



CTC(T&IT), CRPF



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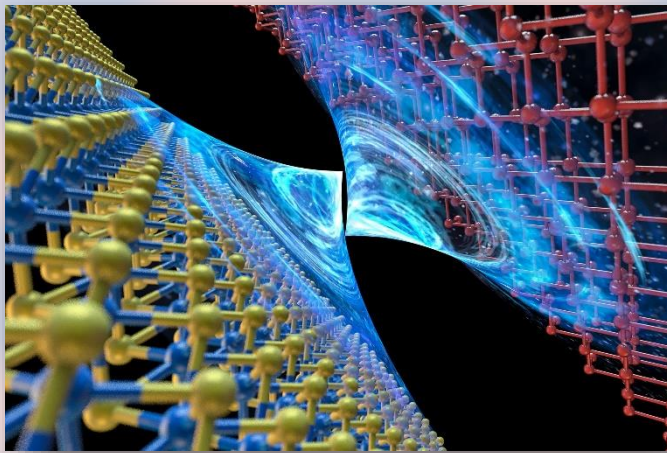
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Nanotechnology Advance Enables Tinier Transistors With Extraordinary Performance



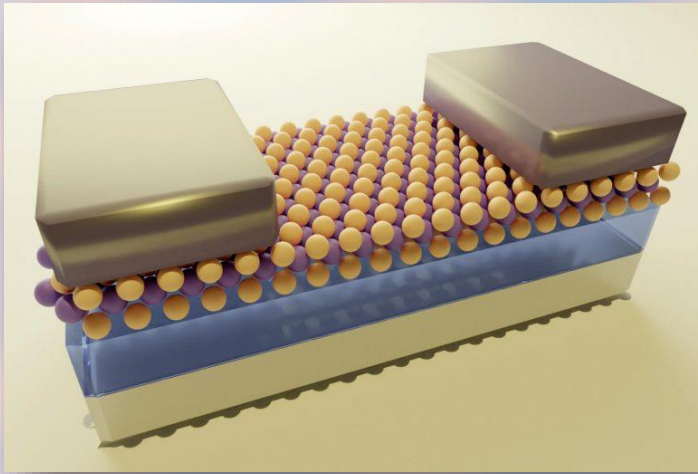
At the interface between the semimetal (bismuth) and the 2D semiconductor (MoS₂), there is no energy barrier for the electron to go through, leading to an ultralow contact resistance between them.

Atomically thin materials are a promising alternative to silicon-based transistors; now researchers can connect them more efficiently to other chip elements.

Moore's Law, the famous prediction that the number of transistors that can be packed onto a microchip will double every couple of years, has been bumping into basic physical limits. These limits could bring decades of progress to a halt, unless new approaches are found.

One new direction being explored is the use of atomically thin materials instead of silicon as the basis for new transistors, but connecting those "2D" materials to other conventional electronic components has proved difficult.

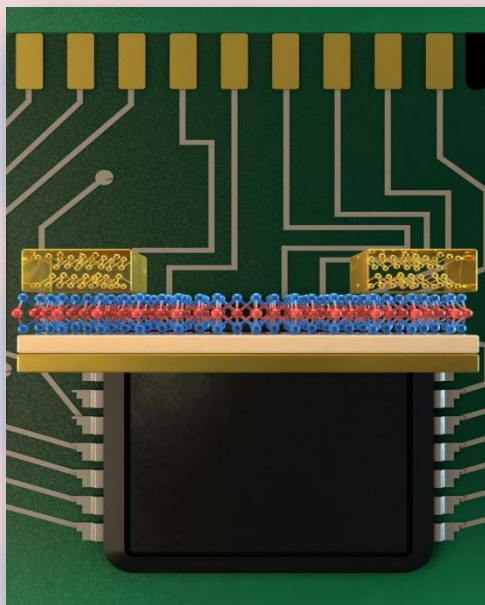
Now researchers at MIT, the University of California at Berkeley, the Taiwan Semiconductor Manufacturing Company, and elsewhere have found a new way of making those electrical connections, which could help to unleash the potential of 2D materials and further the miniaturization of components — possibly enough to extend Moore's Law, at least for the near future.



Such ultrathin monolayer materials, in this case molybdenum disulfide, are seen as a major contender for a way around the miniaturization limits now being encountered by silicon-based transistor technology. But creating an efficient, highly conductive interface between such materials and metal conductors, in order to connect them to each other and to other devices and power sources, was a challenge

holding back progress toward such solutions.

