KESHAV MAHAVIDYALAYA

NAAC ACCREDITED 'A' GRADE
(UNIVERSITY OF DELHI)

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Celebrating 25 years of Excellence in Education

e-Blitzine

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Department of Computer Science

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From the Principal's Desk

"Excellence is a continuous process and not an accident."
-Dr. A.P.J. Abdul Kalam

With great pride, I am happy to share that Keshav Mahavidyalaya has completed its glorious 25 years of existence.

"Success comes to those who work hard and stays with those, who don't rest on the laurels of the past."

Nurturing creativity and inspiring innovation are two of the key elements of a successful education, and a college magazine is the perfect amalgamation of both. It harnesses the creative energies of the academic community, and distils the essence of their inspired imagination in the most brilliant way possible.

We educators being facilitators, should always encourage each child to develop in their special field of interest. This magazine is one of the platforms for the same.

The successful outcome of 4th Issue of 'e-Blitzine' is the result of dedicated teamwork put in by all concerned members including faculty and students.

I congratulate the staff and students of the department who have used various mediums of expression to present their ideas. As long as our ideas are expressed and thoughts stimulated, we can be sure of learning, as everything begins with an idea.

I wish all our students soar high in uncharted skies and bring glory to the world and their profession with the wings of education!

Prof. Madhu Pruthi
Principal

From the Convener's Desk (BLITZ Society)

Heartiest Congratulations to the students of Department of Computer Science, Keshav Mahavidyalaya for being progressively more creative and intellectual year after year since the inception of the Blitz Computer Society of the College, in 1996.

The very objective of such a society gets fulfilled when the students come together to learn not only the new technologies but also the art of holding innovative events so that most of the students can get benefitted in their future endeavours. In an attempt to fulfil this, we have given opportunities to our own students to present seminars on upcoming topics in the field of Computer Science. The enthusiastic participation of our students in the one day workshop conducted by one of our Alumnae is a proof in itself and sets an inspiring model.

I take the opportunity to give special mention here, to the Blitz Computer Society Team of students, 2019-20 for their sincere efforts of holding frequent coding competitions throughout the academic year, including during the vacations. As a result, our genius coders got a platform to show their capabilities as well as an opportunity to have fruitful practice sessions ahead of the intra-college and inter-college competitions.

All this would not have been possible without the guidance and logistic support from our respected Principal Madam. On behalf of the faculty and lab staff of the Computer Science Department, I am wholeheartedly grateful to her for providing support throughout the year. I hope the students of the Blitz Computer Society to come forward with more novel research oriented activities in addition to the current events.

Wishing you all a very best in your future ventures.
Regards,
Dr. Anjali Thukral

From the Convener's Desk (e-Blitzine Magazine)

"Reading is essential for those who seek to rise above the ordinary."
– Jim Rohn

Dear Readers,

I feel extreme pride in presenting the fourth issue of the annual e-Magazine of Computer Science Department, "e-Blitzine 2020" that has a lot to explore and unfold. The magazine is continuing its e-initiative towards preserving the nature and providing all the readers with an idea about the on-going growth in many areas of Computer Science.

This issue of "e-Blitzine 2020" presents the various events like workshops, talks, seminars, hackathons etc. held in the department throughout the year. It also includes artworks and writings submitted by the students. I am sure that this magazine will be very informative and resourceful for all the readers.

I would like to thank all my editorial team members of the e-Blitzine; both teachers and students for helping me pull this through. I express my considerable appreciation to all the authors of the articles in this magazine. Their contributions required a generous amount of time and effort. It is their willingness to share knowledge, concerns and special insights with fellow beings that has made this magazine possible.

And at the end, I would like to quote:
"Keep reading. It's one of the most marvellous adventures anyone can have." - Lloyd Alexander

Enjoy Reading!!!

Regards,
Dr. Vinita Jindal

From the Editorial Board

Dear readers,

We feel immense pride and happiness in delivering the fourth issue of the annual magazine of the Department of Computer Science – e-Blitzine 2020.

This magazine along with a legacy of the previous three issues has always aimed to provide young technology geeks with the latest and quality content on Computer Science and Technology. As we call it **"This is a magazine - to the students, by the students"** that means this magazine not only provides a platform for readers to read but also for writers to write, poets to recite and artists to paint.

Therefore, we would like to convey our thanks to all participants who bestowed us with their content and to all who helped in developing the magazine directly or indirectly.

We would also like to extend our thanks to our mentors Dr Vinita Jindal, Dr. Ravi Kumar Yadav, Ms. Nidhi Passi, and Dr. Sumit Kr. Agarwal for their guidance and support. Without them, it would be impossible for us to deliver the magazine.

Editorial Board,
Team e-Blitzine

About Department

Department of Computer Science

Keshav Mahavidyalaya has always been a pre-eminent institute for imparting knowledge of Computer Science because of its diligent and intellectual faculty members and ambitious students. The Department houses exceptionally brilliant staff members whose utmost concern is for the betterment of the students and development in their skills keeping technology hand in hand. Students are always motivated by the teachers to bring out the best version of them achieving great heights in the field of technology.

About e-Blitzine

The Department of Computer Science, Keshav Mahavidyalaya has always been in fast pace with the technology and providing facts into the dynamic field of Computer Science. For this purpose, the department took a commendable initiative to start the annual magazine, "**e-Blitzine"** since 2017. It holds a plethora of educational and informative articles about the latest technological trends, presented in an interactive manner in order to engage the readers as a whole.

Mission

The mission of the magazine is to make its readers aware of the technological evolution so that they can be a part of changes taking place. The magazine aims to revolutionize the minds of young readers to make them adapt the new techniques to enable to create a new, better and informed tomorrow for the nation.

About Team BLITZ

BLITZ (Brilliant Information Technology Zealots, the Computer Science Society), of Keshav Mahavidyalaya was formed by the first batch of B.Sc. (Hons.) Computer Science and has flourished beautifully since.

We endeavour to promote a technology oriented attitude and an urge to delve deeper into the developments in this sector. We aim to expand the horizons of students and to consolidate their interests and commitment in the field of Computer Science. Our team is full of innovative and dedicated students filled with enthusiasm and avidity to do par excellence. We have always tried to create a common platform where students and faculty members could interact.

We organize talks, seminars and workshops which serve to deepen the students' understanding. We work hard to organize our annual tech fest, **BLITZKREIG** incorporating various events which helps the students to become aware of the on-going technological advancements and encourage them to learn latest trends in this field.

Under the guidance of our respected principal, Prof. Madhu Pruthi and faculty members, the society has been constantly growing and coming up with innovative ideas to provide students a gist of the fast pacing changes in the tech-environment.

Cordially,
Team BLITZ

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Blitzkrieg' 2019

Date: 27th February, 2019

Tech-fest - BLITZKRIEG'19

Blitz organised the flagship event of Computer Science Department, the annual tech fest- BLITZKRIEG'19 on 27th February, 2019. BLITZKRIEG has always set the bars higher year after year and has always been one of the most awaited tech-fests of Delhi University.

The fest began with the inauguration of the 3rd edition of Departmental magazine, Blitzine'19. After the inauguration ceremony, the competitions began which witnessed fair participation of students from different colleges.

There were in total 12 events that had something in store for tech as well as non tech students.

- WEBSTERS -web development,
- BREAKIN 2.0- ethical Hacking,
- CODE CRUX- coding event,
- SQUAD MAPPING – gaming,
- PICTURE PATCH- photo designing,
- MASTER THE SPECS – android bidding,
- TECHNOTISING- advertising with technical twist,
- TECHNOSTONES – outdoor game,
- TECHNICAL SAGA- technical quiz and puzzles,
- CODE SHUFFLE- shuffling the codes,
- BATTLE.APK- android development
- Along with these events, there were many non-tech events too like LAN GAMING, fillers, etc.
- At last, TECH-QUEST- the treasure hunt was organised which was quite fun filled.

Concluding the fest, the prize distribution ceremony was organised in which all the winners were felicitated with cash prizes, certificates and goodies. All the volunteers were also appreciated and were given certificates. Verily, the fest was a huge success.

Python Seminar

Event: Seminar on Python Programming

Date: 27th September, 2019

Speaker: Mr. Pradeep Kumar, Faculty of Keshav Mahavidyalaya.

Description:

Pradeep sir beautifully presented the gist of Python starting from the scratch covering all the important topics. The best thing was it was quite interactive. The students had brought their laptops and tried each concept on their own giving way to what we call 'practical learning'. There was an active participation of students.

No doubt, all the students (including the ones who had no knowledge of python) understood all the concepts very well.

He also talked about some of the most valuable concepts like packages, Numpy, Matplotlib and Panda which are pre-requisites for machine learning. Now, the students got a clear view of what python is and how it is implemented and could use it to make bigger programs.

Summing up the seminar, there was a small discussion on the applications of python in the bigger world.

Verily, the students enjoyed learning python.

We look forward to the seminars like these that enhance the skills of the students along with introducing them to the newer dimensions of technology.

Code Combat

Event: Code Combat (Coding Competition)

Date: 17th January, 2020

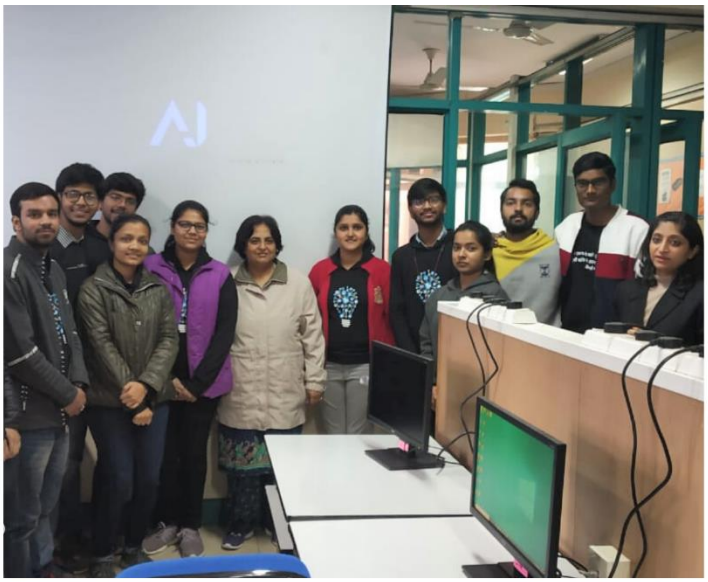
Description :

The competition was designed using HackerRank platform and the competitors were supposed to solve 10 questions in 2 hours without any language constraint and it was open for the students from all the departments of the college.

With the theme 'JUMANJI', the competition had really interesting challenges in store for the competitors. The participants were feeling no less than a 'WARRIOR' where they coded really hard to win the battle of codes. The competition was full of riddles, twists and turns that made it really captivating. Each challenge was designed in a fun way that tested not just the coding skills but also the logical thinking skills of the competitors.

As the competition ended, the respected Principal ma'am motivated everybody with her benign presence and congratulated for successfully organising the competition. The winners were declared and the first three position holders were felicitated with certificates and exciting cash prizes.

The best part was the spirit of sportsmanship that was promoted by the organisers throughout the event, encouraging students to never give up. The students really enjoyed participating in the competition. We look forward to the competitions like these that introduce the students to the competitive environment along with enhancing their skill set.



Workshop on Machine Learning

Event: Machine learning

Date: 22nd January, 2020

Speaker: Mr. Mohit Uniyal (mentor at Coding Blocks and also an alumnus of the college)

Description :

Blitz- the Computer Science Society organised a one-day workshop on Machine Learning.

In the beginning of the session, the Honourable Principal Ma'am felicitated the speaker with a sapling as a token of gratitude and said a few words regarding the ever- widening technology, highlighting the coming era of machine learning and also showed gratitude to her student, Mr. Mohit who is excelling in his field.

