CACS 201: Computer Fundamentals and Applications

PREPARED BY KRISHNA PD. ACHARYA
ASST. PROFESSOR

(MECHI MULTIPLE CAMPUS)

Contemporary Technologies 10 **Hrs**

- Multimedia
- Hypermedia
- E-Commerce
- E-Governance
- E-Learning
- E-Banking
- GIS(Geographical Information System)
- VR(virtual reality)
- AG(augmented Reality)
- AI(Artificial Intelligence)
- Ambient intelligence
- Robotics
- Bitcoins

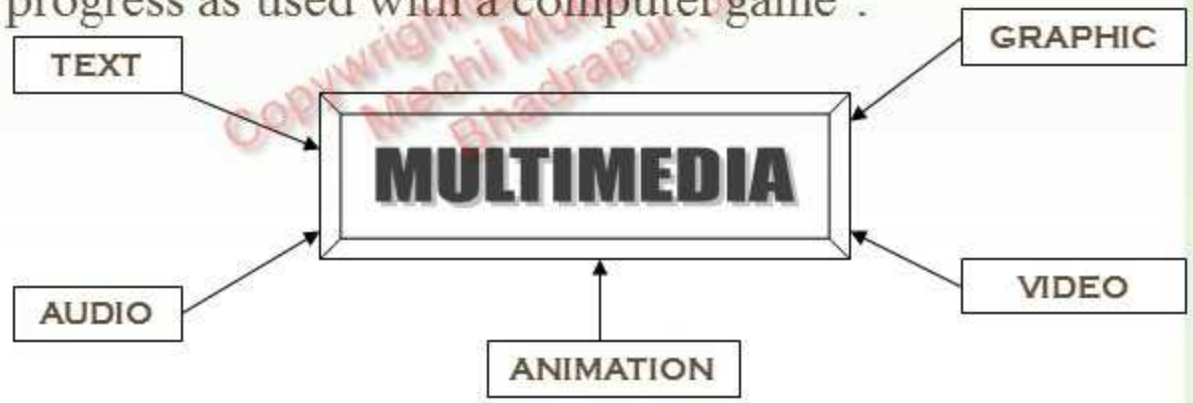
Multimedia

- In a generic sense, multimedia is simply the use of more than one media elements. which includes elements such as text, graphics, sound, animation and video.
- Multimedia is a combination of text, graphic, sound, animation, video and interactivity content forms that is delivered interactively to the user by electronic or digitally manipulated means.
- A fundamental feature of most Web based multimedia is interactivity, which provide user some control over the content.

LINEAR AND NONLINEAR MULTIMEDIA

- Linear active content progresses without any navigational control for the viewer.
- Cinema presentation is an example of linear multimedia.
- Non-linear content offers user interactivity to control progress as used with a computer game .
- Hypermedia is an example of non-linear multimedia.

- Application of Multimedia



Multimedia

- In 1970s the term was used to describe presentations multi-projector slide shows timed to an audio track.
- In 1990s „multimedia „ took on its current meaning.
- Computers marketed in 1990s were referred to as "MULTIMEDIA COMPUTERS" because they contained a CD-ROM drive.
- The term "MULTIMEDIA" was first used by BOB GOLDSTEIN in July 1996 to promote opening of his light works.
- TAY VAUGHAN declared "Multimedia as combination of text, graphic, art, sound, animation, and video that is delivered by computer.

Elements of multimedia:

- **Text** : Text is the most widely used and flexible means of presenting information on paper, display unit or in multimedia for conveying ideas and thoughts. Text represented in computer system usually represented to the ASCII standards. The text may include characters, letters, numbers and other special symbols. For Example : captions on the movie ,web pages etc.
- **Graphics or images**: An image, figure, picture or drawing can be represented as graphics. Graphics represented still images and defined as static representation. It gives better and clear idea on the particular topic. For Example : Charts, Pictures in presentation etc.
- **Audio**: It is one of the important components of multimedia. It is music, speech or any other sound. The audio medium is normally combined with animation medium. When the animation is presented with audio, the information becomes clear. For Example audio on movies.
- **Video**: It is the effective medium for presenting information. The video medium presents the moving images of real events. It is used for generate visual environment during presentation. For Example: Videogame, Movies etc.

Multimedia

- Animation:

Animation is the rapid display of a sequence of images of 2-D or 3-D artwork or model positions in order to create an illusion of movement. The animation medium presents the sequence of still images of artwork at a rapid speed that looks like the image is moving. Cartoon movies such as Tom and Jerry, Pokemon etc are examples of animated movies. It is also used for education purposes.

