ACM CCET STUDENT CHAPTER

CCET

DIGITAL OUTLET

THE CCET ACM TECH MAGAZINE

SEPTEMBER - OCTOBER, 2021
VOL. 2, ISSUE 1

Association for Computing Machinery

VISION

Chandigarh College of Engineering and Technology aims to be a center of excellence for imparting technical education and serving the society with self-motivated and highly competent technocrats.

MISSION

1. To provide high quality and value based technical education.
2. To establish a center of excellence in emerging and cutting edge technologies by encouraging research and consultancy in collaboration with industry and organizations of repute.
3. To foster a transformative learning environment for technocrats focused on inter-disciplinary knowledge; problem-solving; leadership, communication, and interpersonal skills.
4. To imbibe spirit of entrepreneurship and innovation for development of enterprising leaders for contributing to Nation progress and Humanity.

TABLE OF CONTENTS

LOOK WHAT OUR MENTORS HAVE TO SAY

Our mission at CCET is not only to produce engineering graduates but to produce engineering minds.

- Dr. Manpreet Singh

Principal CCET (Degree Wing)

ACM CCET provides student a great opportunity to learn scientific and practical approach of computer science.

- Dr. Sunil K. Singh

Professor and HOD, CSE | Faculty Mentor

Every person should be provided with an opportunity to learn and explore the field of computer science.

- Sudhakar Kumar

Assistant Professor, CSE | Faculty Sponsor

We, at CCET ACM Student Chapter hope to encourage students to diligently pursue their interest in computer technologies and contribute towards the revolution our world is moving towards.

-Muskaan Chopra

UG Scholar, 5th Semester, CSE | Chairperson

CCET ACM STUDENT CHAPTER

- Research and Development
- Hackathon and Coding
- Student Speaker Program
- Internship and Career opportunity
- Web-App designing and Digital Art

ABOUT CASC

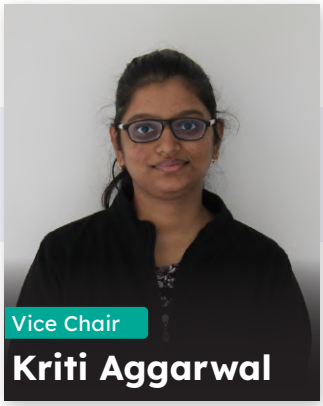
ACM boosts up the potential and talent, supporting the overall development needs of the students to facilitate a structured path from education to employment. Our Chapter CASC focuses on all the aspects of growth and development towards computer technologies and various different fields. Overall, we at CCET ACM Student Chapter, through collaboration and engagement in a plethora of technical activities and projects, envision building a community of like-minded people who love to code, share their views, technical experiences, and have fun.

BENEFITS

- A vast network of nearly 100,000 highly dedicated student and professional peers.
- Become a member of computing community with hundreds of Professional and Student
- A full year subscription to ACM magazines and newsletters.
- Participation in ACM Distinguished Speakers Program (DSP).
- An option to subscribe to full ACM Digital Library, which includes over 2 million pages of text.
- Unique volunteering opportunities to gain hands-on experience and knowledge.

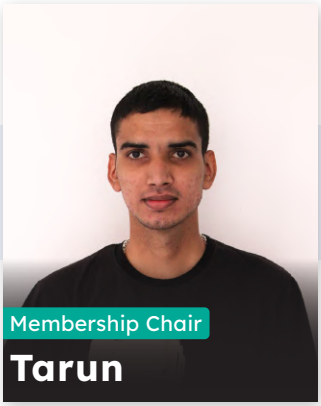
MEET OUR TEAM

Chairperson
Muskaan Chopra

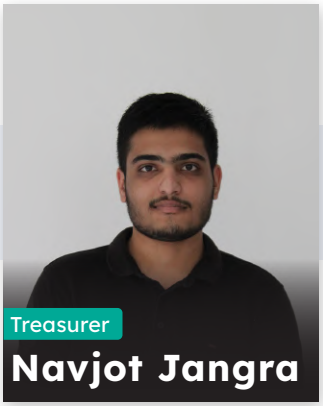


Vice Chair
Kriti Aggarwal

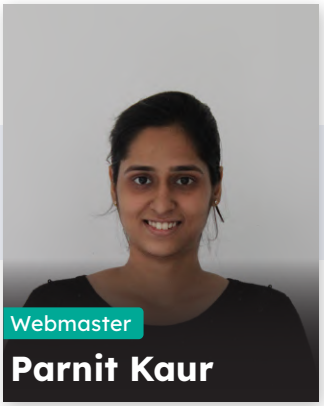
Secretary
Anureet Chhabra



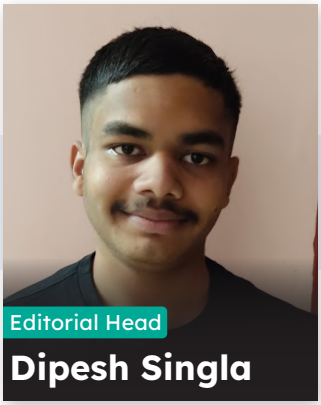
Membership Chair
Tarun



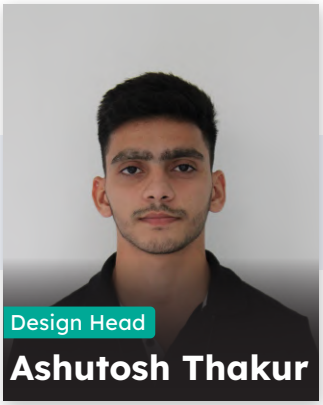
Treasurer
Navjot Jangra



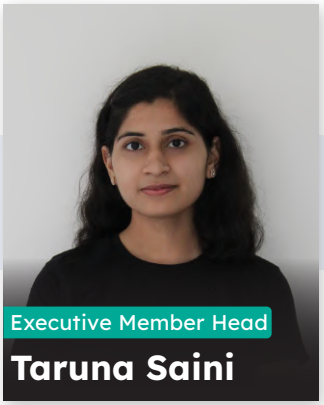
Webmaster
Parnit Kaur



Editorial Head
Dipesh Singla



Design Head
Ashutosh Thakur



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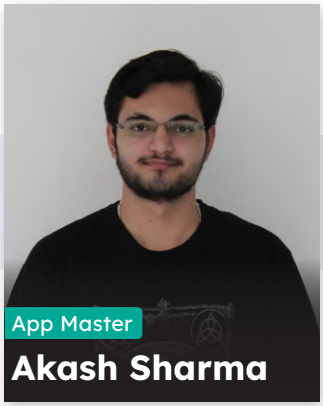
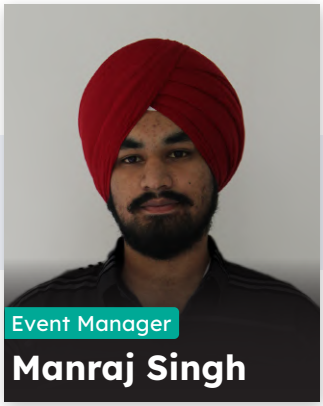
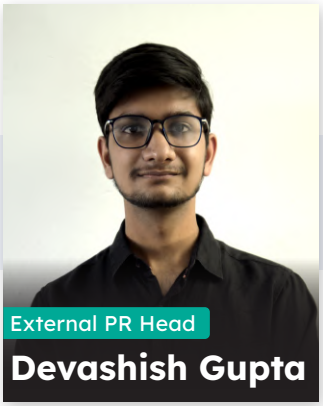


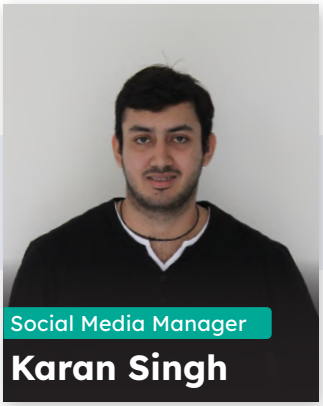
App Master
Akash Sharma



Event Manager
Manraj Singh



External PR Head
Devashish Gupta



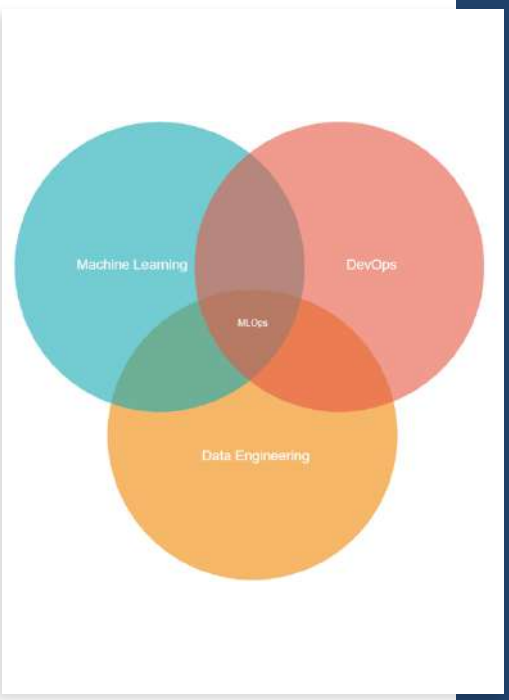
Social Media Manager
Karan Singh

CASC's Recent Achievements

Article Published

MLOps: A New Era of DevOps, Powered by Machine Learning

CCET ACM student chapter is very proud to announce the successful publication of the article "MLOps: A New Era of DevOps, Powered by Machine Learning" By Chair, CCET ACM student chapter **Muskaan Chopra** under the guidance of Faculty Mentor and CSE HOD, **Dr. Sunil K. Singh.** The Article was published under Editor Insights2Techinfo. The article aims to focus on information related to Machine Learning, DevOps, Data Engineering and ML Ops.



