

MAR 2015

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BUFFERED READER

AN INSIGHT INTO CSE



INTO THE
FUTURE
COVER STORY

NEXT GENERATION ASSEMBLY OF
SEQUENCING DATA
PROF. MOURAD ELLOUMI



IN CONVERSATION WITH
YASH SHARMA
ALUMNI PEN

REC ●



Cover by Tushar Turkar (B.Tech, 2015)



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FROM THE HOD'S DESK

Dr. Chiranjeev Kumar

“ You have to learn the rules of the game. And then you have to play better than anyone else.

- Albert Einstein

The first edition of *BufferedReader* was formally released on 30th August, 2014 by our Director, Prof. D. C. Panigrahi during the annual day celebrations of the department. I hope you all have enjoyed reading about the exciting things that have been happening in the Department of Computer Science & Engineering. The editorial board of the department has learnt the rules of the game by publishing the first edition of *BufferedReader*. And now it's time for them to play it better than they did for the first time to ensure that the successful publication of *BufferedReader* is continued.

The Department of Computer Science and Engineering has always had students who have actively been following a tradition of creative endeavors amalgamated with a will to strive for perfection, *BufferedReader* being one of the examples. This magazine clearly demonstrates the initiatives of students, apart from their commitment towards academics, thus enabling the accomplishment of Department's goal of all-round development of students. The main objective of the Department is to encourage each student to develop as an independent and creative thinker, ensuring their intel-

lectual, ethical, and social development, so that they can cope up with the pressures and demands of today's competitive market. In today's era, corporate firms seek only extraordinary talent. Therefore, it is imperative for one to cross the realm of ordinary.

My sincere thanks to all my faculty colleagues and my students who have contributed significantly to the success of the department and also in coming up with the second edition of *BufferedReader*. I applaud the contributors for their stimulated thoughts and varied hues in articles contributed by them. I am hopeful that this small piece of literary work shall not only develop the taste for reading among students, staffs & faculty members but also instill a sense of belongingness within the department. I believe our *Buffered Writers* would continue to Buffer the information for the Readers in future as well.

I appreciate honest and frank feedback on the quality and contents of the *BufferedReader* so that we can improve.

Happy Reading!

THE EDITORIAL



Dear Reader,

The fact that you are reading these words is assertion enough that you have spared time off of your busy schedule for the second edition of Department of CSE's bi-annual magazine - *BufferedReader*. We are extremely grateful to you for that.

Following up a praised and liked maiden issue was a frightening prospect when we set out to sketch what the second edition would look like. Can we get our readers back for more? Did we pique their interest? Can we better it? Questions bugged us, and answers had to be known. So here we are, trying to conjure up the magic trick once more. The words this time have flown in from all over the globe, a professor from Tunisia, an alumnus from Washington, US. We are bringing you the depths and breadths that our department has aspired to and touched upon.

In ways more than one, this volume is a symbol of progress, growth. Our cover story itself talks about the nature of progress, timeless like an immortal truth, a never-aging beast built of aspirations and ambitions of mankind.

Technology and its integration in our lives has been a telling metric of this progress. We have paddled our way through ages, on the ground, on water, in the air, all owed to our majestic little creations - the machines. We have evolved to a time where the days of scholars who would retell the tales of lost past, predict the verses of an unseen future are long gone. Information, a job men spent their troublesome days collecting doesn't take any of their involvement today. The knowledge which elevated some to the riches of fame is a plethora of feeble electronic signals today.

But, when progress, the fuel of life, becomes a product of machines, what do we become?

Today, what's earning a poor man his wage, a machine does for cheaper. What is making decisions of millions could be an efficient artificial intelligence rather than an overpaid brain of a human.

A man without a purpose is a man in dead slumber. The fantasy of an end with no future might remain unfulfilled forever to come, it's not an apocalyptic tomorrow that we dread. Our legacy is much stronger than that. We shudder at the glimpse of that future where humanity is measured in flesh and blood.

Immortality has always been at cross with peace and merriment. Poets of vibrant and vivid illusions have sung verses of such agony, that every soul will vouch for the bliss of mortality.

Where, then, and what are we headed towards. An unkempt fog, a blinding mist, an unmeasured reach and an unknown destination. Fear is not of perishment of body, it's that of the soul.

Or maybe, what comes next to the acme of success, as has always, is a fall to put us back at the foot of this mountain. We climb, we fall and we climb again.

Maybe, we really are a hamster in a hamster wheel.

But as far as we see, there is light and hope. Engulfing it, as we move, we present to you our department's recesses in success, in growth and in glory.

Happy Reading!

WEARABLES

The world quantified becomes data, the data made sense of becomes information, the collated information becomes knowledge and the knowledge, thus scientific, when practically yielded becomes technology. Technology, as Bill Gates very rightly said, is a tool. Technology is not the answer, it, at its best, is an assistant in such a pursuit.

Lifetimes have been spent honing this tool and it has never been sharper than what it is today. It is, but, natural to marvel at all that technology could do and, in future, will. Technology has had many faces, from the earliest classical mechanics to the age of electricity to today's era of electronic intelligence.

Practically yielded knowledge becomes technology, becomes a machine. Machines like the one used to print these words, like the one being used to read these words, have been helping humans simplify the rather insignificant tasks of their daily lives for ages now. Slaves to human masters, they have become inseparable entities of their existence. It then becomes innately imperative that the conversation between two unequals be smooth. An improvement in this conversation is what has progressed the use of wheels from being propelled by raw human effort to being propelled by a swift pressing of an effortless paddle.

The electromechanical companions of humans, our gadgets form the focus of our interest today. A tap on an illuminated brick, flicks of fingers on a confused block of letters, and commands in a common tongue are some examples of how we interact with them. This shift of effort between men and machines has been tremendous.

The bright, uncertain future is awe-inspiring, and *BufferedWriters* bring to you a roadmap into the unknown. The machines of future, and the effortless modes of conversation compiled into three of the most promising and likely outcomes - The Wearables, The Drones, and The Virtual Reality.

INTO THE FUTURE

with Wearables, Drones & Virtual Reality

Hind K. Geel, B. Tech 2015
Saurav Kothari, B. Tech 2015
Shantanu Mishra, B. Tech 2017

When James Cameron came up with the highly successful sci-fi movie 'The Terminator', it not only opened human imagination to the possibility of a cyborg, but also gave breathe to speculations whether we will be able to invent such devices ever. Some 30 years later, when Sergey Brin, co-founder of Google, publicly announced Glass in an event by Foundation Fighting Blindness, the question was no more "will they?", but instead "how far they will?"

Wearables are promising to play such a crucial role in the next generation of technology that even the most trending gadgets today might fail to find a place in your pockets in the next five years or ten. Imagine a world where you can virtually have your family right in front of your eyes, looking through a glass. A world where your wrist watch can measure your blood pressure and return a daily analysis of your workout, where your clothes would replace the necessity of a charger for your smartphone. The gadgets are not even part of a wishful sci-fi, they are very much the reality of today. Wearables have finally succeeded to bring technology to the closest proximity humans have ever succeeded, with projects undertaken as far as creating underskin chips.

Wearables are mostly indistinguishable from accessories whose design they seem to imitate, except the fact that they are actually intended to interact with the user without punching keys or other physical stimulation. Like most gadgets, they too have the hardware such as a watch or a fabric and the information aggregator or analyzer. Information aggregator collects samples of data through which a user can interact with the wearable, say a voice command or through a photosensitive fabric. When the wearable is stimulated by the user, the aggregator evaluates the instructions in real time to execute the proper course of action/response.

The Past
It's a fact lesser known that the technology behind wearables finds much of its history in attempts at cheating casinos. Some of the first wearables were introduced in 1960s and 70s in the form of a pair of shoes and a jacket that could be operated using toes to count cards in a game of blackjack and improve a gambler's odds at the roulette table roughly by 44%. However, the technology remained dormant for the next few years apart from the outburst of calculator watches in the

market in 80s. The technology was admirable, but on most ends wasn't practical for the consumers, and with a barrage of controls, certainly not user-friendly.

Wearables reached their most significant milestone when Dr. Steven Mann, the man credited as the father of wearable computing, came out with a backpack, integrated with MOS Technology's 6502 microprocessor. The steel framed backpack could control photographic equipment and display it on the camera viewfinder attached to a helmet. He went on to invent the wearable wireless webcam, a device which clicked pictures from Dr. Mann's daily life and uploaded it on the web, an act which led many to call him, quite naturally, the first "life blogger". Dr. Mann was awarded a Ph.D. from Massachusetts Institute of Technology in Media Arts in the year 1997.

The Present

Wearables got catapulted as the new millennium saw many of the tech giants investing their resources for its development. Wearables started getting tailor made as per consumer requirements, integrating the gadgets in users' clothing and accessories. The hottest trend is surely the wrist-mounted devices, whether we talk about the smartwatches, the fitness bands or a combination of both. These devices can perform very basic operations of a smartphone, along with monitoring the health conditions such as blood pressure and glucose level.

However, it's not all about wrists that the

manufacturers are interested in. There's already a host of photo-snapping life-loggers available which can take pictures throughout your day and keep a log of your movements to build up a searchable and sharable photographic memory of your day, devices which can capture special moments spontaneously. In fact, wearables can even analyze your music preferences and play suitable music as per your state of mind.

As printed circuits and chips get smaller, the time is ripe for techy clothing to expand beyond capacitive gloves or head-phone-hats. Clothing is the tomorrow of wearables.

The much hyped Google Glass, glasses paired with optical an head mounted display, is able to easily respond to verbal commands, augmented by the occasional manual interaction via controls located directly on the frame. There has even been talk about eventually including a laser-projected virtual keyboard for times when voice command just isn't enough. And with the ability to access countless sources of information in seconds and then relay them to a miniature screen situated in the upper corner of the wearer's vision field, Google Glass sets itself apart from other emerging technolo-

gies. The company even aims to add all these functionalities in a contact lens, saving the company from flak it received for the awkward design of the initial version.

The Future

While we might be persuaded to wear contact lenses, implanted technology will likely be the preserve of medical applications, at least for the foreseeable future. Underskin chips might not be the most comfortable thing a person would like to have. Our clothes, however, are fair game for a wearable revolution. As printed circuits and chips get smaller, the time is ripe for techy clothing to expand beyond capacitive gloves or head-phone-hats. Clothing is the tomorrow of wearables.

Back in 2008, Georgia Institute of Technology reported having developed miniature power plant integrated with the clothes. These electricity generating wires create a charge when stretched and released, and if woven into a pair of trousers, could generate enough electricity to charge wearable sensors or even a smartphone.

Wearable clothing provides an incredible opportunity not just for fitness related products, but for retailers as well through monitoring of the local environment. Electronically wired clothing could recognize compatible nearby outlets of the same brand, direct the wearer to certain parts of a store, or light up in response to offers in-store.

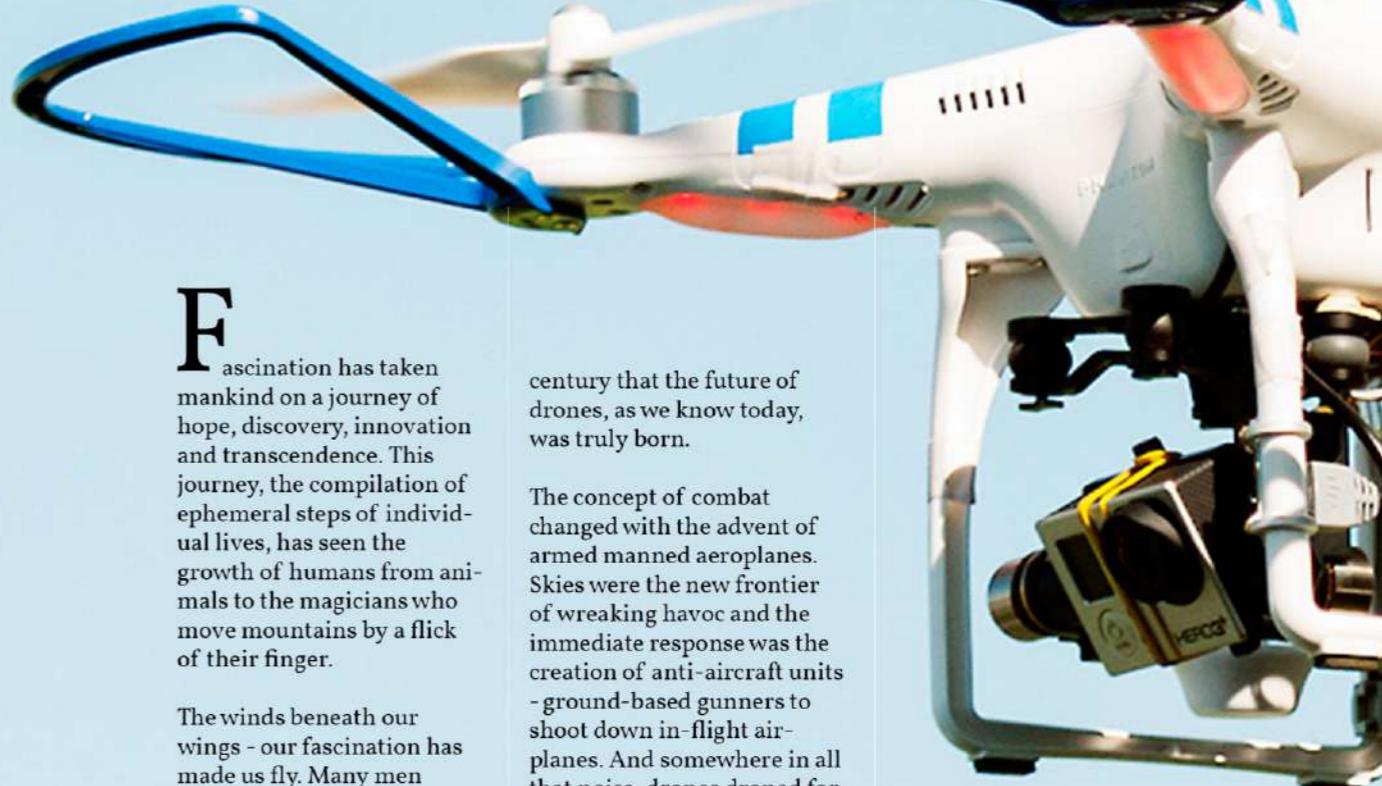
Focus of the wearables in the past has been around fitness products, a genre where wearables perform far better than their smartphone counterparts. How-

ever, the current genre of wearables have failed to please as far as fashion pundits are concerned, a flaw which has led to an increased demand of invisible wearables. Adidas is the closest to realize the vision with Adidas mi-Coach tank vest, which includes a heart rate sensor in the inner support bra. As integrated circuits diminish in size and improve in performance, athletes can transmit real-time data to their personal trainers and coach, and also for statistics for TV commentary and media.