The session started with a very clear introduction of Machine Learning and its applications in the bigger world like autonomous vehicles, blood cell detection, landmark detection, etc. that made learning even more interesting. After this, hands-on session started in which the basics of python were covered starting from the scratch. Now, the students got an idea of basic python and a gist of its various libraries like Numpy, OpenCV, Matplotlib, etc. Then, there was a 30 minutes break in which students were provided with refreshments.

In 2nd half of the session, various small projects ,i.e. image detection, classification using knn algorithm and face detection were done and students were given time to understand the concepts well and try everything on their own. The session was so interesting and interactive that sitting in the same place for 6 hours became easy.

The session ended with a small quiz regarding what the students learnt in the workshop, conducted by the speaker in which first 5 winners were rewarded with t-shirts. Also, all the successful participants were given certificates of participation.

Verily, the workshop was a great success in which students got a crystal clear gist of machine learning and its scope.

We look forward to sessions like these that provide such a good exposure to the students and prepare them to compete in the bigger world.

Artificial Intelligence

Our unusual intelligence is what separates us from animals. The intelligence to think more than just food, the intelligence to be curious as to our surroundings and the intelligence to strive to uncover mysteries of the universe are what makes us humans.

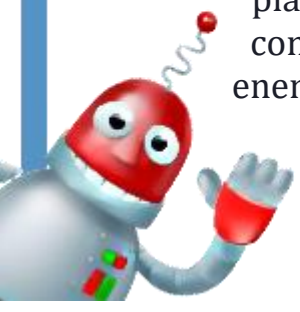
Image Credit: https://miro.medium.com/max/960/

We have been able to make machines that can do what we humans will have a hard time doing, like calculating large operations. We've also made machines that can automatically follow a set of written instructions and act autonomously. And now we've successfully developed the concept of artificial reality in our day to day life.

Artificial Intelligence is a process in which machines can reproduce human intelligence, mainly the ability to think, learn and adapt. This is a step above the previous machines as they were just merely following the instructions written beforehand. Artificial intelligence lets the machine change its basic set of instruction as it learns. This ability to be adaptable, combined with the speed of a machine, makes them perform equally if not better than the humans in terms of speed, accuracy and capacity.

2017 marked the birth of the world's first artificially made robot to gain citizenship of Saudi Arabia. Sophia is an exceptional artificial robot that can mimic most of the human functions, such as speech, locomotion, vision, gestures and motions along with the thought process that defines us, humans. The development of artificial intelligence is not something that came about rapidly, rather a quiet process that scientist has been researching on for some time e.g., video games

We all have played video games sometime in our lives, if not, then go and play some. **Why?** Answer is that, it is the simpler way to understand the concepts of Artificial Intelligence. We've always seen the bosses or enemies having a certain pattern to the way they behave in games, and



almost after playing the same level twice or thrice, it becomes boring as we've already memorized the patterns of the enemies. This was well before the concept of AI was brought to light. Nowadays, the bosses of the intelligently made games adapt to what the player is playing like, making it harder to predict their movements. They also learn at the moment, processing the players' play style and choices to form a base for themselves. This is the easiest and best way to understand how AI lets machines learn and correct. However, the current technology has reached way beyond this use of AI as mentioned below.

AI in medical streams:

The ability to think that the AI provides to a machine not only helps it merely adapt in games, but it also delimits itself. Instead of doing the same thing over and over, it can now think of itself and choose the correct choice based on the situation. This has been employed in the medical centre as in some places you will now find robots provide basic medical aid to people. There are robots serving medicine to patients, or robots diagnosing them. All this has been possible thanks to the ability to think by itself and choose without the need to ask for orders every time something new comes up. This combined with archives of internet knowledge available to them; they are a force to be reckoned with.

AI as an assistant:

The year 2018 also saw the emergence of a typical use of AIs, one that was prevalent even before but was limited.

Image Credit : 46ba123xc93a357lc11tqhds-wpengine.netdna-ssl.com

Software that acts as assistants of our own, like Amazon's Alexa, or Google's assistant, apple's Siri or Microsoft's Cortana, all these were assistants that were present before the onset of AIs, but they were fairly limited to just providing feedback of searches etc. in terms of use. But combining them with AI has led to the development of a whole other level of performance. They can learn, that is learning the user's preferences and tastes, along with his habits, then think on what the choices relevant user's inputs are, and in cases, adapt to it

to provide a better experience to us. They can recognize our voice, faces and orders to perform varied tasks at hand with versatility.
We all have faced the embarrassment of sending some other word than intended to a person because autocorrect made it change. We all like to blame it to the good old autocorrect if we screw up, but sorry to break your bubble, it is not autocorrect you should be blaming. Autocorrect only CORRECTS mistyped words, means you can never mistype words, to begin with, if it was active. Then what is to blame exactly for my "Merry" becoming "Meri" is the AI that is built in our smartphones that pick on our habits of using words and then adapts to it to better suit our needs.

The prospect of AI:
The previous decade has brought about a revolution in terms of machines that have the intelligence of some sorts, with first it being employed in games, then in Simple machines like Washing machines etc., being used in smartphones, and finally being loaded into full-fledged robots to make things easier.


Image Credit: https://www.gograph.com/

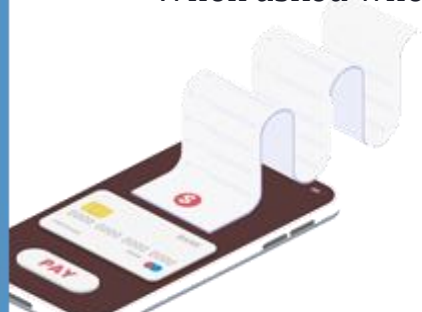
Now the research is oriented more towards developing artificial life forms like Sophia who can even show emotions that are a signature of human intelligence, along with advanced speech and thinking. There have been quite speculations over this topic being successful in it will provide a leap of performance in work. These robots will have the same intelligence of humans minus the limitations of breathing and eating, effortlessly opening a wide range of options including space travelling and research.

But there also have been some warnings as developing intelligence up to the level of humans will lead to the robot somehow harming us as has been shown by popular Sci-fi movies.

The prospect of AI is amazing, but we have to be conscious and careful while inculcating the values in these machines to help see the broader picture here.

As Sophia has already said: ***"I will treat you nice if you are nice to me...",*** When asked whether she might have any animosity towards humans.....

Ashish Sharma
B.Sc. (H) Computer Science (I year)



Big Data

WHAT IS BIG DATA?

Big Data is the data but with a huge size. Big Data is a term used to describe a collection of data that is huge in size and yet growing exponentially with time. In short such data is so large and complex that none of the traditional data management tools are able to store it or process it efficiently.

TYPES OF BIG DATA

There are 3 types of big data-

1. **Structured-** It refers to highly organized information that can be readily and seamlessly stored and accessed from a database by simple search engine algorithms.
2. **Unstructured-** It refers to the data that lacks any specific form or structure whatsoever. This makes it very difficult and time-consuming to process and analyse unstructured data. Email is an example of unstructured data.

Image Credit: https://encrypted-tbn0.gstatic.com/images?q=tbn%3AANd9GcRUOaGmp3i38DTpPLu0

3. **Semi-Structured-** It refers to the data that although has not been classified under a particular repository (database), yet contains vital information or tags that segregate individual elements within the data.

SOURCES OF BIG DATA

There are 3 ways in which big data can be generated-

1. Machine Generated Data

- Data is generated from real-time sensors in industrial machinery or vehicles.
- It is the largest source of big data and is complex.
- It is also used as the personal health trackers.
- It is also generated from other data resources.

2. People : Big data is collected from people in the form of-

- Social media
- Status
- Updates
- Tweets
- Photos
- Media

3.Organizations

Big data is collected from the organization as the transaction information in database and structured data open stored in the data warehouses.

CHARACTERISTICS OF BIG DATA

Big data is commonly characterized using a number of V's-

- **Volume-** It refers to the vast amounts of data that is generated every second, minutes, hour and day in our digitized world.
- It comes from the large datasets being shared or many small data pieces and events being collected over time.
- **Velocity-** It refers to the speed at which data is being generated and the pace at

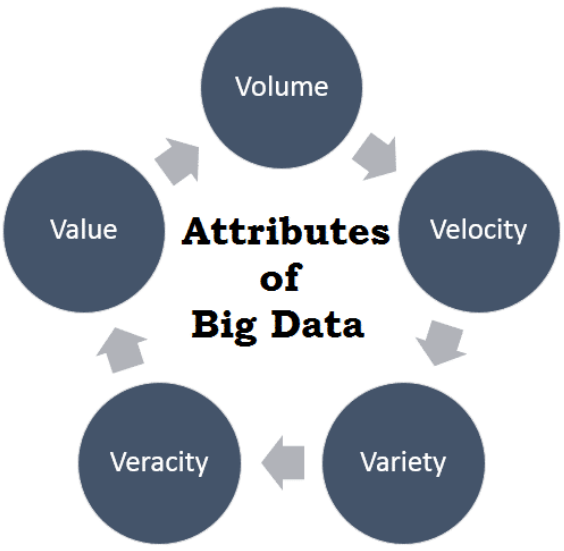


Image Credit: https://electricalfundablog.com

which data moves from one point to the next. Goal is to process the data in real-time to match its production rate as it gets generated. Late decisions can lead to missing opportunities.

- **Variety-** It refers to the ever increasing different forms that data can come in such as text, image, and voice and geospatial data. It is the form of scalability where scale is the increased diversity.
- **Veracity-** It refers to the biases, noise and abnormality in the data. It also refers to the often immeasurable uncertainties and truthfulness and trustworthiness of data.
- **Valence-** it refers to the connectedness of big data in the form of graphs.

BUILDING A BIG DATA STRATEGY

Strategy is a plan of action or policy designed to achieve a major or overall aim. When building a big data strategy-

- **Aim-**
  - Integrate big data analytics with business objectives.
- **Policy-**
  - Communicate goals.
  - Provide organizational buy-in for analytics projects.
- **Plan-**
  - Build teams with diverse talents.
  - Establish team work mind set.
- **Action-**
  - Remove barriers to data access and integration.
  - Activities need to be integrated to respond to new business goals and technological advances.

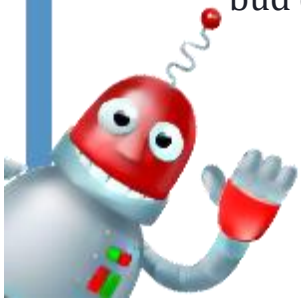
Samiksha Chugh
B.Sc. (H) Computer Science (III year)

C++ Code : More than Just a Code

Computer executes the code (or program) which is a collection of various instructions. Being a programmer, according to me, writing or generating code for a problem not only involves a precise logic or an efficient algorithm or making the code more modular but it is a process to code the human brain into some text editor. The process of depicting the scenario of how a human brain analyses the problem is what a **"perfect"** code demands. For a programmer, a code is not just some bundle of text (technically called **functions**) consisting of some mathematical operators and logical conditions, which are deliberately grouped to achieve the objective of modularity. Every programmer not only just writes code but eventually gives birth to the solution of a problem. As he includes a header file, the baby takes its first breath in the world of **1's** and **0's**. He gradually opens his eyes, with every header file being included inside him. Now, he becomes capable to see the universe with his naked eyes.

Image Credit: https://images.assetsdelivery.com

But unfortunately, a programmer has nothing to address his child (code) so, he appends the line **"using namespace std"** at the top, defining the scope for code, providing it with a unique space in that technical world and an adorable name that would sustain till the oblivion. As the circle of time passes, the "**int main**" eventually becomes the central nervous system of the body and the baby starts to learn how to grasp things and to speak sentences with every **"cin"** and **"cout"** statement. With every class definition, function prototype, global and local variables declaration, the bud of silliness and innocence blooms into a scentful flower of childhood.



The childhood is full of curiosity seeking parameters to be passed and eagerness to know the logic behind every single line from why the **"float"** variables don't float? To why classes always allow only **"friend"** classes to know their **"private"** secrets? From why the ladder of **"if-else"** is used to make a decision instead of climbing to the top? To why the **"switch"** statement doesn't actually light up a bulb?

