TECHTODAY

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Focus on Excellence

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technique of hiding secret data within an ordinary, non-secret, file or message in order to avoid detection

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Editor's
Message

Aparna Joshi
Student Editor

I t is with great pleasure that we present to you the latest edition of TechToday. Our team has worked tirelessly to bring you engaging and inspiring content that reflects the values and quality of our institution, FISAT.We are proud to have achieved our mission of bringing together both knowledge and creativity under the same cover, and we owe it all to the efforts of our dedicated editorial board and the talented young writers and artists who have contributed to this magazine.As we move forward into the future of technology, we hope that this magazine will serve as a valuable resource for our readers, offering insights and perspectives that will inform and inspire. We wish you all the best as you dive into this edition of TechToday, and we look forward to continuing to bring you the latest news and developments from the world of technology.

The Editorial Board

Emerging Trends In VR

-Angel Shaju

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Virtual reality (VR) is a technology that enables users to experience an immersive computer-generated environment that mimics real-life situations. VR systems can simulate a wide range of experiences, including flying through space, exploring new worlds, and interacting with virtual objects. At its core, VR technology involves the use of head-mounted displays (HMDs), which are worn by users to experience a virtual environment. These HMDs typically feature high-resolution displays that are positioned close to the user's eyes, creating a convincing sense of immersion.In addition to the HMD, VR systems also require powerful computing hardware and software to generate and

render the virtual environment. The software used in VR systems must be able to create realistic 3D models, simulate physics, and track the user's movements in real-time.One of the key challenges in developing VR technology is minimizing motion sickness. Motion sickness can occur when the user's visual and vestibular systems are in conflict, causing discomfort and nausea. To reduce motion sickness, VR systems must have high frame rates, low latency, and accurate head tracking. There are a variety of VR systems available on the market today, ranging from low-cost smartphone-based systems to high-end professional systems used in fields such as medicine and engineering. Some of the most popular VR systems include the Oculus Quest 2, the HTC Vive, and the PlayStation VR.VR technology has a wide range of potential applications in fields such as entertainment, education, and training. In this article, we will explore some of the most exciting emerging developments in virtual reality.

Social VR

One of the most exciting developments in virtual reality is the emergence of social VR. Social VR is a new platform that allows users to interact with each other in a virtual environment. This technology is being used to create virtual communities, where people can meet and interact with each other, regardless of their physical location. Social VR also has the potential to revolutionize the way we work and collaborate by allowing people to work together in a virtual space.
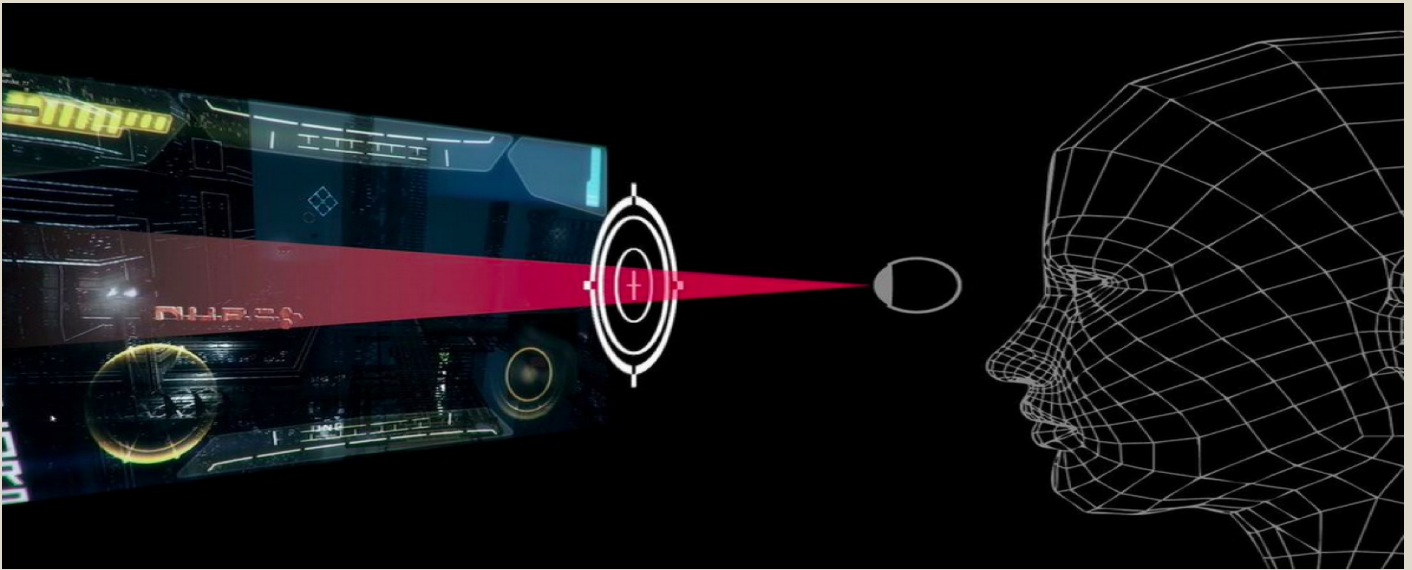
Wireless VR

