
MAR
2018
AN INSIGHT INTO CSE
BUFFERED
READER V4.2
SOCIETY

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FROM THE HOD'S DESK

The eighth edition of the BufferedReader brings me great pride and pleasure as it marks the completion of three and a half years of the magazine. Over the editions, the magazine has made tremendous progress by providing valuable information about the latest advancements in technology as well as the various happenings at the CSE department of IIT (ISM) Dhanbad. It has earned recognition not only amongst all the departments of the college but also throughout the industry. I heartily congratulate the Editorial Board on the release of BufferedReader v4.2.

Since the invention of the steam engine, the rate of evolution of technology has significantly increased and is still increasing. New technologies not only bring comfort and convenience but also create possibilities for new jobs. This edition of BufferedReader talks about some of these at length, along with the events, activities, the placement scenario, etc. of the CSE department. The articles in the magazine would surely benefit the readers.

Artificial Intelligence and Machine Learning are the most popular topics in today's IT world. We are honoured to publish this year's Faculty Article, written by Prof. Ashish Ghosh, an adjunct professor of the department who is a senior faculty member of Indian Statistical Institute, Kolkata. The placements statistics of the department so far this year have been fascinating, and I hope that even better results follow in the years to come.

This edition also brings along with itself a lot of new possibilities as well as challenges for the magazine. I hope that BufferedReader keeps growing in the oncoming issues as it has till date. I wish good luck to the magazine's team for the future. Feedback and suggestions on the content, quality or design of the magazine from your side would be greatly appreciated. Please share it with us at hodcse@iitism.ac.in.

Prof. Prasanta K. Jana, IEEE Senior Member
Professor & Head, CSE Department

EDITORIAL

Dear Readers,

Time and tide wait for none. It seems like it was only yesterday that the idea of this magazine was conceived and the first edition was released by the founding members. But the world of technology has evolved since then, and so has our department and my team. I, whose freshman year was spent in the sapient and sagacious mentorship of our founding members, may well feel elated to present to you, BufferedReader, eighth of its name; the bi-annual magazine of the CSE department of IIT (ISM) Dhanbad. In a world where time is swift and technology is dynamic, we at BufferedReader strive to realise a moment of appreciation for the efforts that the staff and students of our department make; and to bring out the best of Computer Science through our words. This edition covers the period from September 2017 to February 2018, and we have attempted not to miss any event that occurred during the time.

A lot has changed in the past three and a half years and a lot has already been written and disseminated in the past editions. As editors, we discuss the prospective technologies and dig out a topic that is relevant and intriguing to you, dear Readers. It is a challenging task to come up with untried and pertinent topics; to read, research and render them as full-fledged stories. I am glad to present and co-author the Cover Story to this edition, 'System-on-Chip', that discusses at length the growth of the SoC technology, and the rise of the planet of high-speed smartphones.

The modern day smartphones cannot be thought of without the SoC technology that has disrupted the areas of algorithms requiring high speed computing. These algorithms, once infeasible to the computers, can now be computed within a fraction of a second by the mobile devices that fit our pockets. Not only has there been a dramatic decrease in the volume of the system, the functionalities of the average system have also diversified. Features like Iris Scanner, Face Detection, 4K Video Encoder and Biometric Sensors need specially fabricated circuits to carry out the tasks swiftly and unambiguously.

When we talk about technology as students and academicians of Computer Science, we must not limit ourselves to the consumer level only. Unlike the plebeians, we must be curious enough to delve deeper into the facts and features, and realise the intricacies that have resulted into the evolution of that technology. Machine Learning and Artificial Intelligence are the most trending and researched topics in the industry. The Faculty Article of this edition, 'Collaborative Artificial Intelligence' is written by Prof. Ashish Ghosh, from the Machine Intelligence Unit, ISI Kolkata; who is currently part of the department as an adjunct professor. The article offers a refreshing take on AI, wherein humans and AI collaborate and complement each other, to achieve even greater heights of innovation and growth.

Needless to say, this edition would not have come out without the consistent and perspicacious guidance of our Head of Department, Prof. P. K. Jana, and other faculty members. The magazine was turned into print by the tremendous efforts of our diligent design team headed by Raushan Roy. These people have worked assiduously to make the magazine what it is in your hands. The members of Editorial Board are the core and soul of BufferedReader. It is because the untiring efforts of the members that we are able to present to you words from the renowned people and scientists from the industries and institutes. My team and I look forward to receiving any feedback and suggestions that you may want to share at **bufferedreader@iitism.ac.in**.

Ashish Verma | Editor-in-Chief
B.Tech. 2018

ONE CHIP TO RUN THEM ALL : SoC

Abhishek Chattopadhyay | B.Tech. 2019
Monosij Ghosh | B.Tech. 2019
Ashish Verma | B.Tech. 2018

The big bang of technology has had an intense impact on the lives of the plebeians. The personal computers that were developed earlier did not have a direct effect over the lives of the people. The computers were large and confined to the air-conditioned rooms of the business and research organizations. It all began when Bell Laboratories presented the prototype of the first mobile phone about 90 years ago. And around 40 years ago, the first cell phones became commercially feasible and accessible. But the computing power was mostly limited and the cell phones were limited to the mere functionalities of calling and texting.

When Neil Armstrong and Buzz Aldrin first set their foot on the lunar surface, NASA had less computing power than what an average smartphone possesses today. From LSI (Large Scale Integrations) to VLSI and VVLSI, the transistors have found home along with a billion others on a same small substrate of a chip. Post-PC era devices like an iPad did not follow the legacy PC-era architecture but were instead made from the ground-up level. There no longer was a need of a CPU to manage all generic operations and computations. The cell phones had become smart.

The demands on cell phones are ever increasing and challenging at the same time. Once used for simple tasks, they now cannot be thought of without features like video streaming, Global Positioning Systems, Artificial Intelligence and high computing features like face recognition and finger print detection. And more versatile and powerful SoCs are the players behind it all.

ASICs (Application Specific Integrated Circuits) and ASSPs (Application Specific Standard Parts) have been developed for use by multiple design houses for specific and generic purposes. A System-on-Chip (SoC) is a chip that contains microprocessors (MPUs) and/or microcontrollers (MCUs) and/or digital signal processors (DSPs) -- along with hardware accelerator functions, on-chip memory, peripheral functions, and (potentially) various other components. However, if an ASIC or an ASSP contains one or more processing cores, it is an SoC.

There is no doubt in the fact that SoCs have enormous technological benefits. All that you need in order to run a mobile phone can be developed on a single chip and can be manufactured in high volumes. Hundreds of semiconductor Intellectual Property companies are emerging and hoping to ride the SoC tidal wave leaving traditional semiconductor companies in the wake.

Let's delve deeper and explore the world of SoCs and the way it has disrupted the modern day technology.

Fabrication of System-on-Chip

Full Custom Fabrication:

It is a design methodology mainly for designing integrated circuits wherein we specify the layout of each individual transistor and the interconnections between them. This technology maximizes the performance of the chip and minimizes its area.

Standard Cell:

This method is used to design application-specific integrated circuits (ASICs) with mostly digital-logic features. The initial design of a standard cell (in our case an SoC) is developed at the transistor level, in the form of a transistor netlist or schematic view.

A schematic view is generated with a number of different Computer Aided Design (CAD) programs that provide a Graphical User Interface (GUI). Also, a physical representation of the standard cell (also called layout) is designed to fabricate the chips.

From a manufacturing perspective, the standard cell's VLSI layout is the most important view, since it is the closest to an actual "manufacturing blueprint" of the standard cell. After the layout is created, additional CAD tools are used to perform a validation check.

Field-programmable Gate Array:

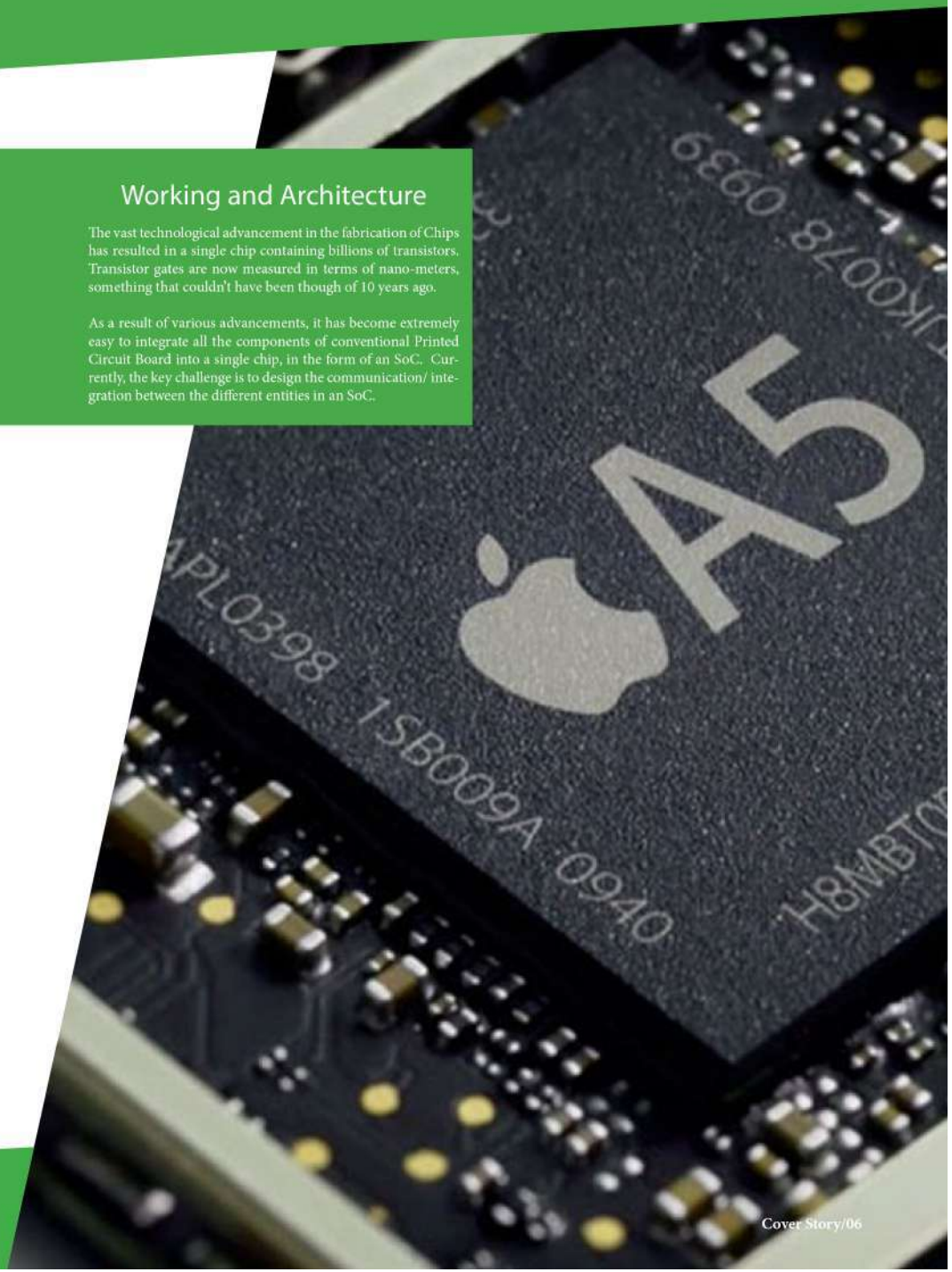
A field-programmable Gate Array (FPGA) is an integrated circuit designed to be configured by a customer or a designer after manufacturing. It is generally specified using a hardware description language (HDL), similar to that used for an ASIC.