Even with the far stretched scope, wearables have not quite been able to live up to the expectations. Study shows that 80% of the users drop out of using wearables by 6 months. The largest selling smartwatch, the Pebble Smartwatch has had a sale of 1 million units so far in two years. To put things into perspective, Android phones were highly criticized on their launch but only took 6 months to reach that figure. The highly anticipated Google Glass project had to sack its current version following allegations of breach of privacy.

While it is premature to predict specific features or form factors that will prevail in the future, wearable tech presents a fascinating field to study. Never before has computing been small enough to be worn relatively comfortably around the clock on the body, presenting opportunities for breakthrough medical advancements and daily life monitoring. With innovations on the horizon, it all rests on human creativity what they can achieve through this pathbreaking technology.

DRONES



Fascination has taken mankind on a journey of hope, discovery, innovation and transcendence. This journey, the compilation of ephemeral steps of individual lives, has seen the growth of humans from animals to the magicians who move mountains by a flick of their finger.

The winds beneath our wings - our fascination has made us fly. Many men looked up in the sky, envied the freedom of flying birds. Only one day, someone was so frustrated with this ostensible inability, that the next day humans could fly.

But the real power is not in doing the task, but in having the task done. The fascination, the power, and the opportunities took the shape of our flying minions we call Drones.

The Past

Drones, a term coined much later to their discovery, are pilotless aerial vehicle, the history of which dates back to mid-1800s when Austrians would attack their enemies using explosives-filled hot air balloons. The idea of birth of drones in combat use aligns quite aptly with our current perception of the technology. But it was only once Wright Brothers gave wings to human dreams of flying at the onset of 20th

century that the future of drones, as we know today, was truly born.

The concept of combat changed with the advent of armed manned aeroplanes. Skies were the new frontier of wreaking havoc and the immediate response was the creation of anti-aircraft units - ground-based gunners to shoot down in-flight airplanes. And somewhere in all that noise, drones droned for the first time. Not nearly as we know them today, but quite the dumb unreliable machines that could very crudely simulate manned planes.

Anatomically, the basic machinery of a manned aero plane took the shape of a drone when fitted with a radio-controlled gyroscope instead of human-pilot. It gave operational capabilities - controlling the roll, pitch, and yaw, to a ground operator who would fly the plane in the range-of-sight.

Development of UAVs progressed from being model enemies to assault weapons in the years following the First World War and during the Second World War. The year of 1936 saw the advent of unmanned aircrafts that could be controlled out of sight and whose flight details were monitored from the ground terminal based on a

radio feedback. Around the same time, the now ubiquitous term drone first came into being, derived from the British aircraft DH.82 Queen Bee.

Success in major part of target drones and assault drones led to their use for other missions like reconnaissance and surveillance during 1980s. In short, this time was a precursor to drones' use in ISTAR (Intelligence, Surveillance, Target Acquisition, and Reconnaissance) today.

The later half of 20th century witnessed another iconic development which later played a key role in making drones way more effective - the birth of satellite communications. The dream of satellite-controlled drones soon became a reality with Israel being the first country to employ them in combat in its war against

Syria during early 1980s. Drones were no longer needed to be pampered. As an instance, today a drone flying over Afghanistan is controlled by two crew members sitting in a trailer ten-thousand miles away in the deserts of Las Vegas, Nevada.

The Present

The helicopters are a great inspiration for today's drones. Quadcopters are today's 'IT' machine. Recreational UAVs is a trend that has spiked considerably in the last 5 years. They mostly come in the shape of a rotorcraft. The size varies from very small - nano-drones which could fit in the palm of your hand like the *Blade Nano QX RTF* drone to micro-drones to much larger professional-drones like the *DJI SpreadWings S1000*. Their ability to vertically take-off, hover at a point in space and move adeptly in restricted airspace gives them a natural advantage over fixed-wing aircrafts.

But it is not the mechanical breakthroughs that lend drones to be the forthcoming wonder. It's the science of computers. Computers have already though latent, played a part in the recent surge in drones' popularity. The small chip mounted on most of today's drones reads and studies itself, and based on the environmental feedback, keeps itself afloat. This includes managing its roll, pitch, and yaw while, most often, the acceleration is left for the sentient operator to decide.

Up in the air, they are given basic survival capability - to stay afloat without guidance. They listen to us and oblige on our commands. We have mounted cameras on them, allowing us to take beautiful pictures, getting to locations not readily humanly possible. This fur-

ther allowed the drones' employment for surveying purposes in archaeology, for guided pesticide treatment in agriculture; for property scouting in real estate; for scouting for victims in disaster management; border patrolling and many other such.

Drones equipped with IR transceivers are flown over a field of crops, the data relayed back is used to judge the health of crops. Scientists in the US have flown drones over whales to collect the data from the snot sneezed by the mammal based on which to judge its health and age. Sometimes the receiver making sense of what drones see and hear is a machine while at others it's one of us humans. With our eyes and ears in the air, we have become the Mister Fantastic of the lore.

The struggle in the development of machines has this unmistakable characteristic where we want to get rid of the human element guiding them. Drones have been no different.

The present is a turning point in the life of drone technology. Masses still believe that drones are something the US used for hunting down Al-Qaeda and Osama; Something that has forced Taliban to reconsider its brutal takeover of Afghanistan. Or maybe something to buy for their kids when they turn fourteen. But we are warming up to drones.

The recent news don't just talk about UK having the most advanced drone in their military fleet. We see some or the other lawsuit being filed against the regulations imposed by the governments of USA, UK, Australia, New Zealand on the use of consumer drones.

The Future

The struggle in the development of machines has this unmistakable characteristic where we want to get rid of the human element guiding them. Drones have been no different. The efforts today are focused to achieve autonomy in the flight of drones. Or in simpler words to get rid of the human operator. We are trying to put as much intelligence on these machines that would allow them to have a safe flight. All it will take is a set of instructions and the next thing we know we will be getting the data we need.

But the data is not good enough for us because it is an incomplete step of understanding. The concept of abstraction demands to put not just data reading capabilities but further data interpretation capabilities on these systems.

The oblivious consumer would ask its pet drone to go check on the health of his crops. The obedient drone would know the location of the farm, the parameters to identify with a healthy quality of crops. It will see, it will evaluate, it will judge and it will know. A flyby moment away, what the unknowing user gets in return is an objective answer, a Yes or a No. The human element is gotten rid of, in entirety.

Although simple enough to be true, the dream is yet to be a reality. For the technology is yet to grow and expand enough to ensure

pervasive presence of necessities for such intelligence, like GPS, like internet. In addition, there is the quality of flight systems, we don't have machines smart enough to understand the environment around us and its inconsistencies. Artificial Intelligence is growing, but it still is in its infancy to take on challenges of such magnitude. When we talk of an autonomous drone, we talk about a fully intelligent machine with wings, however, intelligence of such magnitude is yet to see the light of this day.

But that is not the primal concern, what sits firmly at the gates of this overbrimming dam is a bunch of socio-technical issues. Issues not to be taken lightly. Issues that have prompted aviation authorities of various developed countries to put regulations on drones' use for commercial purposes. Reasons vary from privacy concerns to terrorist threats to accidental hazards. If drones become smart enough to fly on themselves, the question would be what's stopping a maniac to put an explosive on it and crash it into a building? What's stopping a stalker to pry on someone's property?

A change without oppression isn't really an impactful revolution. The detractors will be galore, and like those countless times when an apparent demise preceded the onset of change, drones will be shot down.

But an army of drones is lurking at that farther horizon called future, and a dozen men with shotguns or a couple more of law-suits will be too less to tame them. They have come, they are yet to open their eyes, but for the infallible chronology, conquer, they will.

VIRTUAL REALITY



Virtual Reality, quite simply, is an illusory environment, engineered to give users the impression of being somewhere other than where they are. As you sit safely in your home, virtual reality can transport you to a football game, a rock concert, a submarine exploring the depths of the ocean or a space station orbiting Jupiter. It allows the user to ride a camel around the Great Pyramids, fly jets, or perform brain surgery. True virtual-reality does more than

merely depicting scenes of such activities — it creates an illusion of actually being there. Piloting a Boeing 777 with a laptop flight simulator, after all, does not really convey a sense of zooming across the continent 5 miles above the surface of a planet. Virtual reality, though, attempts to re-create the actual experience, combining vision, sound, touch, and feelings of motion engineered to give the brain a realistic set of sensations.

The Past

"The last step was moving from a command line interface to the visual interface. Maybe the next one was when you might be totally immersed in the world."

- Howard Rheingold Journalist and author of "Virtual Reality, one of the definitive historical accounts of VR"

Some people identify the birth of virtual reality in rudimentary Victorian "stereoscopes," the first 3D picture viewers. Others might point to any sort of out-of-body experience. But to most, VR as we know it was created by a handful of pioneers in the 1950s and 1960s. In 1962, after years of work, filmmaker Mort Heilig patented what might be the first true VR system: the Sensorama, an arcade-style cabinet with a 3D display, vibrating seat, and scent producer. Heilig imagined it as one in a line of products for the "cinema of the future," but that future failed to materialize in his lifetime.

In 1965, Ivan Sutherland — already known as the creator of groundbreaking computer interface Sketchpad — conceived what he termed "The Ultimate Display," or, as he wrote, "a room within which the computer can control the existence of matter." He demonstrated an extremely preliminary iteration of such a device, a periscope-like video headset called the "Sword of Damocles," in 1968.

Meanwhile, at the Wright-Patterson Air Force Base in Ohio, military engineer Thomas Furness was designing a new generation of flight simulators, working on a multi-decade project that eventually became the hallmark program known as the Super Cockpit.

A few years later, in the late '60s, an artist and programmer named Myron Krueger would begin creating a new kind of experience he termed "artificial reality," and attempt to revolutionize how humans interacted with machines.

Throughout the late '90s and early 2000s, virtual reality companies continued to operate, but with a

“What is real? How do you define real? If you are talking about what you can smell, what you can taste and see, then real is simply electrical signals interpreted by your brain.

- Morpheus
(The Matrix)

lower, more pragmatic profile. The military became the biggest advocate for VR's utility. 3D graphics continued to advance, but referring to them as "virtual reality" became increasingly rare. Companies periodically showcased virtual reality systems and peripherals, but despite protests from Lanier and others, the "death of VR" had become a standard narrative.

Then, in 2012, Palmer Luckey revealed a \$300 virtual reality headset called the Oculus Rift.

While the Rift became a symbol of VR's resurgence, the groundwork had

been laid years before. Luckey had worked with researchers like Skip Rizzo, who used VR to treat cognitive and motor rehabilitation — including post-traumatic stress disorder — and Mark Bolas, who had moved to the University of Southern California's interactive media program. Improvements in computing power and display technology, meanwhile, had solved some of the problems that had proved intractable in the 1990s.

The Present
There are technical reasons why the VR bubble burst once. Even today, while there are a lot of promising developments and prospects, the technical challenges have not all been dealt with.

Display Resolution is an immediately obvious issue. 1K x 1K resolution is likely the best and affordable resolution Head Mounted Display(HMD) will be able to support in the next year. Divided by a 100 degree viewing angle, we get a display with less than 1/50th the pixel density of a phone at a normal viewing distance. It will take a few years before HMDs with higher resolution panels can be developed, but it is primarily a cost issue.

