

Unit 7

RECENT TRENDS IN TECHNOLOGY

Artificial Intelligence

- Artificial Intelligence (AI) is an area of computer science that emphasizes the creation of intelligent machines that work and react like human beings.
- It is study and design of intelligent agents
- Intelligent agents is a system which recognizes its environment and takes actions that maximize its chance of success.
- Primary focus of AI is on speech recognition, machine learning, planning, problem solving and many other knowledge-based areas.

Artificial Intelligence

- "It is field of computer science and linguistics that studies computer system which can recognize and react to human language either spoken or written is called Artificial Intelligence" - John McCarthy
- Researches are still going on but some examples we have
- Siri: AI based personal assistant by Apple Inc.
- IBM Watson: AI based naturally spoken question answering
- Sophia: Humanoid Robot

Applications of AI

- **Game Playing**

- AI plays very important roles in playing games so that we can play with computer which think and decide itself like human player. It makes the game more exciting and livelier. Eg. Chess,

- **Speech Recognition**

- AI is very useful in speech recognition so that we can give data and instruction to computer through speech (word).

- **Natural Language Processing (NLP)**

- AI helps the computer to understand our natural language like English, Nepali etc. so that we can communicate with computer like human being

Applications of AI

- **Computer Vision**

- AI can be used to improve the vision of the real world object on computer so that we can view it in 3-Dimension.

- **Expert System (ES)**

- It is software which collects the knowledge and decision making roles of the specialists in a particular field and is used to analyze and decide.
Eg. MYCIN

- **Robotics**

- It is the branch of engineering that deals with creation and training of Robots. AI is used to enhance the performance of robotic work.

Applications of AI

- **Transportation**

- Self driving cars are the examples of application of AI in transportation. AI collects data from vehicle's radar, camera, GPS and produces control signals that operate the vehicle. AI in autopilot is capable of handling takeoff and landing automatically without involvement of pilot.

- **Marketing**

- AI helps to create individualized display ads that website visitors want to see. AI is enabling shoppers to discover associated products whether it is size, color, shape or brand

Applications of AI

- **Cyber Security**

- AI can be used to detect vulnerabilities or abnormal user behavior in business applications

- **Smart Homes**

- Various devices like smart locks, smart switches are increasingly becoming compatible with various devices and application of smart home is becoming more accessible.

- **Communication**

- ChatBots are becoming very popular nowadays for communication with various devices. These devices are used as virtual assistance. Siri, Cortana, Alexa, Google assistant are some popular chatbots. These devices use speech recognition system to perform task on human command.

Robotics

- Robotics is a branch of engineering that is concerned with the creation and training of robots.
- Robotics has wide range of fields such as mechanical, electrical engineering, cybernetics, AI etc.
- Robotics is the engineering science and technology of robots, their design, manufacture, application and structural disposition.
- Robotics is related to electronics, mechanics and software.

Robotics

- The electro-mechanical digital devices process and store the information which is directed by software.
- The mechanical parts generate a frameset and shape for the robot
- Software creates the robots efficient for the execution of jobs for which it is designed.



Robotics

- **Advantages**

- They can work 24*7
- They can increase productivity efficiency and quality of products
- They can work in hazardous environments
- They are much more accurate than humans
- They can do repetitive task all the time
- They do not need any environmental comfort

- **Disadvantages**

- It is expensive to build and buy robots
- It requires frequent maintenance for running
- People can lose their jobs due to automatic robots in the factories
- It requires more power supply all the time
- It may injure humans
- It cannot respond correctly in emergencies.

Robotics

- **Applications of Robotics**
 - It is broadly used in industry where humans are at high risk
 - It is used for accuracy
 - It is used for vehicle and car factory automation
 - Surgeons prefer robotic assistance surgery
 - They are used for disable people
 - Broadly used in space, Bomb diffusion, mine detection, military operation
 - It can be used in agriculture
 - Also used in playing

Cloud Computing

- Cloud computing refers to manipulating, configuring and accessing the hardware and software resources remotely.
- It offers online data storage, infrastructure and application.
- It is general term for anything that involves delivering hosted services over the internet
- There are 3 categories of services

Cloud Computing

- Services of Cloud Computing
 1. Infrastructure as a Service (IaaS)
 2. Platform as a Service (PaaS)
 3. Software as a Service (SaaS)