Article Published

Green HPC's : New-Generation Solution for Decreasing Energy Consumption Of HPC

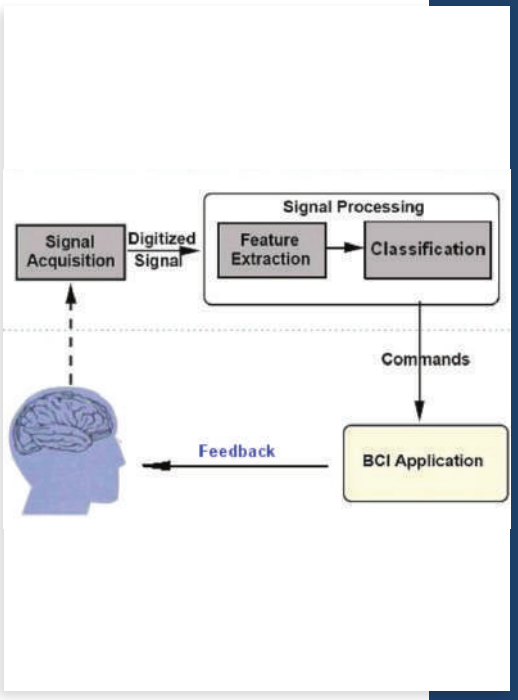
Systems CCET ACM student chapter is gratified to share the successful publication of article "Green HPC's : New-Generation Solution For Decreasing Energy Consumption Of HPC Systems" By Vice Chair, CCET ACM student chapter Kriti Aggarwal and Faculty Sponsor CCET ACM student chapter Sudhakar Kumar. Under the guidance of Faculty Mentor and CSE HOD Dr. Sunil K. Singh. The Article was published on Editor

CASC's Recent Achievements

Article Published

Brain Computer Interaction

CCET ACM student chapter is pleased to share the successful publication of article "Brain Computer Interaction (BCI): A Way to Interact with Brain Waves" By Faculty Sponsor CCET ACM student chapter **Sudhakar Kumar**, Faculty Mentor and CSE HOD, **Dr. Sunil K. Singh**. The Article was published under Editor Insights2Techinfo (A platform for Researchers and Technology Enthusiasts). The Article aims to share information on topics related to Signal Processing, BCI Applications and Digitized



Article Published

Blockchain for Data Science

CCET ACM student chapter is conceited to announce the successful publication of a short research article on "Blockchain for Data Science" By **Dipesh Singla** and Faculty Sponsor CCET ACM student chapter **Sudhakar Kumar.** Under the guidance of Faculty Mentor and CSE HOD Dr. Sunil K. Singh . The Article was published on 16 October 2021, on a web platform Insights2Techinfo (A platform for Researchers and Technology

CASC's Recent Achievements

acm India Council

CTiS Computational Thinking in Schools

cspathshala

Certificate of Participation

This is to certify that **SUDHAKAR KUMAR**

has participated and successfully contributed to the

3rd Conference on Computational Thinking in Schools

From 29th September to 2nd October, 2021, Pune

Organizing Committee Co- Chair	Organizing Committee Co- Chair	Program Committee Co-Chair	Program Committee Co-Chair
Vinit Kapoor	Geeta Ghormade	R Ramanujam	Sonia Garcha

CTiS 2021 Conference

CTis (Computational Thinking in Schools) is an Annual Computational Thinking Conference organised by ACM India (Association of Computing Machinery) and the CSpathshala community. It aims to bring together teachers, educators and researchers tod iscuss issues of curriculum, pedagogy, policy and implementation, related to bringing computational thinking to schools. Faculty Sponsor CCET ACM student chapter **Sudhakar Kumar** participated in this conference and was awarded with the Certificate of participation.

Meet your Mentors

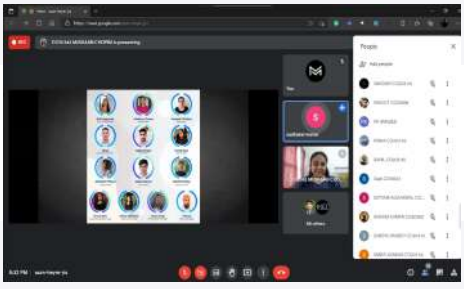
September 5, 2021

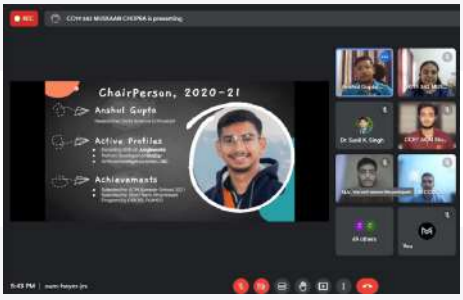
Event Details

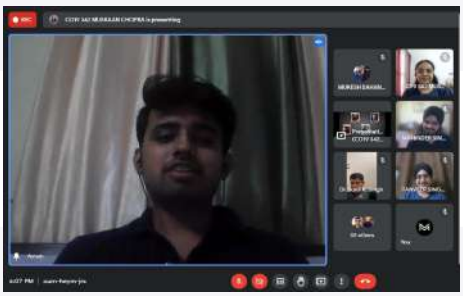
In this event the audience was made to meet the new working body of ACM Student chapter. In this event everyone was briefed about work to be performed. The event involved the participation of the previous working body of ACM. The event saw active participation and interaction from the present students. Various queries were resolved by our Faculty and ACM Working body. A bunch of questions were asked to form the college alumni who are placed at Amazon, Microsoft, and many other companies.

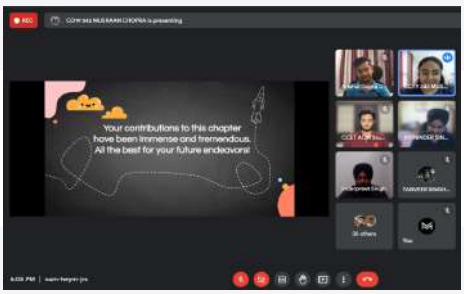
Event Gallery

Youtube Stream







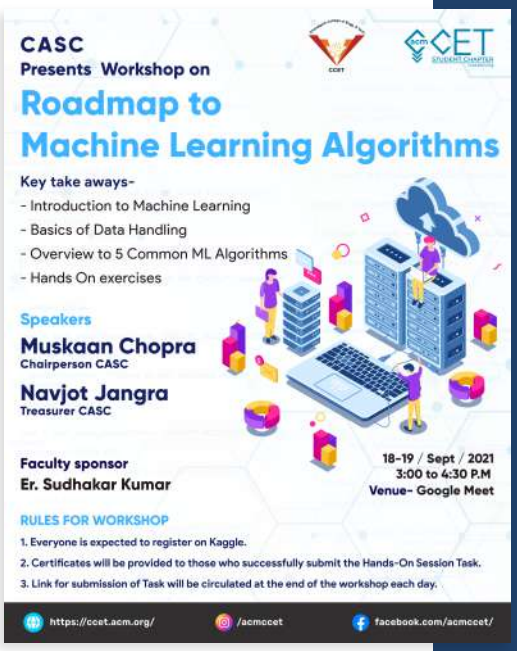


Road map to Machine Learning Algorithms

September 18-19, 2021

Event Details

In this event, the audience was briefed about the concept of Machine Learning and its various algorithms followed by a small hands-on-session where they got first hand experience on how Machine Learning works and its various functions. The event mainly focused on various aspects of introduction to machine learning. On both the days tasks were assigned to the audience and certificates were issued to students on successful completion of the assigned task.



Speakers

Muskaan Chopra

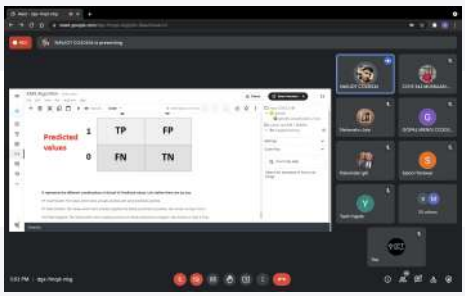
UG Scholar, CSE @ CCET
CO19342

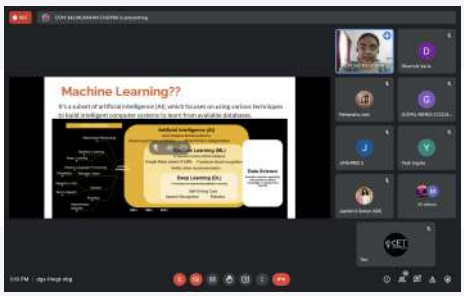
Navjot Jangra

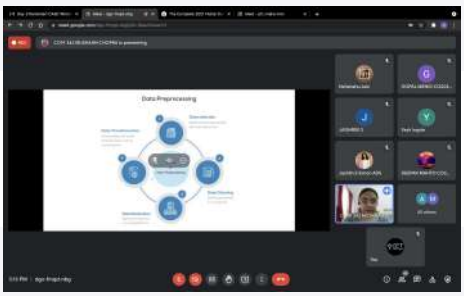
UG Scholar, ECE @ CCET
CO20536

Event Gallery

Youtube Stream







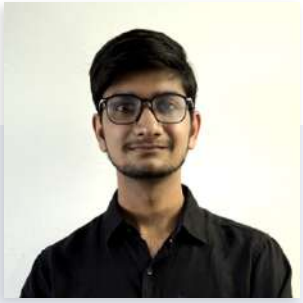
HacktoberFest 2021 - Let's Learn Git and Github Together

October - 03, 2021

Event Details

In this event, the audience was briefed about the concept of Git and Git-Hub. Audiences were told about the open source program named Hackto-ber fest. Various objectives about open sourcing were discussed during the lecture along with this hands-on session on how to fork, clone, push etc. The event mainly focused on various aspects of introduction to git and git-hub. At the end of the lecture students were given a task to contribute to the repository participating in Hacktoberfest 2021.

Speakers



Devashish Gupta

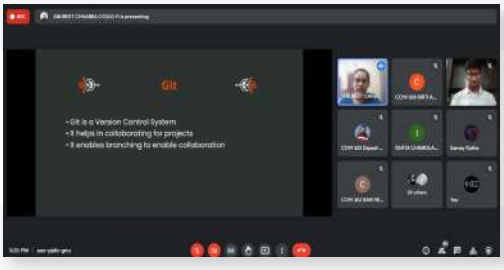
UG Scholar, CSE @ CCET
CO20314

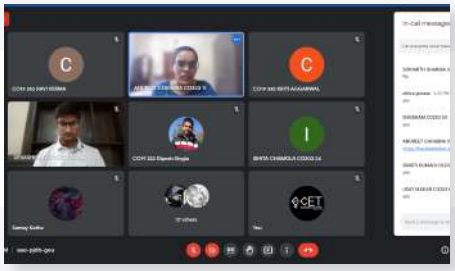
Anureet Chhabra

UG Scholar, CSE @ CCET
CO20311

Event Gallery

Youtube Stream



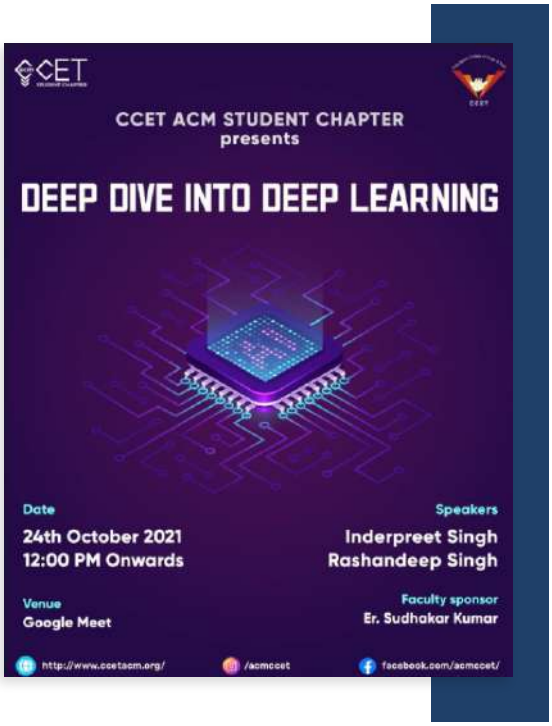


Deep Dive into Deep Learning

October 24, 2021

Event Details

In this event, the audience was briefed about the concept of Deep Learning and its various algorithms followed by a small hands-on-exercise where they got first hand experience on how Deep Learning works and its various functions. The event mainly focused on various aspects of introduction to deep learning.