The interface between metals and semiconductor materials (including these monolayer semiconductors) produces a phenomenon called metal-induced gap state, which leads to the formation of a Schottky barrier, a phenomenon that inhibits the flow of charge carriers. The use of a semimetal, whose electronic properties fall between those of metals and semiconductors, combined with proper energy alignment between the two materials, turned out to eliminate the problem.



With this technology, miniaturized transistors with extraordinary performances are demonstrated, meeting the requirements for the technological roadmap for future transistors and microchips.

So-called two-dimensional materials, thin sheets just one or a few atoms thick, meet all the requirements for enabling a further leap in miniaturization of transistors, potentially reducing by several times a key parameter called the channel length — from around 5 to 10 nanometres, in current cutting-edge chips, to a sub nanometre scale. A variety of such materials are being widely explored, including a whole family of compounds known as transition metal dichalcogenides. The molybdenum disulfide used in the new experiments belongs to this family.

The issue of achieving a low-resistance metal contact with such materials has also been hampering basic research on the physics of these novel monolayer materials. Because existing connection methods have such high resistance, the tiny signals needed to monitor the behavior of electrons in the material are too weak to get through. “There are numerous examples coming from the physics side that call for a low-contact resistance between the metal and a semiconductor. So, it’s a huge problem in the physics world as well.

Smart Eye Technology

Smart Eye Technology is revolutionizing the way of protecting digital screens and confidential documents from prying eyes. It offers the most advanced multilevel biometric authentication process and end-to-end encryption that ensures screen privacy and user-to-user document security in one turnkey platform. With Smart Eye, sharing and viewing files and signing confidential documents has never been more secure, providing a peace of mind by vigilantly protecting their right to digital privacy and security no matter where they are.

Smart Eye Technology is the Screen Privacy and Document Security Platform. Smart Eye's multilevel biometric authentication platform blocks risky screen snooping and protects against unauthorized access to shared documents. Technology brings needed validity to e-signatures with first of its kind facial recognition and photo ID verification process



In today's work-from-anywhere culture millions of files including invoices, Intellectual Property and financial information are shared everyday through non-secure channels such as mobile devices making it more important to protect against all forms of cybercrime. Through multilevel biometric verification and continuous facial recognition, the Smart Eye platform prevents document leaks, fraud and forgery as well as visual hacking.

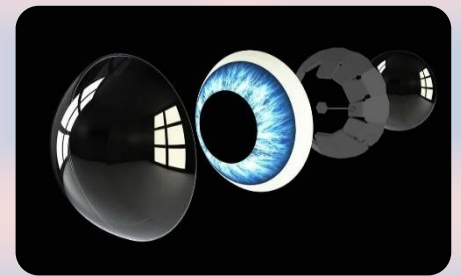


When a user views a document on their phone in the Smart Eye app and someone comes into view of the screen, a warning sign pops up blocking their view and alerts the user. When sharing documents through Smart Eye, access is authenticated through multiple levels of biometrics including;

- ✓ Fingerprint Recognition
- ✓ Voice Recognition
- ✓ Facial Recognition

The sender also has complete control over whether the document can be downloaded or shared; how long the recipient has access; and can terminate access even after the document has been sent.

Smart Eye is also bringing credibility to the e-signature. Many businesses today use e-signature platforms that lack critical verification of the signatory. Smart Eye's platform requires contracts and agreements being signed electronically to be verified by the intended signer through facial recognition and by comparing the user to a photo ID on file.



This type of technology will have a big impact on computing. This can help when developing websites or displaying information. If we look at the negative side of it, the biggest disadvantage of eye-tracking technology is that not all eyes can be tracked e.g. Contact lenses, glasses, and pupil colour can all impact the eye-tracking camera's ability to record eye movements. Another problem in this technology is that calibrating the instruments /equipment takes time which may cause the user to deviate from using the device.

When we are at a public place and have to see some confidential documents, the smart eye helps you to keep its access only to your eye. With its biometric screen protection, it blocks unauthorized users from viewing your screen with continuous facial and iris identification, moment by moment. In this platform, there is an admin panel that allows us to choose document access limits such as where they can view and how long they can access the document.

