we shared while living is eternal "

-Don Williams, Jr.

The Department of Computer Science & Engineering is deeply saddened by the tragic loss of one of its brightest students **Mr. Sushant Kumar** of the **M.Tech batch of 2016**. The department shares its grief and deepest sympathies with the family of the bygone, and all those affected by his sudden demise. We pray for his soul to rest in peace.

INTERNS' EXPERIENCE

Nishit Vivek Dabi, B.Tech 2018
Pranav Prashant Thombre, Dual 2019

As the interviews approached, I didn't prepare specifically for them. I used to take part in programming competitions regularly, and this enabled me to perform well during the interviews. They help you improve your knowledge of data structures and algorithms.
My experience at Google was incredible. The work culture at Google is unparalleled. I especially enjoyed the food.
During my time at Google, I mainly worked on two projects. I am currently not allowed to divulge the name of both these projects. My first project was a visualization service for a data/metrics monitoring library. My work was mostly on the back-end (Java). This project was launched during my internship. My second project was a dashboard on top of a Regression Analysis (and automated alerts), which our team has been doing. I had to write everything from scratch, using mainly Python and Javascript.
During my time at Google I worked under a manager, but I was assigned two mentors. Both of them were very helpful especially when I needed to ramp-up on internal tools and technologies.
I would advise my juniors to take mock interviews, either with their friends or seniors. This really provides an impetus to your preparation. Anything you write in your resume is fair game for the interviewer. So do not write anything that you may not actually know completely about. Unless the question asked in the interview is very straight forward (like implement a Queue with 2 Stacks), don't give away the optimal solution immediately. Even if you do solve the question on the spot, they'll probably think you solved it before. Walk them through a brute force solution first. These were the points I kept in mind while preparing for my interviews.

Vamsi Krishna Avula

Google

Ashish Kumar

<CODE_NATION>

I have done a lot of competitive programming which helped me get an intern in CodeNation. Besides that, I have read GeeksforGeeks and solved problems on Leetcode and InterviewBit. I also practiced to write code on paper and believe me it is tougher than writing on an IDE or a text editor.
Working at CodeNation was a nice experience and the environment was good. Since, I am new to development area it was a bit difficult for me to adjust in the culture. The best part was that they organized outing every week. One can work from home (not interns). Work hours are highly flexible. All employees are friendly and one can learn a lot from them.
Our project was based on Java rules which is a part of Aline: a product for increasing developer productivity. We had to analyze a lot of Java code of various products. I learnt a lot of concepts related to Java. We used Python for coding.
In CodeNation, we used to directly report to our manager. Our mentor used to guide us and review our codes and we used to keep him updated about our current progress. The team at CodeNation is very small, so it was easier to communicate and clear our doubts.
Coding helps you to grab an internship but for surviving in the company you need to have good technical skills and development background. The company expects you to be sincere about your work and finish the project on time. They want their interns to be versatile. They are not going to teach you everything. So start developing anything that you like.
My advice to juniors is – switch to Linux environment from Windows and have a good command on data structures.

Arista was always the company I was targeting. I was very interested in Operating Systems and Computer Networks, and these factors helped me decide that Arista was the company for me. To prepare for the interviews I mainly used Interview Bit. This website helped me develop an in-depth understanding of data structures and algorithms. I also made sure I was proficient in my knowledge of C and C++, before the interview rounds.
I had a fantastic time working at Arista. The work culture prevalent in the company is unparalleled. There was no dress code, and we were allowed to come and go as we please, as long as we kept to the assigned deadlines. My project was titled "GDB macros for IS-IS Routing Protocol". GDB is used to debug live processes or a dead process through its core file. We had to write scripts to walk through the IS-IS related data structures in the core file and dump their state so that the debugging process becomes easier. To proceed towards the project, we first had to understand the code of IS-IS protocol which was implemented in C and figure out the complex data structures which were used.
The people at Arista were really helpful. My mentor was really supportive. Whenever I hit a road-block in my work, he was always ready to help. He always encouraged me and my fellow interns to contact him if we ever faced a difficulty in completing the task that was assigned to us. I always worked diligently on the task that was assigned to me, and I made sure that all the code I wrote was free of bugs. This was the factor which helped me clinch a PPO at Arista.
I would advise my juniors to divide their time and master data structures and algorithms, as these topics are crucial. Coding skills cannot be developed in a short amount of time.
So it is my advice to the juniors to utilise their time productively, and ensure that they make the most of it.