The basic structure of FPGAs consist of programmable logic blocks along with a hierarchy of reconfigurable interconnects that allows the blocks to be "wired together". These blocks are configured to form the various components of SoCs and can be used to perform complex combinational functions.

Working and Architecture

The vast technological advancement in the fabrication of Chips has resulted in a single chip containing billions of transistors. Transistor gates are now measured in terms of nano-meters, something that couldn't have been though of 10 years ago.

As a result of various advancements, it has become extremely easy to integrate all the components of conventional Printed Circuit Board into a single chip, in the form of an SoC. Currently, the key challenge is to design the communication/ integration between the different entities in an SoC.



Structure & Functionalities of Components of an SoC

Control Unit: The Control Unit consists of a Central Processing Unit and various communication buses. The Central Processing Unit is the heart and brain of every computer. Every single operation that one performs on a computer is processed by the CPU. Having a robust CPU ensures better performance and faster execution times. In a broad sense, there are two types of Central Processing Units segregated on the basis of number of cores present in the processor:

Single-Core Processors: A single core processor is present as a single core on a chip, which runs a single thread at any one time. For a long time, processors remained single cored, until it was practically impossible to achieve performance gains from the increased clock speed, transistor count, increased depth of pipeline, increased CPU Cache sizes and/or additional execution units. It was problematic, since to increase clock speeds, the silicon transistors on the chip had to switch faster. These higher speeds required higher input voltages and semiconductor manufacturing processes that resulted in greater leakage current, both of which increased power consumption and heat output. This has resulted in the development of Multi-Core Processors.

Multi-Core Processors: A multi-core processor is a component with two or more independent cores, which read and execute program instructions in parallel. The cores may be coupled tightly or loosely such that they may or may not share caches, and they may implement message passing or shared-memory inter-core communication.

Memory Block: Read-Only Memory (EPROM/EEPROM), Random Access Memory and Flash are the basic memory units inside an SoC. Akin to a computer, memory is required to process and perform various tasks that a smartphone is capable of. All the data present in the various stages of processing are stored in Memory Blocks and are retrieved according to need.

Graphics Processing Unit: The Graphics Processing Unit (GPU) is a specialized electronic circuit designed to render images in a frame buffer intended for output to a display device. The GPU is responsible for processing complex graphics including 3-D games on smartphones/tablets. Smartphones and tablets mostly have a dedicated GPU which renders games and other high-quality animation for a good user experience.

Arithmetic Logic Unit: An ALU is a digital circuit for performing arithmetic and logic operations. It uses operands and opcode to perform specific operations on the input data. After the information is processed, signals are sent to the CPU to request for the next operation. Also, the result of the last operation is forwarded to various other units as required and directed by the Control Unit.

Timing Unit: Oscillators and Phase Locked Loop (which is a closed loop frequency control system) are used in the timing units of an SoC. The timing unit ensures that the SoC achieves the minimum possible clock cycle time for a given configuration.

> "SoC chips use a surface mount technology known as ball grid array. The chips are lined with tiny interconnection pins, both at the top and bottom surfaces. The manufacturers then solder the lower pins to connect the SoC to the board, and use the ones on the top to connect to memory packages. This gives them more flexibility, as they can use memory from different vendors. In general, memory is not connected to the core of the SoC and is left out as an individual entity."

Radios: In current times, mobile phones are used for much more than sending text messages and making voice calls. Most mobile phones support WiFi, GPS/GLONASS and Bluetooth which require individual radio modules to be present inside them. A faster standard of communication, namely LTE (4G communication) requires a specialized radio module to be present in the SoC or as an independent module. This module offers upto 10x better communication rates.

Analog interfaces, external interfaces following industry standards viz. USB, USART, SPI, voltage regulators and power management units form the basic interface of the SoCs. Besides these, there are two components known as Northbridge and Southbridge which handle communications between the components and various I/O Functionalities.

Design Flow of an SoC

Verify Hardware & Software Designs

There are various checks like Design Rule Check (DRC) to verify that the design meets the foundry and other layout needs. Nodal connections of the netlist are then compared to those of the schematic netlist with a Layout vs Schematic (LVS) procedure to verify that the connectivity models are equivalent.

Functional Verification

Functional verification is a very important task in SoC manufacturing. It is the process of verifying that the hardware developed follows the logic intended by the designer. This involves testing performance of the hardware against various permutations and combinations of simulations and situations. The SoCs are verified for logical correctness before being sent to the foundry for fabrication.

Hardware and Software Modules

Hardware blocks of SoCs are developed from pre-qualified hardware elements and software modules which are aggregated and integrated using various software development environments. Hardware description languages like Verilog, VHDL and SystemC are used to write and develop these modules. However, hardware is not the only focus during SoC design. The chips developed must be supported by software drivers that control the operation of the hardware. Since an SoC has to manage networking as well, the protocol stacks have to be written along with the drivers.

Place and Route

Finally, there are powerful Place and Route (PNR) tools which pull everything together and synthesize VLSI layouts, in an automated fashion. The first step involves deciding where to place all the electronic components, circuitry and logic elements in a generally limited amount of space. This is followed by routing, which decides the exact design of all the wires needed to connect the placed components. This step implements all the desired connections while following the rules and limitations of the manufacturing process.

1. Architecture Strategy

The architecture of the processor that we use to design the SoC is a really important factor that has to be considered at all times. We also need to choose the kind of bus that has to be implemented.

The ARM vs x86 CPU Decision

ARM (Advanced RISC Machine) is a family of reduced instruction set computer (RISC) architecture for computer processors as well as SoC. In the beginning, the ARM architecture was specifically developed for use in a PC. In the late 1980's ARM2 was one of the simplest 32-bit processors of its time, with only around 30,000 transistors, which was less than half that of Motorola 68000's 68,000. The lower transistor count coupled with the efficient RISC architecture allowed ARM2 to outperform Intel's 80286 and save on electricity consumption at the same time.

The Intel 8086 CPU launched in 1978 was a 16-bit microprocessor and was followed by several successors whose names also ended in "86", which resulted in the christening of this series as the x86 series. This is perhaps Intel's most successful line of processors. Most computers still use the x86 architecture as the processor core for desktop machines and laptops although it is not preferred as a mobile SoC.

Today ARM processors have a big advantage in mobile devices: they need less energy in order to work. This is very important in smartphones and tablets because the technology of the batteries is always the same and so if you want to increase the autonomy of these devices you need components that use less power. For now, Intel is some steps behind in power usage, so manufacturers prefer to use ARM CPUs in mobile devices. This is mainly due to the retro compatibility of the x86 architecture that Intel is forced to maintain. The x86 chips consist of a higher number of transistors and thus consume more power.

Challenges in designing SoCs

2. Backend Synthesis Strategy and Integration Strategy

There are effects like IR drop, cross talk, 3D noise, antenna disruption, SAR and EMI effects which need to be taken care of while designing a SoC. To tackle these issues, chip planning, power planning, DFT planning, clock planning, timing and area budgeting are required in the early stage of the design. The detailed description of fabrication comes under Integration Strategy.

3. Test Strategy and Validation Strategy

Checking for physical defects, verifying the cores and verification of the integration of the system are the major challenges here.