The Future
Everything that we experience in our life, all that our senses can perceive can be reduced to electrical activity stimulating our brains as our sensory organs deliver information about the outside world. The brain is real - if we can fool our brain, we can create an alternate reality for us. All our perceptions are interpretation of what our senses can respond to. Words have never been

tual-Reality experience, we need tracking, rendering, transmitting to the display, getting photons coming out of the display and getting photons to stop coming out to happen in under 20 milliseconds. Since a single 60Hz frame is 16.6 milliseconds and latency in a typical game is about 35 milliseconds, it will be challenging to get to 20 milliseconds or less.

able to relay intentions perfectly. VR holds the promise of allowing us to literally show one another what we mean rather than expressing it through verbal approximations.

Physical reality has certain limitations which virtual reality will be able to circumvent. For instance, moving from one location to another in the real world requires moving our physical body, which is constrained by the laws of physics. The human body

a very delicate thing, subject to damage extremely easily from many influences. Transportation can also take up a lot of time. What if these dangers and constraints could be entirely eliminated?

VR is the projection of artificial stimuli in order to create the interpretation that we are in a different location in space-time. We could, very well, be able to visit places that do not really exist. Imagine what will it be like to explore the

mountains of Mordor, or to take a walk through Winterfell, or to meet Yoda! The prospects are countless and awe-inspiring. Imagine 10 years ago trying to envision the way we use cell phones today - it's impossible.

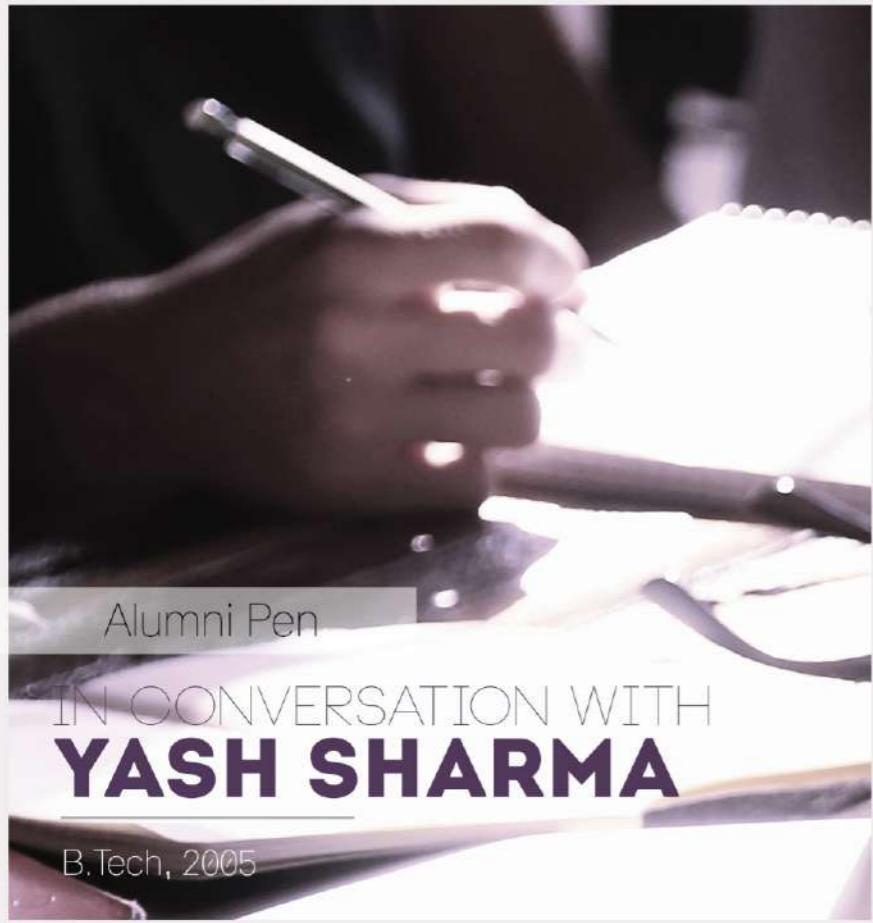
That's the promise VR has today. VR at its best shouldn't replace real life, just modify it, giving us access to so much just out of reach physically, economically. If you can dream it, VR can make it. It's a medium for progress, not the progress itself.



Where machines excel is not in entertaining humans but in assisting them wake up to lesser troubles everyday. We see such a future, full of infinite possibilities, where ages of knowledge is churned in and out daily making sense, making use of.

A bacteria inside the body will be detected by an implanted wearable way before any suffering ensues, the pet drone sitting alongside would be notified to get the medicines and monitor its injection, which it would do most obediently, all which while the human is still dodging the laser blasts, kicking some stormtroopers and enjoying the last installment of the prequel trilogy to the sequel trilogy that lies somewhere between original trilogy and the sequel trilogy of the never ending space saga the world so belovedly calls Star Wars on his 5th generation Oculus Rift Virtual Reality headset.

But until that day comes, hone we on the tool!



When is a computer-science engineer considered successful? A job at a giant MNC in India? A job at a giant MNC abroad? How about working with people who made Windows? Well, Mr Yash Sharma, B.Tech Batch of 2005, fits the bill perfectly. The portfolio reads two years of working in HCL in India; a little longer in HCL, Redmond; five years in Microsoft, Redmond and a current pursuit of MBA at University of Washington, Michael J. Foster School of Business.

Hind and Saurav, two of the Buffered Writers sat with him on the eve of Republic Day (PST) and he was, if anything, eager in responding to our queries, hoping to guide us into a better future. Excerpts from the interview follow:

Hind: Let's begin with old times, Sir. Your transition from India to US back in 2007 to be precise. How was it like to shift from the Indian work culture to the US's?

Yash Sharma: Back in 2007, I was still a novice in the industry with two and a half years of experience, working in HCL in India. The shift was a welcome change for me. There was a visible contrast between the two cultures. One of the most glaring difference I found is that in India, managers in IT field value longer hours of work more than they do the contribution. It becomes a matter of quantity rather than quality. While in US, they don't care as much for hours as they do for the quality of input. And I value that attitude very much. Focus should always be on contribution, on what you learnt from the project rather than how much time you put in.

Saurav: Sir, from our exposure to the world around through internet, books and media, we are of the view that people working in US are more vocal of their

problems and wants. Would you agree to that?

Yash Sharma: That's exactly what I was saying. Submissiveness in a job does not only involve the employer but also the employee. I think it's part of the culture. At times the vocality is not called for and some people might take it in negative way. But you're right in saying that employees in India are a bit conserved. And yes, US people are more vocal. It only helps that here in US managers are also amiable, and make it a point to not bring in the work hierarchy in middle of such conversations. They want such an environment and I believe it improves the team.

Hind: It's been more than 7 years of you working in US. Would you say there's something better in Indian work culture than US?

Yash Sharma: Better... [laughs]. It's been long. I don't know if what I say would be true anymore. There probably are some things better in India. [pauses] I think US people focus more on work than their families. It's part of their culture.

your mindset. That's also one difference between the two countries. Familiarity is more here in the states.

Hind: Maybe, it's because Indian managers know that their employees are leaving them much sooner than later.

Yash Sharma: [laughs] Yes, maybe. I remember once listening to the president of HCL in India saying "I know we're just a catapult for you to get into better jobs". But the question is how can you, with that kind of mindset, convince people to join and work with and for you.

Hind: During the last seven years, did you happen to come to India for any work trips?

Yash Sharma: No...

Saurav: Not even once?

Yash Sharma: [laughs] Yes, not even once. You see, the business in Microsoft is modelled this way. The operating systems part that I have worked on mostly is done primarily here in US. A small module of it is also handled in the Hyderabad office. But I never got to visit those guys.

Saurav: When you joined the industry, the culture of start-ups was not as extensive as it is today. What are your views on it? Would you recommend joining one?

Yash Sharma: I encourage start-ups. I believe that you learn a lot when you are involved with one. The technical challenges they face and solve give you a first hand experience of the heavy lifting that is an integral part of establishing any company. If you want to be a part of one, which I strongly recommend, and get a chance to, don't shy away from the opportunity. Don't work for 5 years to someday begin your own venture. If you get a chance to work in a startup of somebody else today, grab it.

Hind: Do you see this culture dying sometime in the future?

Yash Sharma: I do not see the

startup culture dying. There are so many springing up and so many perishing on any day. You start with an idea, and then you find it's already been worked upon, and you start in some other direction. People do get washed out as it takes a lot of energy in starting one. The amount of time and dedication one has to invest in a new venture is immense, and it's a tiring process. Many entrepreneurs take a break and join a well-established firm after a failed startup. But there are so many problems to solve and as long as there are problems to solve, there will be startups. I don't know why has this culture started recently, but I do not see it dying anytime soon.

Hind: Let us talk about your MBA now. Generally in India, people opt for an MBA straight out of college, but you have been working for over ten years, and it is now that you have enrolled in an MBA program. Which of them is the wiser choice?

Yash Sharma: I know that I speak for a lot of people when I say this, it's an opinion that I and many of my colleagues share, that an MBA is essentially a mid-career move. When you do an MBA, the kind of skills that you learn, the kind of problems you are taught to deal with, unless you have seen and experienced them first hand, you will not be able to fully comprehend the value and importance of what knowledge is being imparted to you.

Having been working for so long, when I attend my classes, I am able to ask informative and well researched questions. Questions that help me and my classmates in being better managers. Fresh college graduates do not have the prerequisites of an MBA program.

Saurav: What about an MS program? Should one gain experience before enrolling in one or opt for it straight out of college?

Yash Sharma: An MS is quite different from an MBA. If you plan on opting for an MS, try to do it at the earliest. Fresh graduates are the best candidates for an MS program

as they are still in their learning modes. You will relate better as you've just come out of a college.

Hind: Any advice for the current students?

Yash Sharma: Keep yourself flexible. You should always be learning and growing for as long as possible. Never settle with your skill set, keep improving and adding to them. An employee that can adapt with time is a valuable asset to every company. Keep looking for opportunities to work in a startup in your initial years to maximize your learning. But do not do so blindly. Evaluate the kind of startup that you are about to be involved with. Look at what stage of their implementation they are on. Ask their founders about the vision they have, how far do they see themselves going. Unless there is passion at the roots, the startup will not flourish.

Saurav: What do you remember about ISM?

Yash Sharma: Ramdhani. I remember...

Hind: Sir, RD...

Yash Sharma: Oh yes. But we had a batch-mate we used to call RD. So, RD for us became Ramdhani. Back then, eateries around ISM were scarce, so Ramdhani was our go-to place, especially after a tiring night-out.

Saurav: Lastly, Sir, are you still a citizen of India?

Yash Sharma: Yes, in fact, I am.

Hind: Well then, Happy Republic Day Sir! It was a great time chatting with you.

Yash Sharma: Same here. Thank you. And Good Luck.

Saurav, Hind: Good Bye Sir.

If you want to leave footprints in the sands of time, don't drag your feet.
Walk with determination, and footprints will be formed on their own.

Dr. Chiranjeev Kumar
HoD, CSE at ISM

THE ANNUAL DAY 2014

Parichaya Walia, B. Tech 2017
Shantanu Mishra, B. Tech 2017

On the occasion of the Annual Day of the Department of Computer Science & Engineering organized by the CSE Society (CSES) on 30th August 2014, the audience at the Penman Auditorium were held captivated by an evening coupled with music, drama, dance and many other performances. It was a motivating as well as recreating time for students, staff and faculty members. Prof. D. C. Panigrahi, Director, Indian School of Mines, Dhanbad was the Chief Guest of the function. The function began formally with a melodious invocation song. Prof. D.C. Panigrahi along with the office bearers of CSE department proceeded towards lightening the lamp, while the anchors highlighted the significance of initiating a ceremony with lightening the lamp in Indian culture.

Dr. Chiranjeev Kumar, Head of the Department, CSE and President, CSES delivered the welcoming speech. He extended his words of gratitude to all the hardworking people dedicated to the progress of the department throughout its 17 years of existence. He went on to mention the tremendous amount of revolutionary changes that took place in the department throughout these years. Some of them included: innovations related to teaching, launching of first volume of *BufferedReader* - the departmental magazine, other initiatives like ACM ISM Student Chapter, CodeISM, etc. that have been progressing at an astounding rate, as well as the hidden extracurricular talents of our own students and staff members. The closing line - "If you want to leave footprints in the sands of time, don't drag your feet. Walk with determination, and footprints will be formed on their own." left students with a great deal of motivation as he concluded his speech on a high note.

Mr. Amgoth Tarachand, Assistant Professor, CSE and Faculty-Advisor, CSES briefed

the audience about CSES & its activities. He set light upon its objectives and functionalities and informed the gathering about the Interaction Program with CSE Alumni organized by the society on 14th June 2014 at Bengaluru. He highlighted the overwhelming response received from the alumni on connecting them all to the students through CSES.