Kodali Bhargav Teja

ARISTA

Vedika Loiya

Microsoft

To prepare for my interviews I mainly spent my time perusing through Geeks for Geeks, studying the data structure and algorithm tutorials. Specifically for my Microsoft interview, I spent some time looking over Operating Systems, as the company normally asks a few questions from this topic. I took competitive coding pretty seriously in my second year, so I was pretty confident in this aspect before the interviews.
My time at Microsoft was amazing. We were individually assigned a mentor, who would guide us as we worked towards completing our respective projects. I think the memorable aspect of my time at Microsoft was probably the work culture. There were no fixed timings. We were allowed to come and go as we pleased as long as we met the deadlines that were set for us.
During my time at Microsoft I mainly worked on VSTS(Visual Studio Team Services). I was asked to improve the pre-existing contextual search algorithm, in the search engine. I mainly used Typescript(an improved version of Javascript), C# and JQuery for this task. My work on this project was both on the front-end as well as on the back-end, and I was asked to add extra features and functionality to the project. Initially, since I was unfamiliar with the languages, my mentor helped me in this regard. Since I was working on improving a pre-existing project, I normally had to consult with him at every juncture of the development process. He was really helpful, and his guidance was unparalleled.
I completed the project to my mentor's satisfaction, and I think this was the vital factor that helped me clinch a PPO. Advice for my juniors would be to utilise their time productively. They should work towards honing their coding skills and undertaking several projects, as these aspects are crucial during campus placements.

From my perspective, GS believes more in testing one's thinking ability rather than the number of coding tools and techniques you know. I prepared by solving ad-hoc coding problems rather than simple straightforward topics.

GS comes under Fortune's top 100 companies to work. It can give us an idea of the esteem quality of its work culture. During the internship they treated us as a full time employee and gave equal responsibilities. GS has a pretty diverse workforce. You get to learn and collaborate your work with people from different locations all over the world. Apart from usual stuff, various gaming competitions, inductions and celebrity networking sessions were conducted for the entertainment and personality development of the interns.

I worked there on a web based trading application to add a rescue management tool. It provided me an awesome opportunity to learn a wide variety of technologies ranging from Hadoop and HBase in backend to AngularJS and Bootstrap in frontend. Along with the development part I dedicated a lot of time in learning new testing frameworks like Jasmine, Junit to test my code.

All interns at GS were assigned a 'Mentor' and a 'Buddy'. Both were quite friendly (they never let me refer them as 'Sir'). GS also follows an open door policy, you can walk in and share your ideas with anyone anytime. Besides, my mentor always guided me to learn as much as possible during my tenure as an intern rather than focusing on completion of my project.

During your internship, GS assigns you some meaningful work which is a part of their live projects hence it expects a reliable and quality development from your side. Also the company expects its interns to understand their business and work culture followed throughout the firm.

Getting a PPO is not at all an easy task. Ialways tried to give more than expected in the given time. I showed my excitement to learn new things, and used to ask a lot of questions. I also used to participate actively and came up with new ideas even when not asked.

Neeraj Patidar

Goldman Sachs

Paras Sharma

SAMSUNG

My preparation for internship was mostly through the online competitive coding sites. I specially solved problems on GeeksforGeeks, InterviewBit and Hackerrank. I also looked some topics specific to companies on the internet which helped me to get a rough idea about the question asked.

Working at Samsung was a very nice experience. Apart from the project, we had many activities over there. They organised a Hackathon for us, celebrated the Interns' Day and we enjoyed a lot. The environment of Samsung is good. People are very helpful over there and you get a chance to learn and develop your skills. Samsung expects its interns to learn new things and learn about company's environment.

My project was on Internet of Things (IOT). I had to develop a sensing and recommendation engine for smart IOT. My mentor was really supportive. He used to guide me every time on what to do and what not. He cleared every single doubt and confusion I had and assisted me in every possible way.