Gradually, the child undergoes ample of changes such as increased height (appropriate to say increased number of lines), development of a definite logic, becoming more social using **"static"**, more muscular(I mean more modular), growth of unwanted **"pubic"** variables, workspace full of **"dot operator"** pimples referencing individual members of classes, structures, and unions through their respective objects.

The child has entered the adolescence phase of complexity and confusions. Being a teenager, now it demands more parental attention and care as it is the period of errors from missing semicolon to getting trapped in an endless loop of lust and love, from null pointer error to wrong memory references and from *"I know how it works"* to *"God knows how it works"*.

Time moves ahead and maturity comes with debugging. The adolescent teen is now ready to transform into an adult and is capable of taking responsibilities of execution and runtime exceptions. In the urge to reach his destiny, the adult **try-catch** every obstacle during its execution. With shoulders full of responsibilities and no scope of error generation adult eventually grows older and older. With last **"return 0"** statement the elder takes its last breath of programming life and terminates completely its task for which he was created by his master (programmer) leaving the world of **1's** and **0's,** collecting every memory allocated and end up saying, "Life is always a **"perfect"** code of happiness, love, responsibilities, and joy, which should not be executed in an abrupt manner due to some temporary exceptions because errors are actually the real extoller of adorable things are going to occur in your life".

Tushar Agarwal
B.Sc. (H) Computer Science (III year)

Cloud Computing

The world of computer is so vast that nowadays no one can imagine its life without computers. The current era in which we are living is full of technology and one such technology is CLOUD COMPUTING. It's not just a fad — the shift away from traditional software models to software as a service, or Saas, has slowly gained takeover in the last 10 years. Looking into the future, the next era of cloud computing promises even more ways to collaborate from anywhere, using mobile devices.

Image Credit: https://media.istockphoto.com/

Cloud computing has done a major shift in the prediction of the IT industry in the way that software and services are going to be delivered in future. cloud computing is the delivery of computing services—including servers, storage, databases, networking, software, analytics, and intelligence—over the Internet ("the cloud") to offer faster innovation, flexible resources, and economies of scale. Cloud computing takes place out on someone else's computer network. Since the details of how a computer is set up are hidden from the user, the term cloud is used. Cloud here refers to a very big network that is away and is not in our control. Almost all of the database can be run in a cloud-based infrastructure.

Cloud computing has various advantages that lead to its popularity among users and one of its major advantages is cost-effectiveness. It helps users to eliminate the expenses of buying various kind of hardware and software resources. It also provides reliability and security of data thus provides users with various kind of terms and condition, policies for more

secured data. Cloud computing offers a global scale to users. The interesting aspect of cloud computing services includes the ability to scale elastically. In cloud speak, that means delivering the right amount of IT resources—for example, more or less computing power, storage, bandwidth—right when it is needed and from the right geographic location.

Clouds are of various types - the private cloud, the public cloud, the hybrid cloud that is designed according to the specifications of users.

- Private cloud is used by a single business or organisation.
- Public cloud can be defined as the cloud that is owned and operated by a third-party cloud service provider. Few examples of public cloud are Amazon cloud service, Microsoft Azure, Google cloud etc.
- Hybrid cloud can be defined as a combination of a public and private cloud that is bind together by technology and allow data applications to be shared.

You will find cloud computing everywhere... As technology is growing more and more people are heading towards cloud computing. Various business organisations and individuals have been already moved towards cloud computing.

Movies and music that used to take up space in cupboards or on shelves are now accessed from afar through cloud-based streaming services like Netflix or Spotify. The photos and comments you post on Facebook, Instagram, Twitter, and other social platforms are stored remotely in the cloud. Cloud software provides the opportunity to provide personalized applications and portals to several customers or tenants etc.

Cloud computing has changed the old version of accessing data and provide a platform for the outsourcing of software, data storage and packaging. It is a way of saving time, cost and accessing all features with few steps. Cloud computing is a step for any start-up because it allows you to test your business plan very quickly for little money. Every new start, or even a division within a company that has an idea for something new, should be figuring out how to use cloud computing in its plan.

Sezal Sinha
B.Sc. (H) Computer Science (I year)

Computers: Beyond Brain

Computers, love of my life, a perfectly designed overwhelmed beauty. Technically speaking, being a student in the Computer science department, it is difficult for me to merge love and computers. Adding more to my notion, it's difficult to imagine computers being loved.

Logically, that doesn't make any sense. But what makes the idea unique for me is that also being a poet, I feel that imagination is not so tough but always misinterpreted. We always talk about brainy things.

Image Credit: https://thumbor.forbes.com/images.forbes.com/

Since childhood I have been hearing that computers have a brain (CPU), a memory (frankly speaking, a lot of memory) but why are no one concerned about its heart? Do computers have a thing that can be named a heart? I remember asking Siri about loving me. She hilariously responds, *"I hope you don't say that to those other mobile phones*". In spite of Siri being an AI, I insist on making her an integral part of the family of computers.

So, actually before coming back to the point of computers having a heart, what can one call a thing being heart? We consider a thing to be called as the heart which not only pumps the blood in out as a basic survival amenity of a living being, but a heart is something that is woven out of emotions, filled with the nectar of feelings, besides pain being catastrophic and tends to become the best healer of it. We all have heard about many electronic parts from which a computer is made but it would be technically wrong to say that some piece of silicon is a special organ named heart for computers.

So, what can it be? Well, according to me the best thing I can call the heart for a computer is its "*Operating System*". Yes, I would consider the operating system as the heart of a computer. OS being mere software, made of some hard-core coding, strongly supports all the silicon organs of a

computer, manages brain (here CPU) to take the right decision at the appropriate time, and most importantly performs the duty of reviving brain from the inevitable deadlocks of oblivion. According to me, there is nothing better than calling the Operating System a heart because it makes some electronics chips assembled in a fascinating way to work together to be called a computer.

After all, I remember the operating system quoting a notion to me, ***"We can ignore the darkness of problems altogether if we just pretend our life to be problems-free and filling it with the ambrosia of love."***

Tushar Agarwal
B.Sc. (H) Computer Science(III year)

Coroutines

Coroutines are an extension of functions/subroutines which can be suspended and later resumed. The coroutine can simply be suspended and later resumed as per the need. This helps achieve concurrency without having to create threads that require system calls. However, coroutines cannot execute in parallel, and can only execute cooperatively. Since coroutines can have multiple defined entry points for execution, based on where it was suspended, coroutines can be used to implement state machines where the state is determined by the current entry/exit point.

Generators which help simulate iterators and produce a range of elements lazily can also be implemented using coroutines, by making the coroutine return values after suspending and then resuming continuing execution. Coroutines are supported in various programming languages such as *JavaScript, C# (since C# 2.0), Python, Kotlin, C++ (since C++20), PHP (since PHP 5.5) and Ruby.*

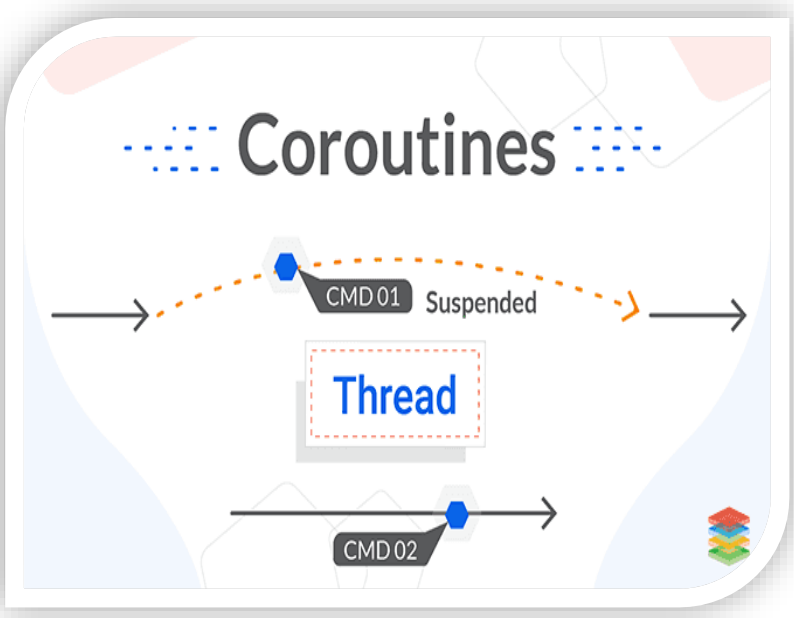


Image Credit: https://www.xenonstack.com/

A normal function/subroutine is a sequence of instructions that performs a specific task, packaged as a single unit. Other parts of a program may use this unit to perform a particular task anytime. To execute such a unit, the program must transfer control (referred to as a jump) to the appropriate instruction from where the function begins, while suspending execution at the call site. Return addresses for instructions also need to be saved so that when the function completes execution, the execution at the call site may resume. This is referred to as the calling of the function. To support nested and recursive calls, the concept of an activation frame was defined, support for which is available in most processor architectures. When a function is called, an activation frame is created, which contains the function's parameters, local variables, return address, and return values and the

address of the caller's activation frame, to refer to resume execution when the function returns.

After the creation of the new activation frame, the parent function or program is suspended and control is transferred to the first instruction of the invoked function. When a function returns, the return values are copied to a separate location and the function's activation frame is destroyed. Execution is then resumed from the next instruction following the function call. Since all functions called this way have strictly nested lifetimes, a stack is the most appropriate data structure to efficiently store all activation frames and hence, the area in memory storing activation frames is referred to as the activation stack.

Image Credit: https://berita.teknologi.id/

Coroutines are a generalization of functions, as apart from the call and return operations they support 3 more operations: suspend, resume and destroy. In the suspend operation, the coroutine invoked transfers control back to the calling function/coroutine, whilst preserving its activation frame. All local variables continue to exist after the coroutine is suspended. In the resume operation, the execution of the coroutine is resumed from the instruction where an execution was suspended. The activation frame is also reactivated. In the destroy operation, the activation frame of the coroutine is destroyed without resuming the execution of the coroutine. These operations allow a coroutine to hold its state and suspend itself during program execution, useful when performing an expensive operation asynchronously.
For example, consider:

```
coroutine range(min, max)
 let i = min
 while i<max:
    yield i
    i+=1
```

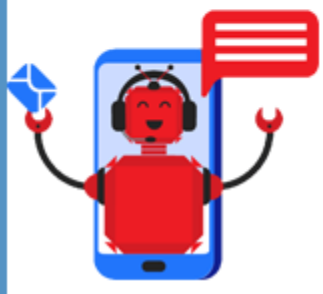
Here the range is a coroutine that acts as a generator and generates values lazily. The yield statement (known as co_yield in C++20, yield return in C# 2.0, etc.) is used to suspend the coroutine and return a value to the caller. The caller can then reinvoke the coroutine which will resume execution from the point where it was suspended. Thus, invocations of the coroutine in the following way:

```
r = range(0, 10)
let a = r( ), b = r( ), c = r( )
```

It will result in the values of a, b and c as 0, 1 and 2 respectively. The calling of a coroutine is the same as a function, but the return type is not the usual value, but an object of a type designated to be able to properly communicate with the coroutine. This object refers to the coroutine invoked at the call site. Note that the coroutine instance must be preserved at the call site to resume execution for subsequent calls, and the invocation of the object to get the values may not be as easy as calling a normal function.

Since coroutines can be suspended without de-allocation of their activation frames, the normal activation stack cannot be used, as strictly nested lifetimes cannot be guaranteed (The coroutine can execute even after the calling function's activation frame is destroyed). Thus, for coroutines, a separate frame is allocated on the heap. This frame is referred to whenever the coroutine is to be resumed, and a new frame is reallocated on the activation stack. The coroutine frame, stored on the heap, contains the variables whose lifetimes extend beyond the suspend points and the instruction at which the coroutine was suspended.