Blockchain Technology

Introduction

A blockchain is essentially a distributed database of records or public ledger of all transactions or digital events that have been executed and shared among participating parties. Each transaction in the public ledger is verified by consensus of a majority of the participants in the system. And, once entered, information can never be erased. The blockchain contains a certain and verifiable record of every single transaction ever made. To use a basic analogy, it is easy to steal a cookie from a cookie jar, kept in a secluded place than stealing the cookie from a cookie jar kept in a market place, being observed by thousands of people.



Bitcoin is the most popular example that is intrinsically tied to blockchain technology. It is also the most controversial one since it helps to enable a multibillion-dollar global market of anonymous transactions without any governmental control. Hence it has to deal with a number of regulatory issues involving national governments and financial institutions.

Current digital economy is based on the reliance on a certain trusted authority. Our all online transactions rely on trusting someone to tell us the truth—it can be an email service provider telling us that our email has been delivered; it can be a certification authority telling us that a certain digital certificate is trustworthy; or it can be a social network such as Facebook telling us that our posts regarding our life events have been shared only with our friends or it can be a bank telling us that our money has been delivered reliably to our dear ones in a remote country. The fact is that we live our life precariously in the digital world by relying on a third entity for the security and privacy of our digital assets. The fact remains that these third-party sources can be hacked, manipulated or compromised.

This is where the blockchain technology comes handy. It has the potential to revolutionize the digital world by enabling a distributed consensus where each and every online transaction, past and present, involving digital assets can be verified at any time in the future. It does this without compromising the privacy of the digital assets and parties involved. The distributed consensus and anonymity are two important characteristics of blockchain technology.

The advantages of Blockchain technology outweigh the regulatory issues and technical challenges. One key emerging use case of blockchain technology involves “smart contracts”. Smart contracts are basically computer programs that can automatically execute the terms of a contract. When a pre-configured condition in a smart contract among participating entities is met then the parties involved in a contractual agreement can be automatically made payments as per the contract in a transparent manner.

Smart Property is another related concept which is regarding controlling the ownership of a property or asset via blockchain using Smart Contracts. The property can be physical such

as car, house, smartphone etc. or it can be non-physical such as shares of a company. It should be noted here that even Bitcoin is not really a currency--Bitcoin is all about controlling the ownership of money

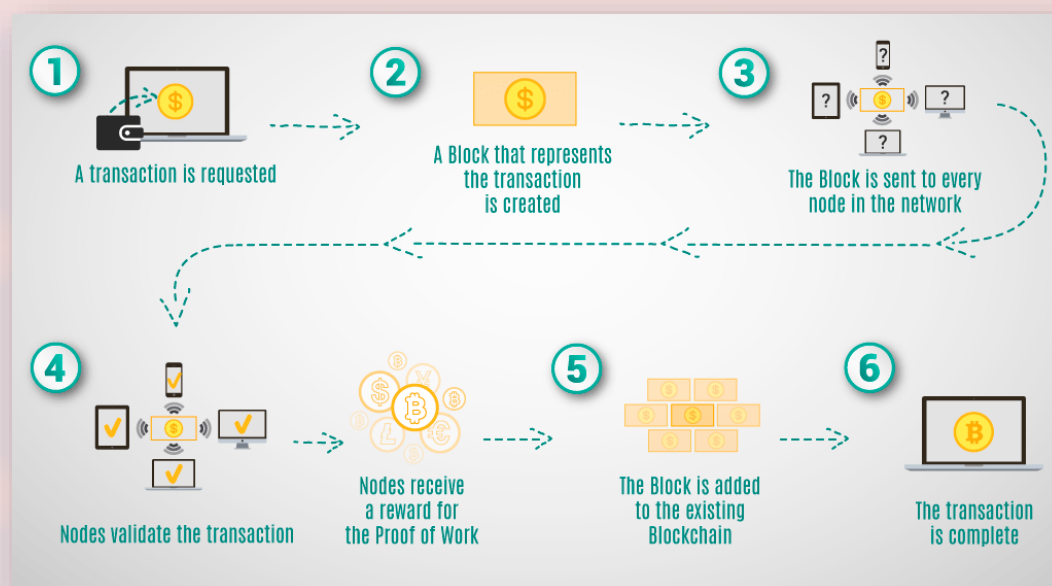
Blockchain technology is finding applications in wide range of areas—both financial and non-financial.



Financial institutions and banks no longer see blockchain technology as threat to traditional business models. The world's biggest banks are in fact looking for opportunities in this area by doing research on innovative blockchain applications.