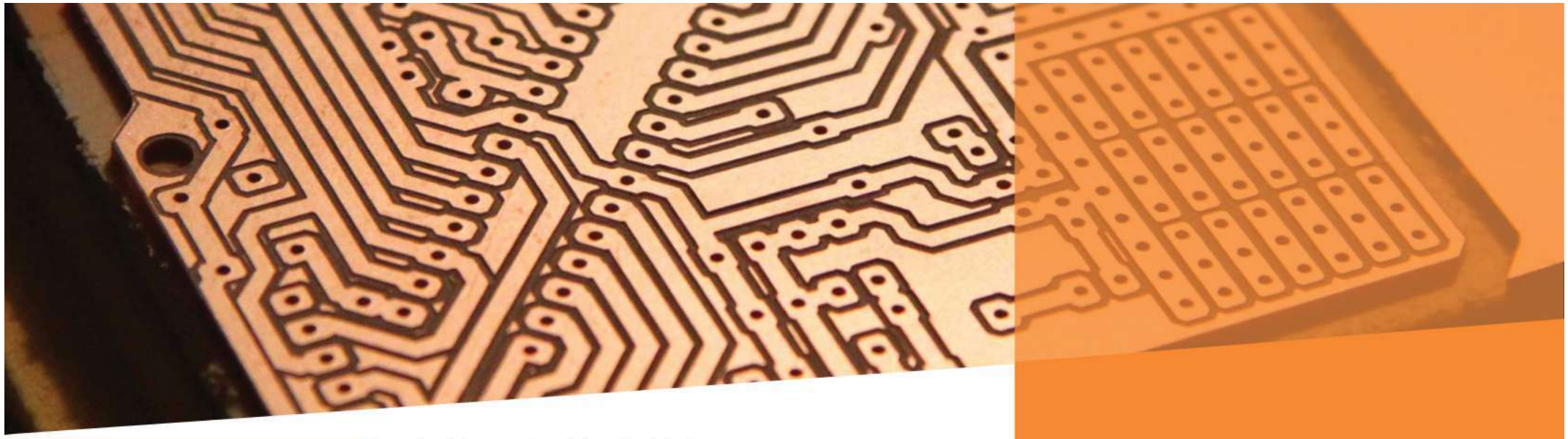
Current market frontrunners

Apple

Apple SoCs all prioritize graphics performance over everything else, both to support the large number of games available on the iOS platform and also as a general push towards high-resolution display panels that Apple is known for. They generally contain less CPU power and RAM than the other flagship mobile phones. The latest offering by Apple is the A11 Bionic which is a 64-bit hexa-core ARM-based SoC. It is based on a 2+4 core configuration based on ARM's 'big.LITTLE' architecture. The high-performance cores (codenamed Monsoon) have been benchmarked to be 25% faster than the Apple A10 SoC and the four high-efficiency cores (codenamed Mistral) are upto 70% faster than the energy-efficient cores in the A10. The A11 processor contains a Neural Engine which can perform up to 600 billion operations per second and is used for FaceID, which is currently an Apple exclusive feature!

Qualcomm

Qualcomm is hands-down the biggest player in the mobile chip-making game right now. It is the only one (other than ARM) that creates its own CPU and GPU architectures, rather than licensing one from ARM or other companies. The current series of CPU architecture is codenamed "Krait" and it is faster clock-for-clock than ARM's Cortex series of processors. The GPU series is named "Adreno" and is the most popular GPU in the market. In fact, most of the US versions flagships of major players like Samsung, Motorola, OnePlus are shipped with Qualcomm fabricated cores.



Modern Advancements

The contribution of SoCs to the world of technology is incomparable, and it has caused one of most dramatic outpourings of technological progress in human history.

The post PC-era saw the advent of smartphones and tablets, and the computing paradigm shifted — overall user experience became a critical benchmark independent of the performance of the underlying technology. Form-factor, cost and power became the critical drivers and increased the importance of on-chip integration of functional hardware. This shift to power-constrained, low-cost chips with increased system-level integration changed the traditional semiconductor landscape, and SoCs came into picture. Qualcomm, Apple, Nvidia, Samsung, Texas Instruments, Intel and MediaTek are a few of the leading SoC manufacturers and the innovations brought about by these companies offered the first significant platform for SoC technology to demonstrate its potential and compete with the traditional CPUs.

Recently, manufacturers are bringing in much greater diversity in chip configurations. Innovations like multi-chip modules, also known as 2.5D, or System in a Package (SiP) are on the way. It involves packing components closely together, without the complete, end-to-end integration of the SoC.

Though smartphones have been the overwhelming driver of innovation in the technology industry, the growth rate is slowing. There's a new boss in town — Internet of Things. Over the next decade, this industry is expected to produce billions of connected sensor devices. These will be used in every corner of the world, to gather new insights to help us live and work better. And at the heart of it all will be an SoC.

Google, Microsoft, Samsung and Intel are a few of the front runners in the IoT industry and the innovations brought about by these companies are slowly morphing the hardware industry, and paving the way to more varied and powerful SoCs. Faster, versatile and more powerful chips, along with declining costs are resulting in an exponential growth of the IoT industry, and we can expect a lot of 'smart' devices in the future and even more innovation in the chip sector.

With the advent of Internet of Things and other developments, Artificial Intelligence and Machine Learning are becoming the new talk in town, and manufacturers are trying to produce more versatile chips which will be able to handle far complex computations.

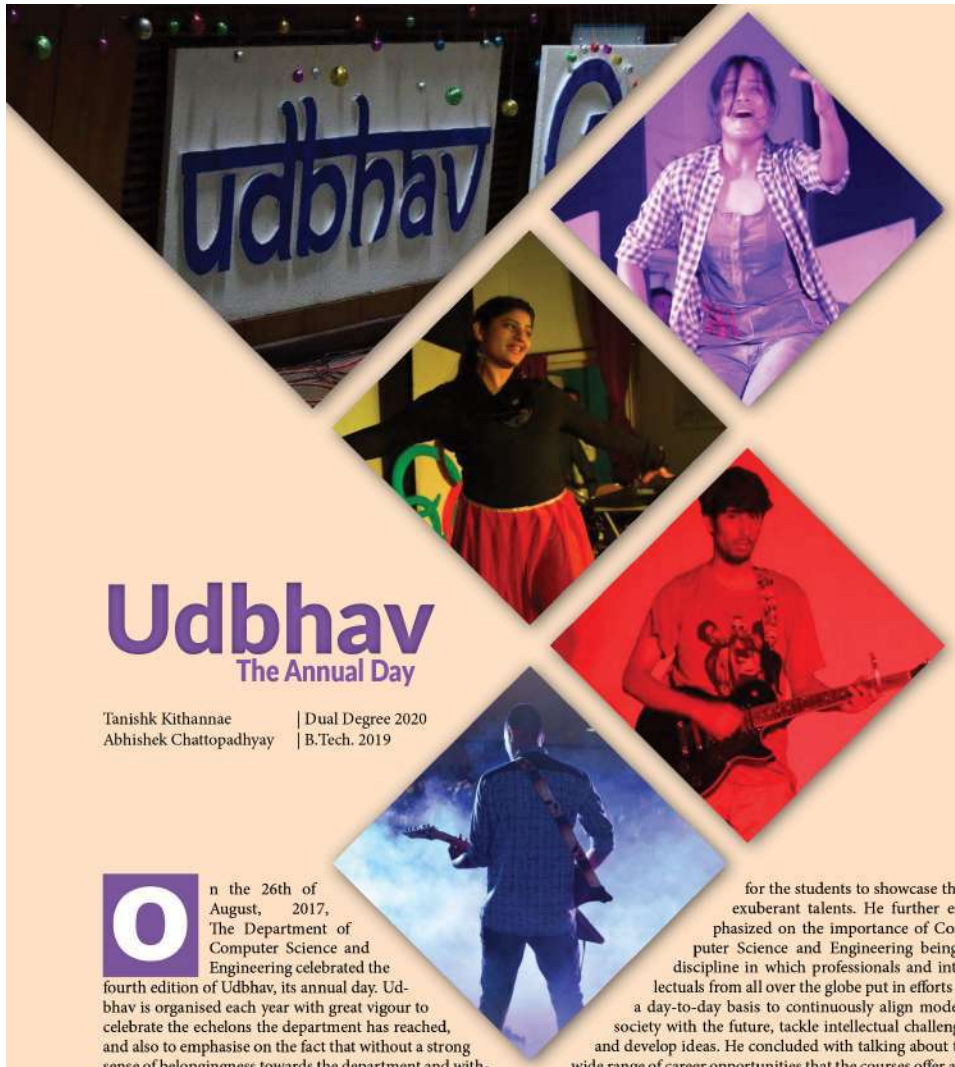
Recently ARM unveiled its next generation of processors, a new microarchitecture named 'Dynamiq' which focuses on AI and machine learning. It will allow for more powerful systems-on-chip, and also processors that are better at computing. Also, Google has developed a custom-built chip called Tensor Processing Unit or TPU that helps drive its AI services, including its image recognition and machine translation tools. A new processor is also under creation, dubbed TPU 2.0 - chips designed to both train and execute deep neural networks, and perform everything from image and speech recognition to automated translation to robotics.

Another field where system on a chip innovation is on the rise is quantum computing. By reworking the architecture of microprocessors, a team of Australian scientists from the University of New South Wales (UNSW) were able to create the first-ever design of a quantum computer chip that allows quantum calculations to be performed using silicon-based material. The new quantum computer chip design is capable of handling millions of 'qubits' and would offer exponentially more processing power. But in reality, scientists have been able to pack less than 50 stable qubits onto a chip and the reason for this limitation is the fact that qubits exist in a delicate, zen-like state of superposition which makes them extremely fragile and unstable, vulnerable to environmental interference. But if scientists are able to overcome this hurdle it will open up a new dimension in the world of computing.

Conclusion

In the near past, the traditional approach to electronics — and especially computing devices — was creating systems that ran on separate, independent parts. Computers and laptops are examples of such systems which are made out of different and distinct components connected together. However, with the advent of VLSI and VVLSI, the permanent miniaturization of all things around us means that there is more reliance on smaller, better and more power efficient systems; this perfectly fits the bill for the current and perhaps, future generations of System on a Chip.+

The disruptive potential of the SoCs took the world by storm and it is showing no signs of dying down anytime soon. Smartphones, tablets, wearable gadgets and even IoT (Internet of Things) devices prove that System on a Chip is an important part of the future of all electronics, and innovations are yet to come which will transform the world of technology. So get ready to see some big changes in the 'silicon' of the Silicon Valley.