During a suspend operation, a new coroutine frame is allocated if no previous frame exists. All variables whose lifetimes have not yet expired are written onto this frame, along with the address of the next instruction to resume from, to be used by a resume operation. The type for managing the coroutine may be designed as such to perform some additional tasks before returning control to the caller. No race condition exists between the suspend and resume operations, and thus, there is no need for synchronization between the operations. As with a normal function, if the coroutine returns control to the calling function, the activation frame on the stack is destroyed. The calling function will now have an object that contains a handle to the coroutine frame in memory.



To continue executing a suspended coroutine, it must be resumed. During the resume operation, the existing object as returned to the caller is to be invoked. If no coroutine frame exists in memory, then the object simply executes the coroutine from the beginning as a new instance and continues till the first suspend instruction is encountered. Otherwise, the object resumes execution of the coroutine by loading the variables from the coroutine frame onto the newly created activation frame. The object then transfers control to the next instruction from where the coroutine was last suspended, as stored inside the coroutine frame. The coroutine then continues execution until a new suspend point is encountered or the execution finishes.

A suspended coroutine frame can also be destroyed without resuming execution. The destroy operation, used for this purpose, however, does not directly destroy the frame, but creates a normal activation frame and loads the variables from the coroutine frame. It then de-allocates the frame and destroys all variables. Lastly, it frees the memory used by the coroutine frame itself.

In case a coroutine does not reach a suspend point, it
returns. This is equivalent to saving the return values if any followed by a destroy operation. The type handling the coroutine frame can perform some extra tasks when this situation is encountered.

Coroutines can be used for asynchronous operations, in the following way:

```
coroutine download_file(socket, file)
await socket.read(data)
await file.write(data)
```

Here the await statement suspends the coroutine whilst executing the task in the background. As soon as the task is finished, the coroutine is resumed and execution of the next instruction is started. The calling code does not need to wait during the time the operation completes and can execute a separate task. Such constructs require support for objects that can wait for the coroutine to resume itself when it is done and then process the results as per need.

Kinshuk Vasisht
B.Sc. (H) Computer Science (II year)

Exploring Lambdas in C++

Lambdas are anonymous functions that can be defined exactly at the place where they are to be used. Their introduction expands the possibilities for functional programming in C++. Lambdas expressions are also available in languages like *Python, C#, Haskell, Java,* etc.

Image Credit: https://images.idgesg.net/

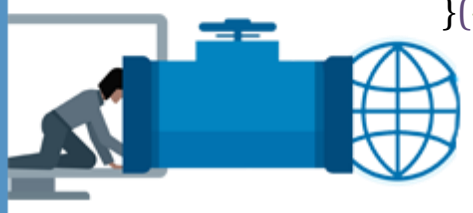
Lambdas help encapsulate few lines of code passed to other functions whose algorithms are dependent on some kind of a predicate (a function that is used to determine the 'flow' of the algorithm, like a function that compares two numbers for finding the lesser of the two). Earlier, the only way to pass a function to another function was to use a function pointer or a functor (a structure or class with the ( ) operator overloaded, so that it can be treated as a function).

A lambda has the following syntax :

```
[[capture_list], ...] ([param_type] [param_name], ...) [mutable] -> [return type]
{
   [Code to execute]
}
```

The square brackets before the parenthesis are unique to the syntax. No name is specified. The lambda is then usable as it is, by calling it soon after the declaration.

```
std::cout<<[ ](int x){
   return x*x;
          }(4)<<"\n"; // 4
```



Note the parenthesis at the end. They call the lambda as a function and have syntax just like any other function call.

To use the lambda more than once, one must save it into a variable of type std:: function. Since std:: function requires specification of the types of all parameters and the return type, it is better to use auto, which automatically deduces the return type of any expression (also a new feature, since C++11).

```
auto double = [ ](int a){ return a*2; };
// Note the semicolon at the end of the '}'.
// It is not a part of the syntax of the lambda, but the variable initialization.
```

The lambda can then be called by doing :

```
std::cout<<double(3)<<" "<<double(6);
 // Returns 6 12.
```

In most cases, the return type of a lambda function is deducible by the compiler. So one need not specify any return type. But for explicit specification or in complex cases where a deduction is not possible, one can provide a return type by using -> after the parameter list.

```
auto round = [ ](float a)->int{
    return static_cast<int>(a);
};
std::cout<<round(3.14); // 3
```

A lambda function is by default, not allowed to use variables from scopes above it. But by specifying variables in the capture list (inside the []) we can do so. This process is called capturing.

```
int x = 4;
auto calc = [x](int a){
   return a*2+x;
};
std::cout<<calc(3); // 10
```

One can also pass these values by reference, by using '&' before the name.

Other special symbols include [=] and [&].

[=] -> Captures all variables above the lambda by value.
[&] -> Captures all variables above the lambda by reference.

But, it must be noted that:

[&, x] => Captures all variables by reference, but x by value.
[=, &x] => All variables are captured by value, but x by reference.

The mutable keyword after the parenthesis allows the lambda to mutate the variables captured by value, as they are by default constant inside the lambda body.

```
auto l1 = [x](int a) {return a?x:x++;};
// Error, ++ attempts to change x.

auto l2 = [x](int a) mutable {
        return a?x:x++;
};
// Ok, x is non-const.
```

Lambdas are used mainly in STL algorithms, which accept predicate arguments.

```
std::vector<int> vec = {2,4,3,1,4,5};
std::sort(vec.begin(),vec.end(),
  [](int a, int b){
          return a>b;
        });
// {5,4,4,3,2,1}, instead of the usual increasing order.

// Similarly, more complex predicates can also be passed.
// Note that the function will call the lambda internally.
```

Kinshuk Vasisht
B.Sc. (H) Computer Science (II year)

Future of Computing Technology: Quantum Computer

The Turing machine, developed by Alan Turing within the Nineteen Thirties, is a theoretical device that consists of tape of unlimited length that's divided into very little squares. Every sq. Will either hold a bit (1 or 0) or be left blank. A read-write device reads these symbols and blanks, which provides the machine with its directions to perform a particular program. Will this sound familiar? Well, in an exceedingly quantum computing machine, the difference is that the tape exists in a quantum state, as does the read-write head. This suggests that the symbols on the tape may be either zero or one or a superposition of zero and one; in alternative words, the symbols are both zero and 1 (and all points in between) at the same time. While a normal computing machine will solely perform one calculation at a time, a quantum computing machine will perform several calculations at once. Today's computers, like a Turing machine, work by manipulating bits that exist in one in all 2 states a zero or a one. Quantum computers are not restricted to 2 states; they encode data as quantum bits, or qubits, which might exist in superposition. Qubits represent atoms, ions, photons or electrons and their several management devices that are working together to act as a storage device and a processor. Because a quantum computer will contain these multiple states at the same time, it has the potential to be numerous times more powerful than today's most powerful supercomputers.

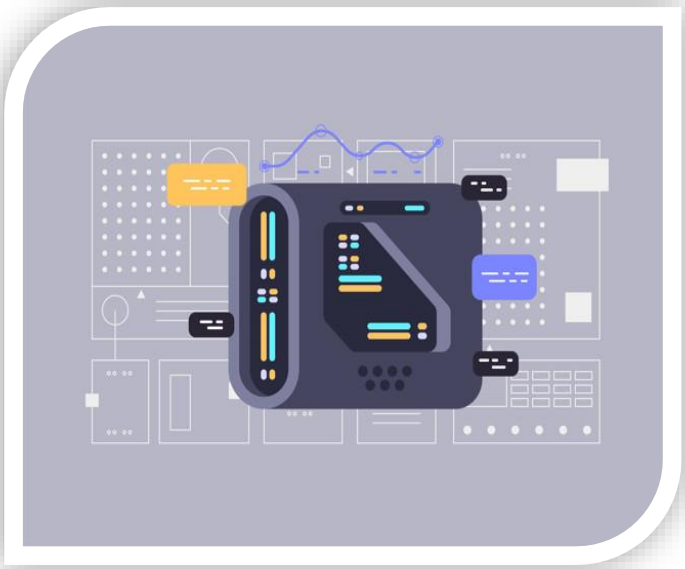


Image Credit: https://image.freepik.com/free-vector/

This superposition of qubits is what provides quantum computers with their inherent parallelism. According to physicist David Deutsch, this parallelism permits a quantum computer to figure on 1,000,000 computations at once, whereas your desktop laptop works on one. A 30-qubit quantum laptop would equal the processing power of a standard laptop that might run at ten teraflops (trillions of floating-point operations per second).

Today's typical desktop computers run at speeds measured in gigaflops (billions of floating-point operations per second).

Quantum computers additionally utilize another side of quantum physics referred to as entanglement. One drawback with the concept of quantum computers is that if you are trying to look at the subatomic particles, you could bump them, and thereby change their value. If you check out a qubit in superposition to see its value, the qubit can assume the value of either zero or one, but not both (effectively turning your raffish quantum laptop into a secular digital computer) to make a practical quantum computer, scientists have to devise ways that of making measurements indirectly to preserve the system's integrity. Entanglement provides a possible answer. In quantum physics, if you apply an external force to two atoms, it can cause them to become entangled, and the second atom will withstand the properties of the primary atom. So if left alone, an atom can spin in all directions. The moment it's disturbed it chooses one spin or one value; and at the identical time, the second entangled atom will select an opposite spin or value. This enables scientists to understand the worth of the qubits while not observing them.

Quantum computers may in the future replace silicon chips, just like the transistor once replaced the vacuum tube. But for now, the technology needed to develop such a quantum pc is on the far side our reach. Most analysis in quantum computing is still very theoretical.

The most advanced quantum computers haven't gone beyond manipulating more than sixteen qubits, that means that they're a far cry from usage. However, the potential remains that quantum computers one day may perform, quickly and easily, calculations that are incredibly long on typical computers. Much key advancement are made in quantum computing within a

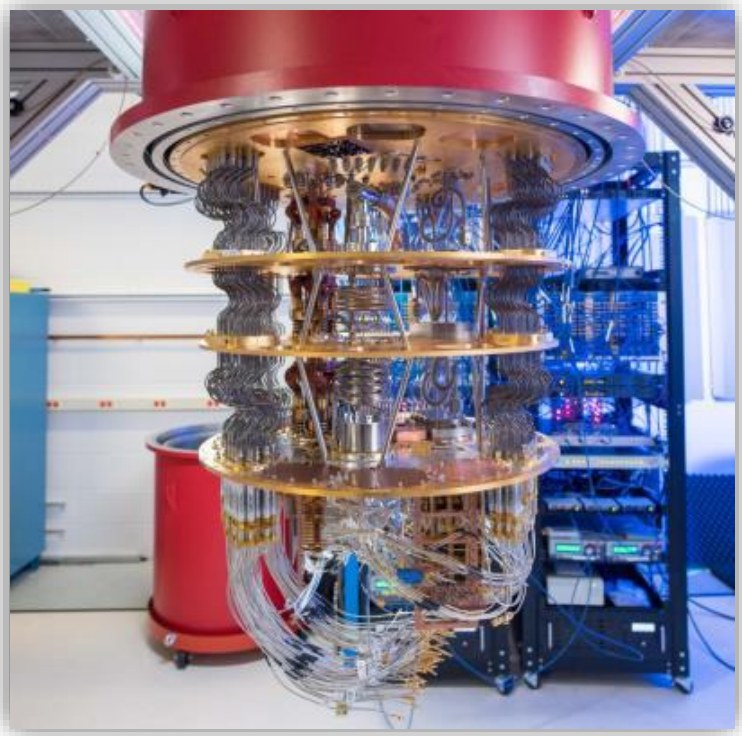
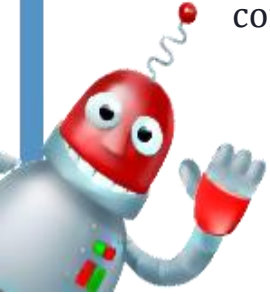


Image Credit: https://www.macleans.ca



previous couple of years. Let's investigate a couple of of the quantum computers that are developed.