Non-Financial applications opportunities are also endless. We can envision putting proof of existence of all legal documents, health records, and loyalty payments in the music industry, notary, private securities and marriage licenses in the blockchain. By storing the fingerprint of the digital asset instead of storing the digital asset itself, the anonymity or privacy objective can be achieved.

How does it work?



We explain the concept of the blockchain by explaining how Bitcoin works since it is intrinsically linked to the Bitcoin. However, the blockchain technology is applicable to any digital asset transaction exchanged online.

Internet commerce is exclusively tied to the financial institutions serving as the trusted third party who process and mediate any electronic transaction. The role of trusted third party is to validate, safeguard and preserve transactions. A certain percentage of fraud is unavoidable in online transactions and that needs mediation by financial transactions. This results in high transaction costs.

Bitcoin uses cryptographic proof instead of the trust in the third party for two willing parties to execute an online transaction over the Internet. Each transaction is protected through a digital signature. Each transaction is sent to the “public key” of the receiver digitally signed using the “private key” of the sender. In order to spend money, owner of the cryptocurrency needs to prove the ownership of the “private key”. The entity receiving the digital currency verifies the digital signature—thus ownership of corresponding “private key”—on the transaction using the “public key” of the sender.

Each transaction is broadcast to every node in the Bitcoin network and is then recorded in a public ledger after verification. Every single transaction needs to be verified for validity

before it is recorded in the public ledger. Verifying node needs to ensure two things before recording any transaction: 1. Spender owns the cryptocurrency—digital signature verification on the transaction. 2. Spender has sufficient cryptocurrency in his/her account: checking every transaction against spender’s account (“public key”) in the ledger to make sure that he/she has sufficient balance in his/her account.

However, there is question of maintaining the order of these transactions that are broadcast to every other node in the Bitcoin peer-to-peer network. The transactions do not come in order in which they are generated and hence there is need for a system to make sure that double-spending of the cryptocurrency does not occur. Considering that the transactions are passed node by node through the Bitcoin network, there is no guarantee that orders in which they are received at a node are the same order in which these transactions were generated.

This means that there is need to develop a mechanism so that the entire Bitcoin network can agree regarding the order of transactions, which is a daunting task in a distributed system.

The Bitcoin solved this problem by a mechanism that is now popularly known as Blockchain technology. The Bitcoin system orders transactions by placing them in groups called blocks and then linking these blocks through what is called Blockchain. The transactions in one block are considered to have happened at the same time. These blocks are linked to each-other (like a chain) in a proper linear, chronological order with every block containing the hash of the previous block.

There still remains one problem. Any node in the network can collect unconfirmed transactions and create a block and then broadcasts it to rest of the network as a suggestion as to which block should be the next one in the blockchain. How does the network decide which block should be next in the blockchain? There can be multiple blocks created by different nodes at the same time. One can’t rely on the order since blocks can arrive at different orders at different points in the network.

Bitcoin solves this problem by introducing a mathematical puzzle: each block will be accepted in the blockchain provided it contains an answer to a very special mathematical problem. This is also known as “proof of work”—node generating a block needs to prove that it has put enough computing resources to solve a mathematical puzzle. For instance, a node can be required to find a “nonce” which when hashed with transactions and hash of previous block produces a hash with certain number of leading zeros. The average effort required is exponential in the number of zero bits required but verification process is very simple and can be done by executing a single hash.

Applications Of Blockchain Technology In Various Industries

Blockchain technology can be utilized in multiple industries including Financial Services, Healthcare, Government, Travel and Hospitality, Retail and CPG.

Financial Services: In the financial services sector, Blockchain technology has already been implemented in many innovative ways. Blockchain technology simplifies and streamlines

the entire process associated with asset management and payments by providing an automated trade lifecycle where all participants would have access to the exact same data about a transaction. This removes the need for brokers or intermediaries and ensures transparency and effective management of transactional data.

Healthcare: Blockchain can play a key role in the healthcare sector by increasing the privacy, security and interoperability of the healthcare data. It holds the potential to address many interoperability challenges in the sector and enable secure sharing of healthcare data among the various entities and people involved in the process. It eliminates the interference of a third-party and also avoids the overhead costs. With



Blockchains, the healthcare records can be stored in distributed data bases by encrypting it and implementing digital signatures to ensure privacy and authenticity.