Some Service providers

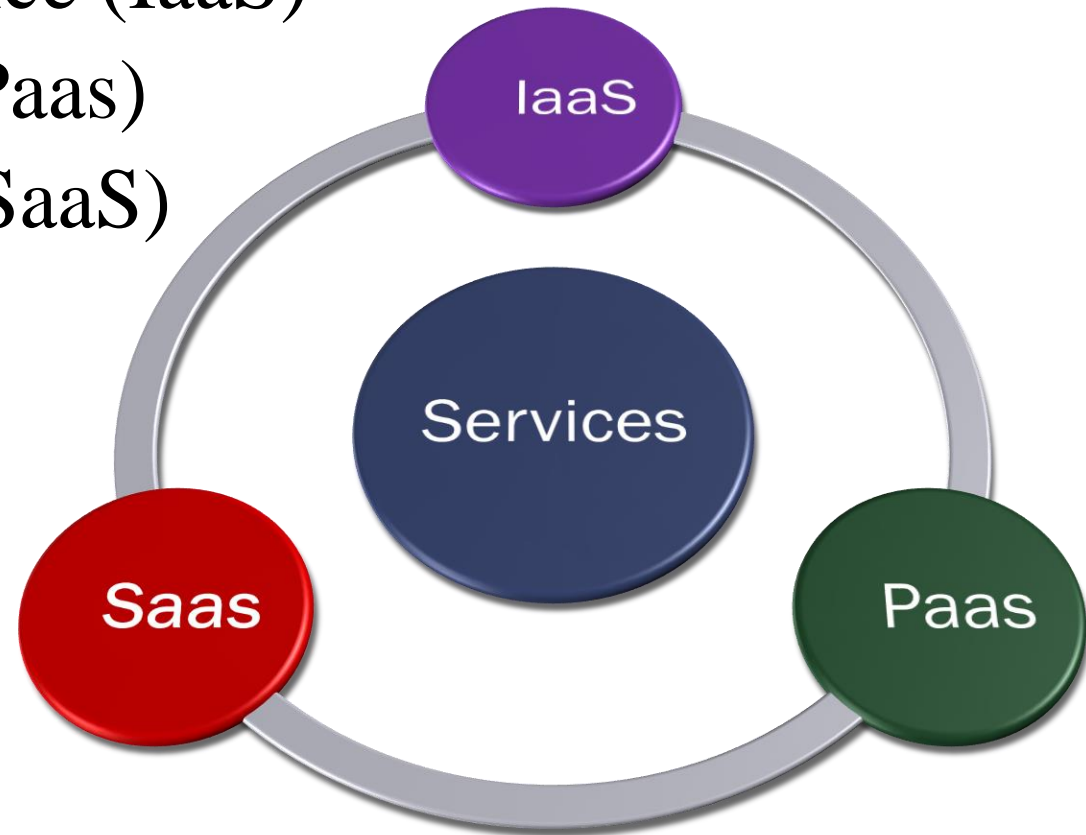
Google cloud

Amazon Web Service (AWS_

Microsoft Azure

IBM Cloud

Alibaba Cloud



Cloud Computing

Benefits of using cloud computing

- cost saving
- increased productivity
- speed and efficiency
- performance and security

Examples: Email, Storage, backup, creating and testing app, analyzing data, audio video streaming, delivering software on demand etc.

Cloud Computing

Components of Cloud Computing

1. Clients

- These are devices that are used by clients and system such as desktops, laptops, mobile phones etc. There are 3 types of clients (Mobile clients, Thin Clients, Thick Clients)

2. Data Center

- It is servers or collection of servers, housing the application and data. These are operated by service providers.

3. Distributed Server

- These are servers we access through the cloud remotely around the world. Servers has more flexibility and increased security.

Big Data

- It is combination of structured, semi structured and unstructured data collected by organizations that can be mined for information and used in machine learning projects, predictive modeling and other advanced analytics applications
- System that process and store big data have become a common component of data management architecture in organization

Big Data

- Big data is often characterized by 3V's
 1. Large **Volume** of data in many environments
 2. Wide **Variety** of data types stored in big data systems
 3. **Velocity** at which the data is generated, collected and processed

Big Data

- Big data is a new tool for data analysis and visualization
- It is useful for business organization to help those gaining deeper insights of customers' habits and behaviors.
- There are many applications of big data in variety of areas ranging from consumers to supply chain operations and companies.