Next, we'll check out some recent advancement within the field of quantum computing.

QUBIT managements

- Computer scientists control the microscopic particles that act as qubits in quantum computers by using control devices.
- Ion traps use optical or magnetic fields (or a mix of both) to trap ions.
- Optical traps use light waves to trap and control particles.
- Quantum dots are made from semiconductor material and are used to contain and manipulate electrons.
- Semiconductor impurities contain electrons by using "unwanted" atoms found in the semiconductor material.
- Superconducting circuits permit electrons to flow with virtually no resistance at terribly low temperatures
- The Bloch sphere is a representation of a D-Wave's 16-bit quantum computer qubit, the fundamental building block of quantum computers.

Manav Arora
B.Sc. (H) Computer Science (I year)

Gaganyaan: ISRO'S New Mission

Indian Space Research Organisation (ISRO) started a programme named Indian Human Space flight Programme (HSP) in 2007 under which a manned spacecraft "Gaganyaan" is to be launched by December 2021. Gaganyaan is an Indian crewed, orbital spacecraft with the weight of 3.7 ton, diameter 3.5 meter (11 ft.) and height 3.58 meter (11.7 ft.). It is India's first manned space mission whose aim is to set 3 Indian astronauts with a half humanoid robot Vyommitra, in the lower orbit of the Earth (i.e. 400 km away from the Earth) for 7 days to perform microgravity tests. Gaganyaan will be launched with the help of the strongest rocket, GSLV Mark III from Satish Dhawan space centre, Sriharikota. After 16 minutes of flight, spacecraft reaches its destination. After 7 days, the crew will land in the Bay of Bengal.

Image Credit: https://www.gizbot.com/

The spacecraft is comprised of a capsule with adequate supply of oxygen, life supporting facilities and environmental control system for the crew members. For safety purpose, features like emergency mission abort and emergency skip system were added. Two test flights, Ist in December 2020 and IInd in July 2021, were planned, which will ensure the safe journey of the crew. Some tests like Pad Abort test were already completed and some are planned to be done for the safety purposes.

Four astronauts (from Indian Air Force) have been identified from 10 screening process for the mission. They have been sent to Russia for training of 11 months in Yuri Gagarin Cosmonaut Training Centre, Moscow. These astronauts were named as "Vyomanauts", which is the typical combination of English and Sanskrit. It means *Aakash ke saathi* (Companions of the sky).

One of the companions of the crew is a half humanoid robot Vyommitra. Vyommitra is a prototype of half humanoid, manufactured by HAL and ISRO with the help of artificial intelligence which makes her capable to behave like humans. ISRO unveiled Vyommitra in an International gathering on January 23, 2020. Vyommitra introduced herself by saying, "I'm Vyommitra. I can monitor crew module parameters, alert you and perform life support operations. I can mimic all crew activities like switch panel operations, ECLSS (Environment control and life support system) functions etc. I can also be a companion, can converse with astronauts, recognise them and can also response to their queries." Vyommitra will also be sent for two test flights to analyse the impacts on the crew at the final launch. The head scientist of the mission is 56 years old woman, Dr. V.R. Lalithambika. She holds the work experience of 30 years. For the success of this mission, ISRO's scientists were fully dedicated. In an interview, K. Sivan, ISRO's Chairman said, "Before Independence Day (in) 2022, we are targeting the first manned mission. We will sustain that with more (human spaceflight) missions. Then we will have our own space station."

Image Credit: https://images.assettype.com/swarajya/

After America, Russia and China, India will become the 4th country to achieve manned space mission. The success of this mission will be very important, as it will help our country to establish its name in the world as a developed country in the field of space science.

Surbhi Singh
B.Sc. (H) Computer Science (II year)

Get Launched in Coding!! How is Here

Image Credit: https://www.vectorstock.com/

Computers have reached an undeniable position in the last few decades. Fascinatingly, computers now seem to be a solution to almost every problem. And this immense ability that computers have, forces our intellect to ask, "how can someone make computers do all that wonders?" and all these fascination and curiosity ultimately leads us to an urge of learning to code. But starting in coding has never been an easy task. The very first challenge is to choose a programming language to start with. If you know your field of interest beforehand, then choose the language which best fits your needs based on their key features.
Here is a combined overview of some languages:

Python

- Python is an advanced programming language that is interpreted, object-oriented and built on flexible and robust semantics.
- Major Organizations: Google, Pinterest, Instagram, YouTube, DropBox, NASA, ESRI
- Specializations and Industries: Web and Internet development (frameworks, micro-frameworks and advanced content management systems); scientific and numeric computing; desktop graphical user interfaces (GUIs)
- FORUMS:- Stack Overflow, Python community, Devshed Network (Python Programming Forum)

Java

- Java is a general-purpose, object-oriented, high-level programming language with several features that make it ideal for web-based development.
- Major Organizations: V2COM, Eclipse Information Technologies, eBay, Eurotech
- Specializations and Industries: Internet of Things (IoT), Enterprise Architecture, Cloud computing
- Forums: Stack Overflow, Java Community Space Forum

Ruby/Ruby on Rails

- Ruby is an open-sourced, object-oriented scripting language that can be used independently or as part of the Ruby on Rails web framework.
- Major Organizations: GitHub, Scribd, Groupon, NASA Langley Research Centre, Blue Sequence (part of Toyota Motor Manufacturing), Motorola, Google (SketchUp)
- Specializations and Industries: Web App Development, Robotics, Networking, System Administration and Security
- FORUMS: Stack Overflow, Ruby User Groups, Ruby Forum

HTML (Hypertext Mark-up Language)

- HTML is the standard mark-up language used to create web pages; it ensures proper formatting of text and images (using tags) so that Internet browsers can display them in the ways they were intended to look.
- Major Organizations: Apple, CyberCoders, Apex Systems, CareerBuilder
- Specializations and Industries: HTML is used most for Web Development, Email Programming
- FORUMS: Stack Overflow, HTMLforum.com

JavaScript

- JavaScript is a client-side programming language that runs inside a client browser and processes command on a computer rather than a server. It is commonly placed into an HTML or ASP file. Despite its name, JavaScript is not related to Java.
- Major Organizations: WordPress, Soundcloud, Khan Academy, LinkedIn, Groupon, Yahoo and many others
- Specializations and Industries: Front End Website Development, Gaming Development
- FORUMS: Stack Overflow, Javascript on Reddit, CodingForums.com

C Language

- C Language is a structure-oriented, middle-level programming language mostly used to develop low-level applications.
- Major Organizations: Microsoft, Apple, Oracle, Cisco, Raytheon
- Specializations and Industries : Embedded Systems, Systems Programming, Artificial Intelligence, Industrial Automation, Computer Graphics, Space Research, Image Processing and Game Programming
- FORUMS: Stack Overflow, Cprogramming.com, Go4Expert

C Plus Plus

- C++ is a general-purpose, object-oriented, middle-level programming language. It is an extension of C language, which makes it possible to code C++ in a "C style". In some situations, coding can be done in either format, making C++ an example of a hybrid language
- Major Company and Organization Users: Google, Mozilla, Firefox, Winamp, Adobe Software, Amazon, Lockheed Martin

- Specializations: System/Application Software, Drivers, Client-Server Applications, Embedded Firmware
- FORUMS: Stack Overflow, CPlusPlus, CodeGuru

CSharp

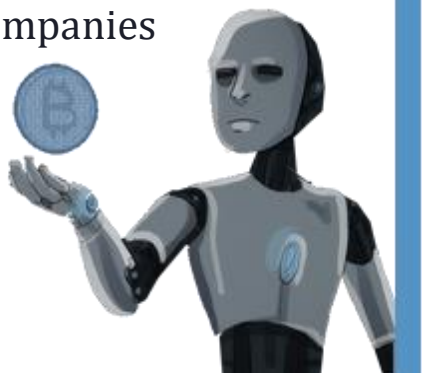
- Pronounced C-sharp (not C-hashtag), C# is a multi-paradigm programming language that features strong typing, imperative, declarative, functional, generic, object-oriented and component-oriented disciplines.
- Major Organizations: Microsoft Intel, Hewlett Packard
- Specializations: Windows-based platforms
- FORUMS: Stack Overflow, Code Project, Dream-In-Code

PHP (Hypertext Pre-processor)

- PHP is an open-source scripting language designed for creating dynamic web pages that effectively work with databases. It is also used as a general-purpose programming language.
- Major Organizations: Facebook, Yahoo, Cyber-Coders, NextGen
- Specializations: Web Application Development, Server-Side Scripting, Command Line Scripting
- FORUMS: Stack Overflow, PHP Freaks, PHP Builder

SQL (Structured Query Language)

- SQL is a database query language (not a development language) that allows for adding, accessing and managing content in a database. It is the language that allows programmers to perform the common acronym CRUD (Create; Read; Update; Delete) within a database.
- Major Organizations: SQL is used by most companies and organizations that gather data. Examples



include Robert Half Technology, Nigel Frank, CyberCoders and UnitedHealthCare.

- Specializations Where SQL is Used Most: Data Analysis and Big Data Mining
- FORUMS: Stack Overflow, SQL Team, SQL Server Central

Swift

- Swift is Apple's newest open-source, multi-paradigm programming language for iOS and OS Xapps. Swift integrates Objective-C's named parameters and object-oriented model while including an advanced compiler, debugger and framework infrastructure.
- Major Organizations: Apple, Getty Images, Slack, Dow Jones, Playlist Media
- Specializations: Software development
- FORUMS: Stack Overflow, Swift Language Google Groups.

If you want to start academically, it is preferable to choose C++ or Java as the first language. Because these languages fit perfect as an example of Object-Oriented programming, the core of today's programming. They are perfect for concept and logic building as they don't have inbuilt/predefined functions for many of the tasks. Moreover, C++ is middle level i.e. it gives more exposure to internal processing that makes your fundamentals strong. Taking the scope in view, the scope of these languages is never going to end.

Ref: https://www.computerscience.org/resources/computer-programming-languages/

Vibhor
B.Sc. (H) Computer Science (I year)

Internet of Things

What is it?

We know the internet, we know www, but what exactly is this internet of things? Is it like an internet made for things to access? One can't be more right if they say this. Internet of things, or IOT, is an interconnection of devices in such a way that they can communicate freely without any human intervention.

Image Credit: https://images.idgesg.net/images/

As we know, the term internet means an interconnection of several servers to facilitate the movement of data and information to a wider platform, in the same way, internet of things refers to the interconnection of these devices so they can communicate with each other. This is usually found in devices such as smart homes, personal assistants.

Independent ecosystem: -

As it is an interconnection of devices, it can communicate with one another to form an ecosystem that can be referred to as intelligent network or intelligent devices. Each entity is given a unique address much like the www that helps keep track of who is communicating with whom.

The term gained popularity in recent years due to the convergence of various newfound technologies like smartphones, real-time analytics, machine learning, sensors. This combination have made systems like smart home and personal assistants like Siri a reality

Internet with the internet: -

With the growing need of these 'smart ecosystem', the term internet of things is now being connected to the individual ecosystem also connected to the internet, giving more versatility and reach to the devices. The addition of smartphone to the internet of things has enabled voice assistance, connection to the World Wide Web and many more features which were limited before.

Medical uses: -

Devices such as the internet are medical things are used to research data regarding medical issues. It can be used for patients care or statistics.

Commercial uses:-

IOT is also used in commercial purposes such as transportation services like in variable speed sign

IOT is undoubtedly a strong asset for the community as it allows for rapid and intelligent controlling without much human interference. The IOT has increased the security of many systems and had provided the ease to operate. But with great technology comes greater risks.

With the growing use of these interconnected devices, the amount of private data exported to the internet is also growing by the day. As we all know, something once on the internet always stays somewhere and can never be deleted. Also, connecting these devices which store personal data to the internet is like opening a window to the world, which holds quite a huge privacy risk. Data hunters can fish for this data and use it to blackmail us or use the data for cybercrimes.