Udbhav
The Annual Day

Tanishk Kithannae | Dual Degree 2020
Abhishek Chattopadhyay | B.Tech. 2019

On the 26th of August, 2017, The Department of Computer Science and Engineering celebrated the fourth edition of Udbhav, its annual day. Udbhav is organised each year with great vigour to celebrate the echelons the department has reached, and also to emphasise on the fact that without a strong sense of belongingness towards the department and without the constant support of the faculty, alumni and students, success is all but wishful thinking. After welcoming the audience gathered in the venue, the dignitaries present were invited upon the stage, and venerated with bouquets. This was followed by the lighting of the lamp, and a beautiful invocation song by the students of the department.

The Head of the Department of Computer Science and Engineering, Prof. P. K. Jana was then invited upon the stage to present his welcome address. He addressed the audience regarding how the annual day was introduced for the sole reason of strengthening the bond within the IIT (ISM) CSE family and that this day was not only meant to be a reflection of various events organised by the department but also a platform for the students to showcase their exuberant talents. He further emphasized on the importance of Computer Science and Engineering being a discipline in which professionals and intellectuals from all over the globe put in efforts on a day-to-day basis to continuously align modern society with the future, tackle intellectual challenges and develop ideas. He concluded with talking about the wide range of career opportunities that the courses offer and how CSE has emerged out as one of the most popular fields for the engineering aspirants to pursue their careers in.

Keeping in mind the need for the betterment of not only a student's technical skills but also his/her all round development, the Dept. of Computer Science and Engineering organises a myriad of events and also undertakes several initiatives through the means of the Computer Science and Engineering Society (CSES). To shed more light on the activities of the society, Dr. Amgoth Tarachand, Faculty Advisor (CSES), was invited upon the stage. He edified the audience with the activities of the society, including SpeakUp (an initiative to help students better their soft skills by learning from the seniors who had already been through the rigour of interviews); BufferedReader (the bi-annual departmental magazine which chronicles not just what happens inside the department, but also the latest happenings in the industry); Confluence, the annual student-alumni meet; and Udbhav itself, to name a few.

Accountability is a crucial factor in determining whether an organisation has been responsible in handling their finances. To present the account statement of the expenses of the society, Dr. Arup Kumar Pal, Treasurer (CSES), was invited on the stage.

The Association for Computing Machinery (ACM) is one of the largest international societies for computing. Our college too has a student chapter, namely IIT (ISM) Dhanbad ACM Student Chapter. Dr. D. Ramesh, the Faculty Sponsor of the Student Chapter, was called upon the stage to further enlighten the audience regarding the activities of the chapter. He mentioned that the chapter boasts over a thousand members, and has actively carried out activities, such as GOOGOL v2.0 (a national level competitive programming contest), PowerPuff Coders 3.0 (a competitive programming contest exclusively for women), Special Interest Groups, and also non-technical events, such as a T-Shirt Design Contest, and Excelsior, a literary fest.

After the addresses on the various aspects of the Department of Computer Science and Engineering, the seventh edition of the departmental magazine, BufferedReader v4.1, was launched. BufferedReader, first launched by the batch of 2014, provides an insight into the world of computing, both inside IIT (ISM) Dhanbad, and all that lies beyond. Be it placement statistics, alumni interaction, industry-institute interaction, or an insight into the working of the esoteric world of computing, the BufferedReader team is scrutinizing it all. It is worth mentioning that through the medium of this magazine, programmers are given a platform to write lines in English (other than code), such as poems and short stories.

The trees bearing fruit today, were born from the seeds sown eons ago. Alumni are an integral part of any institution; not because they were once a part of the institute, but because they are also a part of the world outside. Every year, CSES awards an alumnus the prestigious 'Alumnus of the Year' award, to recognise the efforts of the alumnus who has made significant contribution to the overall growth of the department. This year, Mr. Bhanu Pratap Singh, a student of the batch of 2008, was felicitated with this prize.

One of the most important facets of a wholesome education includes the manner in which collegiate transactions with companies are executed. Every year, CSES felicitates a company with a 'Certificate of Recognition', to acknowledge its contribution towards the overall growth and placement of the students of the Department of Computer Science and Engineering. The certificate of recognition for 2016-17 was awarded to Walmart Labs, for hiring two students for full time roles, and seven students for internships (of which five received pre-placement offers). Mr. Rahul Sridhar (Specialist, Campus Placements), on behalf of Walmart Labs, accepted the certificate from the chief guest. When requested to address the audience, he appreciated the quality of students he interviewed for intern hiring.

As the formal part of the event came to a close, the chief guest of the function, Prof. G. Udaybhanu, Dean (Academics), IIT (ISM), was called upon to address the audience. He was subsequently venerated with a memento by Prof. P. K. Jana, on behalf of CSES. In the consummation of the formal section, Mr. Ayush Khandelwal, Acting Secretary, CSES, delivered the vote of thanks; as he extended his heartfelt thanks to the HoD, the faculty, and especially quoted the efforts of Mr. Maheshwara Reddy and Mr. Dev Kothari. A short recess of fifteen minutes was held, during which the various societies conducted their photo sessions, and the audience helped themselves to the snacks.

With this, the informal session of the event began, as all code and no fun makes both Alice and Bob dull kids. After a sundry of mesmerising performances, ranging from dance and music to stand-up comedy, met with roaring plaudits of the audience, the informal session came to an end.

The prize distribution ceremonies came last. The meritorious students of the various events conducted by CSES were given their prizes, followed by those of ACM IIT (ISM) Student Chapter. With this, the event came to a successful and satisfying end.

WHAT WE SAID

Harmandeep Kahlon | Dual Degree 2020
Saurabh Singh | B.Tech. 2020

Rakesh Ranjan | TESCO

For TESCO, there was a coding round consisting of two questions, based on arrays and bucket sorting. 50% of my interview was on cryptography, which I answered based on my 7th semester knowledge. In the first round, they also discussed my projects. The second round was a system design round. The last round was with the Hiring Manager consisting of behavioural questions.

You have to be good with your CS subjects till the 7th semester. You should be able to convert your thoughts into code. GPA was not a criterion. I'm a 7 pointer. Soft skills do matter as in TESCO, you need to deal with international clients. Projects are also very important. I was mainly selected based on my project.

Have a good grip over the core CS subjects. GeeksForGeeks is the bare minimum, the threshold. I did my competitive coding in the last five months. Knowledge of Data Structures and Algorithms is a must. Projects, through which you learnt something new, are necessary. Challenge yourself, don't stick to mainstream ideas for projects, and explore your limits.

Krishnaditya Deepak
Samsung (Research Profile)

As I applied for a research profile, my selection process began with a group discussion on Machine Learning (ML). While other candidates were asked about their projects in subsequent rounds, my interview focused solely on ML. In my opinion, problem-solving skills for real-life problems are a must to do well in the interviews.
Samsung does give weightage to curriculum and GPA, and for candidates other than me, projects also played an important role. While fluent communication skills are not strictly a necessity, you should at least be able to convey your ideas to the interviewer clearly. If you're preparing for Samsung, I'd advise you to work on projects, on ML if possible. In general, coding, GeeksForGeeks, and projects are the things you should work on. Clear your mind before the interview, and you'll do well!

Maninder Singh
D. E. Shaw

The preliminary screening procedure for D. E. Shaw included coding rounds, technical MCQs, aptitude tests and system testing questions related to Linux. The interviews consisted of an HR round and a technical round. They mainly focused on CS fundamentals, projects, and problem-solving skills. Experience with Linux was also appreciated. GPA was not a criterion - They were simply looking for passionate students. As for soft skills, if you're able to get your ideas across to the interviewer clearly, that's sufficient.

A word of advice for my juniors - Don't target just one company from the get-go! Just focus on your core subjects, and make sure that you don't neglect CS fundamentals. If your fundamentals are strong, the rest will fall in place!

Rohit Singhatwadia
Goldman Sachs

My interview involved only coding related stuff and puzzles. Questions on OS were asked only in the last round. The first round was on puzzles and the last three rounds were on coding. Graphs and Dynamic Programming were asked. Some questions were taken directly from SPOJ. The questions were not very difficult. 90% of the interview was based on coding. Design questions were also asked. Only basics were asked. No questions on ML were asked, but projects were a topic of discussion. GPA was not a criterion, but your rank in the coding round of GS matters a lot. Projects are a must. Communication skills were not particularly necessary.

For preparation, practice on InterviewBit. Know the basics of every topic. Brush up your coding skills.

Digvijay Singh
Flipkart

For Flipkart, there were two coding rounds and one HR round. Each round had two questions related to graphs, strings etc. In the HR round, we talked about the culture there and the technologies they were using. Coding skills were emphasized upon. They were in a bit of a hurry, so they didn't go through my CV even once. GPA was not considered. However, you should be able to communicate your approach and ideas to the interviewers. You should also have worked on a couple of projects. Practice competitive coding and improve your problem-solving skills, that's it!

Praval Singhal
Uber

The selection started with a 2-hour long coding round with 3 questions. Four students were shortlisted based on the coding round. A 3-hour long interview followed, which was consisted of 2 rounds – Technical and HR. They were mostly focusing on problem solving skills. Even in the interview, there were only algorithmic problems in the technical round; and in the HR round, they focused on the projects and what you did in internships and with your mentor in college.

GPA is not a criterion for the selection. They are completely uninterested in academics. You should be capable of communicating your ideas. Projects are very important - the HR round consisted of around 40 minutes of project discussion. You should definitely have at least one or two projects in your resume.

Don't focus just on GeeksForGeeks or some fixed interview questions. Try to come up with multiple approaches to a particular problem, instead of sticking to mugging up the best approach. Improve your problem-solving skills and thinking ability.