When you are working as an intern, you need to be regular. You cannot procrastinate the work and have to complete it on or before the deadline. You need to interact with people and your attitude should be good because if they will find you annoying they are definitely going to throw you out. The PPO is majorly based on rating by your mentor. In Samsung, we had a coding round followed by two interviews – one HR and one technical.

Communication skills are important because during your internship, you have to present your projects and communicate with others. You have to be very fluent and confident about what you are saying.

My advice to juniors would be, "Just do coding else you will not get anywhere".

STUDENT ACTIVITIES

Maheshwara Reddy, Dual 2018

Vaasudev Narayanan, B.Tech 2018

RAIT 2016

The Department of Computer Science & Engineering organized its 3rd IEEE International Conference on Recent Advances in Information Technology during 03-05 March 2016. The event saw massive participation from students, professors and researchers alike. A total of 122 papers were presented during 17 technical sessions. All in all, the event couldn't have been a huge success without the blood and sweat of student volunteers, whose unrelenting efforts made RAIT 2016 a memorable one.

CONFLUENCE 2016

The 3rd CSE Alumni get-together, Confluence-2016 was organized by the Computer Science and Engineering Society (CSES) of the Department of Computer Science & Engineering, ISM Dhanbad on 11th June 2016 at Bengaluru. It has seen huge participation from alumni as well as the present students and showed great enthusiasm throughout the event. The alumni felt jubilant and heart touched by the event, and opined that such events must continue to be organized in times to come.

FAREWELL

Regardless of what going separate ways is hard. With heavy hearts, the Department of CSE organized the farewell for the batch of 2016 on 1st May 2016. The evening was filled with Selfies, laughter, photoshoots, writing messages and everyone was busy making their memories. Department wishes a great time ahead for all of them.

HACKFEST ISM

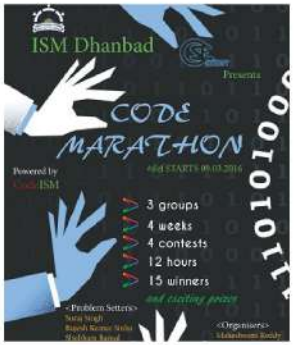
In the first such an event organized in Indian School of Mines, Dhanbad, the Computer Science & Engineering Society hosted the annual Hackathon from March 4th to March 6th in the Penman Auditorium. The fest inaugurated with the esteemed presence of Dr. Chiranjeev Kumar, Head of Department of Computer Science & Engineering, Mr. A C S Rao, Assistant Professor(CSE), Dr. Soumen Bag, Assistant Professor (CSE), Dr. Abhishek Singh, Assistant Professor(Applied Mathematics) and Dr. Mritunjay Kr. Singh, Associate Prof. (Applied Mathematics).

The fest bore witness to a plenty of intriguing ideas born out of students' creative minds. A total of 52 teams, consisting of 1-5 members each, took part in the mega event that extended over 3 days. The projects ranged from web development, chip testing and geoposition detectors to Virtual Reality and Big Data Clustering.

The event was sponsored and judged by a team from **Atkins Systems.**

CODE MARATHON 2.0

The Department of Computer Science & Engineering in collaboration with the Class of 2007 and CodeISM successfully conducted the second iteration of the annual month long competitive coding competition - Code Marathon. Like the previous year, the event comprised three Divisions - one for the final & third years, one for the second years and one for the first years with a participation of 92, 120, and 62 students in the respective divisions. A big shoutout to the problem setters and organizers for maintaining the high standards set by first edition of Code Marathon. The difficulty of the problems was just the ideal amount - not too easy that everybody solves it and not too hard so that no one solves it! They took the painstaking effort of checking each and every submission manually and ensuring the maintenance of the authenticity of the event. They did a wonderful job. The alumni cannot be thanked enough for their active support and cooperation. The future looks bright and the only way to go from here is in the forward direction.