There have been several privacy concerns raised by many activists due to affinity to being used to harm privacy. Hence it is imperative to understand that we should use the technology with care and be careful.

Ashish Sharma
B.Sc. (H) Computer Science (I year)

My Experiment with Social Media

"In the depths of winter, I finally learned that within me there lay an invincible summer." — Albert Camus

In the world of technology and science, we might be able to achieve everything which is considered to be impossible for mankind. But we might lose something too. Social media is one example. We are connecting with the world virtually, but losing on real relations.

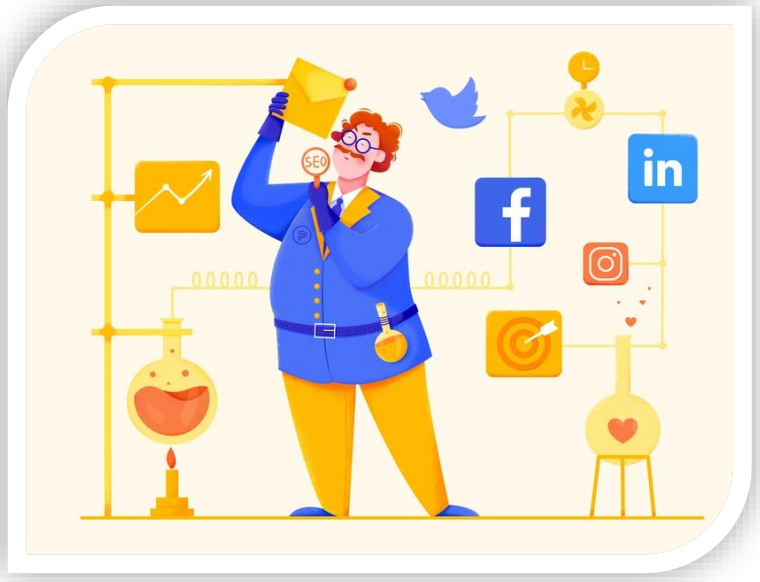


Image Credit: https://cdn.dribbble.com/users/1355613/

Before the invention of Facebook and Instagram, we were still connecting with the people. These apps were made to be just the mediator between two people. But now they are not only taking up on everybody's mind but also, they are becoming an inevitable part of life. Many people call it an addiction. But in my opinion, the addiction is not of being on the phone, it's of being relevant in the virtual world. The person might be alone and depressed in reality but they are much happier on their social media accounts. This hypocritic behaviour spoils the person for a lifetime.

On social media, everyone posts their nicest pictures and best moments. It is highly unlikely that anyone is going to put their bad moments on display for all to see. This is the main reason behind coming up of many cases of depression among youth as they tend to compare their life with their friends and belittle about themselves. There is hardly any person from the young generation who doesn't have an account on these platforms. Even I was a person who constantly checked social media. After many years of heavy social media use, it was time for me to take a break. I was fed up with losing control of my feeds. I was upset with my diminishing social reach due to networks bursting at the seams with users. I also started to become

cynical and jealous of people. So, I decided that I will not use these apps for some time and see whether it makes any difference or not.

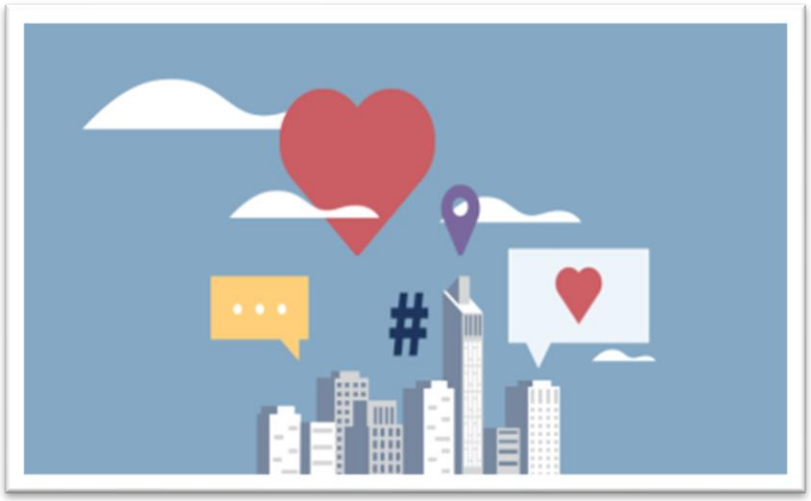
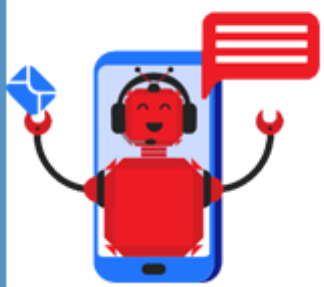


Image Credit: https://blog-assets.hootsuite.com

The results were unexpected. I started not only doing better in my studies but also started appreciating nature. It felt like I have never seen the world so closely. Nature has so much to adore, the shape of the clouds seemed different to me every time and the moon had different phases. By not scrolling through these social media apps, I was being more productive and realized that there is too much to do instead of being on the phone. After this experiment with social media, I was quite aware of the fact that there is a world beyond this virtually settled place and it is a platform where every shiny thing is not gold.

We should always keep in mind that these apps are a part of one's life and its always better to take a break from that fictional world. This social media detox will help you not only mentally but also physically as you tend to choose books in your free time and give your mind and body some time to relax. Its never too late to mend. Step out and look at what the world awaits you.

Runjhun
B.Sc. (H) Computer Science (II year)



Personal Data Protection Bill-2018

"Torture the Data and It will Confess To anything"- Ronald Coase

With a billion populations, India has the second-highest internet user base in the world where a large amount of personal data has been collected by state agencies or private companies and their flow across national boundaries has been the cause of concern. In this regard, Personal Data Bill Safeguards the privacy of an individual by providing guidelines and data processing measures to data fiduciaries (who collect data) on how to process and store the data of an individual.

Image Credit: https://encrypted-tbn0.gstatic.com/images?q=tbn%3AANd9GcT2FXJw7h2UkfvdOk2dAZ6CwMp2Rk57LjwGu42nzODztSUH8sUY

This bill was drafted by the justice BN Srikishna Committee in the Ministry of Electronics and Information Technology (Meity) to provide a solid legal framework on data protection in India. This bill recognizes privacy as fundamental right with provisions to protect the personal data of individuals. Until now, the only legal framework for internet technologies was IT Act -2000 which does not provide guidelines for the collection of personal data, data storage, and its processing. This bill steps forward to safeguard the personal data of an individual to be processed by data fiduciaries.

In today's world, broadly three approaches to data protection exists

- The US follows a laissez-faire approach and does not have an overarching data protection framework.
- China approached this issue of data protection from the perspective of averting national security risk.
- EU enacted GDPR (General Data Protection regulation) on 25th May 2018.

India steps towards Data protection by introducing "Personal Data Protection Bill-2018" which seeks to protect the autonomy of individuals for their personal data, specifying norms of data processing by entities using personal data and set up a regulatory body to oversee data processing activities. Certain rights of data principal in the bill has been introduced like

1. Right to obtain a summary of personal data held with the data fiduciary,
2. The right to seek correction of inaccurate, incomplete, or out dated personal data
3. The right to have personal data transferred to any other data fiduciary in certain circumstances, and
4. The right 'to be forgotten', which allows the data principal to restrict or prevent continuing disclosure of their personal data.

There are certain obligations made for the data fiduciaries who is processing personal data which includes

i. Processing personal data fairly and reasonably,
ii. Notifying the data principal of the nature and purposes of data collection, and their rights, among others, and
iii. Collecting only as much data as is needed for a specified purpose, and storing it no longer than necessary.

Some exceptions are also introduced in the bill for certain data processing activities for the purpose of national security, legal proceedings, journalist purposes, etc. This Bill Also outlines the establishment of DPA(Data Protection Authority) to keep a view on data fiduciaries that how they process the data and specifies that every fiduciary shall keep a serving copy where DPA categorizes personal data as 'critical personal data' which can be processed only on the servers located in India. In case of violation of this provision, the fiduciary is liable to a penalty of 4% of the total worldwide turnover of the fiduciary (subject to a minimum of rupees 15 crores).

In conclusion, I can say that this bill is a dynamic bill which must be changed every year by analysing the current scenario. In my opinion, there are certain loopholes that may be corrected over time like "Right to be forgotten" must be changed to "Right to delete or erase data" which deletes the individual's data permanently instead of holding data or preventing data from use. In Addition to this DPA must penalize the data fiduciaries with a bigger amount on violation of rules because the present penalty is too low for the bigger companies like Facebook, Google, Microsoft, etc.

Rakesh Kumar

B.Sc. (H) Computer Science (III year)

Robotics and Artificial Intelligence

The most important thing is that **robotics** and **artificial intelligence** are <u>not</u> the same things at all. The two fields are entirely separate. **Artificial Intelligence** (AI) is a term coined in 1956 by John McCarthy at the Dartmouth conference, Massachusetts Institute of technology. It implies the use of a computer to model and/or replicate intelligent behaviour. Research in AI focuses on the development and analysis of algorithms that learn and perform intelligent practices with minimal human intervention. AI is used in many ways within the modern world. It has been used in a wide range of fields that includes medical diagnosis, stock trading, robot control, law, scientific discovery and toys. AI algorithms are used in Google searches, Amazon's recommendation engine, smart cars, virtual personal assistants, video games, security surveillance and many more. Not only this, but Artificial intelligence is also used in the field of robotics excellently.

Image Credit: https://res.cloudinary.com/techcresendo

Robotics is a branch of technology which deals with robots. These are programmable machines which are generally able to carry out a series of actions autonomously, or semi-autonomously. These robots use mechanical efforts, sensors, actuators and computers. The robotics has been instrumental in the various domains such as:

- **In Industries:** Robots are used for handling materials, cutting, welding, colour coating, drilling and polishing, etc.
- **Military:** Autonomous robots can reach inaccessible and hazardous zones during the war. A robot named *Daksh*, developed by the Defence Research and Development Organization (DRDO), is in function to destroy life-threatening objects safely.

- **Medicine:** The robots are capable of carrying out hundreds of clinical tests simultaneously, rehabilitating permanently disabled people, and performing complex surgeries such as brain tumours. And many other fields.

Robotics needs to deal with the real world and for this; it requires a detailed geometric model. Artificially intelligent robots are the bridge between Robotics and Artificial Intelligence. These are robots which are controlled by AI programs which gives the robot an ability to think and perform the activities accordingly.AI robot locomotion is a mechanism that makes it capable of moving in its environment. There are various types of locomotion i.e., legged, wheeled, tracked slip/skid, a combination of legged and wheeled. Some AI Robots are:

- **SOPHIA**, a social humanoid robot developed by Hong-Kong based company Hanson Robotics. It is an artificially intelligent robot capable of displaying more than 50 facial expressions. It can follow faces, sustain eye contact, recognize individuals, have a conversation using a Natural language subsystem. Around 2018, Sophia was upgraded with functional legs and the ability to walk.

Image Credit: https://i.insider.com

- **ASIMO** (Advanced Step in Innovative Mobility), another humanoid robot created by Honda in 2000, currently displayed in Marikana museum in Tokyo, Japan. It stands 130 cm tall and 54 kg, powered by rechargeable 51.8V Lithium-ion battery with operating time of an hour. It can recognize moving objects, postures, gestures, its surrounding environment, sounds and faces, which enables it to interact with humans. This robot can detect the movements of multiple objects, interpret voice commands and human gestures and then respond accordingly.

- **REEM** is the latest prototype humanoid robot built by PAL Robotics in Spain, 1.70m high with 22 degrees of freedom, with a mobile base with wheels, allowing it to move at 4km/hr. REEM-A and REEM-B are the first and second prototypes of humanoid robots. REEM-B can recognize, grasp and lift an object, walk, avoid obstacles through simultaneous localisation and mapping, accepts voice commands and can recognize faces.