One of the most significant emerging trends in VR is wireless VR. With advancements in wireless technology, users can now experience VR without being tethered to a computer. Wireless VR provides users with more freedom of movement and a more immersive experience. This trend is already gaining popularity in the gaming industry, where players can move around without being restricted by cables.

Augmented Reality (AR) Integration

Another rapid emerging development in virtual reality is the integration of augmented reality (AR) into VR. AR is a technology that allows digital information to be overlaid onto

the real world. By integrating AR into VR, users can interact with virtual objects in the real world, creating a more immersive experience. This integration has been used in various fields, such as education and training, where users can interact with virtual objects in real-world scenarios.

Eye-tracking Technology

Eye-tracking technology is another emerging development in virtual reality.The device can adjust the VR display to provide a more natural viewing experience. It can be used to track the progress of patients or monitor the attention of students.
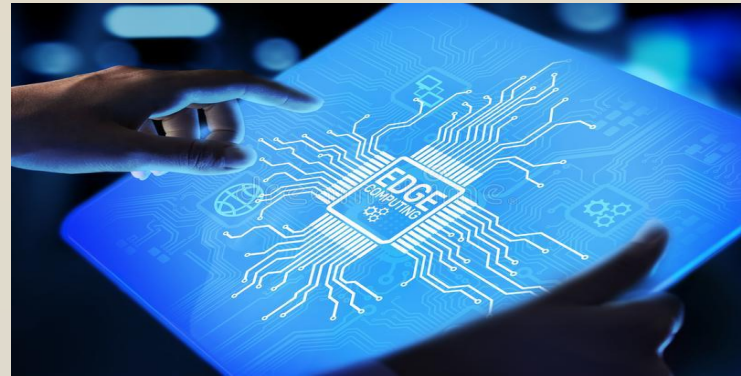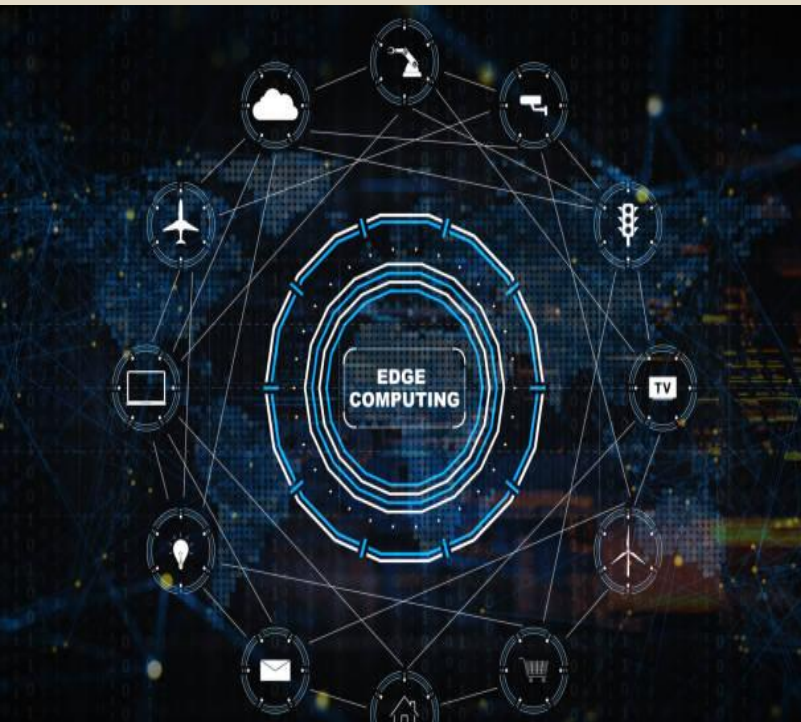
5G Technology

5G provides faster data transfer speeds and lower latency, which makes it possible to stream VR content in real-time. This tech is being used to create more immersive and interactive faster VR experiences.