Virtual Reality

- A simulated 3D environment that a user can experience and manipulate as if they were real.
- User sees the environment on display screen, with mounted special pairs of goggles.
- Special input devices such as gloves, suits and other devices fitted with motion sensors that detect user actions.
- Most of VR offers visual experiences but some may include additional sensory information such as sound through speakers, movement of surroundings and lightening effects

Virtual Reality

Advantages of VR

1. Military application for testing, implementing and training
2. Medical field for practitioner purposes
3. Broadly used in flight training and gaming applications
4. Used in computer aided manufacturing with simulation
5. Used in Motion pictures
6. Also implemented in radio, fine art, music and fictions.

E-Commerce

- E-commerce is the buying and selling of products and services over an electronic network such as internet.
- Transmitting of funds or data over network is also called Electronic Commerce.
- E-commerce can be generally classified as:
 - Business-to-Business (B2B)
 - Business-to-Consumer (B2C)
 - Consumer-to-Business (C2B)
 - Consumer-to-Consumer (C2C)

E-Commerce

Business-to-Business (B2B)

- In this model, a business sells its product or services to another business through the use of electronic media.
- B2B transactions generally have a longer sales cycle, higher order value and more recurring purchase.
- Examples: Alibaba.com, transactions between banks, etc

E-Commerce

Business-to-Consumer (B2C)

- It is the most common business model
- A business sells its product or services to customers through electronic media
- B2C transactions generally have shorter sales cycle.
- It is emerging because of new technologies like mobile apps, online advertisements through which they can directly approach their customer.
- Example: Daraz online shopping, Pizzahut, Webhosting etc

E-Commerce

Consumer-to-Business (C2B)

- Customer to Business is a reversed pattern of business to consumer.
- C2B business allows individual to sell goods and services to companies.
- Examples: Freelancing sites, Data entry jobs etc.

E-Commerce

Consumer-to-Consumer (C2C)

- C2C is a business model that takes care of the commerce transactions among separate individuals or customers.
- It is easy to use because anyone from the general public can sign up and start trading products.
- Example: OLX.com, Hamrobazzar.com, facebook marketplace etc.

E-commerce

Advantages of E-commerce

- Availability: Buying and selling is available 24x7
- Speed of access: Products can be accessed from anywhere
- Wide Availability: variety of products and services
- Easy accessibility: Easy to start and manage business
- International reach: Go beyond the local market
- Lower cost: Low operation cost
- Personalized and product recommendation
- Better quality of services
- Reduced paper work

E-commerce

Disadvantages of E-commerce

- Limited customer service
- Customers can't touch, feel or see the physical product before purchase.
- Customers have to wait for product delivery
- There can be lack of security. i.e. Digital fraud, spams
- Hackers can hack the payment system and account information
- Customers can't try before they purchase products
- Anyone good or bad can easily start business

E-Medicine

- E-medicine is the use of information and communication technology to provide, enhance or speed up health care services by accessing linking clinics or physician offices to central hospitals.
- It is helpful to treat patient situated at remote region through internet.
- The process includes transmitting all the diagnostic documents including X-ray, prescription, images of examination and other documents to another site

E-Medicine

- E-medicine can be as simple as two health professionals discussing about case over telephone and can be as complex as using satellite technology, video conferencing equipment or real time medical procedures to conduct medical operation by sitting in distinct geographical regions.

E-medicine

Advantages of E-medicine

- Medication on remote area becomes possible, where access of qualified professionals is not available.
- If equipment available, knowledge sharing at one common point is possible by using e-medicine.
- This facility will be available at home if there is internet facility.
- It saves time and reducing medicine errors.

E-government

- It is the use of information and communication technologies to transform the traditional government by making it easily accessible, transparent, effective and accountable to the general people.
- It is network of organizations to include government, non-profit organization and private sector bodies to transform all the services in the electronic form.
- Political, social, economic and technological factors of the nation determine e-governance and establishes relationship between government and citizens.

E-government

- Government services are made available online.
- It will increase accountability and reduces the possibility of corruption.
- It is the process of transforming government from manual system to electronic digital system.
- It is one stop portal such as www.nepal.gov.np where citizens have access to variety of information and services.

E-government

Advantages of e-government

- It is easy to access data and information
- It become one portal for delivering government services
- It broadly handles Government-to-Government (G2G), Government-to-Business (G2B), Government-to-Citizen (G2C) data and information services.
- The government services will be made available to the citizens in a convenient, efficient and transparent manner.
- There will be no territory boundaries, not even bounded by geographical regions.

Mobile Computing

- Mobile computing is a technology that allows transmission of data, voice and video through a computer or any other wireless enabled device without having to be connected to a fixed physical link.
- Wireless devices such as laptops, palmtops, PDAs, cell phones, pagers are mobile computing devices
- It enables us to connect with other at any time from any geographical location.