Speakers

Inderpreet Singh

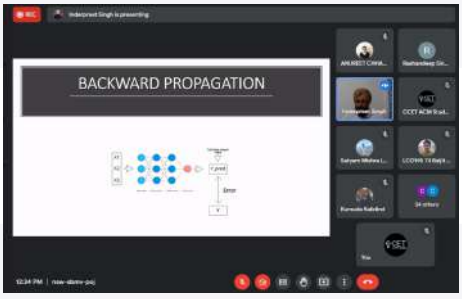
UG Scholar, CSE @ CCET
7th Semester

Rashandeep Singh

UG Scholar, CSE @ CCET
7th Semester

Event Gallery

Youtube Stream



CODING RAIJIN

September - 25, 2021

Event Details

In this event, a competitive programming competition was held on the Codechef platform. In which students from various colleges participated in five coding problems designed by the CASC Coding team. It was a 2.5 hours coding contest with problem levels ranging from easy to difficult. After the competition the next day a meeting was organised by the coding team in which problem sets were discussed.

CODE PIECE

October - 15, 2021

Event Details

In this event, a competitive programming competition was held on the Codechef platform. In which students from various colleges participated in five coding problems designed by the CASC Coding team. It was a 2.5 hours coding contest with problem levels ranging from easy to difficult. After the competition the next day a meeting was organised by the coding team in which problem sets were discussed.

Digital Forensics

By Anureet Chhabra, UG scholar CSE @ CCET
co20311@ccet.ac.in

Digital forensic science is a subfield of forensic science that focuses on the recovery and examination of data found in digital devices in relation to cybercrime. The process's objective is to preserve any evidence in its most original form while conducting a structured investigation by gathering, identifying, and authenticating digital material in order to recreate previous events and submit it as evidence in court of law.

Our society is more technologically reliant than ever before and there is no sign that this trend will slow. The total number of Internet users in the world is 4.66 billion (59.5 percent of the world population).Data breaches are becoming the major problem nowadays we have a lot of important data which we did not want to be publicly available at any cost such as credit card information, Banking related detail, transaction history, Login credentials, locations etc. Data breaches can affect hundreds of millions or even billions of people at a time. In past there have been many such cases of data breaches In 2013, Yahoo was subject to the largest data breach which impacted 3 billion account in which data such as names, email addresses, Phone numbers, dates of birth, and password

Digital forensics majorly consist of the 4 types as listed below such as Cloud Forensics, Network Forensics, Data Forensics, Android/Mobile Forensics As the use of mobile devices has grown, so has the number of crimes committed in connection with them.

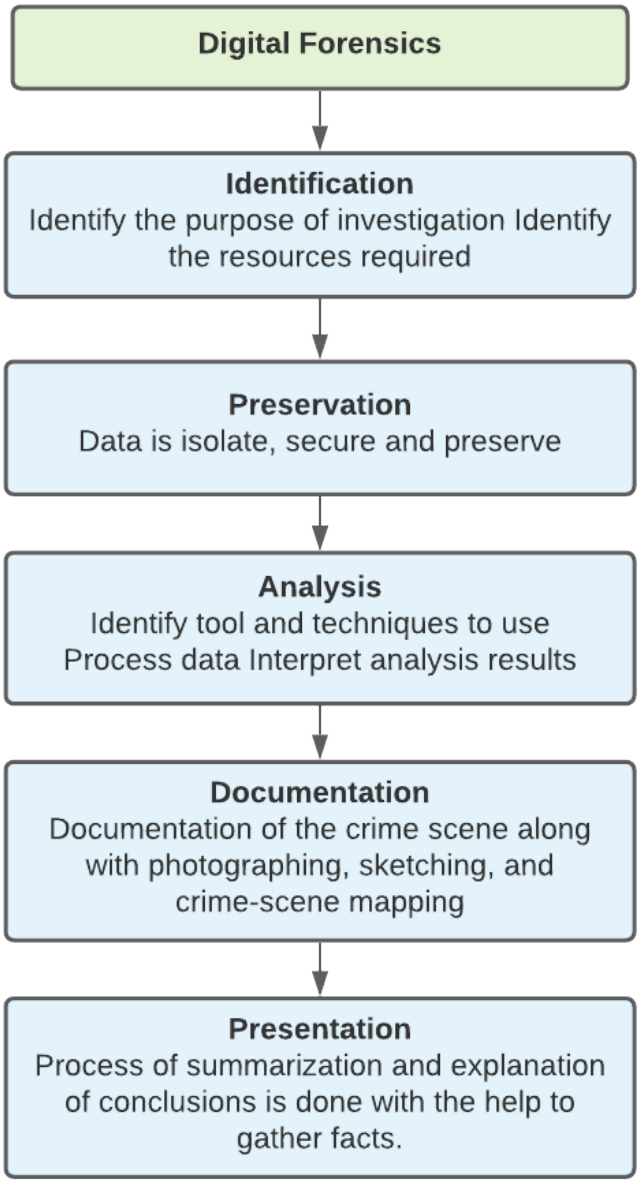
This subdomain is concerned with data such as SMS, phone calls, images, videos, and so on. Similarly data forensics refers to the study or investigation of digital data and how it is created and used. Data forensics consists of identifying, analyzing, recovering, preserving digital information. Data forensics can be conducted on mobile devices, computers, servers, and any other storage device

Network forensics is the monitoring and analysis of computer network traffic for the aim of gathering information and obtaining legal proof. Network investigations, in contrast to other fields of digital forensics, deal with volatile and dynamic data. Network forensics relating to security, involves monitoring a network for anomalous traffic and identifying intrusions.This is a broad forensic domain, and cloud forensics is a subset of this larger subject of digital forensics.Cloud

forensics deals with the data shared over cloud network.The crimes committed in the cloud are extremely difficult to investigate since some of the most well-known and basic tools of digital forensic analysis do not operate in the cloud environment.

Major challenges faced in data forensics are Scientific or Technical Challenges, Source Related Challenges, Law Related Challenges.In technical challenge encryption of data creates problem it is basically hidden information hidden from unauthorised users but Unfortunately, it can also be used by criminals to hide their crimes. This also includes covert channels which allows an attacker to bypass intrusion detection techniques and hide data over the network. The attacker used such channels for hiding the connection between him and the compromised system.

The resources challenges may arise due to change in technology. As the rate of crime rises, so does the amount of data, and the pressure on a digital forensic specialist to interpret such massive amounts of data rises as well. Because digital evidence is more sensitive than physical evidence, it can readily vanish. Forensic professionals utilise numerous techniques to assess the legitimacy of the data in order to make the investigation process faster and more valuable, but dealing with these tools is also a difficulty in and of itself.



Immersive Technology
Virtual reality and Augmented reality

By Divyansh Aggarwal, UG scholar CSE @ CCET
co20316@ccet.ac.in

Immersive technologies

These are the technologies which creates or extends reality(3D virtual environment) and this is done by inviting the user in a digital/-virtual environment having applications in different aspects. It is a computer generated simulation of reality that can make a person feel as if he is present in a virtual environment . this technology creates a new reality for user in which he can look in any direction and sometimes it make impossible for users to recognize whether they are in a virtual/digital world or real world.

The different types of immersive technology are-

- Virtual reality
- Augmented reality
- Mixed reality
- Holograph

Fpv drone flight

And many more but here we will talk about virtual reality and augmented reality as these technologies are two of the biggest trends in the entire tech world.

VIRTUAL REALITY (VR)

It is an immersive technology which creates a virtual environment that can be accessed or interacted by a user through special electronic equipments such as VR headsets or gloves with sensors .

Todays technologies based on virtual reality are build upon the ideas that were introduced in 1800s almost to the beginning of practical photography.In year 1960-1962 Morton Heilig created a multi sensory simulator This was the first approach to create a virtual reality system and it had all the features of such an environment, but it was not interactive.. The term virtual reality was first introduced in the mid 1980s when jaron lanier founder of VPL research , began to develop tools like gear , googles and gloves to access or experience virtual reality.

APPLICATIONS OF VR

Motivation to use VR

The user can watch and manipulate the Virtual environment in the same way we act in the real world, without any need to learn how the user interface works. Therefore many applications like flight simulators, architectural walkthrough or data visualization systems were developed

Modeling, designing and planning

VR helps us to see that how a modeled object in real time and space . VR also helps in surface modeling (to present solid objects).The advantage of this technology is that the user can see and even feel the shaped surface under his fingertips. Although these works are pure laboratory experiments, it is to believed that great applications are possible in industry e.g., by constructing or improving car or aircraft body shapes directly in the virtual wind tunnel or find deformity in the objects and helps in validating imperfections.

Training and education

Flight simulators are used from a long time and we can consider them as the precursors of today's VR. Nowadays they are used by many civil companies as well as the cost of operating it is lower than a real aircraft and they are much safer In other aspects where training is necessary, simulations have also offered big benefits. we can say that virtual reality established itself in many aspects of human activities. It acts as a medium that allows human for easier perception of data or natural phenomena appearance. Therefore the education purposes seem to be the most natural ones as VR allows people with disabilities to use computers and children can learn and understand efficiently through this technology.

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Augmented reality is a technology that projects computer generated augmentations on top of reality.it is like the enhanced version of real world. There are Augmented Reality Apps which merge the digital visual content into the user's real-world environment. Some other popular examples of AR apps include Across Air, Google Sky Map, Layar, Spot Crime, PokemonGo etc.

Augmented reality technology has its roots in the field of computer science interface research Many of the basic concepts of AR have been used in movies like The terminator (1984) and RoboCop (1987). These movies feature cyborg characters whose views of the physical world are augmented by a steady stream of annotation and graphical overlays in their vision systems.

Augmented reality technology was invented in 1968, with Ivan Sutherland's development of the first head-mounted display system. However, the term 'augmented reality' wasn't used until 1990 by Boeing researcher Tim Caudell.