Government: Blockchain technology holds the power to transform Government's operations and services. It can play a key role in improving the data transactional challenges in the Government sector, which works in siloes currently. The proper linking and sharing of data with Blockchain enable better management of data between multiple departments. It improves the transparency and provides a better way to monitor and audit the transactions.

CPG and Retail: There is a huge opportunity for Blockchain technology to be applied in the retail sector . This includes everything from ensuring the authenticity of high value goods, preventing, fraudulent transactions, locating stolen items, enabling virtual warranties, managing loyalty points and streamlining supply chain operations.

Travel and Hospitality: The application of Blockchain can radically change the travel and hospitality industry . It can be applied in money transactions, storing important documents like passports/ other identification cards, reservations and managing travel insurance, loyalty and rewards.

Key Challenges of using Blockchain Technology

the lack of awareness and understanding of the Blockchain concept and how it works are the key challenges of using Blockchains in industries other than financial services sector. The challenges associated with existing legacy infrastructure in organizations and lack of proper technical understanding are major hurdles to the adoption of Blockchain in the mainstream. Adopting Blockchain also require a cultural shift from the traditional ways of doing things, as it involves a major shift by decentralizing the whole process. Complying with the existing regulations and ensuring the required data privacy and security for the shared data bases also adds to the major roadblocks in adopting Blockchain. The global business world is yet to explore the intricacies of the Blockchain concept to its fullest. However, we believe that with the ongoing researches and explorations happening in this space, the business world will soon realize the massive potential of this technology and it will drive a new wave of decentralized applications.

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Automation

What Does Automation Mean?

Automation is the creation and application of technologies to produce and deliver goods and services with minimal human intervention. The implementation of automation technologies, techniques and processes improve the efficiency, reliability, and/or speed of many tasks that were previously performed by humans.

Automation is being used in a number of areas such as manufacturing, transport, utilities, defense, facilities, operations and lately, information technology.

Usually, automation is employed to minimize labor or to substitute humans in the most menial or repetitive tasks. Automation is present in virtually all verticals and niches, although it's more prevalent in manufacturing, utilities, transportation, and security.

For example, most manufacturing plants make use of some automated process in the form of robotic assembly lines. Human input is required only to define the processes and supervise them, while the assembling of the various components is left to the machines, which automatically convert raw materials into finished goods.

In the technology domain, the impact of automation is increasing rapidly, both in the software/hardware and machine layer. The implementation of new artificial intelligence (AI) and machine learning (ML) technologies is currently skyrocketing the evolution of this field.

In the information technology domain, a software script can test a software product and produce a report. There are also various software tools available in the market which can generate code for an application. The users only need to configure the tool and define the process.

Advanced business intelligence in applications is another new form of high-quality automation. In other industries, automation has greatly improved productivity in the last decades.

From the simplest to the most complex application, automation is present in many forms in our everyday life. Common examples include household thermostats controlling boilers, the earliest automatic telephone switchboards, electronic navigation systems, or the most advanced algorithms behind self-driving cars.

Automation makes sure the techniques are used effectively in the delivery of products and services. However, it inherently causes many workers to become unnecessary (especially unskilled ones) and end up being displaced.

Automation will certainly have substantial negative effects on employment and wages for all those occupations that do not require particular training or skills. However, many of these employees could be easily retrained in new jobs, and the impact of this technology on our society is revolutionary enough to create new opportunities for everyone.

According to the World Bank's World Development Report 2019, the positive economic effects in terms of new industries and jobs available far outweigh the negative ones, but automation-based technological unemployment still is a cause for concern. Despite advances in automation, some manual intervention is always advised, even if the tool can perform most of the tasks. Automation professionals involved in the creation, application, and monitoring of such technologies are in high demand.

Internet of Behaviors (IoB)

The collection and use of data to drive behaviors is called the ***Internet of Behaviors (IoB)***. An example of it is industrial sites having employed computer vision to determine if employees were complying with mask protocol and then collecting this behavioral data to be analyzed by the organizations to influence people to follow government protocols at work.

IoB can gather, combine and process data from many sources including:

- Citizen data processed by public-sector
- Commercial customer data
- Government agencies
- Social media
- Public domain
- Location tracking.



The increasing sophistication of the technology that processes this data has enabled this trend to grow.

Companies investing in IoB: AWS, Cisco, SAP, Microsoft, HP, IBM, Dell, Cloudera

(frequently questioned answers)

1. What is an internet address?

An Internet Protocol address (IP address) is a numerical label assigned to each device connected to a computer network that uses the Internet Protocol for communication. An IP address serves two main functions: host or network interface identification and location addressing.