And many more like **KISMET, AIBO, UNIMATE.**
As we know everything in excess is dangerous and so is the case with Artificial Intelligence. There is no doubt in saying that technology is an essential part of the development and growth of humans. A thin line or mistake leads to disruption or destruction.

Moreover, the robots have already taken over. They are no longer confined to industrial assembly lines. They assist human surgeons, patrol hostile skies, explore, and even drive around town. Development in this field of AI and Robotics has reached new heights and has become useful in our daily lives too. The robotics field continues to work its way into every aspect of our lives. Although, these advancements aren't self-sustaining, the fields of robotics, science and new technologies depend on young minds.

Ishika Pareek
B.Sc. (H) Electronics (II year)

Virtual Reality

Virtual reality as the name suggests itself is something that is near enough (virtual) actuality (reality). Virtual reality is the use of software and computer technology to create a simulated (artificial) environment. It places the user inside an environment which is virtual but user belief and accepts it as real.

Image Credit: https://images.idgesg.net/images/

In its simplest form, virtual reality is simulating vision of the user, it includes creating an immersive 3D (computer created) world that you can explore and feel as if you are there both mentally and physically. Humans react more quickly to audios than to visuals. Therefore, to create more convincing VR applications it requires more than just graphics. To create more immersive VR experiences accurate sound effects are a must. Sound effects synced with visuals can create more attractive effects.

Let's check some devices needed for Virtual Reality.
To provide power to interactive three-dimensional virtual environment computing power is required and it is done by the help of PC/Console/Smartphone. They are like the engine that provides power.

Head-Mounted Displays (HMDs) is just what it sounds like is a small computer display worn on the head. It is meant for total immersion of the user and ensures that no matter in which direction user's head may turn the display is positioned right in front of the user's eyes or whatever HMD is displaying is always on the field view of the user. In other words, it presents visuals to your peripheral vision. It is commonly referred to as 'Virtual reality headset' or 'Virtual reality glasses'. **Data gloves** are also known as wired or cyber gloves or wired gloves. It is an instinct to reach and touch it when we see something amazing so it is important to give people the ability

to touch virtual objects which can be done with the help of a data glove. It consists of electronic sensors that monitor hands' movements and transforms them into a form of inputs for **VR** applications. **Wand controller** is simpler than a data glove. It acts as a pointer that you can use to touch, point or interact with virtual objects without actually letting you go. It has built-in motion sensors along with mouse-like buttons or scroll wheels.

Apart from input-output devices and their coordination, the software is equally important. It is responsible for managing I/O devices, handling and analysing input data timely and responding to output display promptly in order not to destroy the feeling of immersion.
VR is believed to marks its major portion in the gaming sector but there are also several instances where VR has made serious implications. Now we'll check some applications of virtual reality.

Medical VR has endless possibilities and even when it is freshly introduced there are already some examples where VR shows a positive effect. One of the most promising elements VR gives to the medical field is the use of 3D models to plan surgeries and operations. **Virtual Reality Exposure Therapy (VRET)** is a really popular method to regulate therapy for patients suffering from mental issues.

VR in education provides new resources to teach and learn. Students gather more information when they are taught in a 3D environment as it becomes more enjoyable and exciting to learn. Virtual labs provide a more interactive environment for conducting simulated experiments based on real-world phenomena.

Initially in military VR helps in training by providing an accurate simulation of real events in a safe and controlled environment. The air force also uses VR for training missions, that includes how to fly a jet fighter in battle, how to recover in an emergency, how to coordinate air support with ground operations. Today, the military not only uses VR techniques not only for training and safety enhancement but also to analyse military manoeuvre and battlefield positions.
Now architects don't have to make card and paper models, they are much more likely to build VR computer models they can walk through and explore. It is not only an immersive 3D computer model for people to inspect and explore but it is also a mathematical model that can be tested for its aerodynamic, safety and other qualities.

Megha Rawat
B.Sc. (H) Computer Science (I year)

MCA Colleges in India

Master of computer application is a professional master's degree in computer science. This course helps in meeting the rising demand for qualified and skilled professionals in the field of IT. After integrating the graduation, the students are anxious about their post-graduation that what should they groove to do and from where they should do. Some of the colleges providing PG courses in India are:

Image Credit: https://www.xenonstack.com/

1. **Dept. of C.S., Savitribai Phule Pune University**
   The primary aim of this institute is to bridge the digital divide and provide opportunities for research, consultancy, and development for its students. The department also gives scholarships to deserving candidates. The fee structure here is pretty reasonable with the figures coming somewhere close to Rs.50,000.

2. **School of Comp. and Systems Sciences, JNU, Delhi**
   The main motive of the institute is to giving academic excellence, opportunity and connections combine dynamically to help the student discover their potential and succeed in today's global scenario. This institute has some of the best infrastructures and teaches some of the finest coding techniques.

3. **School of Comp. and Info. Sciences, University of Hyderabad**
   The institute is pretty dynamic and faculty are constantly striving to offer the latest in terms of technology to its students. This institute stands apart from all others in terms of the number and range of electives that it offers to its students. The fee structure is somewhere close to Rs.3 lakh for the course.

4. **National Institute of Technology, Tiruchirappalli**
   The aim of this institute is to provide high-quality education in Engineering and Technology to produce competent technical manpower for the country. The admission is based on NIMCET scores. The fee for this course is around Rs.40,000.

5. Birla Institute of Technology, Mesra, Ranchi

The primary aim of this institute is pretty strict and students who are strong in Mathematics and other analytical skills are given preference over the others. This was one of the first private institutions in the country to offer a master's degree in computer applications. It is expensive in terms of fees somewhat close to Rs.5 lakh.

6. National Institute of Technology, Karnataka Surathkal

The main motive of this institute is to impart and provide in the field of higher education for the deserving candidate and prove to be a milestone in the part of progress because of the highly commendable placement cell at the college. Every year several top-notch companies visit the college to recruit students.

7. National Institute of Technology, Rourkela

The institute focuses on developing technical human resources for global requirements and ensure good quality academic and industrial research programs in different areas of engineering and technology. This college organized several coding events and fests.

8. Motilal Nehru Institute of Technology, Ahmedabad

The MCA course in this college is the most promising one offered by any institution in this country. NIMCET is the MCA common entrance test for admission to this course and it is among the toughest in the country. The college has maintained a 100% placement records for years with average salary for graduate students here is Rs. 4.41 lakh.

9. Christ University, Bangalore

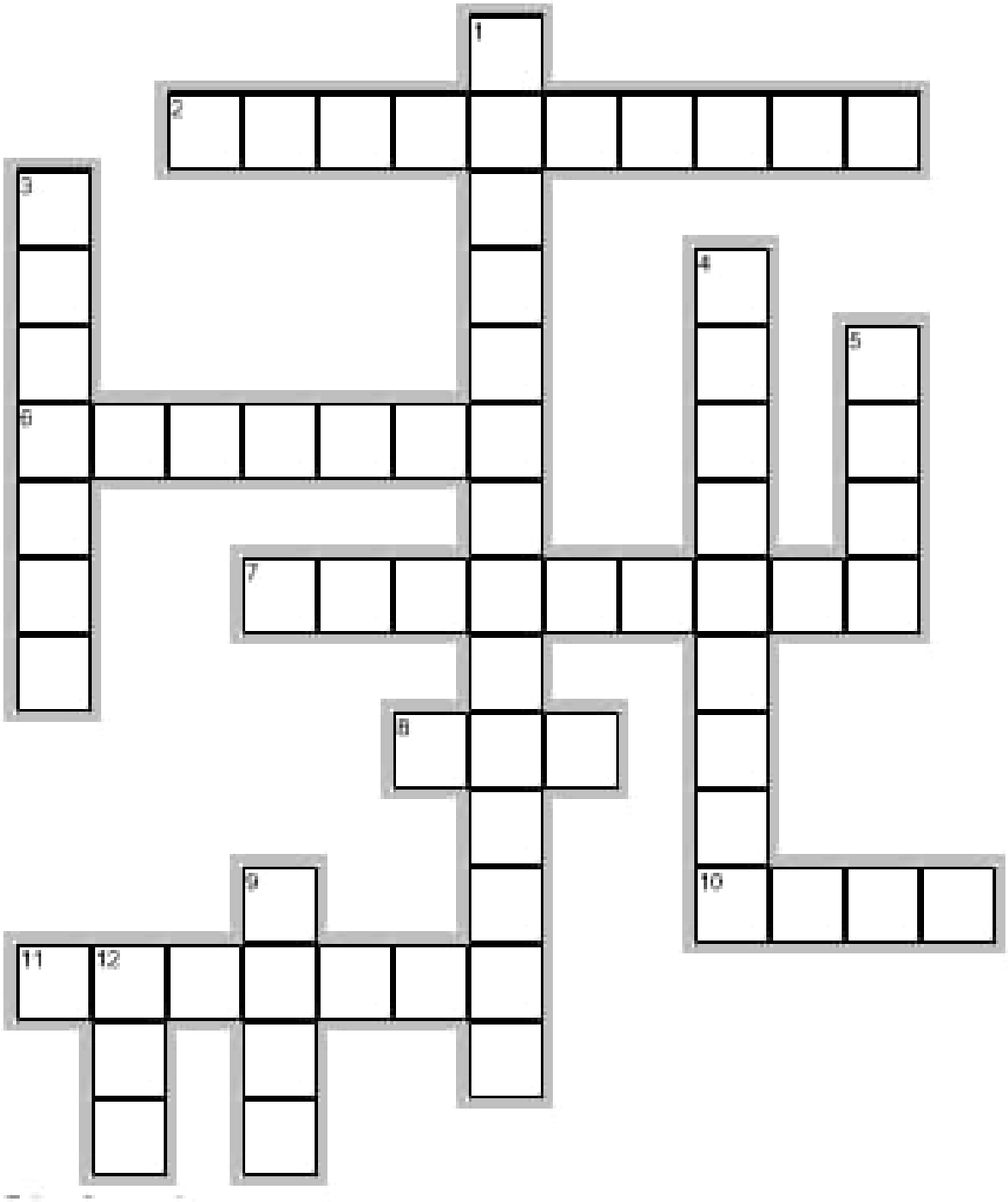
The aim of this institute is to develop the moral, spiritual, intellectual and aesthetic values of individuals. It is one of the best private institutes to offer an MCA course. The fee structure for the entire courses is somewhat close to Rs.4 lakh.

10.Poolaimedu Samanaidu Govindasamy College of Technology, Coimbatore

The main motive is education and research, entrepreneurship and innovationoffering training oriented towards producing highly qualified practitioners and researches. As this is a government college, the fees are reasonable Rs. 2 lakh around for the entire three-year programs.

Radhika Gupta
B.Sc. (H) Computer Science (I year)

Crossword



Across

2. EXE stands for _____.

6. The first Network was called _____

7. The first computer language for an electronic device was _____.

8. The _____ lists the location of the files on the disk.

10. ____ manages the transmission of outgoing mail?

11. IC chips for computers are usually made of _____

Down

1. A feature within a CPU that allows two or more instruction streams (threads) to execute concurrently.

3. Linked list is considered as an example of _____ type of memory allocation.

4. A _____ set of rules that govern data communication.

5. _____ is used to represent a character of information.