APPLICATIONS OF AR

Augmented Reality enhances a user's interaction with the real world.Augmented reality helps humans to see virtual objects which display information that he/she cannot directly see or detect with his own senses. The information conveyed by the virtual objects helps a user perform real-world tasks . it can be helpful in many domains like -

Medical

Medical augmented reality helps mainly in visualizing medical data and the patient within the same physical space. Another application for augmented reality in the medical domain is in ultrasound imaging.

Military

AR can be used to display the real battlefield scene and augment it with notable information. more benefits for military users may be training in large-scale combat scenarios and simulating real-time enemy action, as in the

Battlefield Augmented Reality System Applied Computational Science. The BARS system also provides tools to author the environment with new 3D information that other system users see in turn.Security and Safety of the military user while training in these simulated environments is more as compared to real trainings.

ROBOTICS

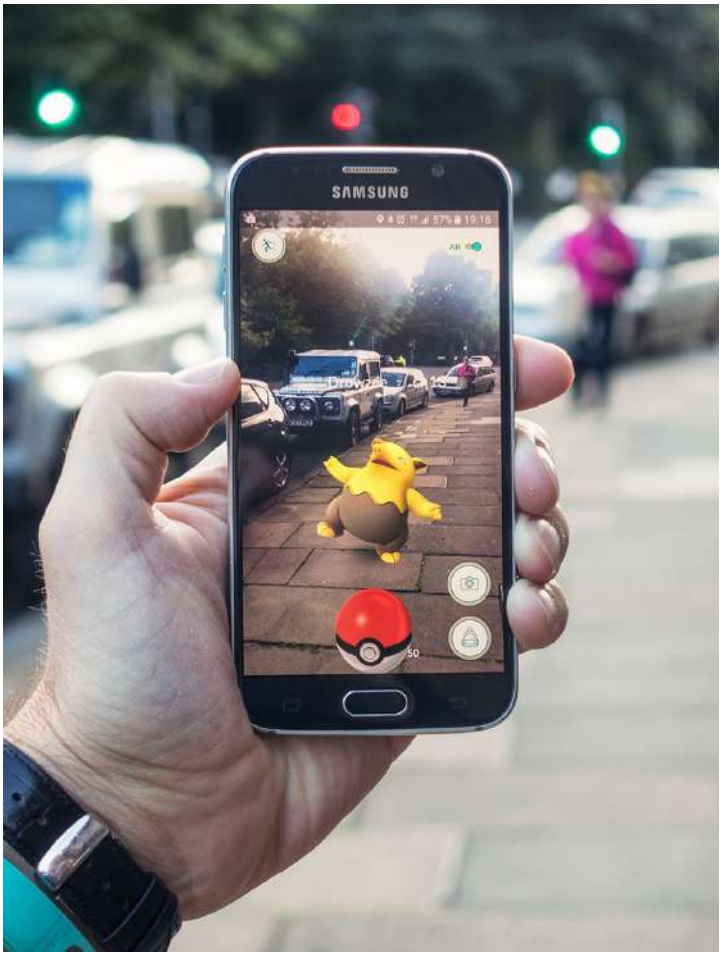
AR is an ideal platform for human-robot collaboration .Medical robotics and image guided surgery based AR were designed .Predictive displays for telerobotics were designed based on AR. Remote manipulation of using AR for robot was researched . Robots can present complex information by using AR technique for communicating information to humans and can be helpful in various domains of humans .

Geospatial

Using two interfaces based AR hardware and software were described for collaborative geographic data representation and manipulation .AR can be used for planning of military training in urban terrain like how to demonstrate ecological barrier and show their locations in the landscape.

Navigation and Path Planning

Results clearly show that the use of augmented displays result in a significant decrease in navigation errors and issues related to divided attention when compared to using regular displays Nokia's MARA project31 researches deployment of AR on current mobile phone technology.google maps are also using AR to display arrows and markers on user's device to show him exactly where to go .



FUTURE OF Virtual Reality AND Augmented Reality

Virtual Reality and Augmented Reality are two of the most important trends within the entire tech world. they will be one of the most transformative tech trends in future.many possible future directions are already speculated for further research. Many HMDs created with AR and VR in mind need to be developed. HMDs are still too clumsy and have limited field of vision, contrast and determination . HMDs and other wearable equipment's, like data-gloves and datasuits, may be a limitation for the user. All wearable equipment's need be developed to be lighter, smaller and easier to figure with the user. Also the AR system researchers should consider other problems such as response time delays, hardware or software failures from AR systems. A limita-

tion of AR systems is registration error. Occlusion detection is a lively area of study of AR and VR systems. Analyzing various tracking methods, possible tracking research directions are identified that allow researchers to effectively maximize knowledge in video frames, or integrate vision-based methods with other sensors in a novel way. It is important to include a recognition system to accumulate a reference representation of the important world. Further research on this direction could provide promising results, but it's mostly a top-down process and hard to affect object dynamics, and evaluation of various hypotheses. The challenge is to construct a pervasive middleware to support the AR and VR system.

According to a comprehensive research report by Market Research Future (MRFR), "Global AR and VR Market information By Technology, By Component, By Device Type and Vertical - Forecast till 2027" the market to reach USD 766 billion by 2025 growing at a 73.7% CAGR..

Companies that cover most market of AR and VR (presently)

- Blippar
- Google LLC
- Samsung Group
- EON Reality Inc
- Hewlett-Packard Company
- Augmented Pixels Inc.
- DAQRI LLC
- Terminal Eleven (SkyView)
- Wikitude GmbH
- awe.org Pty Ltd (buildar.com)
- Zapper Limited
- Virtalis Limited
- Facebook Inc
- Magic Leap Inc
- HTC Corporation
- Microsoft Corporation

Is Android safe?

By Akash Sharma, UG scholar CSE @ CCET
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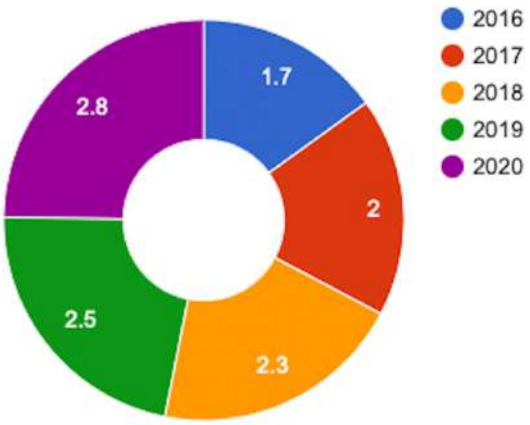
Android devices are becoming increasingly popular day by day since the beginning. According to reports by Google there are currently 2.5 billion active users of Android devices, the number of apps on Google Play Store are 2.78 million as of 2021 which surpassed 1 million back in 2013. Since then the Android ecosystem eventually became hacker's easiest and favourite target. Android devices in our hands nowadays has a lot of valuable data which attracts unethical hackers such as login credentials, data of digital payments, private information, locations and IP address etc.

One of the very popular way to obtain these data easily is through piggybacking. Piggybacking is defined as an activity where a particular android app is repackaged after manipulating the app code and content to insert a malicious payload which can breach the security of the whole android device.These payload can be anything like a simple adware. Many studies support that in android most malware are simply repackaged versions of actual apps but some apps have extra injected code when compared with the original app. These piggybacked apps have the same functionality, features and UI as the original app but they contain some extra code that performs malicious activities.All these things makes it very difficult to detect fake and piggybacking and repackaged applications in android. No doubt Google is working very hard to maintain the security using Google's Play Protect



Number of Android apps (values in million)

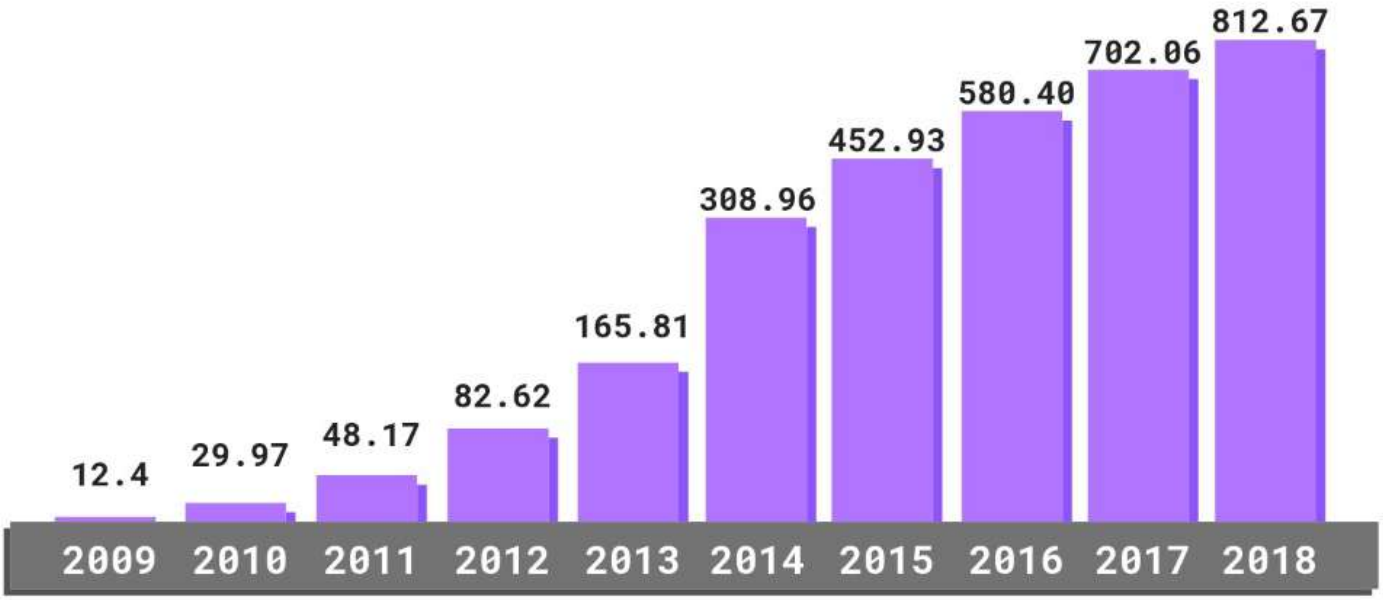
It's cloud-based process analyses and reviews up to 500,000 apps daily and prevents the malicious apps from reaching the Store. But still Google's Play Security is not enough to maintain the security considering there are 2.5 Billion active users and above statistics.

Many Researchers proposed ways to detect repackaging and piggybacking in android application there are many tools also available like Mobile Security Framework MobSF, QARK, DroidMoss which are open source also but none of the above promised to properly detect Vulnerabilities in all categories of apps like (Financial, Social, chatting apps etc.).

Many tools available just uses code wise comparison with the original apps that is both unscalable and inefficient. Till date many study proved that approach described in [Fast, Scalable Detection of "Piggybacked" Mobile Applications] is better till date in which they presented their developed module decoupling technique to effec-

-tively locate the primary module for comparison with O(n log n) complexity.