COLLABORATIVE ARTIFICIAL INTELLIGENCE

Prof. Ashish Ghosh
Adjunct Professor at IIT (ISM) Dhanbad
Machine Intelligence Unit
Indian Statistical Institute Kolkata

Image Credits : The Visionary

The first (1760-1840) and the second (1870-1914) industrial revolutions made people richer and more urban. Now, a "smart revolution" is under way. A number of fascinating technologies are converging and giving rise to clever software, novel materials, dexterous robots, new processes (like 3D printers) and a whole range of customised web-based services. When compared with previous industrial revolutions, this is evolving at an exponential rather than a linear pace. It is disrupting almost every industry in every country. The possibilities of everything getting connected to everything through IoT, with unprecedented processing power, storage capacity, and access to knowledge, are unlimited. All these possibilities will be multiplied by emerging technologies like CPS, along with breakthroughs in 'smart-ness' of artificial intelligence.

The technology behind artificial intelligence is really intriguing, and what it will turn into forces us to rethink everything we know about the meaning and purpose of life and work. The pace at which Machine Learning, Data Science, Big Data Analytics, etc. are driving, AI calls for a good need to discuss whether we really need AI, or we are calling for mass unemployment.

Smart people who will build AI will still have savvy jobs, but there is a real bargain to make about the unskilled labourers. What we argue is that humans are way too smart in their respective domains - AI just helps them do things easily. For instance, consider a simple "chaiwala" replaced by an AI vending machine. There may be two sides to the story. The "chaiwala" may own the vending machine and make money, or he may act as a human supervisor over the vending machine and teach it to make the perfect cup of "chai", customised for every season and for every customer. Humans are meant to build a great world, so why not leave the petty jobs to AI?

Humans have been printing maps and following compasses for centuries. Now, GPS along with AI can give real time traffic information to the commuters, and maybe even provide a better route to their destination. Earlier, humans used to make weather predictions taking all factors in mind. Now, we have our own personalised weather forecast apps that can remind us to take an umbrella if it predicts a rainfall. Personal assistants like 'Siri' can make a common man feel like a VIP by reminding him about his daily appointments. AI will also make it faster to extract insights from population-level health data and make more personalised diagnoses and treatments possible. There are many such instances where people depend on AI for their day to day survival.

All that AI needs is lots of data. Earlier, all the paper work and data used to be stacked on racks, and forgotten. If somebody analysed the data, it turned out to be useful or else the files were just discarded as trash. It was impossible for humans to analyse such large volumes of data. So, they started using computers. Now, if there are complex relationships in the data, or the data itself is unstructured, incomplete or complex; it is hard for humans to solve it using simple mathematical tools. That is where humans need AI - to convert the trash to knowledge.

It does not mean that AI can be a self-sustaining system without humans. Human intelligence and intervention are important components of any AI strategy. Robots should never be able to do things we don't want them to do. That is what we should ensure at every stage - that AI must have human intervention. Only then, will it be a boon rather than a threat. In the future, humans and AI will learn to work with each other instead of against each other. Neither one will 'win out' over the other, but will learn to cooperate or be inter-dependent in order to solve humanity's hardest problems.

PLACEMENTS 2018

Aditya Sharma | B.Tech. 2020
Ashish Verma | B.Tech. 2018

Information Technology

The highest number of students got placed in the IT companies with Samsung R&D Insitute, Bangalore hiring a whopping 28 students, out of which 19 were PPOs. The offers were for the developer profile. The highest package was offered by the American company Uber which extended one offer through multiple technical rounds of interviews. Whereas Microsoft and Arista Networks offered jobs to 3 and 1 interns respectively, Sandvine and Samsung R&D Institute, Noida also hired 2 and 8 students in the campus placements.

Finance

Goldman Sachs was the major charm amongst the Finance companies and extended 9 offers (5 PPO, 1 second offer) for Strats profile. IB giant, D. E. Shaw visited the campus for the first time and extended 2 offers (1 second offer). Visa, a major financial services provider extended two offers. Trading firm Futures First also hired one student on the first day.

e-Commerce

WalmartLabs Bangalore and Amazon IDC Hyderabad extended 5 and 2 PPOs respectively to the summer interns after rigorous interview rounds. Indian counterpart Flipkart hired 7 students on the first day with an attractive pay scale. The British multinational retailer TESCO extended 4 offers to the CSE students.

Media

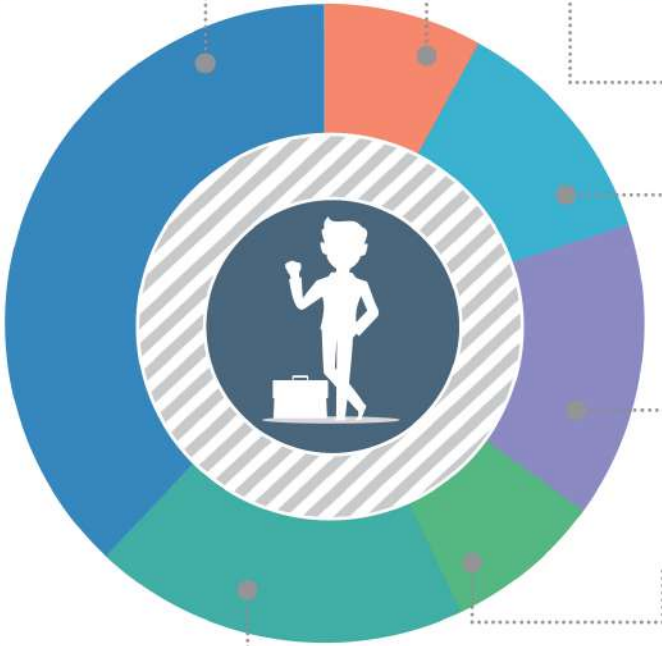
State government recognised tech start-up FBFPrime, a media streaming company, hired one student offering a lavish salary. Sling Media, Bangalore extended 3 placement offers to the students.

R&D

Samsung R&D Institute, Bangalore was the only R&D company to have visited the campus. Hiring for the research post first time, SRIB extended two research profile offers to the students with a very high package.

Miscellaneous

Indian MnC Infosys offered jobs to 4 students whereas Canadian company CGI Group Inc. extended 4 offers to B.Tech and 5 offers to Dual Degree students. Amdocs also hired 7 students for the Pune office.



Information Technology
Uber, Microsoft, Samsung, Arista Networks, Sandvine, Capgemini
Total Offers: 53

Media
FBF Prime, Sling Media
Total Offers: 4

Finance
Goldman Sachs, D. E. Shaw, Visa, Deloitte, Futures First
Total Offers: 16

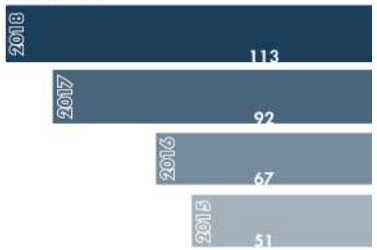
e-Commerce
WalmartLabs, Amazon IDC, Flipkart, Tesco
Total Offers: 18

R&D
Samsung Research & Development, Bangalore
Total Offers: 2

Miscellaneous
Infosys, CGI Group Inc., Amdocs
Total Offers: 20

Pie chart constructed on the basis of the number of companies visited.
Statistics as on the 31st of January, 2018.

Total Offers



Highlights

- Eligible Candidates: 109
- Total Full-Time Offers: 113
- 35 Pre-Placement Offers
- 25 Companies Visited
- Total Internships (3rd Yr): 75

THE ROAD LESS TAKEN

Aditya Sood | Dual Degree 2020

Virat Kohli earns close to ₹3.2 Cr for a single Instagram post as per Forbes, while Bollywood A-listers charge ₹10-12 lakh for a single tweet. Needless to say, social media has become the place for advertising and endorsements, reaching more users than print, radio or TV media ever could.

But while celebrities and sports stars take home the major chunk of the social media advertising money, there's still plenty left on the table for the smaller players to make a living out of. Over $35 billion was spent on social media advertising globally, which means even the crumbs of that share are worth a lot.

Take Lily Singh for instance. Singh, aka Superwoman, was the highest paid female YouTuber in 2016. She earned close to $7.5 million from her YouTube channel alone that year; not to mention her earnings from the endorsments of products, books and fan-tours on the basis of the 'Superwoman' brand.

What you really need to pay attention to here is that Lily isn't doing rocket-science: Her channel comprises of mostly comedy sketches and music videos. And despite the fact that those things don't seem to have a $7.5 million value on the surface, her legion of followers ensures a user base large enough for viable targeted advertising.

THE DETAILS

A 'social media influencer' is a person or a group of individuals who have a considerable following online on social media platforms such as Facebook, Instagram, Twitter, Snap, or even sites like YouTube and Medium. The influencer is (generally) an expert in some particular domain, because of which the content s/he puts out attracts a large following and consumption.

Many influencers then monetise this attention that they have attracted by accepting sponsorships from companies for their content or by advertising products.

At the core, an influencer is just someone who is really passionate about something, and who then puts out content in the form of images, videos or articles on various platforms as an outlet of that passion. So each of them is, essentially, a content creator. And it is because of the content that the influencer has a following. Such content ranges from tips to improve your phone's performance, or a recipe to bake the perfect chocolate cake, to an entertaining video about your favourite movie/book/video game, or the rendition of a popular song – depending upon the field/domain of the influencer. It doesn't matter whether the content is practical and useful, or simply entertaining, as long as it resonates with the consumers of the content.

The livelihood of an influencer depends heavily upon having a meaningful following on these platforms. Keeping this goal in mind, they engage heavily with their followers. Comments, competitions, content-requests, etc. – anything which can help them acquire and retain followers.

The reason why these influencers are able to earn a living is pretty simple. The basic principles of selling anything involve building a good product/service, and then bringing it to the attention of potential customers. For decades, the latter was largely achieved through ads on billboards, print media, radio, and television. Early 2000s saw the adoption of Internet as a viable option. In today's world, it's not uncommon to have companies choosing to advertise only over the Internet – with roughly 2.3 billion smartphone users across the globe, it's not a bad idea.