Dr. Sukomal Pal, Assistant Professor, CSE and Faculty Sponsor of ACM ISM Student Chapter delivered an introductory speech on the ACM ISM Student Chapter. He discussed the objectives of ACM Student Chapter at ISM with a focus to increase general awareness on computing and establishing a computing culture. He gave an account of different activities of the Chapter in this direction by highlighting the events it organised in this calendar year, such as Ode-De-Code 1.0 and 2.0 (coding competition), Web Design Contest, and Technical Workshops etc. for all the students of ISM. He also acknowledged the overwhelming participation of ISM students in the workshop on "Recent Trends in Information Technology" organized in association with TCS, Kolkata.

Annual Day also marked the unveiling of the first volume of the departmental magazine, *BufferedReader*. The name, coined by the batch of 2014, will always be a souvenir of their journey at ISM. *BufferedReader* is an exceptional proof that the literary flame is burning bright within the students of the department. They have proved that the literary prowess can go hand in hand with technical mastery. The first volume of the magazine was released by our Director during the event.

Mr. Aikansh Garg (2011 Batch), an alumnus of our department and currently working at Amazon, Hyderabad, was conferred with the "Alumnus of the Year 2013" Award. This award was consti-

tuted by CSE Society to be presented annually to the alumnus with utmost contribution to the overall growth of the Computer Science and Engineering department. While addressing the students, he mentioned 3 key points to success: "Think big", "Work hard without shortcuts" and "Keep having fun".

Soon after his speech, a special recognition to SRI, Bengaluru was announced for the year 2013-14. This award was

Annual Day marked the unveiling of the first volume of the departmental magazine, *BufferedReader*.

also constituted by CSES to be presented every year to the company contributing most to the overall growth and development of the department and students. Though unavailable for the event, they sent their warm regards. The students, who had received PPOs from SRIB, accepted this honor of recognition on their behalf.

The audience were animated as the Director proceeded to deliver his speech. The Penman Hall was filled with motivation and inspiration listening to his words. The entire auditorium echoed with applause, as he quoted examples from the pages of history, from the lives of Copernicus, Louis Braille, and Galileo who with a lot of hard work and determination, achieved the zenith of success at a very young age in their lives; and encouraged the students to do the same.

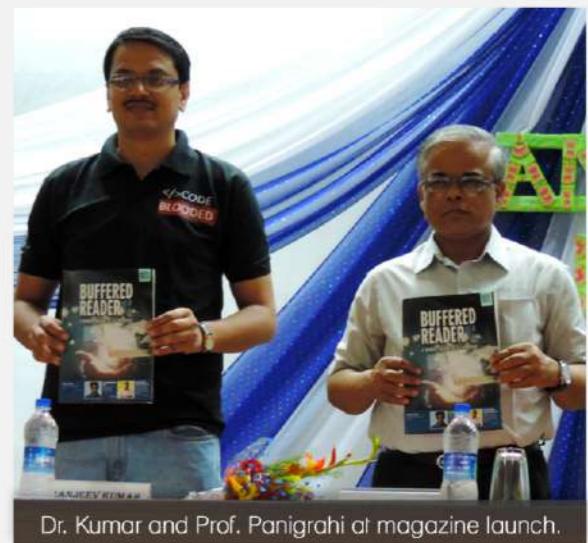
The formal session of the CSE day concluded with Mr. Rishabh Kumar, the Secretary of

CSES delivering the vote of thanks.

The evening took a musical and artistic turn when the cultural events began. The auditorium was flooded with voices of cheers and applause for every performance. Students engaged the people in attendance with their artistic flavour. From the solo dance performance to classical song, to the breaking bone western dance forms; from the mesmerizing musical performances to the short enactment of "Life as an Engineer in ISM", to the controversial but eye opening mime act on Article 377. The cultural events indeed displayed a wide variety of talents of the young bright brains of the department and the performances were celebrated by presenting awards. Shubham Sharma, Abhishek and Kapil Kumar were respectively awarded for the best solo song, solo dance and instrumental performances. Rituparna Sonowal and Bidangshree Brahma, who set the stage on fire, were awarded for their group dance performance. Yash Goyal was also awarded for his mystifying instrumental song performance. Finally, the day came to an end with a photography sessions of various societies.



Mr. Aikansh Garg being felicitated by Prof. Panigrahi as the Alumnus of the year.



Dr. Kumar and Prof. Panigrahi at magazine launch.



Prof. D. C. Panigrahi, Director of Indian School of Mines, delivering his keynote at the event.



PROF. MOURAD ELLOUMI
Laboratory of Technologies of Information and
Communication and Electrical Engineering (LaTICE),
and University of Tunis-El Manar, Tunisia
Mourad.Elloumi@gmail.com

Professor Mourad Elloumi received an Undergraduate Degree in Mathematics and Physics in 1984, and a Master's Degree in Computer Engineering in 1988, from the Faculty of Sciences of Tunis, Tunisia. He also received a Master's Degree in Computer Science in 1989, and a PhD Degree in Computer Science in 1994, from the University of Aix-Marseilles III, France. Then, he received a Habilitation for conducting research in Computer Science in 2003, from the National School of Computer Science, Tunis, Tunisia. He is currently a Full Professor in Computer Science, Faculty of Economic Sciences and Management of Tunis, University of Tunis-El Manar, and Head of the BioInformatics Group (BIG) of the Laboratory of Technologies of Information and Communication and Electrical Engineering (LaTICE), National High School of Engineers of Tunis (ENSIIT), University of Tunis, Tunisia. Professor Mourad Elloumi is the author/co-author of more than 50 publications in international journals, books and conference proceedings. He was a Guest Editor of a special issue on biological knowledge discovery and data mining, Knowledge Based Systems Journal (Elsevier 2002), a Guest Editor of a special issue on pattern finding in Computational Molecular Biology, Recent Patents on DNA and Gene Sequence Journal (Bentham Science 2013), a Co-Editor of the proceedings of two international conferences and the Editor-/Co-Editor of four books, respectively, on Algorithms in Computational Molecular Biology (Wiley 2011), Biological Knowledge Discovery (Wiley 2014), Pattern Recognition in Computational Molecular Biology (Wiley 2016, to appear) and Algorithms for Next-Generations Sequencing Data (Springer 2017, to appear). His research interests are Algorithmics, Computational Molecular Biology, and Knowledge Discovery and Data Mining.

NEXT GENERATION ASSEMBLY OF SEQUENCING DATA

INTRODUCTION

A DeoxyriboNucleic Acid (DNA) macromolecule can be coded by a string over a four-letters alphabet. These letters are A, C, G and T, they code respectively the bases Adenine, Cytosine, Guanine and Thymine. DNA sequencing consists then in determining the exact order of these bases in a DNA macromolecule. As a matter of fact, DNA sequencing technology has played a key role in the advancement of Molecular Biology.

In this article, are discussed the three main steps (preprocessing, processing and postprocessing) for Next-Generations Sequencing (NGS) data assembly.

DNA SEQUENCING TECHNOLOGIES

The first generation sequencing technology, also called Sanger sequencing technology, was developed in the mid 70's. It was based on sequencing machines like Applied Biosystems's 3130XL-3730XL and Beckman's GeXP Genetic Analysis System. The sequencing of the first human genome by using this technology took about ten years, required the cooperation of many laboratories around the world and costed ~3 billion US dollars. Few years after the publication of the first human genome in 2003, the Second-Generation Sequencing (2GS) technology appeared. Compared to Sanger sequencing machines, 2GS ones run much faster, with significantly lower production costs and much higher throughput in the form of short reads, i.e., strings coding portions of DNA macromolecules, of lengths varying from ~30 to ~400 base pairs (bps). Available 2GS machines include Roche's 454 Genome Sequencer FLX, Illumina's HiSeq 2000, Life Technologies' SOLiD3 and Helicos' HeliScope. By using 2GS technology, Biologists can sequence more than five human genomes in a single run and produce related reads in days, with a cost of less than 5,000 US dollars per genome. The Third Generation Sequencing (3GS) technology is appearing and it is providing even lower production costs and even much higher throughput. Available 3GS machines include Pacific Biosciences' PacBioRS, Complete Genomics' cPAL and Ion Torrent's PGM. And with Oxford Nanopore's gridION, we talk already of the Fourth Generation Sequencing (4GS) technology. So, let's call the sequencing technologies that

appeared after Sanger sequencing one, i.e., 2GS, 3GS, 4GS,... technologies, Next-Generations Sequencing (NGS) technologies. The set of reads associated to a DNA macromolecule obtained, thanks to the NGS technology, is called NGS data.

STEPS FOR NGS DATA ASSEMBLY

NGS data assembly can be achieved in three main steps: preprocessing, processing and postprocessing. In what follows, we introduce each one of these steps.

Preprocessing

The preprocessing step consists of errors correction, redundant reads removal and low quality reads removal. Indeed, during the sequencing process:

- (i) Sequencing errors may occur, resulting in errors in the reads. There are three types of errors: insertion, deletion and substitution of characters.
- (ii) It is possible that portions of a DNA macromolecule were sequenced many times resulting in reads with more than one copy or reads that are portions of longer ones. These reads can be considered as redundant. It is then computationally efficient to remove these reads, without loss of information.
- (iii) Reads, or portion of reads, that contain a lot of errors are low quality data. It is necessary then to remove these reads otherwise they will generate wrongly assembled strings.

Actually, the preprocessing step enables to improve the results of the assembly and reduces the computing time and/or the memory space of the processing and postprocessing steps.

Processing

The processing step includes assembling the obtained reads to infer a string that, hopefully, codes a DNA macromolecule, or a part of a DNA macromolecule. There are various approaches that can be adopted to reach this goal:

- (i) Greedy approach: By using this approach, we operate as follows:

First, we identify the reads that overlap with each other and select the two reads that have the highest overlapping score.

Then, we remove the two selected reads from the current set of reads, merge them in a single string and add the resulting new string to the current set of reads.

We repeat this process until no more reads can be merged or we obtain a single long string coding a

DNA macromolecule, or a part of a DNA macromolecule.

- (ii) Overlap-Layout-Consensus (OLC) approach: By using this approach, we operate as follows:

First, we construct a graph where a node represents a read and there is an arc from a node i to a node j , if and only if, the i th read overlaps with the j th one.

Then, we identify paths in the built graph. Each path represents actually a succession of overlapping reads that make up a longer string, called contig.

Finally, we try to find an overlapping order of contigs to infer a single long string coding a DNA macromolecule, or a part of a DNA macromolecule.

- (iii) De Bruijn Graph approach: By using this approach, we operate as follows:

First, we construct a De Bruijn graph where a node represents a substring of length k , called k -mer, extracted from an input read and there is an arc from a node i to a node j , if and only if, the k -mer represented by the node i overlaps with the k -mer represented by the node j on $(k-1)$ characters.

Then, we identify an Eulerian path in the constructed graph. This path represents a string coding a DNA macromolecule, or a part of a DNA macromolecule.

Postprocessing

The postprocessing step consists mainly of validating the obtained string, supposed to code a DNA macromolecule, or a part of a DNA macromolecule. To do this, there are several techniques that can be adopted. For example, we can:

Map the reads that were used to produce the assembled string.

Identify and count highly conserved genes expected to be present in the assembled string.

Evaluate the quality of the assembly.

Compare the obtained result with those of other assembly algorithms

CONCLUSION

Next-Generations Sequencing (NGS) technologies can generate millions of reads related to a DNA macromolecule, or a part of a DNA macromolecule. NGS data assembly is a difficult task, due mainly to the size of the data and the presence of repeats in these data, and is the subject of a large research. No one of the existing algorithms that deal with NGS data assembly is perfect. Biological validation of the results of NGS data assembly is one of the most important issues.

Job is a major part of a person's life after he earns a degree or a diploma. It supports him both morally and economically. So it is important that one chooses his career wisely and as per his interest. While I was pursuing B.Tech from BIT Sindri, some of my friends encouraged me to join the field of teaching. I also gradually realized that I could do better in this field than any other. So I decided to opt for a teaching career. Following the required process, I prepared for and qualified GATE, and secured a place for M.Tech in Computer Application at ISM, Dhanbad.

Fortunately, the masters course was very much teaching oriented which supported me to pursue my interests further. I acutely observed the different ways of teaching followed by my talented teachers. For instance, from some it was the way they taught, while with others it was the dedication. They were crucial in supporting me throughout my two years of masters. From some, I learnt to be strict up to a required level and from others, to be friendly with students. All those teachers are my idols and I try to emulate them as I move forward in my professional life.

After spending a year at ISM, gaining teaching skills from some of the best teachers of India, I assumed the role of teaching assistant and thus the responsibility of teaching the brightest minds of this nation – IIT-JEE and GATE qualified students. I put in my best efforts in tutorial classes and labs. Every class was a new challenge for me, another step towards my goal. I couldn't have gotten a better plat-

form to enhance my teaching skills.