2. What are the domain name types?

Top-Level Domain (TLD) refers to the suffix or the last part of a domain name. There's a limited list of predefined suffixes which includes:

- .com – commercial business (the most common TLD)
- .org – organizations (typically, non-profit)
- .gov – government agencies
- .edu – educational institutions
- .net – network organizations
- .mil – military

3. Example for IP Versions?

IP addresses are binary numbers, but they are usually stored in text files and displayed in human-readable notations, such as:-

- 172.16.254.1 (for IPv4)
- 2001:db8:0:1234:0:567:8:1 (for IPv6)

4. When internet started?

In 1969, the Department of Defense (DOD) of United States started a network called ARPAnet (Advance Research Project Administration network). It began in a modest way with one computer in California & three in Utah, to share software & hardware resources.

The Gateway Internet Access Service (GIAS) was launched on August 15, 1995 in Bombay (now Mumbai), Delhi, Calcutta (now Kolkata) and Madras (now Chennai). The initial launch of Internet services in India was with a rate of Rs 25,000 for a 250 hour TCP/IP account for commercial organisations at 9.6 kbps speed.

5. How e-mail works?

Email systems consist of computer servers that process and store messages on behalf of users who connect to the email infrastructure via an email client or web interface.

When someone sends an email, the message is transferred from his or her computer to the server associated with the recipient's address, usually via a number of other servers.

- A user sends an email message and connects to an SMTP (Simple Mail Transfer Protocol) server as configured in her email client or Mail User Agent (MUA).
- On the SMTP server, a Mail Transfer Agent (MTA) looks at the recipient address and looks up the domain part of the address to determine its destination.
- After querying a Domain Name System (DNS) server for the name of the Mail eXchanger (MX) for the recipient's domain name...
- ...the SMTP server will send the message to that server via the SMTP protocol.
- The receiving server will store the message and make it available to the recipient, who can access it via web, POP, or IMAP.

Abbreviation

EVR	-	Electro Video Recording
IEEE	-	Institute of Electronics and Electrical Engineers
ARPANET	-	Advanced Research Project Agency Network
CAD	-	Computer Aided Design
DNA	-	Digital Network Architecture
EBCDIC -		Extended Binary Coded Decimal Interchange Code
IDN	-	Integrated Digital Networks
MIPS	-	Millions of Instructions Per Second

Quiz

- 01) Virtual currency Bitcoin is based on -
- 1) Block Chain Technology
 - 2) Internet of Things
 - 3) Artificial Intelligence
 - 4) 3-D Printing
- 02) Which of the following is the first calculating device?
- A. Abacus
 - B. Calculator
 - C. Turing Machine
 - D. Pascaline
- 03) The third generation of cellular telephony can provide both, the voice communication and..
- A. frames
 - B. videos
 - C. digital packets
 - D. digital data
- 04) Modern Bluetooth is the implementation of protocol, defined by
- A. frames
 - B. stations
 - C. signals
 - D. cellular
- 05) In cellular telephony, every base station continuously broadcasts signals using its
- A. pilot plan
 - B. pilot system
 - C. pilot frame
 - D. pilot channel
- 06) ICT stands for :
- A. Inter connected Terminals
 - B. Intera Common Terminology
 - C. International Communication Technology
 - D .Information and Communication Technology

07) In the hypermedia database, information bits are stored in the form of:

- A. Cubes
- B. Nodes
- C. Signals
- D. Symbols

08) The concept of connect intelligence is derived from:

- A. fuzzy logic
- B. virtual reality
- C. value added networks
- D. Bluetooth technology

09) Which of the following is the appropriate format of URL of e-mail?

- A. www.mail.com
- B. www_mail.com
- C. www@mail.com
- D. WWW@mail.com

10) On the keyboard of computer each character has an "ASCII" value which stands for:

- A. Adaptable Standard Code for Information Change
- B. American Stock Code for Information Interchange
- C. African Standard Code for Information Interchange
- D. American Standard Code for Information Interchange

Acknowledgement

We are highly thankful for reading out this compilation and hope it will be use full for you in our day today professional and personal life .We would like to hear your interest areas, suggestions from you to make this newsletter more informative and interesting. Your views will definitely help us to create this newsletter as an effective medium to reach you with latest development in the fields of communication and technology.



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