Additionally, most of these users spend over 2 hours daily on these platforms; clocking as many as 40 mins each, on average, on YouTube and Facebook alone. This total is made up of multiple 10-15 social media "breaks" the user takes throughout the day. As a result, most of the content put out on these platforms is customised for this – photos, 5-min videos, or short articles you can quickly read while you're waiting in the chow-line, or for the next lecture to begin.

Such usage trends make influencers look like fairies-for-hire compared to the idiot box which essentially tries to sell the same product to everyone watching it at the moment – from the pre-schooler crazy about 'Chota Bheem', to the retiree looking for a new hobby. The platforms these influencers put out their content on, allow a level of indivually targeted ads which has never been possible before.

But the most critical point to understand is that each of these influencers is a 'brand' in his/her own right. It doesn't matter if everyone in the world doesn't know them, because close to everyone that does know them is a consumer of their content. These people enjoy the content, and also associate themselves with the 'brand' of the influencer. This connect between the two is gold for attracting potential customers, because of which clients get their money's worth; as everyone they reach out to through the appropriate influencer (depending upon the product/service) is likely to atleast find out more about it. Leveraging the brands of these influencers is just about as much as one can achieve in targetted-advertising, without having every potential consumer followed by a private investigator.

So even if an influencer doesn't choose to monetize the content s/he is putting out, the following does help build their personal brand, which comes in handy for doing endorsements or even selling their own products. For instance, Casey Neistat doesn't monetize his vlogs on YouTube. But his 8.7 million followers give him the status of a pop culture god, which comes in handy when he's endorsing a product or selling his own official merchandise.

CONCLUSION

Social media has simplified how a person can reach out and share their content with people around the world. It's easier to do something that you are really passionate about and earn well on the side more than it has ever been, thanks to the plethora of social platforms, each catering to a specific type of content – from articles (Medium, Wordpress) and podcasts (Soundcloud, iTunes Store) to photos and videos (Instagram, Facebook, Snapchat, YouTube). So if a 9-to-5 job isn't for you, 2018 is definitely a good time to take a dip in the waters of social media influencer business. Because if you can attract the users while doing something you enjoy, then remember the Joker's advice - "If you're good at something, never do it for free."

Capture the Flag

Capture the Flag was the first of its kind information security event serving up to the intellectual cravings of the participants. The questions for this event included Web Deciphering, Forensics, Cryptography, Spectrogram Analysis and Binary Reversing. Some of the participants were lone wolves who attempted the various challenges by themselves, and the others worked in teams to attempt to score the highest number of points. This event as usual was timed, and the points were totalled once the time expired.

The participants made their adventurous journey through a web environment, finding all the "flags" utilizing the hints laid out in the questions and submitting it to the CTF Server to earn points. They navigated through the question set sequentially, gaining points for every correct flag found. They were allowed any number of attempts for each flag without penalty. Whenever they found themselves stuck, they were allowed to seek a maximum of two hints. All teams fought tooth and nail until the last sand particle trickled down in the hourglass. Eventually, the team which solved the most challenges and thus secured the highest cumulative score won, ending up with prizes, pride and immense joy.

Co-Ordinators:
Abhishek Chattopadhyay and Pratyush Kesarwani

Organisers:
Mohit Tripathi, Devesh Anand, Pratyush Mishra, Aditya Sharma, Abhay Gaur, Abhinav Bajpai, Gaurav Arora, Vivek Tiwari, Kamlesh Kumar, Apurv Gaurav Singh & Arnab Ghosh

Winners:

1. **Team WhiteHat**
   Shashi Kant Sharma
   Siddharth Bharadwaj
2. **Team Kryptonites**
   Shubham Sonkar
   Saloni Mohta
   Harsh Gupta
   Pawan Dogra
3. **Team Weirdos**
   Ajit Kishor
   Abhijeet Kumar
   Ratnesh Kumar Singh

TECHSTACY CONCETTO 2018

Saurabh Singh | B.Tech. 2020
Pandre Vamshi | B.Tech. 2020

The Annual Techno-Management Festival of IIT (ISM), Dhanbad, Concetto was held from 12th to 14th January. The forte of this festival lied not only in its spectacular display of technical acumen but also in its wide platform for entrepreneurial undertakings and social initiatives This three day techno fiesta is one of the largest Techno-management fests in Eastern India, packed with a plethora of technical events - competitions, workshops, guest lectures, paper meet and exhibitions. Contributing to the success of this festival was the Computer Science and Engineering Department. The department managed to carve out a niche for itself in an event packed fest by conducting two intelligently crafted events - Capture the Flag (CTF) and ARTH- which were a resounding success with the participants.

ARTH

The second event organised by the department in this year's edition of Concetto, ARTH certainly gave CTF a run for its money. The event was based on the concept of integrating Augmented Reality with Treasure Hunt; involving advanced technology in the old game, thus making it cooler. With the peculiarities of the game Pokemon Go which uses the existing environment and creates a virtual world of objects, the Augmented Reality Treasure Hunt event was organized with a participation of over 1100 participants.
The playground defined for the event was the entire college campus. The teams were provided with a mobile application compatible with both Android and iOS devices and their first clue before they set on the journey to glory. They pointed their cameras to the poster in the guessed location. Few of them got it right and, a logical puzzle popped up, solving which would yield the next clue. The others tried their luck with guesses. The answer to the last clue popped up a google form in which they had to fill their team name. As it always happens in this unforgiving world, the first team who accomplished this task was declared the winner.

With utmost enthusiasm and zeal, the participants gallivanted across the whole campus in the hunt for 'victory'. The event cultivated the spirit of innovation in the consciousness of students and refined the fest distinguishingly.

Co-Ordinators: Dewanshu Haswani and Harsh Goyal

Organizers: Ashish Kumar Burnwala, Priyanshu Kumar, Aadarsh Singh, Raj Rani, Swarnima Tripathi, Sachin Bhadoria, Kami ni Kumari, SM Khobaib Alam, Rohan Solanki, Saksham Gupta, Pranjal Gupta, Anshu Jalan & Rishabh Gupta

Eventually, the events concluded amazingly with delightful feedback from the participants. Winners received prizes along with a certificate from Prof. Prasanta K. Jana, Hon'ble HoD of the CSE Department. He congratulated the winners and motivated the students to continue with such events every year.

Winners:

1. **Team CBX1000**
   Akash
   Rajeev Kumar
   Shubham Rajak
2. **Team CRUSADES**
   Devesh Gupta
   Mihit Raj Keshav
   Sudhanshu Shrivastava
3. **Team TECHWARRIORS**
   Puneet Garg
   Priyanshu Shrivastava
   Pyare Lal Mahawar

WHAT THEY SAID

Monosij Ghosh | B.Tech. 2019
Aadarsh Singh | B.Tech. 2020

Tesco

TESCO, the British multinational, came on Day 1 for the campus placements. The HR expressed her deep gratitude towards the college administration for the warm hospitality and management, and promised to come again with a hope to see more diverse candidates.
The HR emphasised that GPA was not a big concern and mentioned that though it adds to the value of a candidate, TESCO generally seeks all-rounders. When asked to share a few tips for the future candidates, she remarked that an in-depth knowledge of a specific topic and an interest in the company can go a long way. She also mentioned that it was necessary to have good articulation skills.
Regarding the matter of gender ratio, she remarked that they prioritize the student's talent over their gender but will look forward to a more balanced batch of candidates in the future.

WalmartLabs

The Fortune 1 Company HR seemed quite content with the internship process. He was elated that the earlier batch of interns did exceptionally well and had high hopes from the current one. He also promised to come earlier next year for intern hiring. Since it was one of the later companies, the early birds had got the worms. When asked about the overall performance and the areas that the students could improve upon, he commented that we had done better than IIT Bombay and IIT Kanpur, which was really uplifting! He also pointed out that though students here were good at data structures and algorithms, they need to improve their coding skills. He also seemed a bit unhappy with the skewed gender ratio and hoped that it would improve in the upcoming batches. We all hope for the same. He complimented the current batch of interns and said that their willingness to learn and work with their colleagues and seniors would definitely play a major factor in their assessment for PPOs.

Sandvine

Sandvine, a networking equipment company, was one of the early recruiters this year. The HR was content with the hospitality provided at IIT (ISM) and was willing to come back again. When asked about the importance of GPA for placements, he remarked that GPA was just a criteria to shortlist candidates in the first round and to resolve ties in the subsequent rounds.
He mentioned that extracurricular activities are not an important judging criterion unless they involve anything technical and also emphasised on the importance of communication skills.
He noted that the performance of the students from IIT (ISM) was at par with the other IITs but unfortunately, few candidates had a weak foundation and their knowledge in many fields was superficial. We hope that our upcoming batches take his words as a form of constructive criticism and work on it in the future.

Flipkart

The HR from Flipkart had a nice experience in our college and thanked the volunteers for the seamless conduct of the entire process. Surprisingly, he was carried away by the beauty of our campus.
He was quite impressed with the current batch of interns and remarked that they were really smart. He advised the students to be confident during the interviews and not to feel disheartened on getting rejected; as he was certain that each and every one will ultimately succeed, provided they stay determined and put in continued hard work.
When asked about his expectations from an intern, he stated that since internship is a learning phase, the only prerequisite was being enthusiastic and having the willingness to learn.

Sling Media

Sling Media was one of the major companies that arrived for recruitment this year. The HR had no complaints with the hospitality and management but humbly requested for a better slot in the upcoming years, as he reminded us that many candidates may be interested in a core development company like them but being allotted a later slot reduces their chances for recruiting the crème de la crème.
When asked about the role of GPA, he commented that apart from shortlisting, it didn't matter much and the main focus lies in evaluating the technical knowledge and problem-solving skills of the candidate. He advised students to pursue projects on current technologies like Machine Learning and Artificial Intelligence and also highlighted the importance of leadership qualities and articulation skills, which we know, definitely adds substance to the portfolio.