With the confidence ISM instilled in me, I could then teach anywhere. But I joined VVIT Purnea which is a private college on purpose. This college presented me with an opportunity to enhance its network based infrastructure and to develop the college website. It was an enriching experience.

I can say that I have seen the state of a variety of engineering colleges in India as I have been a part of a state govt. college (BIT, Sindri), a central govt. college (ISM, Dhanbad) and a private college (VVIT, Purnea). Government has increased the number of engineering colleges in the country but I fear the quality of education hasn't followed the trend. Private engineering colleges are in the hands of business-minded people who in many cases do not have any technical background and their prime interest is in amassing profits. They may have business acumen but lack a drive and vision for furthering the education system.

The tumbling quality of education is not only the result of business-mindedness of people in the education system but also a dearth of enthusiasm in youth in joining this field. Sadly, today students do not have a good mindset about teaching as a profession. The days are gone when number of students would aspire to be teachers.

I often think why is it that today only a few students from highly reputed colleges of the country go for a teaching career. In my opinion, one of the biggest reasons is the compensa-



TEACHING THE ROYAL PROFESSION

ALUMNI PEN

Gyan Tiwary
M.Tech, 2014
gyan@iitindore.ac.in

Teaching is and will always be a royal profession because in this field we are responsible for enhancing the skill set of the human resources of our country.

tion offered. In this era of recession it would not be wrong for students to prefer a job in an MNC offering a package of astronomical sum of money over being a teacher and not earn as much. Another reason is the lack of competition in this field. On the other hand private companies provide a highly competitive environment

which helps in the growth of an individual. Risk, I believe, makes people work hard and perform better.

To overcome these problems, I would suggest that there should be a substantial increment in the salaries offered to teachers so that teaching becomes a more lucrative career for students. Stringent standards should be put in place for hiring teachers. To develop a competitive environment, there should be periodical tests to keep an brush up the competitiveness of the field. Online education should be practiced to keep pace with the students. Uploading of lectures and assignments on the college server and keeping track of submission and completions from there itself can be an effective assist to classroom teaching. Any education system is formed of both students and teachers and an improvement will have to include efforts from both.

In the end I would say that teaching is and will always be a royal profession because in this field we are responsible for enhancing the skill set of the human resources of our country by giving our best to them. This is the only job where you have to impress people less qualified than yourself by improving their skills. You have to work for them and not for your boss. Along with the satisfaction that you attain in shaping the future, you also get enough personal time to follow your hobbies and improve yourself.

The author is now pursuing his Ph.D. from IIT Indore.

The views expressed are author's personal views.

WHAT THEY SAID

The Recruiters



“ Be interactive. The interviewers are there to help you. Make sure you speak your thoughts out.

Amazon India, the recruiter that hired six FTs (full-time hires) during this placement season and offered three PPOs (pre-placement offers) to last year's interns had some words to say for the current third years and second years to better prepare for firms like themselves and others.

"I feel the concepts of the students were quite clear but the application to problems was not up to the mark" said Smita, an SDE at Amazon. She continued, "It's not just about Amazon, but any company visiting would want you to be able to code your ideas out. It is also imperative that you clear your fundamentals up." Taher Dhinojwala, the HR, joined her in emphasizing the importance of knowing a project through its length and breadth. They asserted, "Whatever projects that you are doing, it is expected that you understand what the project is about even when your core implementation is only a sub-module. It is imperative that you understand the design choices and technologies used in your project."

Mr. Taher strongly worded, "It's not a good sign if you write something in your resume and you don't know much about it. I suggest if there's a project listed in your resume and it is something you want to talk about in your interview. Then do make sure to do a good homework on it a couple days in prior. Make sure that your doubts and basics are cleared out. Jot down what you've done, your successes and failures in the project and what you did to circumvent those failures. In short, get the technical know-how. Most importantly, avoid any kind of superficial impression."



“ The students surprised us with their sharp basics. In-depth knowledge, however, was the weaker aspect.

T

the maiden visit of Adobe India to ISM campus was a welcome sight for the students. The recruiters found six students fitting their criteria of excellence and competence. The technical interviewers and head flew in from the Noida office while the HR, Mr. Abhinav, chugged in from Bengaluru.

Mr. Vikram Sethi summarised the technical team's experience, "The basics of the students here are really sharp. We really weren't hoping, I don't know why. Maybe because some of the IITs we go to, we find sub-par students than here." He praised the students, "The praise is earned and it's not something we are saying for the sake of it. But since this is a comprehensive and honest feedback, there were shortcomings too. The implementation aspect of the students is what we found lacking. The experience of real-life projects go a long way in explaining the why's and how's of a technology. And we found a dearth of that in students here. The projects listed in their resume were executed on an outer level." He proceeded with a couple of suggestions, "The department should, in our opinion, focus a little more on the technical projects it assigns to the students and should follow through them with a certain level of zeal so that even the student would not find it tiring."

In conclusion, he said "Lastly, I would again like to complement the quality of students here. The fundamentals of their coding were sharp. They surprised us. But the hopes, thus set high, were not lived up to because of the lack of in-depth knowledge."

Placements began on an ecstatic note when Samsung offered full-time jobs to 7 of their past year's intern-hires. They also offered internship opportunities to 7 of the pre-final year students of B.Tech - CSE.



From online tests in the campus to interviews in Delhi resulted in 1 of the third year being offered summer internship.



Amazon rung the opening bell of the season with 6 full-time hires from campus and 5 interns. Amazon also offered full-time jobs to 3 of the last year's interns.



ARISTA

1 student was given a pre-placement offer. They also recruited an intern for the summer training.

POLARIS

The first Band-B recruiter offered full-time jobs to eleven of the to-be-graduates.

khosla labs

1 undergrad got an offer for full-time employment from the start-up.

Google

Another big addition to the roster of on-campus recruiters, Google offered full-time job to 1 undergrad.

SapientNitro™

The first phase of the season ended on a high note with SapientNitro offering full-time jobs to 7 of the undergrads.

SAMSUNG

The first visitor to the campus during the second phase of the season - SRI Noida, came a little late this year and offered 4 full-time job offers to undergrads.

ORACLE

FINANCIAL SERVICES

Another Band-A recruiter, OFSS hand-picked 4 of the brightest undergrads for full-time jobs at their firm.

NOV 2014

AQ

Analytics Quotient

3 undergrads got a full-time job offer from AQ.

μσ

Mu Sigma

1 undergrad got full-time job offer.

BrowserStack

A month long recruitment process came to an elated end when 1 undergrad got an offer for full-time job.

Capgemini

Winter breaks didn't break the steady inflow of recruiters. Capgemini offered job offers to 2 undergrads

amdocs

Amdocs offered 2 undergrads and 2 grads a chance to work for them once they graduate.

DEC 2014

Mahindra COMVIVA

2 undergrads were offered jobs from Mahindra Comviva.

NUCLEUS SOFTWARE

A new Band-B recruiter - Nucleus Software, offered full-time job offers to 5 of the undergrads

SOKRATI

2 of the undergrads emerged triumphant after a month-long series of interviews and tests by Sokrati.

FEB 2015

IBM

Following in the heels of TCS came another mass-recruiter, IBM and picked 6 undergrads and 7 grads for full-time jobs.

Infosys

The trilogy of mass-recruiters was complete with the visit of Infosys. 6 CSE undergrads and 5 CSE grads were offered job opportunities

ERICSSON

4 of the undergrads were offered job opportunities at Ericsson.

TATA

TATA CONSULTANCY SERVICES

The mass-recruiter of engineers across the country grabbed 5 CSE undergrads and 1 CSE grad from ISM.

STATISTICS 2015

After three years of escalating student-strength and diminishing placement-stats, the Batch of 2015 bounced back in a stupendous fashion. Unprecedented number of PPOs, half-a-dozen new recruiters and a vibrant zeal to outperform all,

this placement season saw the Dept. of CSE perform like no other. Captured in the infographic - a bar-raised, a standard-set and a gauntlet thrown to the upcoming batches.

WHAT WE SAID

What they said about us is not enough, for that's just one part of the story. A smart man learns from the failures and triumphs of others.

As college ends and the final years prepare themselves to step into the unknown, they leave behind their experience to guide the future wayfarers. Newton has very rightly said "If I have looked far, it's by standing on the shoulders of giants".

Here's presenting you the giants and a ladder to climb upon the shoulders.
Hop on!



Tushar Turkar
PPO from Samsung Research India - Bangalore.

You are in a way the first placed student of B.Tech, 2015 batch. Do you regret to miss the thrill of the placement season?

Yes I do think I missed out on the "thrill". But then, that's because I have a job now, a respectable one and I have a good closure to my college life. Did I have a moment where I thought of rejecting the PPO and get into the battlefield? Yes. But that moment was fleeting. The interviews, the preparation would have been a good experience.



Karon Khullar
First Campus Hire to Google in ISM history

You've been interviewed by the giants - Amazon last year, Google this year. Invariably Google is a dream job of many CSEians. At the cost of sounding obvious, stuff like geeksforgeeks gets you through many of the interviews. But, is there some mantra to crack Google? What's Google looking for in you?

Well, apart from strong understanding of DS and Algorithms, they are looking for good problem solving skills. They give a lot of importance to "how you think". It's not about giving correct solutions in the interviews, it's about how you approach a problem in real time. Since most of the Google interviews are algorithmic, competitive programming helps a lot. Apart from competitive programming, websites like Careercup, Geeksforgeeks, and Leetcode are really helpful.



Amandeep Bhal
GRE - 320, TOEFL - 100
Zhilmil Dhillon
GRE - 326, TOEFL - III

We know that getting a good GRE & TOEFL score is crucial but never enough for pursuing MS at a respectable institute. How should one go about building the rest of his profile & resume?

Building a profile for Masters requires effort throughout your graduation. The earlier you start, the better it is. Everything ranging from co-curricular activities to having academically published papers is important. One should try to grab extra projects, and to execute them with efficiency as well. Something that people underestimate a little are the recommendations, one should identify some prominent personals in the field and try to get their recommendations. It's a mix of everything from Projects, Recommendations and the scores.



Ashish Bahukhandi
99.57% in CAT. Placed at Sapient Nitro.

In hindsight, Will you say that it would have been wiser focusing on one out of Campus-Placement and CAT?

I wouldn't. Two reasons, I

won't say I didn't try enough for campus-placements and I think preparing for them helped me hone my technical skills for CAT and the interviews that followed. I believe in backup plans. CAT is not an easy feat so I had to have a backup plan along with that. The job that I have now is my backup plan. And most importantly, my technical preparations came in handy when I sat for the interviews of IIMs recently.

To me it's a win-win.



Ashwani Chandil
Placed at Adobe Systems.

Your selection in Adobe was a staggering achievement but before that came a list of setbacks - no PPO from Samsung, getting till final round of Polaris, Amazon, and Direct-I. And to any conscious soul, that's no easy feat. How did you pull yourself up each time and push harder than before?

No PPO from Samsung was a disappointment. My work there was one of my most sincere efforts. Polaris was more of a practice. After Samsung, I devoted one whole of month to prepare for Amazon and on the day when it mattered, I was confident. Amazon was the one that really broke me down. I would say my friends helped me a lot. Hope is not lost until the people who matter are still believing in you.

What I think I did right was, I didn't let failure demean myself. I might have been a little sad but I wasn't unsure of my own abilities. That's what I think matters. I kept my emotions separate from my knowledge.



Sumit Saurabh
Placed at Sokrati

How different is to be interviewed by a well-established market giant like Adobe and a fairly new player like Sokrati?

In my experience, the well-established firms, like Adobe, do have a defined process for their recruitment. The questions, the grilling, the testing is something that is, to some extent, basic. While with the startup that I was interviewed for and I am now placed at, they interviewed me on a comprehensive level and went deep with their assessment, testing my knowledge rather than my ability to remember and by-heart stuff. With Adobe, I think I could've anticipated what's coming, but with Sokrati I couldn't have.



Saurav Kothari
Placed at BrowserStack

Having seen the tense environment of a campus placement and a called-out interview which is more desirable?

If the objective is to simply get a job, then in-campus interviews are a much easier test to crack rather than the ones which are conducted at their offices. At campus, the panelists are mostly employees who have been with the company for a few years, and they come with a set of questions that range from easy to difficult. But once they call you out to their office, your interviewer could be the VP, the Lead Engineer or even the CEO. And when someone as senior as them sits in front of you, they do not come with a set of questions, they are armed with immense knowledge and experience and the questions they put up are nothing like what you are prepared for. I personally had to write the code for an HTTP Server and a Proxy Server right then - something I could not have expected in a campus interview.

PEER REVIEW

Arijit Dulta
M.Tech, 2016

Peer-review is the term used for the evaluation process by one or more people of similar competence to the producers of the work.

Why is it called Peer-review

The reviewers who review the article submitted by the author are specialized in the same scholarly area as the author and so they are considered the author's peers. Hence, it is called the Peer-Review process.