VR Underwater

VR underwater can be used in marine research to study the behaviour and habitat of marine life. It can also be used in the tourism industry to provide an immersive experience of underwater attractions and marine life.

Virtual reality is rapidly evolving, and emerging developments in this field are shaping the future of this technology. Social VR, augmented reality integration, haptic feedback, eye-tracking technology, and 5G technology are just a few examples of the emerging developments in virtual reality. These developments are creating new opportunities for VR to be used in various fields, such as gaming, education, healthcare, and more. As technology continues to advance, we can expect to see even more exciting developments in virtual reality in the coming years.

Edge Computing: Revolutionizing Real-Time Data Processing

-Sanika T C

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In today's digital age, the amount of data generated by devices and sensors is growing exponentially. This has led to an increased demand for real-time data processing and analysis, which can be challenging for traditional cloud computing architectures. This is where edge computing comes in, as an emerging technology that enables real-time data processing and analysis at the edge of the network. Edge computing is transforming the way we process and analyze data. It involves bringing computation and data storage closer to where it is needed, such as at the edge of the network or on devices themselves. This allows for faster processing, reduced latency, and improved security, among other benefits.

What is Edge Computing and Why is it Important?

Edge computing is a distributed computing paradigm that brings computation and data storage closer to where it is needed. Instead of relying on a centralized cloud computing infrastructure, edge computing distributes these resources to the "edge" of the network, closer to the end user or device. One of the main drivers behind the rise of edge computing is the growth of the Internet of Things (IoT). With the increasing number of connected devices and sensors, there is a need for faster and more efficient processing of the data they generate.

Edge computing can help address this challenge by allowing data to be processed and analyzed closer to the source, rather than sending it to a central location for processing.Edge computing architectures can be divided into three main categories: fog computing, mobile edge computing, and hybrid edge computing.Fog computing involves deploying computing resources, such as servers, storage, and networking equipment, at the edge of the network, close to where the data is generated.

This allows data to be processed and analyzed in real-time, without the latency associated with transmitting data to a remote cloud server for processing. Fog computing is often used in industrial automation, smart cities, and healthcare applications. Mobile edge computing involves deploying computing resources, such as servers, storage, and networking equipment, at the edge of the mobile network. This allows data to be processed and analyzed in real-time, without the latency associated with transmitting data to a remote cloud server for processing. Mobile edge computing is often used in autonomous vehicles, smart transportation, and augmented reality applications. Hybrid edge computing involves a combination of fog computing and mobile edge computing. This allows data to be processed and analyzed in real-time, using both fog and mobile edge computing resources. Hybrid edge computing is often used in applications that require real-time data processing and analysis, such as industrial automation, smart cities, and healthcare.

Advantages

Edge computing ensures improved security. By processing data locally, edge computing can help reduce the risk of data breaches and other security threats. This is particularly important in industries such as healthcare, where the security and privacy of patient data is of utmost importance.Edge computing can also help improve scalability. By distributing computation and storage resources across the network, edge computing can help reduce the load on centralized servers and improve overall system performance. This can be particularly useful in applications that require real-time processing, such as autonomous vehicles or industrial automation.It also reduces network congestion and bandwidth usage by processing data at the edge of the network, rather than transmitting it to a remote cloud server for processing. This can help improve network performance and reduce costs.

Challenges and Opportunities

While edge computing offers many benefits, it also presents several challenges. One of the main challenges is managing and orchestrating the distributed resources. This can be particularly difficult in large-scale deployments that involve thousands or even millions of devices. Additionally, there is a need for standardization and interoperability across different edge computing platforms, to ensure that devices and applications can work together seamlessly.