Samsung

Samsung, the multinational conglomerate, surprised us all yet again this year, by giving away the maximum number of internship offers. The HR seemed particularly happy with the strong coding culture of our college but also advised the candidates to gain prerequisite knowledge about the company for which they are appearing for an interview, as it gives them an added edge.
He remarked that the academic grades bear little to no significance if the candidate is able to perform satisfactorily and also encouraged the students to have an in-depth knowledge of whichever field he/she is studying or interested in. He advised the students to take constructive feedback from seniors and alumni, and accordingly select the company, where they think that they can actively contribute. Let us try to follow his guidelines and perform better in the subsequent years.

NATURE'S CONSORTIUM

Photographed By:
Akshat Goyal | Dual Degree 2018

Aperture	f/5.6
Shutter Speed	1/1250 sec
Focal Length	4 mm
ISO	125

ACHIEVEMENTS

- Session's Best Paper award in the International Conference CEECE – 2017, held at Pataya, Thailand; from 28-29 December 2017. Received by: Preeti Komal, Kumar Nitesh and Prof. P. K. Jana (HoD CSE).
- Dr. Chiranjeev Kumar, an Associate Professor of the department, has been promoted to Professor.

Prof. Chiranjeev Kumar

NEW R&D PROJECTS

- Project under 'FIST Program 2017'. A grant of Rs. 57 Lacs. has been received from DST.

FAREWELL

Dr. Sushila Maheshkar

Dr. Sushila Maheshkar, an Associate Professor of the department, has been one of the major contributors to the department. Her mentorship has brought out the genius within many. We owe her a big 'thank you' and wish her the best for her future ventures.

DEPARTMENT HIGHLIGHTS

Pandre Vamshi | B.Tech. 2020
Aditya Thakre | B.Tech. 2019

"The department of Computer Science and Engineering continues to bear the torch of terrific achievements, accomplishments and activities right through the year 2017-18. Amongst all, we present to you the honourable mentions."

WELCOME

Dr. Ansuman Bhattacharya has joined the Department in 2017 as an Assistant Professor. The department welcomes him to the fraternity .

Dr. Ansuman Bhattacharya

EVENTS

- One day workshop on Artificial Intelligence by Intel Nervana AI Academy Bangalore on 6th September, 2017.
- Amdocs conducted an Open House with the students of all courses on 'Disruptive innovation in the Telecom and IT Industry' on 17th January 2018.

SHORT-TERM COURSES

- Coding Theory and Cryptography: Fundamentals and Applications from 13 to 17 December 2017, sponsored by ISEA Project.
- A week long National Training Program (NTP) on Wireless Sensor Networks from 18 to 22 December 2017, to train the college faculty members in the field of WSN.
- Security of e-system and Networks from 10 to 14 February 2018, under GIAN Program by Prof. M. Obaidat.

STUDENT ACHIEVEMENTS

- A team comprising of Jayant Sharma (B.Tech. 2018), Harmandeep Singh Kahlon (Dual Degree 2020) and M. Krishna Kumar (ECE B.Tech. 2018) secured ranks 14 and 35 at the Kolkata and Kharagpur ACM ICPC Regionals 2017-18, respectively.
- Jayant Sharma (B.Tech. 2018):
  1) Won iPhone 7 by securing second rank in Goldman Sachs Code Break Contest organised for interns in June 2017
  2) Among the top ten national finalists of Amazon Code Wizard Challenge held in March 2017
- Aditya Kaushik (DD 2019): Finalist of Poetry Slam at Rendezvous 2017, IIT Delhi. He stood 4th on the final tally.
- Ankesh Raj (DD 2020): Globalink Research Internship 2018, Université Laval - Québec City (Canada)
- V Prasad Naik (B.Tech. 2020): Inter IIT 400m silver medal. Rajya puraskar in scouts & guides NCC-A (pre-RDC-4)

Ph.D.s AWARDED

- Tapas K. Mishra on "Design of reliable and energy-efficient protocols for ad-hoc networks"
- Priyanka on "Blind and non-blind watermarking techniques"
- Sanjaya K. Panda on "Designing Resource Allocation and Task Scheduling Algorithms for Cloud Computing"
- Subhash Chandra on "Off-line and on-line signature verification techniques"
- Prerna Mohit on "Secure computer communication based on public-key cryptosystem"
- Abeg Kumar Jaisawal on "Biometric identification using machine learning"
- Nabajyoti Mazumdar on "Analysis and Development of Fault-Tolerance and Routing Algorithms for WSNs"
- Naushad Varish on "Content-based Image Retrieval Techniques in Transform Domain"
- Soumitra Roy on "Irreversible and Reversible Watermarking Schemes of Digital Images"
- Arijit Karati on "IBE and Multi-Authority ABE with their Challenges, Techniques, and Applications"

STUDENT ACTIVITIES

Jakshat Desai | B.Tech. 2020
Harman Kahlon | Dual Degree 2020

ACM EVENTS

Hour of Code

The Hour of Code is a worldwide movement under which students are made privy to the wonders of Computer Science, in the hope that they may choose to pursue a career in it in the future. IIT (ISM) Dhanbad ACM Student Chapter joined the movement and conducted the event on 8th December, 2017. The session covered various topics like data science, web development, mobile application development, Google Summer of Code, and open source development. Being a vast field, Computer Science provides several choices for one to explore and build a career in. The event aimed at developing interest in the various fields of Computer Science among the participants, and helping them choose their fields of interest. Over four hundred students took part in the event, and all of them were awarded with certificates.

HOUR OF CODE

Parliamentary Debate Competition

Ideas and innovation are difficult to shape into reality in the absence of the ability to communicate them to others. Realising this, the ACM Student Chapter IIT (ISM) Dhanbad, in association with LITC, the literary club of the institute, conducted a Parliamentary Debate Competition on the 5th and 6th of December, 2017 as a part of the Computer Science Education week. The competition followed the Asian Parliamentary debate format, with the participants entering in teams of four.

Introduction to Competitive Programming

The ACM Student Chapter of IIT (ISM) Dhanbad conducted their first major event of the academic year on 9th and 10th September, 2017, with the aim of enforcing its motto, 'Anyone can code'. Competitive programming forms an essential part of Computer Science, and the event aimed at imparting valuable information regarding the subject to the participants. It witnessed an unprecedentedly large participation of over six hundred coding enthusiasts, who experienced the joy of learning.

CSES EVENTS

Code Rush 4.0

The Computer Science and Engineering Society (CSES) of IIT (ISM) Dhanbad conducted the fourth iteration of its annual coding competition, Code Rush on 31st October 2017. The contest commenced at 9 pm and lasted for two hours during which coders from all the years as well as alumni showed overwhelming participation. The problem setters for the competition were Anupam Wadhwa, Ayush Kumar and Harmandeep Singh Kahlon. First year students competed in Div 3, second year students in Div 2, and Div 1 was the battleground for third and final year UG, PG students, research scholars and alumni. The winners of the event for each division were:

Winners

Div 1.0	1. Ashish Kumar* 1. Jayant Sharma 2. Shivam Jindal 3. Rajat Chourasia
Div 2.0	1. Ankur Dua 2. Mehul Mistry 3. Yash Choudhary
Div 3.0	1. Rachit Mishra 2. Pawan Dogra 3. Deepanshu Pandey 3. Abhinav Kumar

CodeISM

Competitive coding plays a vital role nowadays when applying for an internship or a full-time job. It forms an essential part of Computer Science, requiring one to come up with efficient solutions to computational problems. Whether directly included in the curriculum or not, it is something that each Computer Science student must know and learn. Realising this, the Computer Science and Engineering Society (CSES) conducts coding classes every weekend wherein the students are exposed to several concepts and methods of solving various problems. These classes usually have a duration of about two hours and are conducted by senior students from the Computer Science branch.

The students who tutor these classes are as follows:

1. Aarush Juneja
2. Anupam Wadhwa (Co-ordinator)
3. Ayush Kumar
4. Harmandeep Singh Kahlon
5. Harsh Goyal
6. Rahul Hooda
7. Shivam Jindal

CSE SPORTS DAY

Members of our department, along with immense distinction in academics, also compete ardently on the field. The annual sports day of the department had both students and staff participating on the same platform, bringing a welcome change from the lectures for a healthy on-field competition.

The fixtures held included Cricket, Football and a few other entertaining games. Cricket matches were held between three teams: The first team comprising of the Faculty members and the JRFs; while the other the two consisted of B.Tech. and M.Tech. students respectively. The B.Tech. team collected the most notches, defeating the other two in separate matches. The soccer match was a different story, in which the M.Tech. team beat the B. Tech. team in penalty shootouts.

Apart from these, few other games were also held for the merriment of the family members of our faculty. Everyone enjoys a good tug of war, which made it an apt conclusion for the sporting activities of the day.

A prize distribution ceremony took place in the end for the winning teams, bringing the day to a satisfactory close.

* Alumnus

ALUMNI

PEN

Aditya Thakre | B.Tech. 2019
Mehul Mistry | B.Tech. 2020

Forget your past, what you are, why you are,

your major achievements or mistakes. Today is yours.

-Dr. Sudhanshu Jha

In talks with

Dr. Sudhanshu Jha

Assistant Professor,
Department of Computer Applications,
National Institute of Technology,
Jamshedpur

Dr. Sudhanshu Kumar Jha is an alumnus of IIT (ISM) Dhanbad and was a research scholar under *Prof. P. K. Jana*. In an insightful conversation with the editors, he shares his experiences and encounters.

Q1. Sir, how are you doing? Please shed some light on your current way of life.
I'm doing great. It's going well, but there are always better things ahead. That's how I perceive things in my life. At present, I am working as a faculty member in the Department of Computer Applications, NIT Jamshedpur.