Although nothing is safe now days but still there are few ways to be more safe especially when we consider android devices like. Avoid unsecured public WiFi Hackers often target important locations such as bank accounts via public WiFi that can often be unsecured due to relaxed safety standards or even none at all. Secondly, Regularly delete your browsing history, cookies, and cache Removing your virtual footprint is important in minimising the amount of data that can be accessed by hackers. And last but not least Use a security app that increases protection. Sometimes these security apps help to avoid common malware and viruses which in future may cause a problem.



Total Malware Infection Growth Rate (In Millions)

Ethical Hacking

By Devashish Gupta, Ishleen Kaur , UG scholars CSE @ CCET
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Ethical Hacking…sounds quite sinister right? Well, that's not the case. Hacking is the term used to define the technical abilities involved in breaking into computer systems and gaining access to sensitive data. Ethically hacking, as the name suggests, is hacking which is ethical.

What is Ethical Hacking?

The primary distinction between hacking and ethical hacking is the target's agreement. In hacking, the hacker gains unauthorized access to the target's sensitive data with the goal of causing harm. Whereas in ethical hacking, the hacker accesses the system with the target's agreement and is responsible for the system's security and safety from the hacker's perspective.

Who are Ethical Hackers?

Ethical hackers are well-versed in computer operating systems and networks. He is recruited by an organization to hack into their computer network system and check for potential weaknesses and vulnerabilities. He does, however, have access to very sensitive information, so he must be trustworthy. An organization trusts a white hat hacker to neither disclose nor misuse their customers' information, but rather to make their system more reliable and less vulnerable to hackers.

Types of Ethical Hacking

There are, broadly, 4 types of ethical hacking:

1. Hacktivists: A hacktivist, simply described, is someone who utilizes hacking to effect political and social change.Hacktivism began as a tool for individuals to protest online in order to bring about change. Hacktivists use the same tools and techniques that regular hackers do. For example, their tactics might range from simple website defacement to exploitation through the use of Doxing to promote a message. They could even use a Distributed Denial of Service (DDoS) attack to bring entire networks down.

2. Cyber Warrior: A cyber-warrior is someone who engages in cyberwarfare for personal purposes, as well as for patriotic or religious reasons. Cyber-warriors use information technology to wage war. They may use hacking or other related tactics to attack computers or information systems, or they may defend them from their adversaries. Cyber-warriors may also discover more effective ways to secure a system by exploiting flaws discovered through hacking and other means and closing them before other hackers discover and exploit them.

3. White Box Penetration Testers: White box penetration testing allows you to test a system with administrative or root privileges. Access to the architecture, papers, standards and source code are all included. As a result of this, consultants can review source code and have high-level privilege accounts on the network. White-box testing is the most time-consuming sort of penetration testing since it requires combing through the huge quantity of data accessible to uncover potential points of weakness.

4. Certified Ethical Hacker/ Licensed Penetration Tester: Those trained or licensed professionals in the field of hacking who undertake the duties of both black box and white box hackers are known as certified ethical hackers or licensed penetration testers. They are in charge of examining the system and networks for vulnerabilities and flaws.

3d Face Reconstruction From Uncalibrated Images

By Rishika Yatishwar Gaur, UG scholar CSE @ CCET
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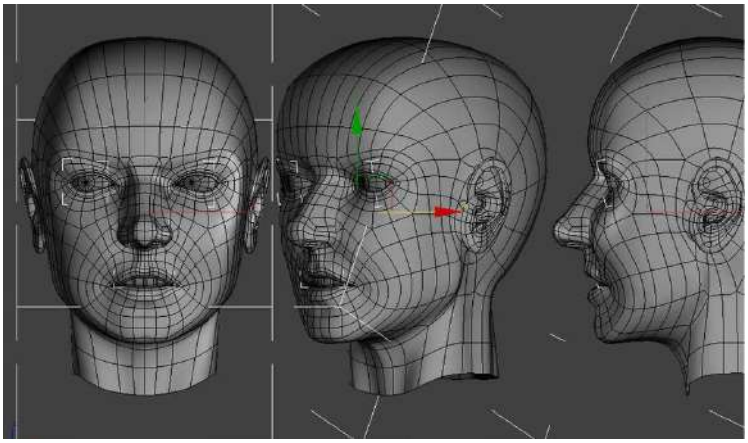
3D face reconstruction from 2D images is quite complex especially when a 2D image is snapped under an uncontrolled situation or activity. A 2D image can generate various 3D faces depending on environmental constraints like lighting and camera angle, this could create ambiguity. Moreover, 3D face reconstruction from 2D images is not fully accurate.



How to achieve it?

There are mainly four approaches in achieving 3D face reconstruction from the uncalibrated image: Statistical model fitting, photometric stereo, machine learning, and deep learning.

In statistical model fitting, additional information is provided which is further included in generating 3D faces. From a set of 3D facial scans, the one that is best fitted to the given image is built. The fitting can be done by three means: optimize non-linear cost function, optimize linear cost function and optimize the probabilistic cost function

In photometric stereo, we estimate the geometric factors and also estimate the normal vectors of the surface. Information is gathered either by a single image or by multiple images. Using multiple images is much beneficial as it provides bigger constraint space.

Machine learning is the second-best approach after deep learning. Most of the models are based on regression either by single regressors or by multiple steps of regression.

Deep learning is implemented by neural networks. We gather raw training data and process it accordingly. It can predict the geometry and texture of faces.

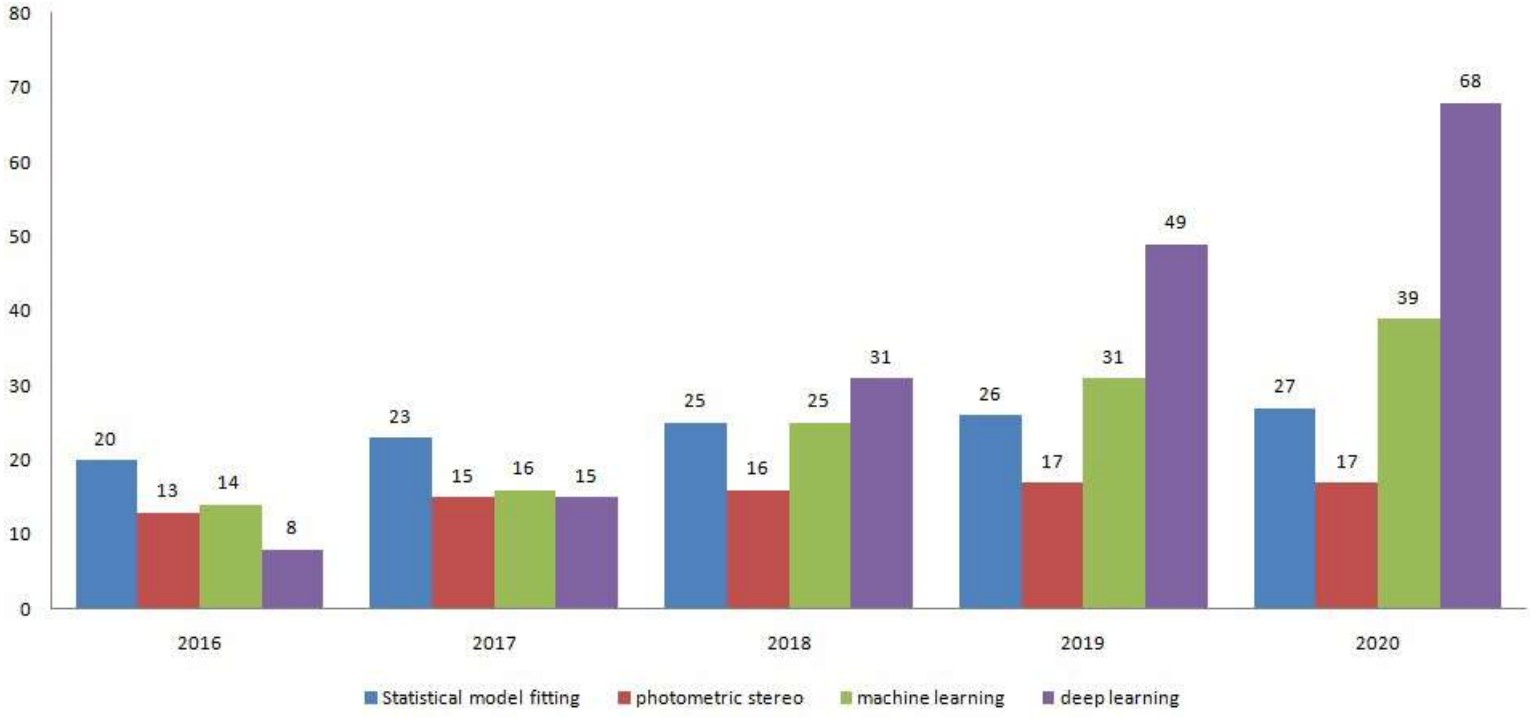
Which strategy is the best?

The chart above shows the research growth of these approaches in previous years. We can say that deep learning is growing fastly as it considers even little details to generate a realistic 3D face but still it requires a huge dataset. Photometric stereo is somewhat constant because it requires a lot of assumptions and its quality is inferior to other approaches. Machine learning is also growing but not to that extent because deep learning can fill the gaps present in machine learning. Statistical model fitting has more computational cost and they cannot combine fine geometric details that are important.

Where it is used?

The odds of reconstructing a 3D face from a 2D uncalibrated image have many applicat

ions like Image editing, facial motion re-targeting, Face animation, Face alignment, and Facial recognition. In image editing, we can create new synthetic images by editing one or more images. In facial motion re-targeting, we collect some attributes from one image and apply those attributes to another image. In face animation, we reconstruct a 3D face from an image and use them to make characters in games, VR, or movies. In face alignment, we detect landmark points in a 2D image. In facial recognition, we need to recognize a person from a huge database of individuals by just an image, like in criminal investigations.



Voice Search Optimization

By Taruna Saini, UG scholar CSE @ CCET
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Voice Search Optimization (VSO) is the process in which the web pages are optimized or upgraded to appear in voice searches. It uses the concept of searching keywords to maximize the visibility and rate of suggestion in voice search results so as to increase the number of visitors to their websites or web apps. Many websites have incorporated this technology into their web pages considering the fierce competition vying for search engine rankings and an increased traffic.