Mobile Computing

Advantages of Mobile Computing

Flexibility – Mobile computing allows you to work from anywhere, at any time, giving you the flexibility to get things done when and where it's convenient for you.

Connectivity – Mobile computing keeps you connected to the Internet, allowing you to access information, stay in touch with others, and collaborate with colleagues and classmates.

Efficiency – Mobile computing helps you be more efficient, allowing you to complete tasks quickly and easily while on the go.

Productivity – Mobile computing can increase productivity, as you can take care of important tasks and responsibilities while away from your desk.

Innovation – Mobile computing is constantly advancing and evolving, providing new and innovative ways to stay connected and get things done.

Mobile Computing

Disadvantages of Mobile Computing

Dependence – Mobile computing can lead to a dependence on technology, making it difficult to disconnect and enjoy life without constant digital distraction.

Battery Life – Mobile devices have limited battery life, requiring frequent recharging and causing inconvenience and disruption.

Security Concerns – Mobile devices can be vulnerable to cyberattacks and data theft, putting personal information and sensitive data at risk.

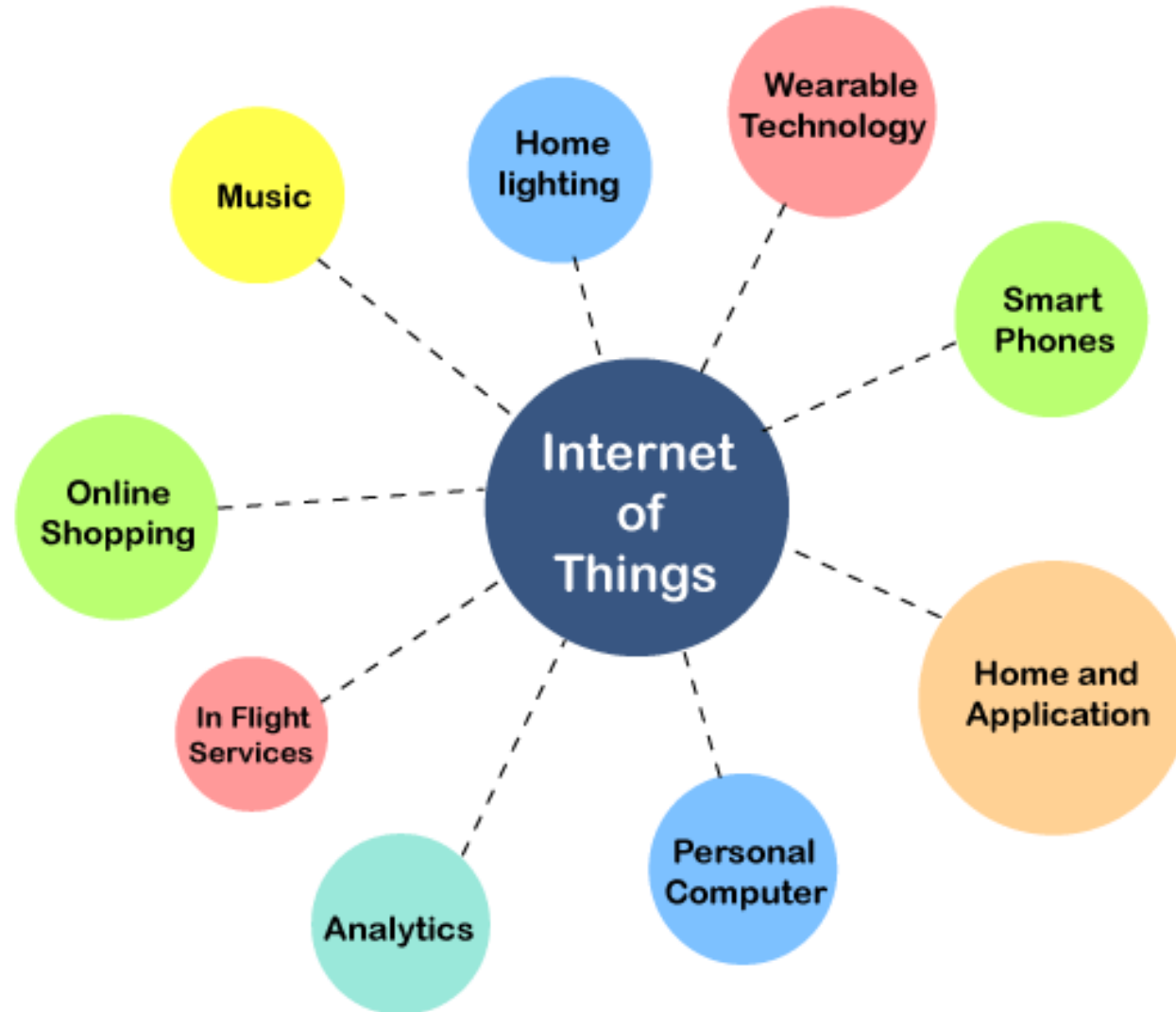
Cost – Mobile computing can be expensive, with high costs for devices, data plans, and accessories.