Q2. How was your life in ISM and how has been the journey since?
Wonderful. I visited so many places, met eminent professors and researchers, learned new ideas that helped me a lot. The knowledge and experience I got in the college helped me hone my skills and grow as a good teacher and a better communicator. After completing my course from ISM Dhanbad, I first joined KIIT University, Bhubaneswar, and then moved to NIT Jamshedpur. I learned a lot from almost every colleague of mine. The life I spent in the ISM campus was unforgettable and I can easily cite those days as the happiest days of my life.

Q3. How does it feel being interviewed for the magazine of the department you were an integral part of?
I feel delighted to be interviewed by the magazine team. Being an integral part of the CSE department once, I feel very proud.

Q4. Having spent a big chunk of time in ISM, what do you miss the most?
Freedom! Once you are a part of an organization, your freedom ceases to exist. I always miss those ISM days when 'I' was the one who chose the ways to my life.

Q5. What, according to you, should be done for the betterment of the department? Do you find anything which the department lacks or should work on?
Well, the department has changed drastically since I left. The department, though, must try to collaborate with some industries and some top-notch foreign universities to set up specialized labs for innovation and research. It should invite personalities from giant software companies working in the R&D sector to take interactive sessions on current trends in technology.

Q6. How has the education from this institution helped you? Do you have anything to say to the current students?
University education has helped me in every aspect of my life. I learned how to utilize my time, enjoy every moment of life and above all, how to give back to the community for the betterment of the society.

Q7. Is there anything that you wish you had done while in ISM?
While we were at ISM, we did a lot to empower the department, however strong bonding among students (whether they were at UG/PG or Ph.D. level) and faculty members was still a challenge. I feel that we should come together for the betterment of the department by focusing more on collaboration based research, discussion and celebrations as well.

Q8. What would you advice to the current students?
To the young minds, I'd like to pitch: "We always wait for the future to arrive and once it knocks, we miss our past, so utilize every moment in life with strong determination and enthusiasm."
The past is gone; the future is unpredictable, so all you have is today. I believe that success – whether personal or professional – is generated from three critical building blocks: knowledge, critical thinking, and curiosity. Forget your past, what you are, why you are, your major achievements or mistakes. Today is yours. Live life to its fullest.

Q9. What do you think you can do as an alumnus to help the department and the college? How would you like to contribute if you get a chance?
As an alumnus of the department, I have a strong attachment with the department. Should I get a chance to contribute, I would be at the forefront.

Q10. Please share with us your proudest moments.
Generally, for a research scholar, the proudest moments are getting a fellowship increase, a notice for a pre-submission seminar, and above all, the date of the defense viva-voce. However, to me, getting a satisfactory smile on the supervisor's face off my work is unforgettable. Receiving the final award degree in the Convocation was a cherishing moment too.

Q11. What else would you like to share?
Studying is important, but so are other moments. College life is a bliss. Never turn down a chance to enjoy those days.

On The Edge Of The Horizon

Tanishk Kithannae | Dual Degree 2020

It had been a chilly day. Detective Connor blew his nose into the handkerchief once again; the weather had been rather unkind to his sinuses. He had been meaning to see the doctor, but duty stood above all. Besides, with immortality, a cold couldn't kill you. Not that it didn't have its disadvantages. Most diseases had been eradicated, but since nobody was going to die, nobody really cared. But of course, all of mankind's great innovations still couldn't protect our detective from the nefarious cold. The detective froze for a moment. His phone was ringing. Not that he had had any foreboding, he simply didn't wish to take the gloves off his hands. As he kept the phone back in his pocket, he realised he should have had a foreboding. A visit to the doctor was due.

In the recent past, there had been a spurt in the rates of rapes and physical assaults, because even the criminals knew they couldn't cause anybody any form of permanent physical damage. Or so they thought. An inaudible murmur of seething rage emanated from Connor's lips. It had been about a month since it happened. The poor girl now had to see her father's prostrate body, soon after half of hers had turned limp too. That friday, when Tina was returning from a visit to her friends, she realised she was being followed. In an attempt to thwart the danger she presumed she was in, and rightly so, she ran. The hooligans caught up with her soon, but she wouldn't give in. Irritated by her guts, they beat her to a pulp, and broke her back, as a result of which the lower half of her body was rendered paralysed. One might argue it was alright, given she wasn't going to die, but Connor would under no circumstances abide such criminality. To him, Tina was like a daughter. He had never seen her frowning, not even as her father wept while he operated on her in a failed attempt to salvage whatever little movement his skilled hands could afford his daughter.
He didn't have the facts, nor was he even remotely aware of whether or not Tina conjectured correctly in her frail state of mind. The one thing, he did however know, was that the doctor had been found lying lifeless on his office floor. Once he was at the house, the first thing he did was meet Tina. No words were exchanged. Glances spoke all that they had to, as Tina broke into tears in his arms. He tried to hide it, but a few were shed by his eyes too. Tina spoke a few tangible words between sobs, but he wasn't paying attention. He immediately excused himself and left to see the doctor. He had little medical knowledge, but he remembered his father once telling him a fact. It was something about how their ancestors would verify if a man was alive by checking if the left wrist was throbbing. Clearly, the doctor's wasn't.

Even though he was a detective, his faculties weren't quite needed here. A letter lay in the doctor's pocket, and the syringe the doctor administered himself the special toxin with had rolled not very far from the body. The letter read:

Dear Tina,

I know I have a lot to answer for. There are many mistakes I have made, and even though I realise my departure is perhaps the biggest one of them all, you must understand my reasons.

I lengthened lives. Lives of men who cared nothing for others. I imagined a world that was far from the throes of death and disease.It did happen, as you would already know. I need you to understand it wasn't for the greed. However, a man once fed the taste of power can never cede it. They began to abuse their newfound ability; the inability to die.

They trivialised death. They spat in the face of it, and belittled the man who offered them dominion over it. For years, and years together, I tussled with my ethics. Who was I to change the natural order? Who was I to question the manner in which this universe offers an end to those who suffer? I am not very religious, but I am a man who couldn't understand how things worked, and a man who finally understood why it was important to preserve the sanctity of the ways of the cosmic realm. I realised not believing that someone else controls your life doesn't give you the authority to assume his responsibilities.

I saw you suffer, my darling, and I saw you writhe in pain. All my years of experience, all these days of feeling like I was the one who'd outclassed the devil himself had come to nothing. I couldn't stand it. I simply couldn't. I couldn't stand the idea that the men who hurt you did so because you couldn't die. Neither could they. I gave them that power. I gave all these faces these fake smiles, for they didn't know what death felt like. Now, I will make them want it.

All of my clients, who abused my powers, have been injected a virus that cannot be treated. Their flesh will rot while they scream in pain for death, an end no power can afford them now, for the one man who could has written his last letter.

My love, I am sorry. You were all I truly had in the world, and today, here we are. I need you to know that I loved you. One day, maybe, we shall meet again, if hell and death are ever a possibility.

Connor held onto the letter. Tina needn't know the truth, she had already faced enough. All she had to know, was that her father was a kind man, whose work was misused. A sudden sneeze sent the letter flying. He really needed to visit a doctor.

PUZZLE

RULES:

- The puzzle has been encrypted by a simple cipher.
- Decipher it and send us the answers at bufferedreader@iitism.ac.in
- There are exciting prizes for the first 3 entries with maximum correct answers from each year of B.Tech., M.Tech., and PhD. respectively.

1. wkh glvflsolqh zklfk lv frqfhuqhg wkh frpsxwdwlrqdo dvshfwv ri qdwxudo odqjxdjh idfxowb:
2. d surmhfw wr fuhdwh d qhz lqwhuqhw sodwirup wr frpelqh wkh uhdfk ri wkh zhe zlwk wkh vshhg ri vrjwzduh zulwwhq wr uxq qdwlyhob rq vshflilf rshudwlqj vbvwhpv:
3. dqgurlg-ghulyhg sodwirup wr khos ghyhorshuv exlog frqqhfwhg ghylfhv wr zrun dfurvv lqwhuqhwriwklqjv:
4. d vlpsolilhg surjudpplqj prgho iru surfhvvlqj odujh qxpehu ri gdwdvhwv iru gdwd lqwhqvlyh dssolfdwlrqv:
5. d sdvvzrug vbvwhp edvhg rq wkh svbfkrorjb ri idfldo uhfrjqlwlrq:
6. d qhz jhqhudwlrq ri ioljkw vlpxodwru lqfrusrudwlqj yluwxdo uhdolwb:
7. wkh iluvw ilup wr vhoo d txdqwxp frpsxwhu:
8. wkh wkhruhp zklfk hvwdeolvkhv wkh dojrulwkp wr eh xvhg dprqj d qxpehu ri dojrulwkpv kdylqj d frpprq urrw:
9. wkh vhw ri dojrulwkpv xvhg djdlqvw gdwd wkdw kdv qr klvwrulfdo odehov:
10. d odvhu-pdsslqj whfkqrorjb dqg vpduwskrqh dss wkdw hqdeohv xvhu wr jhw dq dffxudwh frxqw ri wrwdo fdorul-hv eb srlqwlqj dw wkh irrg:
11. jrrjoh'v huvwzkloh ylvlrq wr pdnh wuxob fxvwrplcdeoh vpduwskrqhv:
12. d qrq-surilw dl uhvhdufk frpsdqb wkdw dlpv wr fduhixoob surprwh dqg ghyhors iulhqgob dl:
13. zkr zdv wkh iluvw khdg ri wkh ghsw. ri fvh?
14. zkhq glg wkh ghsduwphqw vkliw wr lwv shupdqhqw vsrw lq wkh fdpsxv?
15. lqlwldo rq-fdpsxv sodfhphqw dqg edwfk vwuhqjwk ri wkh fvh ghsduwphqw:

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BufferedWriters












CONTACT US
bufferedreader@iitism.ac.in
www.bufferedreader.org




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