History

Initially, voice search started as a small concept under the Bell Laboratories in 1952 which designed 'Audrey' for understanding digits. Ten years later, IBM presented 'Shoebox', which can understand 16 words in addition to numbers. In the 1970s, the U.S Department of Defence commissioned 'Harpy', a system which recognized 1011 words. The first consumer product was introduced in the 1990s by DragonDictate. In 1997, Dragon Naturally Speaking was released which could recognise 100 words per minute. The voice search started gaining popularity in 2008 when Google incorporated voice search to Google Maps in it's BlackBerry version. Google Voice Search was later used as an application in other smartphones. In 2011, Chrome browser added the voice search feature. Around the same time, Dag Kittlaus, Adam Cheyer and Tom Gruber from the Stanford Research Institute made an application to understand natural speech which was later bought by Apple, became the base for Siri, and released in 2011 with the iPhone 4S.

Popularity

- Sales from voice search amount to more than $2 billion
- More than 1 billion voice searches are made every month.
- 27% of the online population is using voice search on mobile.
- 58% of the users use voice search for finding local business information.
- 65% of consumers aged 25-49 years old talk to their voice-enabled devices daily.

Techniques to optimize web pages for voice search

1. Keyword Research - Some things must be kept in mind while preparing keywords such as the question keywords like what, how, when, etc which must be included. Also, filler words such as I, me, the, of the, to, for, etc should be used to make the query appear

more conversational. Lastly, in order to complete a question, long-tail keywords should be used.

2. Featured Snippets - Featured snippets are the short and precise pieces of information aiming to provide a direct answer to the user. These are extracted and read from the highly ranked pages and provide a fast and brief description about the answer to the user's question.

3. Knowledge Graphs - The knowledge graph is a database of information collected from various sources. To reduce the organic click-through rate, the search engines look for pre-existing knowledge graphs in a webpage.

4. Schema Markup - Schema Markup is the structured data that helps the search engines to make sense out of your content. With the help of schema markup, your content is discovered easily and it helps to provide a complete picture about your content.

5. FAQ Section - Most voice searchers begin their search with a question starting with "What", "When", "Who", etc. and a FAQ section or a FAQ page must include related questions for providing immediate answers. The answers must be provided in a conversational tone so as to sound appealing to the voice search.

6. Create content according to customer persona - Relevance, conciseness and brevity are essential for a voice search. Rich and compelling content must be created to address the user's pain points. An efficient strategy is to create content with a headline of the most common question, then providing a concise answer or definition to the question and to use the rest of the space to elaborate the answer.

7. Ensure website loads fast - Every searcher wants quick answers and no search engine would use content from a website which loads too slow. 8. Making a mobile friendly website - Creating mobile friendly content is essential keeping in mind that most of the verbal questions are asked via mobile devices. The website must be responsive and crawlable to ensure maximum visibility and exposure.

9. Local Search Optimization - It is the process of targeting local keywords and optimizing websites so that they can appear in local search results. A good example of this is Google's 'near me' searches.

10. Use conversational language as content - Usage of natural language increases the scope of matching the search results. In addition to this, the content must match according to the style of the queries. The content should address the type of question, keywords and conversation style, etc.

System on a Chip Architecture

By Sidharth Sharma, UG scholar CSE @ CCET

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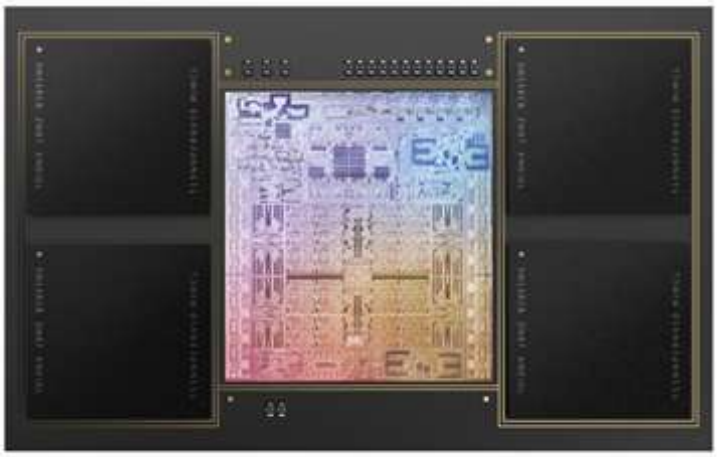
Recently Apple announced it's latest processors the M1 PRO and the M1 MAX. Scaling up M1's transformational architecture, M1 Pro offers amazing performance with industry-leading power efficiency, while M1 Max takes these capabilities to new heights. These new chipsets are based on an architecture called the System On A Chip Architecture (SOC). The article provides a deep insight to this architecture and explains how it can provide fast computing for the future.

The transition from magnetic platter hard drives to solid state drives was the most recent architectural change. Computer speeds were greatly enhanced as a result of this. In fact, if you had an outdated computer and just switched your storage from hard drives to SSD technology, you would almost certainly notice a significant speed boost.

Why is the current system the slowest, with high-speed processors, graphics cards, RAM, and SSD cards? Taking the BUS. That is to say, the motherboard. The bus is responsible for communication between the processor, memory, and graphics card. We can only travel as quickly as the highway (bus) allows. This is where the "system on a chip" technology comes into play. There is no need for a bus design for the components incorporated into the semiconductor because more technology is integrated directly into the chip. In the future, SoC processors will have more features such as built-in RAM, built-in graphics, and possibly more.

Talking about the technical aspects if we take example of the Apple's M1 MAX chip the SOC architecture provides it a greater single thread performance as compared to it's counterparts such as Intel. The latest architecture also provides better performance for data scientists and ML enthusiasts as they have 8 high performance cores and two low power cores.With GPU embedded within the system and a memory bandwidth of upto 200gb/sec the latest architecure not only provides tons of performance but at the same time also consumes 70%less power as compared to other quad core processing units. With 57 billion transistors and 32 core GPU the chipset still consumes less power despite such a massive performance. The SOC architecture gives the energy efficiency at the same time ensures abundant performance with greater single core performance and more transistors per unit space. This chipset architecture definitely seems to be the future of chipsets in not only high performance computers but also the notebooks we currently use.



M1 Max is the largest chip Apple has ever built 57 billion transistors and up to 64GB of fast unified memory

Embedded System

By Lalit Sharma, UG scholar CSE @ CCET

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An embedded system is a microprocessor or micro-controller based system which consists of hardware and software designed to perform a dedicated task either independently or in the larger mechanical or electrical system. In simple words, it is a special-purpose computer custom built to serve a specific purpose. Some examples of embedded systems are calculators, washing machines, traffic lights, etc.

CLASSIFICATION OF EMBEDDED SYSTEMS -

Embedded systems are generally classified into 3 types:

1. Subsystems
2. Standalone Systems
3 . Networked Systems

Embedded Subsystems

The term embedded means placed inside something bigger. This type of embedded system is usually a part of a larger system. A very common example of this type of embedded system is the digital display in cars. Here the car is the larger system in which that display is embedded. Some other examples are the timer in the microwave oven in your house or a keyboard or mouse in your computer. They are all examples of embedded subsystems. Independently these systems are of no use but they aid a larger system to do their task.

Standalone Embedded Systems

These are the embedded systems that can perform their tasks independently. For example, mp3 player which can play their music independently, USB drives that can store data even after being unplugged from a computer system, digital cameras, digital watches, etc. Since they are not embedded into something bigger and can perform their task without depending on other embedded systems hence they are classified as standalone embedded systems. Although this is not always 100 percent true since some dependency is always there for example in the case of a USB drive a computer system is required to transfer the data into the drive but after the transfer, the USB drive doesn't require the computer for sustaining that data

and it will remain in the drive everafter detaching the drive from the computer and as we all know the main purpose of the USB drive is to store the data, therefore, it is classified under this branch of embedded systems

Networked Embedded Systems

A famous example of this type of system is home automation. Here several sensors are placed throughout your home and their collective duty is to perform home automation. This is the most recent trend in this field, and new products are developed in this class of embedded systems every day. In this classification of embedded systems different embedded systems are connected to one another over a network and share information if required, to complete the task. The scope of this type of system is so vast that a subclass known as the Internet of Things is originated from this classification of embedded systems popularly known as lot.

The embedded system has such a wide range of applications whose discussion is beyond the scope of this article. They are being used in almost everything nowadays from a remote control toy cars to running artificial intelligence.

JSON WEB TOKENS (JWTs)

By Sahil, UG scholar CSE @ CCET
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A JSON token is a type of online key or token widely used in websites. And as the name suggests these are based on JSON format.
Commonly a JSON token consists of three main components a header, a payload, and a signature.

1. The header

The header part identifies that what type of algorithm will be used to generate the signature.it is a base64url encoded string of a JSON blob like this

```
{
"alg" : "HS256",
"typ" : "JWT"
}
```

base64url encoded string: eyBhbGcgOiBIUzI1NiwgdHlwIDogSldUIH0K
The most common algorithms used are HMAC and RSA algorithms.

2. The payload

The information contained in this section usually used for access control. This part is also base64urln encoded before being used

```
{
"user_name" : "admin",
}
```

base64url encoded string: eyB1c2VyX25hbWUgOiBhZG1pbiB9Cg

3. The Signature

This section is used to validate and verify that the token has not been tampered. It is done by concatenating the header with the payload, then signing with the algorithm specified in the header

signature = HMAC-SHA256(base64urlEncode(header) + '.' + base64urlEncode(payload), secret_key)
// Let's just say the value of secret_key is "key".->
signature function returns
4Hb/6ibbViPOzq9SJflsNGPWSk6B8F6EqVrkNjpXh7M
For this token the string
“eyBhbGcgOiBIUzI1NiwgdHlwIDogSldUIH0K.eyB1c2VyX25hbWUgOiBhZG1pbiB9Cg” has been signed up with algorithm HS256 with the secret key “key”. And the resultant string is

“4Hb/6ibbViPOzq9SJflsNGPWSk6B8F6EqVrkNjpXh7M”
And the complete token we get is by concatenating each string with a “.” In between them
eyBhbGcgOiBIUzI1NiwgdHlwIDogSldUIH0K.eyB1c2VyX25hbWUgOi-BhZG1pbiB9Cg.4Hb/6ibbViPOzq9SJflsNGPWSk6B8F6EqVrkNjpXh7M

Exploiting JWTs for Fun and profit

IF JWTs are implemented correctly then they can provide secure way to identify the user since the information contained in the payload section can never be tempered. But if these JWTs are implemented in poor and carelessly way then an attacker gets a chance to show his skills in many ways. So, let’s see the different ways to exploit JSON web tokens

1. Changing the algorithm type.

An attacker can temper the alg field of the header. If the web application does not restrict the algorithm type used in JWT an attacker can specify which algo to use, which could compromise the security of the token.

a. None algorithm

JWTs support a “none” algorithm which means evert token will be considered valid if their signature is set to empty. For example,

eyAiYWxnIiA6ICJOb25lIiwgInR5cCIgOiAiSldUIiB9Cg.eyB1c2VyX25hbWUgOiBhZG1pbiB9Cg.