Peer-review Process

- The author of the article submit the article to the journal editor.
- The editor of the journal forwards the article to ex-

Goal Of Peer-review

The goal of peer review is to assess the quality of articles submitted for publication in a scholarly journal and maintain a standard for the articles published in that particular journal.

Need for Peer- Review

If peer-reviewed articles are accepted for publication, it implies that those articles are the best research practices in a field as a peer-reviewed journal will never publish articles that fail to meet the standards established for a given discipline.

perts, called peers, in the field.

- These experts are impartial to review the article and carefully evaluate and assess the quality, accuracy and validity of the research methodology and procedures of the submitted manuscript.
- If appropriate, sometimes they may suggest revisions. Once satisfied with the standard, they accept it.
- On the other hand, if the reviewers find the article lacking in scholarly validity and rigor, they reject it.

Features of a peer-reviewed article

- The journal in which the article is published must describe itself as a peer-reviewed publication.
- There must be citation for it in one of the databases that includes scholarly publications.
- There is an abstract (summary) at the beginning of the article.
- The tone of the article is thoughtful, restrained and serious.
- The article have footnotes or citations of other sources. The article must have a bibliography or list of references at the end.
- Author's credentials are listed in the article.

The topic of the article is explored in depth. The article is written for readers with some prior knowledge of the subject. The article is divided into proper sections with headings such as Introduction, Theory or Background, Result, Discussion, Conclusion etc.

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artwork by
Bidangshree Brahma
M.Tech, 2016

A RED YELLOW GREEN

Amitesh Kumar Pandit
M.Tech, 2016

Every artificial system is designed and developed under the consideration of providing best interface between user and machine. The basic motive of a system is to provide convenience to all users and it doesn't restrict anyone who is eligible. Because if it does then it's not effective. There are so many sys-

tems that require some modification. Our roadway traffic signal system is one of them.

Sometimes the colour blind people are unable to recognize the difference between red and green colour. According to medical science, it doesn't come under any category of disease or



Different shapes for different signals will ease perception for color blind people

for different signals.

While driving a vehicle on a new way the driver needs to worry about traffic signal pole location, which at times is covered by trees or hoardings. If driver's mind is set only

This will ensure public to stop when ground stripe glows up and will move when pole light glows up. So it becomes colour independent for colour blind persons and can be seen headfirst by novice and unnoticing drivers.

morbidity. It is just inherited from their ancestors.

According to web record, one among twelve men is colour-blind and they are not eligible to drive due to incorrect perception of signal colour, but we can't change the signal colour as it is suited for majority of people. This problem can be resolved by having different shapes of lights

on road, it may lead to a hazardous accident.

In my point of view, the solution will not come if we use UV and infra red lights as they are not perceived by human eyes. The best way is to remove the signals from the pole. Make stripe of red lights and line of yellow lights across the road and leave the green signal as it is.



Kriti Singh, B. Tech 2017
Maheshwara Reddy, Dual 2018

TECHSTACY

Concelto 2014

Concelto - a three day event that gets students into fiddling with rotors, mechanical arms and pieces of code, saw the innovative minds to compete for the best. This 2014, a pack of events were organised under the auspices of the Computer Science and Engineering Department at the Indian School of Mines. The events listed on the board were Errereur Fixture, Gizmo's Luck, HackX and Webs.

Errereur Fixture required the contestants to iron the bugs out from the codes given to them. With shades of software testing, the event was conducted online on the TypeForm interface. Organisers Amit Poonia, Harsh Singh and Dinesh Kumar and the co-coordinators Ashwini Kumar, Varun Sharma and Harsh Singh stood as the backbone of the event.

Gizmo's Luck, a popular event from the previous year, continued to attract the beta lovers. It aimed at familiarizing the participants with new and useful software and reflected how quickly they could adapt to an unknown software. The player had to understand a randomly allotted software in the limited time and accomplish the task given using the same.

WEBS put forth a series of riddles to be solved by the contestants to wade through the levels. They were given a tricky question which was to be solved and the answer would unlock the problem to be abated in the webpage and the corresponding hint

would also be given relying upon which the participants had to fix the webpage. With a smooth website interface, the puzzles tested the presence of mind rather than the rote retention of the schoolish ways of solving arithmetic. Thus, this event required ample brainwork clubbed with efficiency to solve the riddle and fix the webpage simultaneously.

One of the heavily participated events of the fest, HackX was a team event that was centered on spotting the black sheep in a government organization who get involved in an anti-social activity. The enthusiasts snooped around various files as they unlocked each puzzle using the id and password from the previous clue and simultaneously kept tracking the plot in order to figure out the culprit. The event was organized by Bhavishya Mathur, Raj Roushan, Kriti Singh, Rajat Gupta and Sparsh Choudary and coordinated by Prafulla Kumar Vipul and Vivek Kumar helped making the entire event a grand success and were applauded by all.

The key persons who worked hard to make the events a success were the branch coordinators Utsav Kumar and Manvitha Reddy who offered their undaunted support throughout.

All the winning teams were bestowed with rewards and cash prizes at the end of the events by the Head of the Department, Computer Science and Engineering, Dr. Chiranjeev Kumar.

The Makers And The Winners

Errereur Fixture

Coordinators

Ashwini Kumar
Harsh Singh
Varun Sharma

Organisers

Ashok Patel
Amit Poonia
Dinesh Kumar

Winners

1. Srinivas Devaki
Kodali Bhargav Teja
2. Ajit Kumar
3. Prince Raj Kumar
Gaurav Kumar

Gizmo's Luck

Coordinators

Utsav Kumar
Naman Taneja
Ravindra Goyal

Organisers

Ankush Karda
Vivek Singhal
Rakshit Pareek
Shubham Bansal

Winners

1. Lumosity | Rishi Jain
P.S.Naruka
2. Falcons | Raj Roushan
Bhavishya Mathur
3. Spartans | Naman Jain
Junaid Alam

WEBS

Coordinators

Nishant Mittal
Aditya Goyal
Nitish Agrawal

Organisers

Ashutosh Maheswari
Gaurav Agarwal
Arjav Patel
Paras Sharma
Aishwarya Raimuley

Winners

1. Arun Kumar Mishra
Raj Ranjan
2. Ashutosh Gupta
Shivam Agarwal
3. Rohit Agarwal
Raja Kedia
3. Deepak Saini
Praval Singhal

HackX

Coordinators

Prafulla Kumar
Prafulla Kumar Vipul
Vivek Kumar

Organisers

Bhavishya Mathur
Raj Roushan
Kriti Singh
Rajat Gupta
Sparsh Choudary

Winners

1. Kodali Bhargav Teja
Devaki Srinivas
2. Shubham Bansal
Rakshit Pareek
Vivek Singhal
3. Akhil Ojha
Aishwarya Raimuley
Bhargav Parsi



TECH MILESTONES

Janmajai Rastogi
B. Tech 2016

INTEL COMPUTE STICK

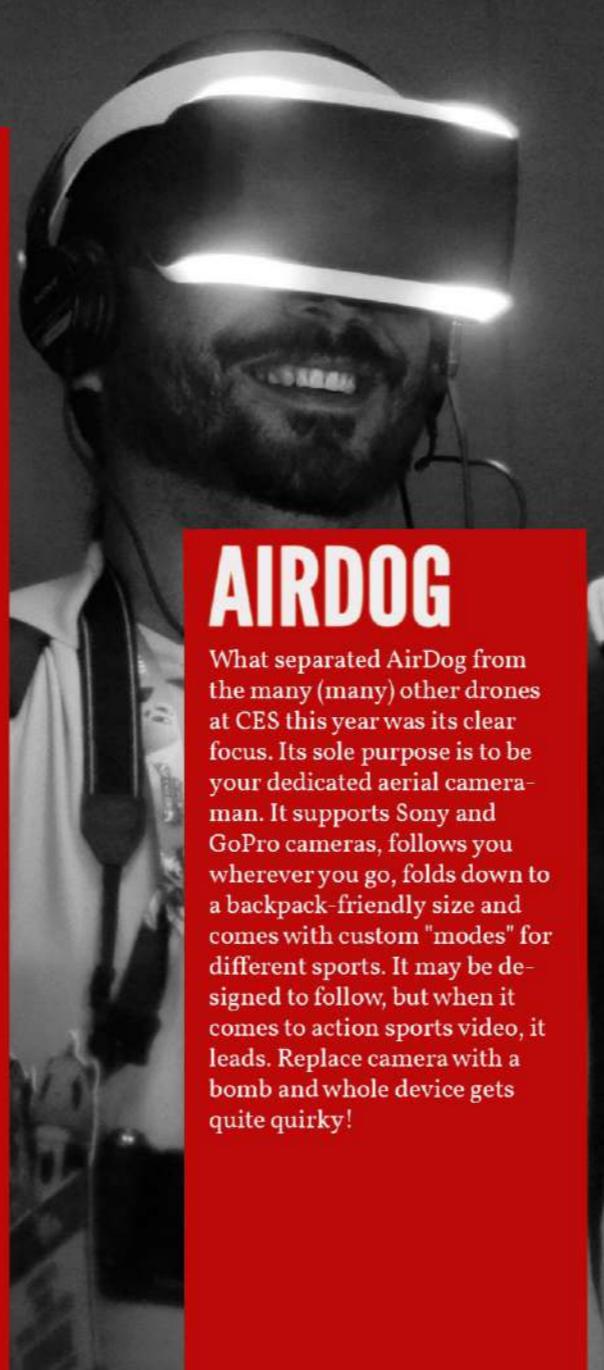
The Intel Compute Stick, a humble HDMI dongle that houses a full desktop computer experience. It's not a particularly powerful one—you get a quad-core 1.33 GHz Intel Atom processor, 2GB of RAM, and 32GB of solid state storage—but it does have Wi-Fi, Bluetooth, and both a full-size USB port and a microSD card slot for expandability. As long as you're not gaming and find yourself a decent couch controller, you could probably do quite a bit from this tiny PC!

OCULUS RIFT

The Rift is an upcoming virtual reality head-mounted display, being developed by Oculus VR. Oculus showed off its newest Oculus Rift prototype at this year's Consumer Electronics Show in Las Vegas, and the virtual reality headset has an incredible new feature. It's called "spatial audio", and it makes the virtual environments sound like you're truly there.

PROJECT ARA

Google has just released the second version of their Module Developers Kit (MDK .2) for Project Ara, which expands on how developers should go about creating new modules. One addition to the Project Ara undertaking is a new contactless connection system between the modules and exoskeleton that save space, reduce overall cost and will increase the overall durability of the device. What's more, the team also introduced a new software protocol called Greybus which will better handle the communication between modules and the exoskeleton. In a future update, Ara owners will be able to manage the functions of the modules using a dedicated Ara Manager app on their devices. The app will also give users more advanced module details, and will allow users to swap the modules whenever they'd like.



AIRDOG

What separated AirDog from the many (many) other drones at CES this year was its clear focus. Its sole purpose is to be your dedicated aerial cameraman. It supports Sony and GoPro cameras, follows you wherever you go, folds down to a backpack-friendly size and comes with custom "modes" for different sports. It may be designed to follow, but when it comes to action sports video, it leads. Replace camera with a bomb and whole device gets quite quirky!

ANDROID TV BOX

Razer has joined other recent comers in the Android TV arena with Forge TV, but unlike the others, its box is aimed squarely at gamers, not cord-cutters. As such, it's suitably powerful with a quad-core Snapdragon 805 CPU, Adreno 420 GPU, 802.11ac WiFi, Bluetooth 4.1, 2GB RAM and 16GB of storage. Yes, that'll let it handle garden-variety Google Play games for up to four players and beam them onto a big-screen TV. But the Forge TV's main powers have little to do with weak-sauce Android gaming, and more to do with Razer Bluetooth peripherals and the piece de resistance called "Cortex: Stream." That tech uses WiFi to give you low-latency streaming from a source far more suitable to gaming than a dinky Android box -- namely, your PC.

8K DISPLAYS

Sharp has announced a number of new displays that it says "simply cannot be duplicated by other companies." The firm showcased an 85-in 8K LCD screen, a 120-in 4K commercial LCD display and a 60-in wrap-around pillar display at CES in Las Vegas. The 8K LCD screen has a native resolution of 7,680 x 4,320 and Sharp says it is the world's first 8K LCD display to be compliant with the standards of the first 8K test broadcasts. It has a 120 Hz refresh rate, 12 bits per pixel and a brightness of 400 cd/m². The screen is expected to debut in Japan as soon as 2016.

MICROSCALE 3-D PRINTING

Imagine if 3-D printers could use a wide assortment of different materials, from living cells to semiconductors, mixing and matching the "inks" with precision? Jennifer Lewis, a materials scientist at Harvard University, is developing the chemistry and machines to make that possible. She prints intricately shaped objects from "the ground up," precisely adding materials that are useful for their mechanical properties, electrical conductivity, or optical traits. This means 3-D printing technology could make objects that sense and respond to their environment. "Integrating form and function," she says, "is the next big thing that needs to happen in 3-D printing."