WINNERS

First Division

Naman Taneja
Raj Jha
Aman Ranjan Thakur

Second Division

Vaibhav Goyal
Jayant Sharma
Samanway Dey

Third Division

Harman Kahlon
Abhishek Bansal
Anupam Wadhwa

ACM ACTIVITIES

INDIAN SCHOOL OF MINES, DHANBAD

POWERPUFF CODERS 2.0

The annual competitive coding contest was conducted by ACM-ISM Student Chapter on 11th February, 2016. The event was solely intended for the girls of ISM, Dhanbad. It comprised of two divisions - one for final, third & second year and the other for first year. It witnessed a participation of 39 students. The winners for division 1 were Shreya Mour (3rd year, ECE), Aishwarya Raimuley (3rd year, CSE) and Nikita Kapoor (2nd year, M&C) in chronological order. The winners for division 2 were Daisy Modi (1st year ECE), Puja Kumari (1st year CSE) and Akanksha Sahay (1st year ECE). The problem setters were Gaurav Singh (2nd year, CSE), Ashish Verma (2nd year, CSE) and Aditya Kaushik (2nd year, CSE).

GSoC WORKSHOP

A workshop cum seminar was held by ACM ISM Dhanbad Student Chapter on Introduction to Google Summer of Code and Open Source Coding on 15th March at 6:00 pm. The event was held at Penman Auditorium. The one hour interactive session was conducted by Sujay Raj Jha(5th year, M&C) where he introduced students to the concept of Open Source Coding and Version Control Systems(VCS). He also talked about GSoC as a mentoring platform which picks students for real world software development projects and the procedure to be followed to apply for it.
ACM Spring of Code, a competition on the lines of GSoC for developing an Online Judge was announced for the students of ISM. It was held from 17th March, 2016 to 6th April, 2016.
A total of 500 students attended the workshop cum seminar.

ODE - DE - CODE

Ode-De-Code 4.0 - the biannual competitive coding contest was conducted by ACM-ISM Student Chapter on 10th February, 2016. The event comprised of three divisions - third & final year, second year and first year. It witnessed a participation of 300 students. The winners for division 1 were Prince Raj Kumar (3rd year, CSE), Anant Kumar (Final Year CSE), Aman Ranjan Thakur (3rd year, CSE). The winners for division 2 were Krishna Kumar (2nd year, ECE), Abhishek Jaiswal (2nd year, CSE) and Ashish Verma (2nd year, CSE). The winners for division 3 were Puja Kumari (1st year CSE), Swatantra Gupta (1st year CSE) and Rishabh Bharti (1st year CSE) in chronological order. The problem setters were Naman Taneja (4th year, CSE) & Ashish Kumar (3rd year, CSE).

CODING WORKSHOP

A workshop on 'Introduction to Coding' was held on 5th February from 6 pm at GJLT. The workshop was split into two sessions considering the huge participation of first years. 340 members showed up in both session for the workshop. The importance to coding was emphasized and students were given resources for the same.

BIG DATA WORKSHOP

ACM ISM Dhanbad Student Chapter organized a Tech Talk on "Big Data using Hadoop" which was delivered by Mr. Ramu Malur, Architect - Data Engineering at WalmartLabs on April 7th, 2016, in Management Hall. Around 70 members attended the event.

ALUMNI PEN

User Experience in

CELLULAR COMMUNICATION

Sanjay Kumar Biswash
PhD. 2012
Researcher on Energy Efficient Networks
Tomsk Polytecnic University

I have a good experience from ISM. The ISM has the potential to lead in the global market (research and academia), and can achieve a milestone in next-generation-research. The research and innovations is platform where you can show your potential, and peoples will follow you. Here I am recommending everyone to think about the research as a carrier and it is an only one platform where visualization makes the reality. It will helps you to make a complete personality, and you will get-rid-of ego, bossism, self centric conservative thoughts.

Mobile cellular communication is a leading network communication tool in modern era. The industry and academia is working collectively for Quality of Experience(QoE) related to cellular communication. In the past decade, we were completely focused upon technical aspects of the mobile networks. Only now are we looking forward to a better user experience rather than costly and complex technological details.

Consumers are greedy for cheap, energy efficient, reliable, and high throughput based communication networks. This is the motivation for several network technologies, such as the Internet of Things (IoT), Software Defined Networking (SDN), Fifth-generation (5G) networks, etc.; and all of which are targeting for better, fast, reliable and a cost efficient communication. For example, the 5G network has is targeting to achieve 1000 times more speed at a 100 times lesser cost. It is essential to realize that these targets are not easy, and need fundamental changes to the existing cellular technology. People are ready to accept the certain changes in the current cellular technology, such as Device centric communication, massive MIMO, intelligent device, etc. There are several challenges associated with these, a couple of them include Physical and Network layer management.