This token will be considered as valid token. Because it is base64url of the following these two blobs, and no signature is present

```
{
"alg" : "none",
"typ" : "JWT"
}
{
"user" : "admin"
}
```

b. HMAC algorithm

Two most common algorithm used for JWTs as mentioned above are HMAC and RSA

While using HMAC the token will be signed with a key, then later it will be verified with the same key. But in RSA the token will be first created with a private key, then verified with the corresponding public key.

HMAC -> signed with a key, verified with the same key

RSA -> signed with a private key, verified with the corresponding public key

Now lets assume that there is an application that initially was designed to use RSA tokens. The token are signed with private key A, which are always kept secret from the public. Then the token is verified with public key B, which is available to anyone
These things are okay if the tokens are treated as RSA tokens.
Token signed with key A -> Token verified with key B (RSA scenario)
Now if the attacker is able change the alg to HMAC, he might be able to create a valid token by signing the forged tokens with the RSA public key B

This is because when originally the token was signed with RSA, it was also verified with RSA public key B. And when the algorithm switches to HMAC the token is still verified with RSA public key B, but this time the token can be signed with public key B (since it is using HMAC).

Token signed with key B -> Token verified with key B (HMAC scenario)

2. Provide a non-valid signature:

In many scenarios it is also possible that signature of the token never verifies after it arrives at the application. This way an attacker can simply bypass the security mechanism by simply providing an invalid signature

3. KID manipulation:

KID stands for "Key ID". It is header field in JWTs, and it helps developer to specify the key to verify the token. Usage of KID parameter looks like this:

```
{
"alg" : "HS256",
"typ" : "JWT",
"kid" : "1"
}
```

a. Directory traversal

As KID is used to retrieve a key file from the file system. But if it is not sanitized before it can lead to directory traversal attack. And in this case the attacker would be able to specify any file in the file system as the key to be used to verify the token.

"kid": "../../public/css/main.css"
// use the publicly available file main.css to verify the token

b. SQL injection

KID can also be used to retrieve the key from a database. In this case, SQL injection could be used bypass JWT signing.

"kid": "aaaaaaa' UNION SELECT 'key';--"
// use the string "key" to verify the token

Deep learning in Intelligent Transport Systems

By Gopal Mengi, UG scholar CSE @ CCET
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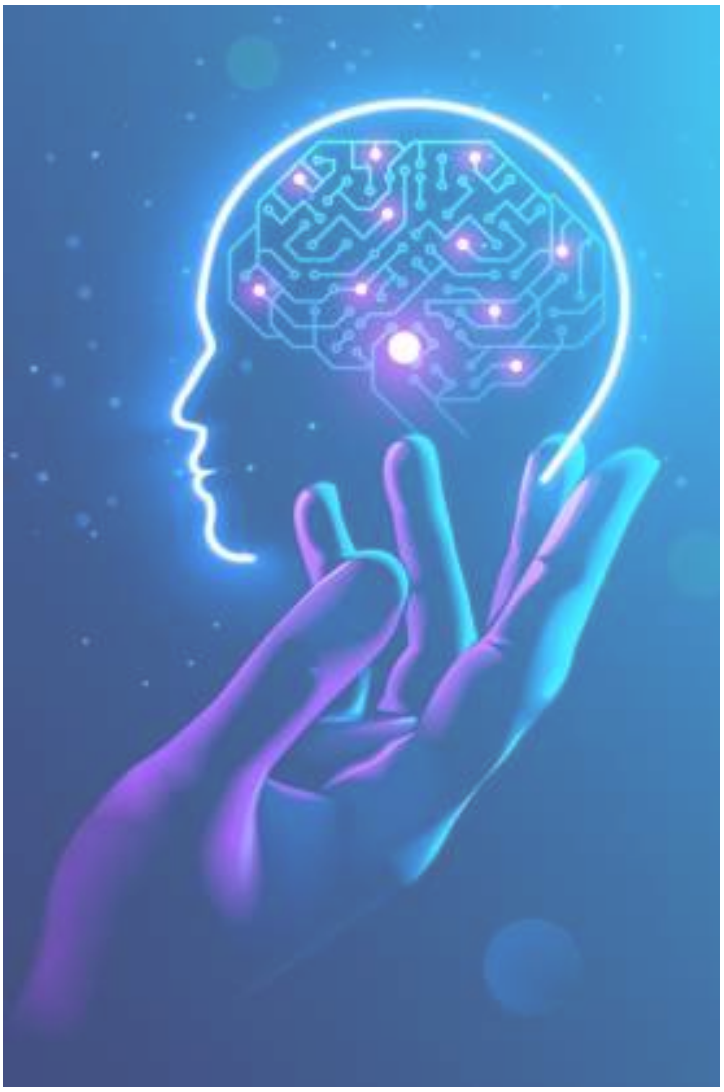
What is an Intelligent Transport System (ITS)?

The ITS is basically an intelligent transport management system which helps in reducing accidents and provides a better way to manage traffic as in today's world there are many vehicles on the road which if not managed can be very dangerous.The current technologies involve, CCTV's which help the traffic management staff to have a real-time look at the traffic and watch for accidents. Vehicle detection is another technology that warns the system about any vehicle or obstruction in the way. Some ongoing systems which are yet to be implemented, include a crosswalk detection software which works on the same principle as the vehicle detection system and also the Bluetooth technology in cars which can be used to detect the speed of the vehicle which can be used for the safety of the vehicle as well as the pedestrians on the road. One of the path-breaking technologies includes the signal coordination software in this system the signals upstream and downstream which coordinate with each other to improve the traffic flow which in turn increase the fuel economy and lowers the cost of traveling.

Deep Learning

Deep learning (DL) is a subset of AI in which the learning system is completed utilizing numerous layers of stacked boundaries. These boundaries are part portrayals of numerous angles that can impact the organization's result. Each layer has numerous neurons which correlate to the neurons in the brain, that store boundary loads. Each layer's input is multiplied by these parameters, and the output is a representation of each parameter's impact on the input



Applications of Deep Learning in Intelligent Transport Systems

The prediction of traffic attributes is one of the most broadly thought about employments of Deep Learning in transportation. Information on traffic attributes can help drivers make better route choices and traffic control organisations manage traffic more effectively.

Results from one dataset are challenging to generalise to other datasets since driving behavior and traffic factors vary by location. Previously, parametric and statistical methods such as autoregressive integrated moving average (ARIMA) modeling were employed to predict traffic features, but these methods were often ineffective at predicting irregular traffic flows. Nonparametric methods are now being employed in the behavioral prediction of traffic to obtain improved accuracy, thanks to the introduction of machine learning and, more specifically, DL methods. First attempts in the prediction of traffic characteristics include deep belief networks (DBN), to achieve more accuracy the weather data has also been used with the traffic data to predict traffic data more accurately. However, due to irregular characteristics of the traffic, several studies have been conducted to discover relationships between traffic parameters and RNN. For instance, a gated RNN unit was utilized to assess traffic stream according to climate conditions, while LSTM was used to deal with a similar test. Researchers have utilized LSTM to expect travel time and traffic stream while additionally considering climate factors. At last, to expect blockage in transportation network joins, we utilized a blend of deep RBM and RNN.

Some other applications of deep learning in ITS include

Vehicle identification

A visual consideration model that forms an element map utilizing a mix of the most regularly utilized tones in tags separates information from plates utilizing a CNN model, lastly runs an SVM on the recovered information has been made to perceive tags utilizing DL models.

Traffic signal timing

One of the primary errands of ITS administration dependent on numerous sorts of information is controlling traffic by means of traffic light lights. The findings of these studies have provided traffic authorities with logical models that utilize numerical techniques to settle this enhancement challenge. Displaying the elements of traffic to get the best exhibition has taken another way, thanks to current DL studies. This is due to the fact that the nature of RL has made it Easier to apply in various research to determine the ideal traffic signal timing.

Virtual Personal Assistant

By Deepak, UG scholar CSE @ CCET
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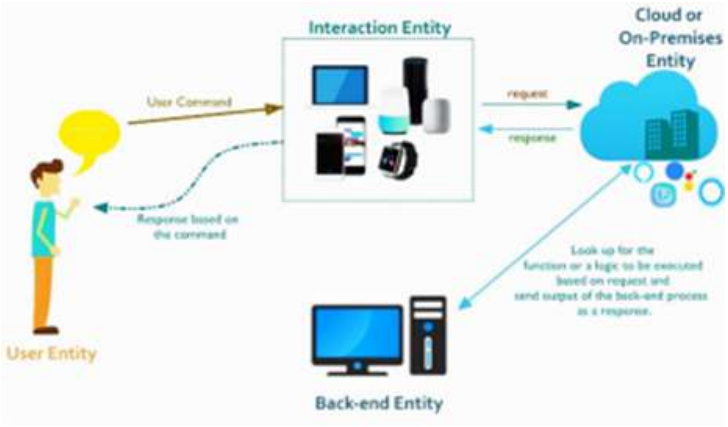
Over the last few decades, there has been significant advancement in the field of artificial intelligence. Its development over the decades has resulted in a very vast field with a lot of promise.

Artificial Intelligence manifests itself as a Virtual Personal Assistant. It processes data and responds to commands using machine learning and natural language processing. Throughout the past century, many virtual personal assistants were developed, with Apple releasing the first modern virtual personal assistant for the iPhone 4S.

Working

Virtual assistants operate through four entity terminals: user, interaction, cloud, and back-end.



The user entity refers to the person issuing a command. Anyone can be the user in this case. The virtual assistant takes the command. It is possible to do so using a voice recognition service. The gadget then accepts the command as input. These are entitiesthat interact with one another. They make it easier for users to engage with the cloud. They handle incoming and outgoing data streams from the cloud, as well as command and response. A smartphone is an example of this

The interaction entity transmits the command to the cloud entity after it has been established. The gadget handles simple and basic commands. Complex situations, on the other hand, necessitate the use of the cloud. They must have access to users' data to respond to the demand. The final entity is the back-end entity, which refers to developers. They must build algorithms in response to specified user requests. The sophisticated instructions instruct the cloud to send data to a back-end entity to build a response to the command

Features, Services, and Use

The voice assistant gadget must be activated with a Wake word. Natural language awareness is essential to grasp the request more efficiently. Text to Speech provides device output, while the conversation manager handles user communication. It may also provide third-party services, customer servicewith bots.

Security and Privacy Concerns

Concerns have been raised about the usage of voice-controlled virtual assistants in terms of security and privacy. The biggest concern is the user's data, which is stored in an unencrypted format and is subject to cyber

assaults. Data is also more likely to be illegally shared with a third party.

Future Scope

It has a lot of promise and a bright future. It has the potential to broaden its area of use in all fields, and with more handy features, it is expected to appear everywhere shortly. Gartner, a worldwide research firm, expects that by 2023, voice-based communications will account for 25% of all employee contacts. It is predicted that by 2025, half of all knowledge workers would utilize a virtual assistant daily, up from 2% in 2019.