THE DASH

When you think of wearable technology, it's easy to overlook the humble headphone. After all, we've been "wearing" them for so long now. Bragi's "The Dash" earbuds aren't so easy to overlook though. The wearable buds have serious fitness credentials (activity tracking, heart rate monitoring, etc.) and intuitive touch controls. By tilting your head up, for example, you could have a voice read you the weather forecast. If a call comes in, you could nod to answer or reject it. Those macros can be swapped, disabled, and programmed to other functions, too. With so much tech packed into these things, it's no wonder they're

ENERGOUS WATTUP

We might not know exactly what the house of the future will look like, but one thing's for sure: It'll need power. Enerous WattUp is a new wireless power solution that can charge wearables, phones and the hundreds of sensors that will one day litter your home. It's early days for the tech, but it's already close to a retail launch -- Enerous believes its partners will have the first wave of devices on shelves by the end of the year. Enerous' wireless charging solution WattUp has the potential to drastically alter the way we power our devices. It's capable of charging devices from 15 feet away -- imagine never having to take off your wearable, or your kids having toys that never run out of batteries because they're constantly being fed power from afar? WattUp could be a game changer.



SPARTAN

Microsoft is planning to radically overhaul its web browser in Windows 10. Sources familiar with the company's plans tell that the new browser, code-named Spartan, will include a host of new features not found in rival browsers. Chief among the plans for Spartan is new inking support that allows Windows 10 users to annotate a web page with a stylus and send the notes and annotations to a friend or colleague. A second major feature for Spartan will be the integration of Microsoft's Cortana digital assistant. Microsoft is planning to use Cortana to surface information on flights, hotel bookings, package tracking, and other data within the traditional address bar. Other features include a new way to group tabs together to declutter the occasionally messy interface of multiple browser tabs. Spartan will allow users to group tabs however they want, making it easier, for example, to split up personal tabs from work ones. Let's hope it also does not wrap up as a most used browser for downloading Chrome.

SMART POWER

Big data and artificial intelligence are producing ultra-accurate forecasts that will make it feasible to integrate much more renewable energy into the grid. National Center for Atmospheric Research (NCAR) uses artificial-intelligence-based software which crunches the numbers, along with data from weather satellites, weather stations, and other wind farms in the state. The result: wind power forecasts of unprecedented accuracy that are making it possible for Colorado to use far more renewable energy, at lower cost, than utilities ever thought possible. Also the forecasts are helping power companies deal with one of the biggest challenges of wind power: its intermittency.

ROBOTIC VISION

A computer-vision algorithm developed by a Ph.D student at the Victoria University of Wellington could enable robots to view static images more like humans. Some object-detection algorithms focus on patterns, textures, or colors, while others target the outline of a shape. However, the imaging technology of Syed Saud Naqvi selects the best algorithm to use on an image by extracting the most relevant information for making a decision. "The defining feature of an object is not always the same--sometimes it's the shape that defines it, sometimes it's the textures or color," notes Naqvi. Victoria senior lecturer Will Browne, one of Saud's supervisors, says the technology could be used on the Web to self-caption photos with location and content information, and in the future the technology could be used to identify cancer cells in a mammogram.

On the contrary with robots soon to have seeing capabilities let's see when Stephen Hawking's quote "The development of full artificial intelligence could spell the end of the human race" becomes a true reality.

THE ROAD LESS TAKEN DESIGN

Ashay Sinha, B.tech 2016

Humanity has, since its dawn, believed in the challenge to accomplish something more than just the ordinary, what we exactly call the extraordinary. It has risen above anonymity and has achieved remarkable things. And the ones who have actually done so are the ones who have conventionally followed the unconventional. The Road Less Taken, is an effort by *BufferedReader* to bring out some of the unconventional career choices that a student of computer science might embark upon, post graduation.



Albert Einstein once remarked that imagination is everything. It is the preview of life's coming attractions. And when we ask ourselves, as to what goes hand in hand with imagination, one of the possible answers that we get is Design. Design is the method of putting form and content together. Design, just like art, has multiple definitions. Design can be art. Design can be aesthetics. And Design today, is one of the areas in which the computer science graduates are making foray into.

The leading institutes in India that offer post-graduate courses in Design are the National Institutes of Design (NIDs) and the Indian Institutes of Technology (IITs). NIDs are internationally acclaimed as some of the finest educational and research institutions for Industrial, Communication, Textile and IT Integrated Design. They are Institutes of National Importance under the Ministry of Commerce and Industry, Government of India. Amongst the host of programmes that they offer, Graphics Design, Animation Film Design, Digital Game Design are the ones that are likely to be of interest to a graduate of computer science. NIDs and IDC, IIT Bombay have been ranked among the top 50 Design Schools in the World by Business Week.

The rapid changes in the way communication is happening in recent context of technological advancement has made the understanding of Graphics Design much more important than ever before. During their period of study, students in Graphics Design are encouraged to work on a variety of proj-

ects, majoring in the selected sub-domain of Graphics Design. The areas covered range from image making to illustration, photography, information & communication systems in digital domain and much more.

Likewise, the objective of Animation Film Design is to enable students to find solutions to complex problems in various fields of communication design using animation film making as a creative medium. They experiment with various mediums like 2D, 3D, mixed media, pixilation, experimental, graphic narratives etc. to tell animation stories of many kinds. Graduates of this programme find rewarding careers as animators, character designers, story-board artists as well as creative directors, producers, consultants and designers in many organizations such as Channel [V], MTV, Nickelodeon, Cartoon Network, etc.



Digital Game Design educates students in the areas of digital media, digital arts, history and theory of gaming, 2D and 3D graphics, simulation and modeling and user interface design. The programme provides inputs in the areas of interactive digital storytelling, visual effects and motion graphics, 2D and 3D character animation and digital renderings. The course inputs are planned in strategic manner that the graduates can join as professionals in game industries and related domains like entertainment, visualisation, etc.

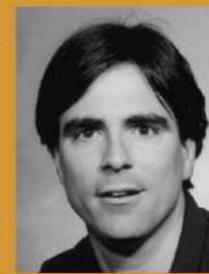
The Department of Design at IIT Guwahati offers a more research oriented Master of Design (M.Des) programme that includes courses on visual design, system analysis and information design, interaction design, graphics design, design semantics etc. On the similar lines, the Industrial Design Centre, IIT Bombay offers a Master of Design programme in Visual Communication, Animation and Interaction Design. This design programme coexists in an active triadic relationship with design education, design

research and design practice. IIT Kanpur offers a multi-disciplinary design programme that draws subjects from varied fields of engineering like mechanical, computer science, bio-sciences, electrical and chemical engineering, and humanities. This design programme is unique in offering its students an opportunity to get soaked in all the elements and principles of design. They are introduced to the core aspects of user interface design, visual design and product design through class room sessions and workshops.

These design programmes offer well-structured course-templates for students to synthesize technology and aesthetics in the service of human-needs. They encourage creativity, innovation, craftsmanship, and personal expression leading to evolution of products and services in the field of engineering design and visual communications. The projects interspersed between the courses provide adequate opportunities for brain-storming yielding products and services to meet social, environmental and business needs.

THEY MADE IT BIG

Randy Pausch



Randy Pausch was an Assistant and Associate Professor in the Department Computer Science at the University of Virginia's School of Engineering and Applied Science, respectively, from 1988 until 1997. While there, he completed sabbaticals at Walt Disney Imagineering Electronic Arts (EA). In 1997, Pausch became Associate Professor of Computer Science, Human-Computer Interaction, and Design at Carnegie Mellon University. In 1998, he was a co-founder, along with Don Marinelli, of CMU's Entertainment Technology Center (ETC). He consulted with Google on user interface design and also consulted with Palo Alto Research Centre (PARC), Imagineering, and Media Metrix. Pausch is also the founder of the Alice software project. He received the National Science Foundation Presidential Young Investigator Award and was a Lilly Foundation Teaching Fellow. Pausch was the author or co-author of five books and over 70 articles.

Pausch received two awards from ACM in 2007 for his achievements in computing education: the Karl V. Karlstrom Outstanding Educator Award and the ACM Special Interest Group on Computer Science Education Award for outstanding contributions to computer science education. He was also inducted as a Fellow of the ACM in 2007. Pausch died of complications from pancreatic cancer at the age of 47 on July 25, 2008.

TOP DESIGN SCHOOLS IN THE WORLD (SOURCE: BUSINESS INSIDER)

| Rank | Institute | Location |
|------|---|-----------------|
| 1 | Rhode Island School of Design | Providence, USA |
| 2 | Massachusetts Institute of Technology Media Lab | Cambridge, USA |
| 3 | College of Design, Architecture, Art and Planning, University of Cincinnati | Cincinnati, USA |
| 4 | Carnegie Mellon University School of Design | Pittsburgh, USA |
| 5 | Parsons The New School for Design | New York, USA |

Udaya Kumar Dharmalingam



Udaya Kumar Dharmalingam is the designer of the Indian Rupee Sign. Kumar obtained a bachelor's degree in architecture (B.Arch) from the School of Architecture and Planning at Anna University, Chennai in 2001. Subsequently, he received his master's degree, an M.Des in Visual Communication, from the Industrial Design Centre, IIT Bombay in 2003. He also did his doctoral studies at the IDC, receiving his PhD in 2010. His areas of interest include graphics design, typography, type design and design research with special focus on Tamil typography. The then Minister of Information and Broadcasting, Ambika Soni approved the new Indian currency symbol design conceptualized by Kumar on July 15, 2010. He was awarded prize money of ₹ 2,50,000 for his efforts. His design was selected from among five short listed symbols. According to Kumar, his design is based on the Indian Tricolour. He is currently an Assistant Professor at Department of Design, IIT Guwahati.

TOP DESIGN SCHOOLS IN INDIA (SOURCE: BUSINESS WEEK)

| Rank | Institute | Location |
|------|--------------------------------------|------------------------------------|
| 1 | National Institutes of Design | Ahmedabad, Gandhinagar, Bangalore, |
| 2 | Industrial Design Centre, IIT Bombay | Mumbai |
| 3 | Department of Design, IIT Guwahati | Guwahati |
| 4 | IIT Kanpur | Kanpur |

DEPARTMENTAL HIGHLIGHTS



SHORT TERM COURSE ON DIGITAL IMAGE PROCESSING AND ITS APPLICATIONS

A short term course on **Digital Image Processing and its applications** was organised by the Department of Computer Science and Engineering during 26-30 December 2014. Coordinated by Dr. Arup Kumar Pal, the course was aimed at imparting a broad overview and comprehensive understanding of image processing techniques using MATLAB as well as to provide hands-on training in MATLAB environment.

The course touched upon research fields like Image Enhancement, Image Compression, Soft Computing based applications, Image Cryptosystem & Data Hiding, and Content Based Image Retrieval (CBIR).

The participation to the course was overwhelming and included faculty members, research scholars, UG and PG students from academia like BIT Mesra, NIT Jamshedpur, WBUT, CUJ, KIIT to as far as Pondicherry University and other reputed engineering institutes.



Mr. Mohit Chawla (B.Tech 2016) was selected for a design and innovation workshop organised by Google MIT Media Labs, India at IIT Gandhinagar.

ACM ICPC 2014-15

Team "Random Segment" finished 25th at ACM ICPC Asia region - Kharagpur Site in a total of around 80 teams. Team Members: Anant Kumar & Nishant Raj (B.Tech - CSE, 2016) and Prateek Nischal (B.Tech - EE, 2016).

Team "Code Cracker" participated in ACM ICPC Asia region - Gwalior Site. The team members were Parichaya Walia (B.Tech - CSE, 2017), Milind Rohit (B.Tech - CSE, 2017), Avinash Chandra (B.Tech - CSE, 2017) & Rajesh Kumar Sinha (B.Tech - CSE, 2017).

Team "Tesseract" participated in ACM ICPC Asia region - Amritapuri Site. The team members were Naman Taneja (B.Tech - CSE, 2017), Suraj Singh (B.Tech - CSE, 2017) and Prayank Mathur (B.Tech - CSE, 2017).



Mr. Ashish Bahukhandi (B.Tech, 2016) scored 99.57 percentile and Mr. Amit Hooda (B.Tech, 2012) scored 99.84 percentile in CAT 2014.

Mr. V. Murahari (B.Tech, 2016) CSE department represented Indian Universities Athletics team (combined universities) for 54th Sr. National Open Athletics Championship held at J. N. Stadium, New Delhi from 2nd to 5th Nov. 2014. He was one of the 4 athletes and the only male athlete among the hundreds of Indian Universities who achieved the qualifying standard specified by Athletic Federation of India.

Team "Bullseye" (Naman Taneja & Jay Doshi) ranked 12th in TCS Codevita, a coding competition organised by TCS last year. The teams, "Turing" and "CodePhoenix" of ISM students also featured among the top 30 qualifying teams.

Mohit Chawla (B.Tech, 2016) was selected as the Secretary of Cyber Society.



Ashay Sinha (B.Tech, 2016) was selected as the Secretary of Faculty Society (CSE).