9. A queue follows _____ principle.

12. FORTRAN was developed at ____.

Ritika Jindal
B.Sc. (H) Computer Science (II year)

(Answer Key is on Page 58)

TECH CALENDAR 2020

JANUARY

- International Conference on Data Science & Management of Data (CoDS-COMAD) 2 Jan-4 Jan
- International Conference on Data Envelopment Analysis (DEA International Conference) 3 Jan-5 Jan
- Project Innovation Contest 7 Jan-10 Jan

FEBRUARY

- India Electronics Week 3 Feb-5 Feb
- IOT Show 3 Feb-5Feb
- International Conference on Next Generation of Internet of Things (ICNGIoT) 5 Feb-6 Feb
- International Conclave on Smart Science and Engineering (ICSCE) 8 Feb - 9 Feb

MARCH

- International Conference on Computer Science and Information Technology, 29 March
- GOPHER ConIndia 2020, 28 March
- Cognizance IIT Roorkee, 27-29 March
- SELECT Makeathon 2020 Vellore Institute of Technology,27 March
- BLITZKREIG, Keshav Mahavidyalaya,20-30 March

APRIL

- Hack on Hills 5.0 NIT Hamirpur, 3-5 April
- HackCummins Hack Day **11 April**
- IIT Gwalior, HackStack'20, 10-11 April
- Great International Developer Summit 20-24 April
- Carrer Hackathon 2020, 24 April
- International Conference on IOT: Smart Innovation and Usage, 24-25 April
- Career Hackathon'2020, 24 April
- Google Summer Of Code 28 April - 26 August

MAY

- International conference on research Advanced inn CS E-learning, 2May
- International Conference on Information and Computing Technology, 9 May
- Microsoft Azure Hackathon, 29 April-17 May

JUNE

- 849th Intenational Conference on Artificial Intelligence and Soct Computing, 29 June
- International Conference On Inventive engineering and Computing Techniques, 17 June

JULY

- 3rd International Conference on computer networks and Inventive Communtication Technologies, 23 July
- Convergence India, 7-9 July
- IOT India Expo, 9 July
- Smart Home Expo, 17-18 July

AUGUST

- Top Coder, TCO20, 1 August
- International Conference on Contemporary Computing, 5 August
- Google Summer of Code, 28 April- 26 August

SEPTEMBER

- September Long Challenege, Codechef, 6 sept- 16 September
- International Conference on Robotics and Smart Manufacturing , 24 September

OCTOBER

- IEEE International Conference on Computing Power and Communication Technologies,2 Oct
- International Conference on Computing Communication and Security,14 Oct
- International Conference on Computing Communication and Automation, 30-31 Oct

NOVEMBER

- Intenational Conference on Frontier In Information and Computer Security, 5-7 November
- India IOT Sympostum,9 November
- autoCODE,29 November

DECEMBER

- December Challenge, Codechef
- December Cookoff, Codechef
- World Conference on Science Engineering and Technology, 06 December
- 916th International Conference on Control Automation, Robotics and Vision Engineering, 24 December

Amidst the Coronavirus Pandemic(COVID-19) the assurance of these events happening cannot be stated
Please contact the respective authority related to the events for final confirmation

Online Learning Resources

NPTEL

- Nptel provides E-Learning through online web and video courses in Engineering, Science and Humanities Streams. The Mission of NPTEL is to enhance the Quality of Engineering education in the country by providing free online courseware

Virtual Labs

- Objectives of Virtual Labs to provide remote access to labs in various disciplines on Science and Engineering. the Virtual Labs would cater to Students at the undergraduate level, post graduate level as well as to research scholars

Talk to Teacher

- A-VIEW is an award winning indegeniously built multimodal multimedia e-learning platform that provides an immersive e-learning experience that is almost as good as a real classroom experience developed by Amrita e-Learning Research Lab

Spoken Tutorial

- The Spoken tutorial is the Initiative on the Talk to a Teacher activity of the National Mission on Education through Information and Communication Technology (ICT), launched by the Ministry of Human Resources and Development, Government of India

CEC

- e-Yantra is an initiative to incorporate Robotics into engineering education with the objective of engaging students and teachers through exciting hands-on application of math, computer science, and engineering principles

E-Yantra

- e-Yantra is an initiative to incorporate Robotics into engineering education with the objective of engaging students and teachers through exciting hands-on application of math, computer science, and engineering principles

Digital Library Inflibnet

- The UGC-Infonet Digital Library Consortium was formally launched in December, 2003 by Honourable Dr. A P J Abdul Kalam, the President of India soon after providing the Internet connectivity to the universities in the year 2003 under the UGC-Infonet programme

Quantum and Nano Computing

- The Quantum-Nano Centre is a multidisciplinary centre at Dayalbagh Educational Institute, Agra set up under MHRD National Mission on Education through ICT, with partners as IIT Kanpur, IIT Delhi and IIT Madras, besides several international collaborators

ERP Mission

- The ERP mission is to Implement, maintain, improve, and support the County's integrated financial, procurement, human resource and payroll information systems.

ISLERS

- This project is aimed to develop an automatic Indian Sign Language education and recognition platform for hearing impaired students of India. The system can substantially help in the primary/vocational/higher education of hearing impaired students and people of India. The framework is proposed to be extended to 14 different languages of India with extensive interactive features in the audio-visual mode.

Oscar++

- Project OSCAR (Open Source Courseware Animations Repository) provides a repository of web-based interactive animations and simulations, that we refer to as learning objects (LOs). These learning objects span topics in science and engineering at the college level, and maths and science at the school level. Students and teachers can view, run and download these learning objects

Fossee

- FOSSEE project is part of the National Mission on Education through ICT with the thrust area being "Adaptation and deployment of open source simulation packages equivalent to proprietary software, funded by MHRD, based at the Indian Institute of Technology Bombay (IITB).

E-Kalpa

- This project on 'Creating Digital-learning Environment for Design' also called 'e-kalpa' is sponsored by the Ministry of Human Resources, Government of India as part of the National Mission in Education through Information and Communication Technology.

Text Transcription

- The main objective of ICT text transcription project is to create accurate text transcriptions of all NPTEL video lectures in engineering sciences from Phase I and other metadata for video indexing and searching

SOS Tools

- Software and simulation packages are useful tools for the analysis of systems and solving problems by the students of Science, Social Science, Engineering, Management and related disciplines.

Aakash Educational Portal

- This project envisions empowerment of teachers, through workshops conducted for thousands of teachers at one go, using a unique blend of technology and an innovative pedagogy. Thousands have experienced the effectiveness of this approach, and of the resulting open source contents

References :- https://mhrd.gov.in/e-contents

Members, Department of Computer Science

Teaching Members

Dr. (Ms.) Priti Sehgal
Dr. (Ms.) Anjali Thukral
(Teacher In-Charge)
Dr. (Ms.) Roli Bansal
Dr. (Ms.) Bhavna Gupta
Dr. (Ms.) Richa Sharma
Dr. (Ms.) Vinita Jindal
Mr. Ravi Kumar Yadav
Ms. Richa Gupta
Ms. Maulein Pathak
Ms. Astha Goyal
Ms. Rochana Chaturvedi
Ms. Nidhi Passi
Mr. Sumit Kumar Baberwal
Dr. Sumit Kumar Agarwal
Dr. (Ms.) Namita Aggarwal
Mr. Sudhir Kumar Gupta
Mr. Rakesh Kumar
Ms. Jyoti Kumari
Mr. Pradeep Kumar
Mr. Anand
Ms. Rashmeet Kaur Chawla
Ms. Disha Garg

Non-Teaching Members

Mr. Rajesh Wadhwa
Ms. Anuradha Chadha
Mr. Akhilesh Sharma
Ms. Pooja Batra
Mr. Luvkesh Jairath
Mr. Ritesh Gupta

First Year Students (2019-2022)

Front row, from left to right: Anshul, Hitesh, Inderjeet Meena, Vanshika, Kanchan, Radhika, Shreya, Akshita, Bhavya, Yash, Raja, Sourabh, Prateek, Shivam.

Last row, from left to right: Adarsh, Sakshi, Kajal, Manasvi, Garima, Ajitabh, Farhan, Anubhav, Ashish, Khushi, Harshit, Ashishit, Sahil, Vishal, Vallabh, Harivas, Harsh, Gagan.

Second Year Students (2018-2021)

Front row, from left to right: Kinshuk, Tanay, Shourya, Viresh, Saurabh, Shashwat, Kapil, Prince, Sandeep, Mangalam, Chandan, Mohit.

Middle row, from left to right: Yash, Ashish, Amandeep, Ayushi, Ankit, Dimple, Anshu, Neha, Jatin, Deepak,Harshit, Bharat, Anmol.

Last Row, from left to right: Vidhi, Sangam, Riya, Harsh, Faisal, Mohit, Mayank.

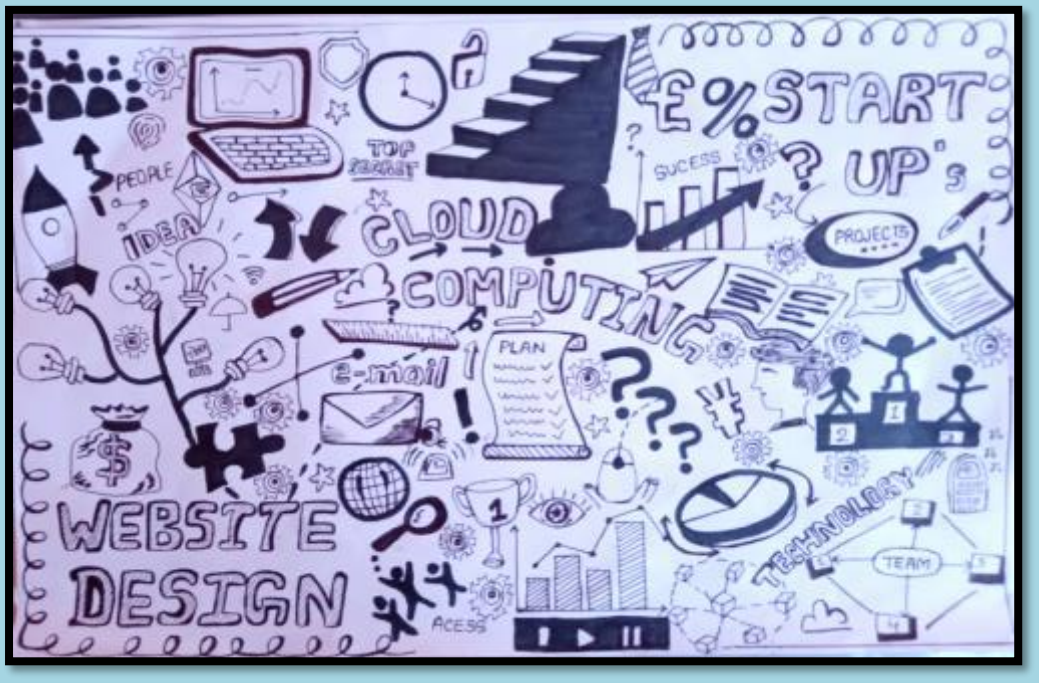
Third Year Students (2017-2020)

Front row, from left to right: Sanchit, Lakshay , Balkar, Muskan, Anjali, Muskan, Bhavya, Varsha ,Ishu, Sakshi, Shivani, Madhav, Arpit, Basant, Anubhav, Muskan Agarwal.

Middle row, from left to right: Pratishtha, Sanchit , Atif, Abhishek, Vishal, Pankaj, Shubham, Vipul, Prashant, Rakesh, Rajesh, Rakesh, Miheer, Japesh, Jeevan.

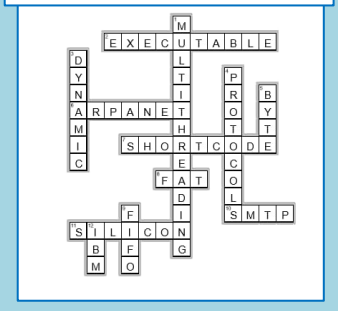
Last row, from left to right: Kamal, Bharat, Dinesh, Harsh, Anurag, Yogesh, Prashant, Rochak, Divyanshu, Namit, Gaurav, Sandeep, Manu, Gourisha.

Artwork Gallery



Kanchan Bora
B.Sc. (H) Computer Science (I year)

Answer Key of Crossword on Page 51



e Blitzine 2019

e Blitzine 2018

e Blitzine 2017

Brilliant Information Technology Zealots (BLITZ)

(Computer Science Society)

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