Edge computing can be used to enable new applications and services, such as real-time analytics, predictive maintenance, and immersive experiences.It can also help reduce the cost and complexity of cloud computing, by offloading some of the processing and storage to edge devices.
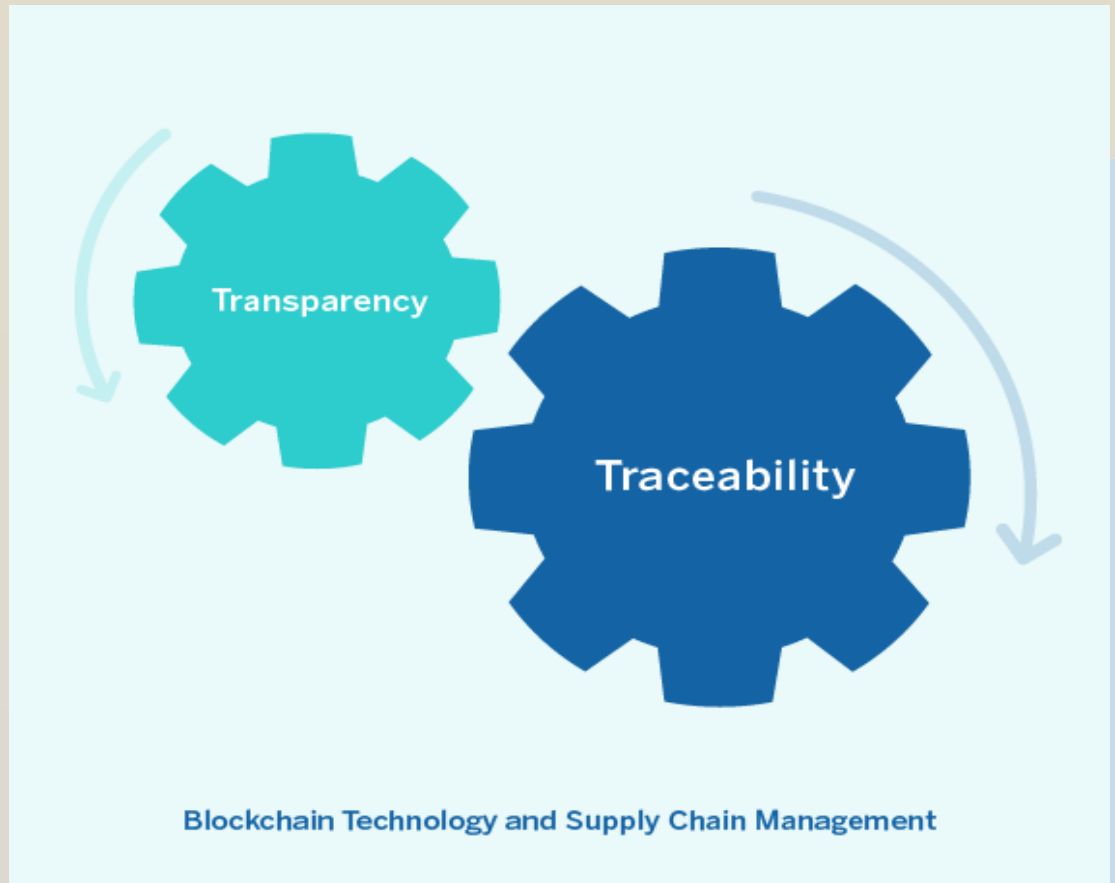
Conclusion

Edge computing is a powerful paradigm that can help improve the performance, security, and scalability of distributed systems. By bringing computation and data storage closer to where it is needed, edge computing can enable new applications and services, and reduce thecost and complexity of cloud computing. While there are many challenges to be addressed, the opportunities for innovation in this field are vast. As the Internet of Things continues to grow, edge computing is poised to become an increasingly significant part of our computing infrastructure.

Blockchain-based Solutions for Supply Chain Transparency

- Swetha Rajeev

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Blockchain Technology and Supply Chain Management

A supply chain is a network of entities, organizations, people, activities, and resources involved in the creation and delivery of a product or service to a customer.It encompasses the entire process from raw material acquisition, production, storage, transportation, distribution, to final delivery to the end consumer.

A supply chain involves many stakeholders, including suppliers, manufacturers, distributors, retailers, logistics providers, and customers, all of whom contribute to the flow of goods and services along the chain.

Effective supply chain management is crucial for optimizing the flow of goods,

minimizing costs, reducing lead times, and improving customer satisfaction. Supply chain transparency is a critical issue for companies, regulators, and consumers, as itis essential for ensuring ethical and sustainable sourcing of products. Supply chain transparency is the ability to see and track the movement of products and materials through the supply chain, from the source of raw materials to the end consumer.

Blockchain-based Solutions for Supply Chain Transparency

Blockchain technology is increasingly being seen as a potential solution to the challenges of supply chain management. By providing a secure, decentralized platform for tracking and verifying the movement of goods and services through the supply chain, blockchain technology has the potential to improve transparency and accountability, reduce costs, and promote ethical and sustainable practices. In thisarticle, we will explore how blockchain-based solutions can be implemented to improve supply chain transparency. We will look at the key features of blockchain technology, and

howthese features can be leveraged to create a more transparent and efficient supply chain.