Most of the challenges can be solved by the extreme densification of mobile base station and systematic arrangement of multiple antennas. If we implement device-based communication with the association of 5G, then it will be a remarkable achievement in the modern communication domain. The suggested idea will reduce the cost associated with communication, and yield a better throughput. With the help of above techniques a mobile user can communicate with other cellular device without any interface of cellular base station. But this particular technique has certain open research challenges, such as :

Relay selection techniques

If the source and target mobile user are very distant. They would then need an intermediate node such as a relay node.

Bandwidth and link utilization techniques for user-centric networks

The mobile user will sense link utilization, and based on the result the user can initiate the quality of experience services.

Green and energy efficient networks

Where "green" represents minimum carbon dioxide emission. Energy efficient networks show the least energy consumption for long distance (hop-to-hop) communication.

These suggested techniques are bound to enhance the user experience and improve the network coverage in a given area. The cell breathing (cell zooming) will be also applicable in the base station densification, and it helps for context aware networking. If the user load is less in a particular coverage area then the mobile base station serving area will shrink, and this results in uniform load distribution. The proposed idea is a deployment of device centric networking in the cellular communication. The device based communicating was initially introduced in cellular networks as a new paradigm to enhance network performance to increased spectral efficiency and reduced communication delay.

We can implement the said concept in following ways:

The relay selection and link utilization can map a very natural process, such as least utilization of path. In general we follow the least utilized path to travel from source to destination. The same methodology can be applicable here. Compute the least utilized path based on SNR, energy, delay etc. and select the best one.The green networking aims at lesser carbon dioxide emission. We can deal with it with the envision of two-tier cellular network that involves a macro cell tier (i.e., BS-to-device communications) and a device tier (i.e., device-to-device communications) network topology, which will provide a better cell coverage and less signal loss, and will also lead to lesser energy consumptions. The proposed architecture will be a dramatic change from the conventional cellular architecture and will also bring about a unique technical revolution. In such a two-tier cellular system, since the user data is routed through other users' devices, security must be maintained for privacy. To ensure minimal impact on the performance of existing macro cell BSs, the two-tier network needs to be designed with smart interference management strategies and appropriate resource allocation schemes. The theoretical aspect of idea can be achieved by mathematical analysis and practical implementation of it can be done by programmable GNU radios and daughterboard design. (The complete above discussion is based on my own experience). ■

Student Contribution: *A sketch by Rishabh Mehta, B.Tech 2017*

STUDENT'S CONTRIBUTION

Stop

Lend your ears to hear your own self out,
Rushing to and fro without a minute to think,
There are still things that you don't know about,
And life rushes by like an eye's blink...

Stop...
To see for once the world around,
The ones needing your attention all surround,
With many unnoticed and crashed to the ground,
How come you missed someone so profound?

Stop...
For those who once cried for you,
Still helpless to come out of the blue,
For whom you are the morning dew,
All they desire is your relation with them to anew.

Stop...
To notice what has been lost,
The feelings have died out of your heart's frost,
But who's going to pay and at whose cost,
For in the end it is only you who exhaust...

Stop...
To accept all wrong you have done,
The sins won't go even if you try to run,
Set them right under the sight of the sun,
To restore the happiness and the accompanying fun...

And at last move...
With everyone who mean to you in this life,
Who were with you in success and strife,
Forgive and forget- let everyone one know,
You didn't walk on the flowers
While worrying about the weeds to grow...

Harsh Ranjan B.Tech 2019

A leap of faith

My truth and my pain,
My world flows in tear.
My smile is a mask,
Wear 365 a year.

A year in four will come,
Your hideaway will smear.
With truth on thy face,
We meet in leap year.

My truth is thy name,
It's far away I fear.
Just words in the black,
You send to me my dear.

My world might be distant,
My soul is always near.
A year in four will come,
We meet in leap year.

Raj Roushan B.Tech 2017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