Physical Damage – Mobile devices are small and fragile, making them susceptible to physical damage from drops, spills, and other accidents.

Internet of Things (IoT)

- Internet of Things (IoT) describes the network of physical objects - things that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet.
- The Internet of Things (IoT) is a network of interconnected, embedded devices that can capture and transmit data without the need for human interaction over a wireless network.
- IoT applications in everyday life include smart wearables, smart health monitoring, traffic monitoring, IoT in agriculture with many sensors, smart devices, robots in hospitals, smart grid and water supply, and so on.

Internet of Things (IoT)



Internet of Things (IoT)

Technologies made IoT possible

- Access to low-cost, low-power sensor, affordable & reliable technology
- Easy Connectivity of sensors to the cloud and other things
- Increase in availability of Cloud computing platforms to business & consumer
- Advanced Machine learning and analytics technology
- Advancement in Conversational Artificial Intelligence and neural networks enhanced Natural Language Processing (NLP) to IoT devices.

Internet of Things (IoT)

Applications of IoT

1. Smart Homes

If we look at our homes, we can find IoT. The IoT is also used to record TV shows. Now, we can purchase smart televisions and record the shows we wish to watch according to our schedule.

2. Smart City

The IoT helps manage traffic control, hydraulic and thermal power, dumping material, and other manual work. It helps in managing vehicles through IoT.

Internet of Things (IoT)

Applications of IoT

3. Self-driven Vehicles

With the invention of smartphones, we can quickly book cabs. The public can easily book their transport and reach their destination without wasting time

4. Online Shopping

Online shopping has become the preferable IoT over smartphones. we can quickly go grocery shopping for clothes and everyday used things online. IoT has set specific devices which aid online shopping through android and iOS phones.

Internet of Things (IoT)

Applications of IoT

5. Health

IoT has set particular devices like beds in hospitals and unique types of sensors attached to our bodies that can monitor our blood sugar continuously. These devices help measure blood pressure, and an oximeter regulates our body temperature.

6. Agriculture

IoT has obtained a level in agriculture as well. The application of the Internet of things gives us perfect data regarding information for growing crops well. It gives us information regarding the type of soil needed, appropriate temperature, and water required for the proper growth of the crop.

Internet of Things (IoT)

Applications of IoT

7. Traffic Management

We can also use IoT applications for traffic management. We all must have used Google Maps or other location-centric software someday. These applications predict the traffic while reaching the source to the destination.

8. Energy Saving

Different types of sensors are being equipped in the devices to save electric and water energy. It prevents useless waste by establishing a dual communication system between the energy power user and the supplier. These devices also help in monitoring energy consumption regularly.

Internet of Things (IoT)

Applications of IoT

9. Wearables

The Internet of Things has introduced sensors and devices with artificial machinery that help operate virtual glasses, calorie burner meters, and GPS tracking belts. It has established Apple phones which can be connected to our watches, heartbeats, and fitness bands. Google, Samsung, and Apple have introduced IoT applications that are helpful in daily life.

10. Pollution Control

With the help of IoT, we can collect data from a particular area and inform the concerned authority and the government well in advance to take steps to control pollution.

Internet of Things (IoT)

Challenges of IoT Implementation

1. Connectivity

Variety of wired and wireless standards are required to enable different application needs.

2. Power

Many IoT applications need to run for years over battery and reduce the overall energy consumption

3. Security & Safety

Protecting user's privacy, manufacturer's IP and blocking malicious activity is more difficult

Internet of Things (IoT)

Challenges of IoT Implementation

4. Reliability and Stability

Reliability and stability of sensors must be high

5. Data Storage

Storage of data and information for a long period of time without any damage is important

6. Complexity

IoT application development is very complex and need experts

Thank You

END OF UNIT 7