Implementing Blockchain-Based Supply Chain Solutions

While blockchain-based supply chain solutions offer many benefits, implementing these solutions can be a complex and challenging process. Here are some steps that businesses can take to successfully implement blockchain-based supply chain solutions:

1. Identify the Problem: The first step in implementing a blockchain-based supply chain solution is to pinpoint the specific problem or challenge that the solution will address. This may involve analyzing existing data, conducting interviews with stakeholders, and mapping out the various stages of the supply chain to identify areas of inefficiency, lack of transparency, bottlenecks, and areas of risk.

2. Choose the Right Blockchain Platform: Once the problem has been identified, businesses must choose the right blockchain platform to meet their specific needs. This may involve considering factors such as scalability, security, and interoperability with other systems.

3. Develop Smart Contracts: Smart contracts are a key component of blockchain-based supply chain solutions, and must be carefully designed and developed to ensure that they meet the needs of all stakeholders. This may involve working with developers and other experts to create custom smart contracts that reflect the specific requirements of the supply chain.

4. Collaborate with Stakeholders:

Implementing a blockchain-based supply chain solution requires collaboration and buy-in from all stakeholders, including suppliers, distributors, retailers, and customers. This may involve educating stakeholders about the benefits of blockchain technology and working with them to develop protocols and standards for data sharing and collaboration.

5. Test and Refine: Once the solution has been implemented, businesses must continuously test and refine the system to ensure that it is working effectively and meeting the needs of all stakeholders. This may involve conducting regular audits, collecting feedback from stakeholders, and making adjustments to the system as needed.

conclusion

Implementing blockchain-based solutions for supply chain transparency can bring about a multitude of benefits for businesses across various industries. Blockchain's unique features, such as immutability and transparency, make it an ideal technology for improving supply chain management processes. By providing end-to-end visibility and accountability in the supply chain, blockchain-based solutions can help reduce the risk of errors or fraud, enhance collaboration, improve compliance with regulatory requirements, and increase trust between parties.It is expected that the benefits of increased supply chain transparency will continue to grow, driving innovation and improving efficiency across various industries.

Education through Augmented Reality

Education has undergone a significant transformation in recent years with the advent of technology. Augmented Reality (AR) is one such technology that has the potential to revolutionize the way students learn and interact with the world around them. AR blends virtual elements with real-world environments to create immersive experiences that enhances engagement, motivation, and understanding.

History

The history of Augmented Reality (AR) dates back to the 1960s when the first AR system was developed by Ivan Sutherland. However, it was only in the 1990s when AR started to gain significant attention and advancements were made in the field. With the advent of smartphones and other mobile devices, AR became more accessible to the masses and its applications in various fields started to emerge.

- Sonal Sabu Thattil & Polwin Davis

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Today, AR continues to evolve and is being used in a wide range of industries, including education, entertainment, retail, and healthcare, among others. The future of AR looks promising with advancements in technology and increased investment in the field, leading to the development of new and innovative AR-based solutions.

How it works

Augmented Reality (AR) works by overlaying digital content on the real world using a device, such as a smartphone or tablet, with a camera. AR technology tracks the physical environment and aligns digital content with it, allowing users to interact with the virtual objects as if they were part of the real world. This creates an immersive experience that blends real and virtual elements, offering a new way to engage with information, entertainment, and other content.

Advantages

Augmented Reality (AR) technology has the potential to revolutionize the way students learn and interact with the world around

them. Some of the key advantages of AR in education are:

1. Improved Engagement: AR creates an immersive experience that enhances student engagement and interaction with the content.

2. Hands-on Learning Experience: AR allows students to interact with virtual objects as if they were part of the real world, offering a hands-on learning experience.

3. Enhanced Visualization: AR provides a more visual and interactive way to understand complex concepts, making it easier for students to grasp the information.

4. Increased Motivation: AR makes learning more interesting and fun, which can increase student motivation and engagement.

5. Accessibility for all Students: AR technology can be used to create educational content that is accessible to all students, including those with disabilities.

Application of AR

1. Gaming and entertainment: used to create immersive experiences for players, allowing them to interact with virtual objects in the real world.
2. Education and training: used to provide interactive lessons and simulations, making learning more engaging and effective.
3. Marketing and advertising: used to enhance product demonstrations and customer engagement, allowing potential customers to interact with products in real-time.
4. Industrial maintenance and repair: provide workers with step-by-step instructions for repairs, reducing the time and cost of maintenance.
5. Healthcare and medicine: used for medical imaging, providing doctors with a detailed view of a patient's anatomy and allowing for more accurate diagnoses and treatments.