VoIP To Compete

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Basic of VoIP

Voice over IP (VoIP) is an innovation that permits voice, video, and sound to be sent as information bundles across an IP organization, regardless of whether private or public. VoIP advancement is rapidly standing out and interest in the space because of the advantages it might give. Cost decreases, wide media limits, phone and organization smallness, flexibility, and combination with different applications are, for the most part, benefits of VoIP for the two customers and correspondence specialists as demonstrated in Figure 2.

VoIP as Platform

At the point when we utilize an exemplary circuit-transmuted telephone to contact a partner's office from yours, the call commences from the equipment around your work area, goes over one of a confined number of pathways on particular phone organizations, and emerges at a predetermined area-the circumventing telephone work area. VoIP calls are rudimentally pieces of information on the overall Internet. They are not bound to geological areas or explicit contraptions, because VoIP uses general guidelines, it can verbalize with any contrivance that upholds the Internet convention. It can peregrinate to an electronic mail inbox on a PC to a remote organization in any area of the planet similarly as promptly as it can to the telephone on that associate's work area.

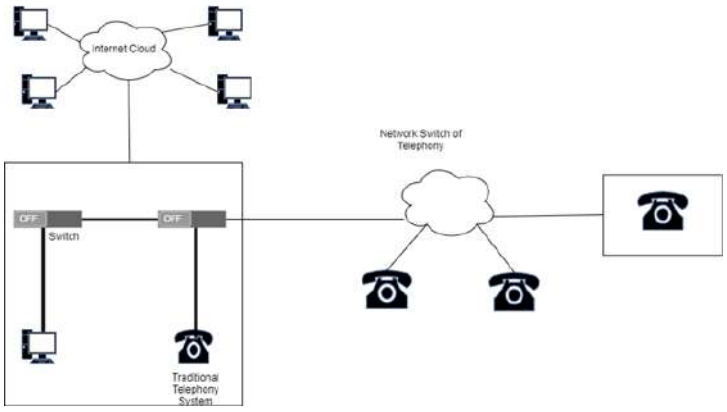

Figure 1: - Conventional telephony

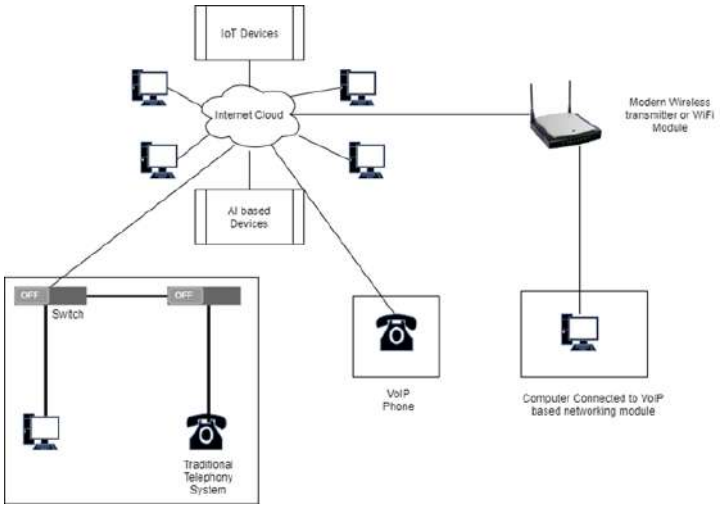

Figure 2:
VoIP Telephony vs. Conventional tele-

- The initial phase in building a VoIP stage is to introduce gadgets Converters, Programming, or Telephones, that workers see in their front office.
- VoIP programming and equipment design administer what capacities are offered, just as

how VoIP gadgets speak with corporate IT frameworks
- The initial phase in building a VoIP stage is to introduce front-office gadgets—the telephones, converters, or programming that workers visually perceive.
- The incipient VoIP programming and equipment design administer what capacities are offered, like how VoIP contrivances verbalize with corporate IT frameworks.
- Similarly, as static corporate Web destinations gave way to dynamic, intelligent, truly business-upgrading utilizations of the Internet 10 years prior, VoIP will fill in as an establishment for more essential correspondences that blend voice in with different information—supposed "united interchanges"
- Consider VoIP's potential as an essential instrument as far as three kinds of ability: Customization, Virtualization, and Intelligence.

Virtualization in VoIP

VoIP. With a couple of mouse clicks, it is likewise functional to make a help for a boundless number of telephones anyplace on the planet. This mix of compactness and versatility takes fixed and costly components of customary correspondences and makes them alterable and modest. It empowers organizations to set up minimal expense repetition to control hazards, and it gives organizations adaptable correspondences that can quickly respond to moving interests

Customization in VoIP

The main advancements in conventional telephone network innovation (as shown in Figure 1), for example, guest ID and phone message, required a very long time to create and execute. New calling provisions or voice applications are easy to make and foster using VoIP. Albeit off-the-rack VoIP programming and gadgets offer a scope of functionalities, organizations are occupied with creating one-of-a-kind applications that might build up marking, further develop client care, and work on inner correspondences.

Intelligence

As these models show, organizations are now using VoIP's customization and virtualization highlights, however, these are among the few that have advanced past straightforward expense cutting establishments. The best capability of VoIP will be acknowledged when organizations foster progressively modern frameworks to interface interchanges and business cycles and lift the efficiency of information laborers.

Some facts and myths about VoIP

- While the extraordinary greater part of individual organizations actually utilizes conventional telephones, around 10% of global telephone traffic presently streams over the Internet using voice over Internet convention, or VoIP
- VoIP is more than essentially another innovation for making customary telephone discussions more reasonable.
- Its solidarity comes from the way that it changes over discourse into computerized information parcels that can be saved, blended, modified, copied, in with different information, and dispersed to almost any gadget that can associate with the Internet.
- Think of it as what could be compared to World Wide Web (WWW).
- The term IP, or Internet convention, just alludes to the specialized rules that oversee how advanced information is encoded.

• Because of these mundane norms, VoIP might connect with other Internet-predicated information and frameworks progressively.
• Notwithstanding, think about this: Because VoIP changes over voice into Internet-accommodating information parcels, it can and will dislodge the firm, packaged telephone benefits that most organizations actually use.
• Also, because it will allow organizations to plan their own altered telephone applications, it will move control of telephone benefits from transporters who have customarily characterized (and controlled) them and toward the organizations that use them.
• VoIP will fill in as the binding system for such applications, empowering progressively custom-made, savvy, and vital voice conversations

Conclusion

VoIP is coming. The key differentiation won't be between the individuals who convey it and the people who don't, or even between early adopters and loafers. Innovation will be a fight between the individuals who consider VoIP to be basically one more method for getting the normal, worn-out things done and other people who use it to totally rethink their organization.

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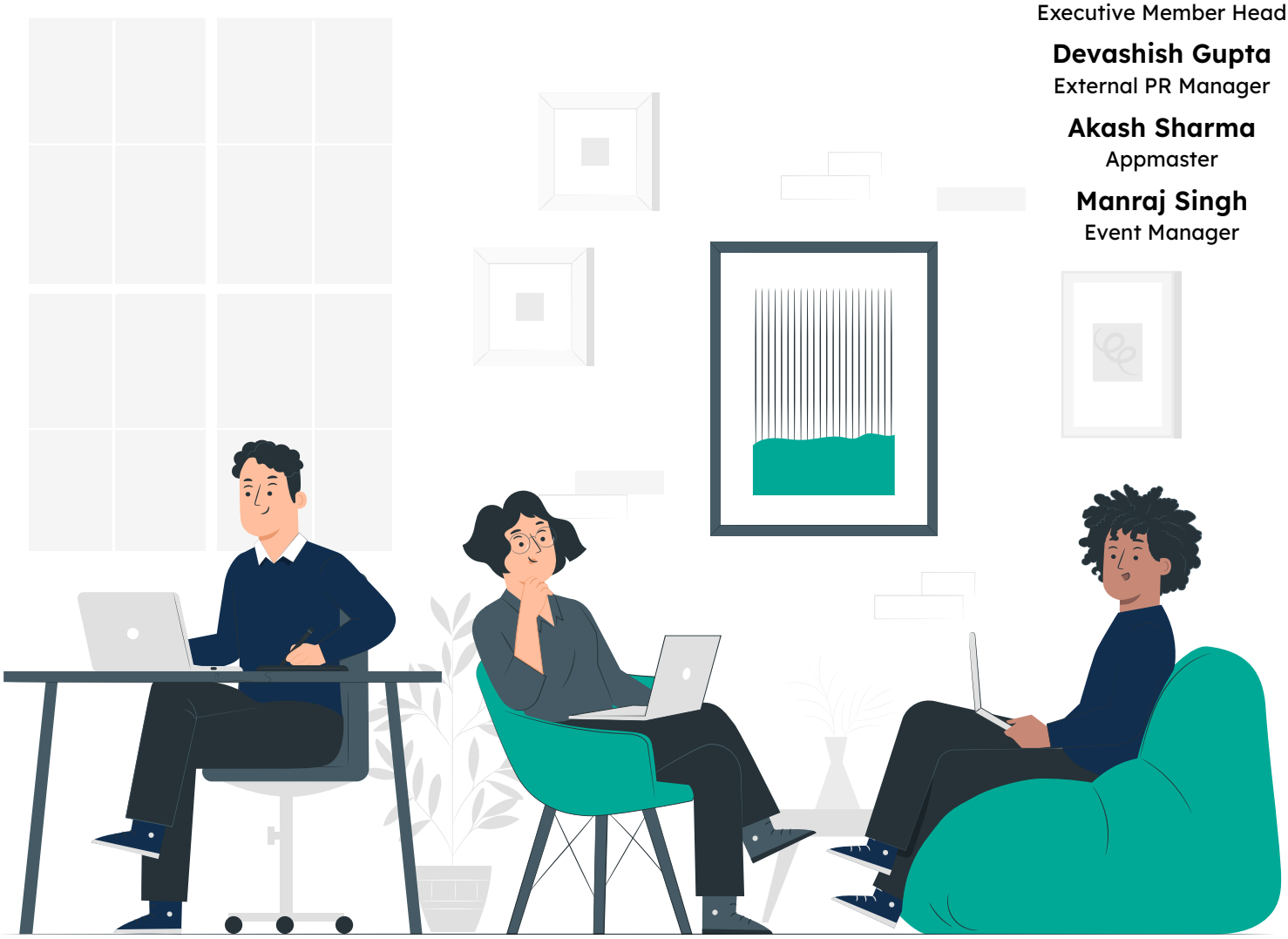

“ Computing is not about Computers, it's about living, Living to solve the problems of society using Computer Science ”

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