The CSElex cluster, of which the Department of Computer science and Engineering forms a part, won *Hasya Kavita*, *Bindaas Bol* and *Mime* in Pratibimb-2015.

Three ISM-JRF **Sangram Ray**, **Pratyay Kuila** and **Neha Sharma** completed their PhD.

Shubham Chauhan (B.Tech, 2016) was selected as the Secretary of Cultural, Scientific and Literary Society and was further elected as the General Secretary of ISS Executive Body for the academic year 2014-15.



Naman Taneja (B.Tech, 2016) was selected as the Outstanding Student of B.Tech 3rd Year.

ANNUAL SPORTS DAY WINNERS

Sai Srinivas Sunny (B.Tech, 2018) won -

- 400m - Gold medal
- 4x400m relay - Silver medal
- 4x100m relay - Bronze medal

Naga Sushma (B.Tech, 2017) won -

- 4x100m relay - Gold medal
- High Jump - Silver medal

PARAKRAM

Asit Kumar Bai (M.Tech-CSE, 2016) stood winner of carom.

Asit Kumar Bai (Mtech-CSE, 2016) was Man-of-the-Series in Cricket Championship and Man-of-the-match in one match.

Phoolsingh Lodhi (M.Tech - CSE, 2017) was a member of the winning cricket team.

Ronit Malhotra & Sanjeev Ahirwar (B.Tech - CSE, 2017) and **Prashant Singh & Ayush Soni** (B.Tech - ME, 2017) stood 1st in the Inter Year Table Tennis Championship 2014-

Madhusmita Dash (B.Tech, 2017) won Gold in 4x100m relay and High Jump

Shilpa Kanojiya (B.Tech, 2017) won Gold Medal in 4x100m relay

Bidangshree Brahma and **Rituparna Sonowal** (M.Tech - CSE, 2016) stood 2nd in three-legged race

Vijay Anand (M.tech. CSE-IS, 2016) was the captain of M.Tech cluster team in Tug-of-War which finished 2nd



The Android Club, under the aegis of the Google Students' Club, was started with an initiative to make students learn app development for the world's most popular mobile & wearables OS - Android.



NEW ADDITION

Dr. Soumen Bag, joined the department on 18th Dec 2014 in the capacity of an Assistant Professor.



A new Laboratory (CSE - Lab-3) was added to the department after construction work finished on expanding the existing hardware lab. The new hardware lab can now accommodate around 90 students at a time.



Vishwakarma Puja celebrations were held in the department on 17th September, 2014.



The farewell ceremony of Shri Ashok Kumar, who acted as the PA to HoD, was held on 30th Nov, 2014. He became the first person to have retired from the Department of Computer Science and Engineering.

SPECIAL LECTURES BY DISTINGUISHED GUESTS

Mr. Kushal Banerjee, TCS Kolkata delivered a lecture on "Recent Advances in Information Technology" on 28th August, 2014.

Dr. Maheshkumar H. Kolekar (IIT, Patna) delivered a lecture on "Medical Image Processing" during Short term course on Digital Image Processing & its Applications which was held in two sessions spanning from 29th -30th December.

Prof. Mourad Elloumi (University of Tunisia) delivered a lecture on "Introduction to Bioinformatics" giving the students of the department an insight into his research work on 30th December, 2014.

Professor **Mourad Elloumi** from the National High School of Engineers of Tunis (ENSIT), University of Tunis, Tunisia joined the department as a Visiting Professor for a Month (16 Dec 2014 to 15 Jan 2015). On his penultimate day before heading back to his place he took a guest lecture on Bioinformatics and gave the students a glimpse of his profound excellence.



INTERNATIONAL COLLABORATIONS

MoU with Botho University, Botswana, Africa

Delegates from Botho University, Botswana, Africa visited our department and signed an MoU to promote joint studies, research and training activities through student and staff exchange.

Data-Agreement with University of Glasgow, UK

The department signed a Data Agreement with University of Glasgow, UK to access GOV2 Collection for Text-Retrieval research. This collection is one of the most widely used IR data.

Publications from the Department during August, 2014 to January, 2015 in Thomson Reuters

Total Number of Publications to

| | |
|---------------------------|--------------|
| International Conferences | More than 30 |
|---------------------------|--------------|

| | |
|--|-------------|
| Other Journals of International Repute | More than 5 |
|--|-------------|

Contributors

Prof. P. K. Jana, S. Mukhopadhyay, Dr. Haider Banka, Dr. Sachin Tripathi, Dr. Hari Om.

Pratyay Kuila, Suresh Dara, Abhimanyu Kumar, Manoj Kumar Mishra, Md. Azharuddin, Chiranjeev Manike, Ravi Sankar Sangam.

NEW ADDITIONS CSES ALUMNI MEMBERS

Lifetime Membership

Mr. Amrit Kumar (B.Tech, 2006)

Mr. Sandeep Kumar (B.Tech, 2006)

Mr. Sumit Gupta (B.Tech, 2006)

Mr. Devender Mishra (B.Tech, 2011)

Mr. Shivang Seth (B.Tech, 2011)

Annual Membership (2014-16)

Mr. Rajeev Kumar (B.Tech, 2008)

Annual Membership (2014-15)

Mr. Dilip Kumar (B.Tech, 2006)

Mr. Anurag Anand (B.Tech, 2007)

Mr. Bhanu Pratap Singh (B.Tech, 2008)

Mr. Mohit Ranjan (B.Tech, 2008)

Mr. Azad Naik (B.Tech, 2009)

Mr. Napender Singh (B.Tech, 2009)
Mr. Sagar Arora (B.Tech, 2009)
Mr. Shobhit Srivastava (B.Tech, 2009)

Mr. Sital Kedia (B.Tech, 2009)
Mr. Vijit Prabhu (B.Tech, 2010)
Mr. Aikansh Garg (B.Tech, 2011)

Mr. Amit Gaurav (B.Tech, 2011)
Ms. Anshuma Shukla (B.Tech, 2011)

Mr. Sourav Sharma (B.Tech, 2011)
Mr. Abhishek Singh (B.Tech, 2012)

Mr. Ashwin Datt (B.Tech, 2012)
Mr. Parvez Ahmed (B.Tech, 2012)

Mr. Piyush Banginwar (B.Tech, 2012)

Mr. Prateek Saini (B.Tech, 2012)
Ms. Tejomai Kandru (B.Tech, 2012)

Mr. Mayank Saxena (B.Tech, 2013)

Mr. Rajat Mahajan (B.Tech, 2013)
Ms. Rupal Jain (B.Tech, 2013)

Mr. Shubham Jain (B.Tech, 2013)

STUDENT ACTIVITIES



CSES

QUIZ WIZ V2.0

The Computer Science and Engineering Society (CSES) organized the second edition of its technical quiz, Quiz-Wiz v2.0 on 13th of September, 2014. The Quiz was organized to test the general technical knowledge of the students and as a means to encourage students of different years to interact with each other. Keeping this in mind, it was mandatory for all teams to have four members – one from each year. The quiz was conducted with Dr. Chiranjeev Kumar and Mr. Amgoth Tarachand as esteemed guests. Ankit Agarwal (B.Tech, 2016) was the quizmaster of the event along with Rajat Gupta (B.Tech, 2017).

Round 1 consisted of 15 questions and then the next 4 rounds consisted of 5 questions each. The questions included visual puzzles like logos, popular personalities and visual connects. With a blend of interesting rules and a few tricky questions, the teams still managed to score well, with 'The Misfits' bagging the top position.

Vasudev Narayanan (B.Tech, 2018) secured first place among the audience, and was awarded a cash reward of ₹ 500.

| Team Name | Members |
|-------------|--|
| The Misfits | 1. Rishabh Thukral 2. Bhavishya Mathur 3. Ashish Verma 4. Mohit Punjabi |
| Vanquishers | 1. Aditya Pandey 2. Raj Roushan 3. Abhinav Goyal 4. Ashish Bahukhandi |
| Sinstein | 1. Dev Kothari 2. Pratik Jain 3. Shubham Chauhan 4. Saurav Kothari |

Top three teams of the tournament

Code Rush

CodeRush was organized on 2nd of November, 2014 by Computer Science & Engineering Society. Anant Kumar and Nishant Raj (B.Tech, 2016) were the event organizers. The first and second year students competed in first group and the rest of the students including third final year UG, PG students and research scholars competed in another. The contest lasted for two and a half hours.

The Winners

| Group One | Group Two |
|-------------------|--------------------|
| 1) Raj | 1) Majeed Siddiqui |
| 2) Gautam Kumar | 2) Naman Taneja |
| 3) SrinivasDevaki | 3) Kumar Shubham |

ACM STUDENT CHAPTER

Workshop on the "Recent Trends of Information Technology"

The workshop was hosted by Mr. Kushal Banerjee, Senior Developer from TCS. It was a good workshop attended by many students from all the years and departments. This workshop was first of its kind for this session with the primary goal of increasing interaction of the students with the IT industry.

Android Play

Arunably, the most interesting event of ACM-ISM Student Chapter - "Android Play", which is still in progress, was designed to increase teamwork and to enhance the skill which are required for those working in large projects and to teach Android Development. Only one workshop was conducted for this season and there are more events to come on these lines which will be followed by a hackathon.

Calendar of ACM Student Chapter

| Event | Date |
|---|---------|
| Nationwide Coding Competition - GOOGOL on eCodechef | April 4 |

For details of our past events and to contact us visit ism.acm.org.

CODEISM

Workshop on Introduction to Coding and Problem Solving

The Computer Science and Engineering Society and CodeISM conducted a workshop on "Introduction to Coding and Problem Solving" exclusively for first year students (B.Tech and Dual Degree) of CSE on January 12th, 2015. The main objective was to make the students aware about basic concepts of programming in C and also to introduce them to basic competitive coding platforms like SPOJ, Codechef, Hacker Rank etc. The workshop was conducted by Naman Taneja, Prayank Mathur, Suraj Singh, Anant Kumar and Nishant Raj of B.Tech, 2015 batch.

Tentative Calendar of CSES

| Event | Tentative Date |
|------------------------|----------------|
| Workshop on Photoshop | Early April |
| Farewell of 2015 Batch | April 27th |

CodeMARATHON

sponsored by

B.TECH
CLASS OF 2006 & 

PRIZES WORTH MORE THAN
₹75000 WON

For the first time in the history of ISM, a mega coding competition was organized by CSES and CodeISM which saw the participation of around 240 students and sponsorship of more than ₹ 75,000. The event was sponsored by CSE Batch of 2006 and In cresol. The event consisted of a series of coding contests, each contest ran for 2.5 hours with 5 problems to be solved. The rules were same as followed in ACM-ICPC contests. To provide a fair competition, the contest was played in three different divisions. Division-1 consisted of participants from pre-final & final year UG students and PG students. While Division-2 and Division-3 had participants from 2nd year and 1st year B.Tech respectively.

| Division - 1 | Division - 2 | Division - 3 |
|--------------------------------|------------------------------|-------------------------------|
| Majeed Siddiqui (B.Tech, 2016) | Vamsi Krishna (B.Tech, 2017) | Aditya Kaushik (B.Tech, 2018) |

The winners

THOUSAND SUNS

Parichaya Walia, B. Tech 2017

I've seen a thousand suns
Rise, a thousand different ways.
Some mornings cut through
the night. While others,
dead dark for days.

I've seen a thousand suns
Set, a thousand different sails.
But all the joys it cast—
Being far forgotten;
Even the tragic tales.

Be it my first, or the thousandth sun.
One thing surely remains
Of the words unheard,
the search is on.
That echoes through silence,
And prevails.

तू क्यों जीने से डरता है

Yash Goel, B. Tech 2018

तू क्यों तन्हाई पे मरता है
तू क्यों जीने से डरता है..

क्यों रोता है कम नंबर आने पर
इन कागज के टुकड़ों की क्या कीमत है
कर हिम्मत, ले फैसला मेहनत करने का
फिर बेशक आगे तेरी ज़िंदगी जननत है..

आएँगे मौके हजार सब्र तो रख
क्यों जल्दी से निराश हो पड़ता है
तू क्यों तन्हाई पे मरता है
तू क्यों जीने से डरता है

जीत नहीं सका तो क्या दुख है
ज़ंग लड़ने का भी अपना सुख है
कर मेहनत निरंतर, एक दिन सफल हो जाएगा
खुद पे भरोसा तो रख, तू जीत का परचम लहराएगा

जीने अपनी ज़िंदगी मेरे दोस्त
ये तुझे दोबारा नहीं मिलेगी
अगले जानम की बाते तो बस किसे कहानियों मे होती हैं
अगले पल का कुछ पता नहीं, बाते ज़िंदगी भर की होती हैं

तू दिखा साहस, तू बढ़ा कदम
आखिर मे सब अपने बस मे होता है
नहीं मरेगा तू तन्हाई के पीछे
क्योंकि अब तू जीने से नहीं डरता है..

sketches by
Shalmoly Mondal
M.Tech, 2016

CONTACT US



For queries and suggestions, at
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