Conclusion

As AR technology continues to advance, we can expect to see more innovative applications and new opportunities to enhance the way we live and work. AR has the potential to revolutionize industries, improving efficiency and customer experiences, and providing new and innovative solutions to real-world problems. In the near future, AR is likely to become a ubiquitous technology, seamlessly integrating with our daily lives and changing the way we perceive and interact with the world.

CLOUD COMPUTING

-Samanuai A

S5

Cloud computing is a computing paradigm in which a large number of systems in private or public networks are networked together to provide dynamically scalable infrastructure for applications, data, and file storage.

The introduction of cloud computing has significantly reduced the cost of computation, application hosting, content storage, and delivery. Cloud computing is a practical way to realise immediate cost savings, and it has the potential to transform a data centre from a capital-intensive setup to a variable-priced environment. The fundamental principle of "Reusability of IT Capabilities" underpins the concept of cloud computing. Cloud computing differs from traditional concepts such as "Grid computing," "Distributed computing," "Utility computing," and "Autonomic computing" in that it broadens horizons across organisational boundaries.

Cloud computing is on-demand network access to computing resources, often provided by an external entity and requiring some management effort. These resources include servers, disk space, networks, applications, and services. There are a number of useful cloud computing architectures and models that can be used with other technologies and design approaches. Cloud computing tops Gartner's list of the 10 most disruptive technologies of the next few years. It represents the longstanding dream of imagining computing as a service, where the principles of economies of scale help drive the cost of computing. Infrastructure effectively shut down.

Major players such as Sun Microsystems, Google, IBM, Amazon and Microsoft have started setting up new data centres to host cloud computing applications in different parts of the world to provide redundancy and consistency in the event of a site failure. Nowadays the cloud is a great solution for those looking for rapid deployment techniques. Cloud computing is a type of configurable, parallel, distributed, virtual, and flexible system that refers to the delivery of applications such as hardware and software in virtual data centres over the Internet. Cloud computing services are configurable and customers pay fees based on usage of resources and services
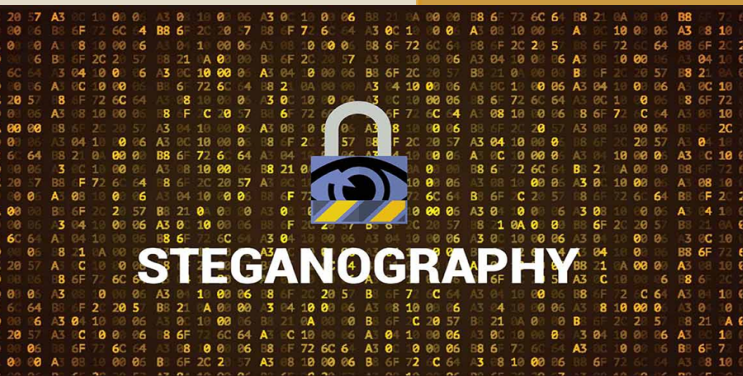
Cloud computing is defined as "a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or interaction from service providers." Cloud computing has the following five essential characteristics, according to this definition:

1) Self-service on demand

2) Access to a large network

3) Resource sharing

4) High elasticity

5) Metric service

Cloud computing is a new distributed computing paradigm that promises to provide users with cost-effective, scalable on-demand services without requiring large upfront infrastructure investments. One of the primary reasons for cloud computing's success is the role it has played in removing the size of an enterprise as a critical factor in its economic success. The concept of data centres is an excellent example of this change, as it eliminates the need for small businesses to invest heavily in infrastructure in order to create a global customer base.

STEGANOGRAPHY

Data security techniques of steganography

-Vyshakh Madhu T

S5

Steganography is the ability to transmit sensitive information by encoding it into multimedia files including images, audio, and videos. The final objective is to conceal the embedded data's very existence. Despite the fact that the name "steganography" has existed for thousands of years, its digital form just recently developed, and research was strengthened in the wake of the tragic events of September 11th, 2001(Twin towers).

Steganography and Cryptography are different in their way of data hiding but they are in fact complementary techniques

Steganalysis, as opposed to steganography, is the recognised countermeasure science used to identify and estimate the concealed information with minimum expertise in steganography algorithms. The robustness, undetectability, and amount of the buried data are the main goals of steganography.

The primary uses of steganography are allowing two people using an open communication system to secretly communicate invisibly. For secure and confidential conversations when strong cryptography is required. In other circumstances, such as in military applications, merely the fact that two people are communicating might be extremely significant. Information-hiding strategies could be highly useful for medical picture and electronic identification card systems. Current applications ofsteganography include online voting processes and online banking operations

Various Forms of Steganography

1. Text Steganography: Text files can use steganography to covertly store information. With this technique, each word's letter contains an encoded version of the concealed data.

2. Image Steganography: Image steganography is the second kind of steganography, which involves hiding data by utilising an image of an alternative item as a cover. The secret to data steganography in images is pixel intensities. Images are widely employed as a cover source in digital steganography since an image's computer description contains many bits.

3. Audio steganography- is the study of concealing information in sound. It safeguards against illegal reproduction when used digitally. Using the watermarking technique, the message is encrypted within another piece of data (the "carrier"). Media playback, primarily audio clips, is what it is typically used for.

4. Video Steganography - Using video steganography, data or other files can be covertly inserted into video files on a computer. The "carrier" in this design can be video (a compilation of still images). The discrete cosine transform (DCT), which is invisible to the naked eye, is frequently used to insert values that can be utilised to obscure the data in each image in the movie.

H.264, MP4, MPEG, and AVI are the most frequently used file formats for video steganography.

5. Network or protocol Steganography entails hiding data by utilising a network protocol as a cover object, such as TCP, UDP, ICMP, IP, etc. In the case of covert channels, which exist in the OSI layer network model, steganography can be applied.

Compared to conventional cryptographic techniques, steganography has a significant benefit. When someone employs cryptography, they are subtly drawing attention to the fact that the medium in question contains hidden information. As a result, the very existence of encrypted data signals to hackers, However, steganography conceals the private data in a document that otherwise seems innocent. As a result, potential hackers are unaware that anything mysterious and alluring even exists.

Conclusion

Steganography has been quite helpful in a variety of applications. With widespread application of its techniques, it raised the bar for information security. It would be quite helpful and give new programmers who wish to work in steganography a better platform. It is possible to design more innovative techniques by evaluating the ones already in use.
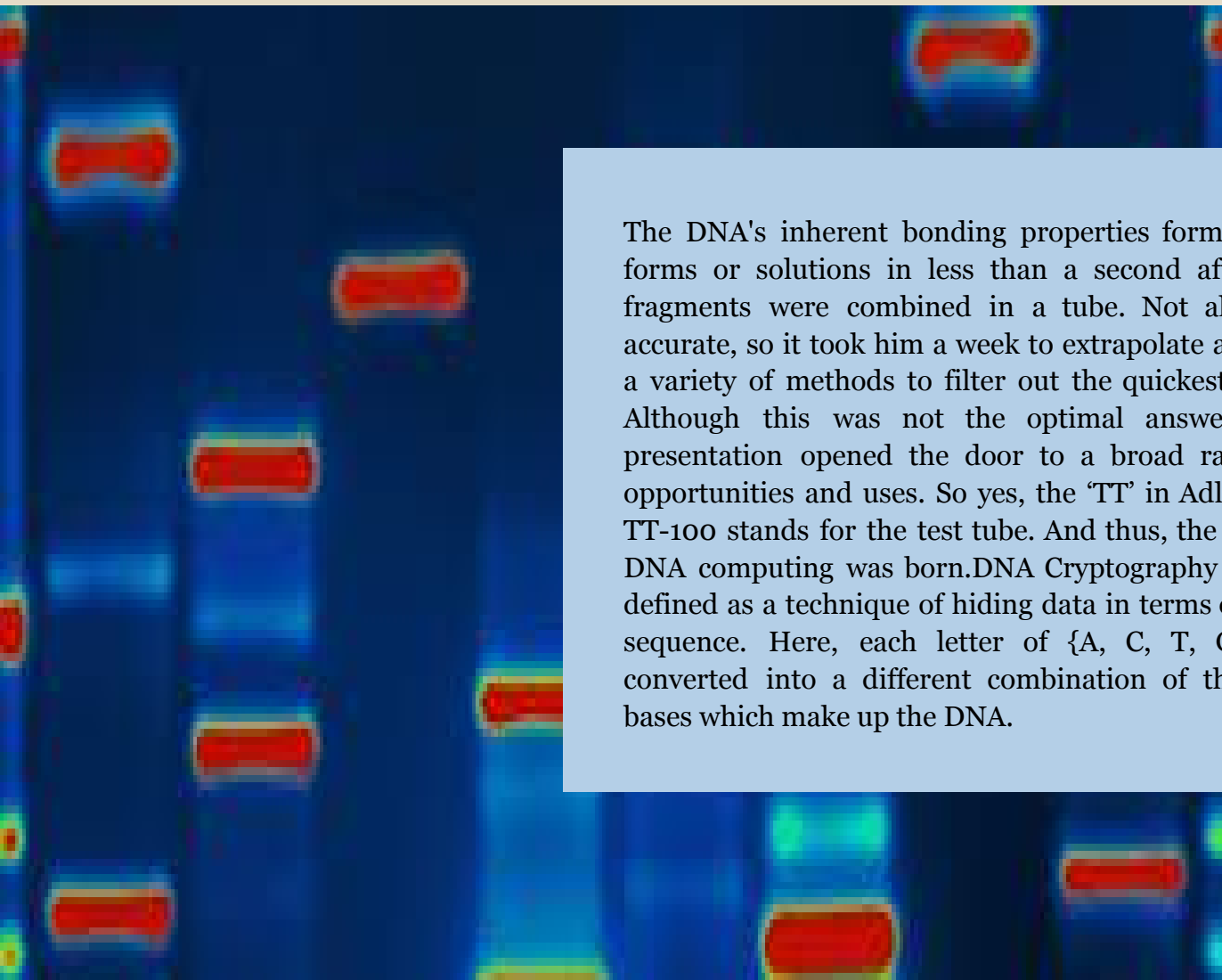
DNA Cryptography

–Josephine James

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Data is the backbone of everything we do. In recent years, digital data has evolved to include cloud storage. It is a server that hosts all types of uploaded data, including media files. Storing data without security may lead to information leaks and privacy problems. Hence, there comes a need for securing stored data and data in transit. This is where cryptography comes in. Cryptography has two components – encryption and decryption. Encryption is the process of concealing information and converting it to a 'cipher'. Decryption is the act of decoding this cipher to recover the original message. Using a 'encryption key' to encrypt the information and a 'decryption key' to decode it is the fundamental concept behind traditional cryptographic methods.

Modern cryptography uses keys of very large size. This makes it difficult for traditional computers to crack the cipher. As technology advances and quantum computers become more prevalent, data becomes more

The DNA's inherent bonding properties formed 109 forms or solutions in less than a second after the fragments were combined in a tube. Not all were accurate, so it took him a week to extrapolate and use a variety of methods to filter out the quickest route. Although this was not the optimal answer, this presentation opened the door to a broad range of opportunities and uses. So yes, the 'TT' in Adleman's TT-100 stands for the test tube. And thus, the idea of DNA computing was born.DNA Cryptography can be defined as a technique of hiding data in terms of DNA sequence. Here, each letter of {A, C, T, G} can converted into a different combination of the four bases which make up the DNA.

vulnerable. This can cause typical data encryption methods, such the RSA and AES algorithms, to become obsolete. Quantum computers might decipher the encryption in a fraction of the time it would have taken conventional computers to do so. Thus, a need for better encryption arises.One of the new methods for data security makes advantage of DNA's biological structure. This is referred to as biological computing, molecular computing, or DNA computing.Millions of linked nucleotides form the lengthy polymers that make up DNA strands. One of the four nitrogen bases, a five-carbon sugar, and a phosphate group make up these nucleotides. These constituent nucleotides of these polymers are named after the nitrogen bases they contain:

adenine (A), cytosine (C), guanine (G), and thymine (T). Mathematically, this indicates that these four characters may be used to encode data. This is more than enough, considering that an electronic computer only requires two numbers, 1 and 0, for the same function.

Although it appears brand-new, the idea is not new. Leonard Max Adleman unveiled the TT-100 model of a DNA computer in the 1990s. A seven-point Hamiltonian route problem, popularly known as the travelling salesman problem, was used to verify his experimental hypothesis. In this problem, the salesperson must determine the

quickest route between seven locations with specified distances while ensuring that he never traverses the same city twice and returns to the starting city. Adleman depicted the street linking the cities as a complimentary strand of DNA created from a single-stranded RNA, and each city as a short DNA sequence of roughly 20 bases. All the pieces could be connected with one another.

Conclusion

DNA stores a massive amount of information inside the tiny nuclei of living cells. It encodes all the instructions needed to make every living creature on earth. The shrinking and parallelism of traditional silicon-based devices are the key benefits of DNA computation. With its distinctive data structure and capacity for several simultaneous operations, DNA enables one to approach a computing issue from a fresh angle.

Adleman's experiment paved the way for the beginning of DNA computing. And one can hope that this idea will contribute to the development of uncrackable encryption algorithms which will eventually form the strongest possible data encryption in the world of cryptography.

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