- Interactivity

Interactivity can be termed as the dialog that occurs between an individual and a computer program. Interactive multimedia refers to the multimedia applications that allow users to actively participate rather

than being passive recipients of information

ADVANTAGES

- Multimedia enhances the effect of text presentations.
- Improves the quality of presentation and retains the attention of audience.
- It can be used for educational as well as entertainment purpose.
- It is quick and easier to operate for the instructor.
- Multimedia presentations can be modified very easily.
- Multimedia is Entertaining as Well as Educational.

Disadvantages

- Non-interactive – if one-way, no feedback.
- Complex to create.
- Time consuming.
- Use of multimedia is expensive

Hypermedia

- Hypermedia is a computer-based information retrieval system that enables a user to gain or provide access to texts, audio, and video recordings, photographs, and computer graphics related to a particular subject.
- Hypermedia refers to those used in hypertext, but instead of simply linking text to text, hypermedia involves liking various media, such as sound, imagen, animation and/or video. For example, a word or picture might have a link to a sound file giving its pronunciation.
- Hypermedia is anything that allows the user to gather information in a nonlinear way. This means that the user has a choice as to what path he or she takes in order to gather information. The user has the option of skipping certain items or can go through every piece of information that is listed
- Examples
  - Links that view audio
  - Links that view images
  - Links that view videos
  - Hypertext links to other locations
- The World Wide Web (WWW) is the best example of hypermedia applications Through WWW it is possible to deliver hypertext, graphics, animation and sound between different computer environments .

E-commerce

- **E-commerce:** It is a process of buying and selling or exchanging products, services and information using electronic media. In other words, e-commerce is one of the most important aspects of the internet, which allows people to exchange goods and services immediately and with no barriers of time or distance.
- **E-business**: refers to a broader definition of EC, not just the buying and selling of goods and services, but also servicing customers, collaborating with business partners, conducting e-learning, and conducting electronic transactions within an organization.

There are different types of E-commerce:

- **Business to Business E-commerce (B 2 B):** This type refers to a company selling or buying from other companies electronically. **Example** https://bolpatra.gov.np/egp/ is a b2b web application to make procurement between two organization in Nepal.
- **Business to customer E-commerce (B 2 C):** In this type, the company establishes a website on the internet and put information about products and services, allow customer to order these from website and also provide customer support services. Example.Amazon.com is general merchandise that sells consumer products to retail consumers.
- **Consumer-to-Consumer E-commerce (C2C) :** It provides a way for consumers to sell to each other, with the help of an online market maker such as the auction site eBay. eBay.com creates a market space where consumers can auction or sell goods directly to other consumers.
- **Business to Government:** B2G model is a variant of B2B model. Such websites are used by government to trade and exchange information with various business organizations. Such websites are accredited by the government and provide a medium to businesses to submit application forms to the government.

E-commerce

Advantages.

- Using E-Commerce, organization can expand their market to national and international markets with minimum capital investment. An organization can easily locate more customers, best suppliers and suitable business partners across the globe.
- E-Commerce helps organization to reduce the cost to create process, distribute, retrieve and manage the paper based information by digitizing the information.
- E-commerce improves the brand image of the company.
- E-commerce helps organization to provide better customer services.
- E-Commerce helps to simplify the business processes and make them faster and efficient.
- E-Commerce reduces paper work a lot.
- E-Commerce increased the productivity of the organization. It supports "pull" type supply management. In "pull" type supply management, a business process starts when a request comes from a customer and it uses just-in-time manufacturing way.
- 24x7 support. Customer can do transactions for the product or enquiry about any product/services provided by a company any time, any where from any location. Here 24x7 refers to 24 hours of each seven days of a week.
- E-Commerce application provides user more options and quicker delivery of products.
- E-Commerce application provides user more options to compare and select the cheaper and better option.

E-commerce

Disadvantages.

- There can be lack of system security, reliability or standards owing to poor implementation of e-Commerce.
- Software development industry is still evolving and keeps changing rapidly.
- In many countries, network bandwidth might cause an issue as there is insufficient telecommunication bandwidth available.
- Special types of web server or other software might be required by the vendor setting the e-commerce environment apart from network servers.
- Sometimes, it becomes difficult to integrate E-Commerce software or website with the existing application or databases.
- There could be software/hardware compatibility issue as some E-Commerce software may be incompatible with some operating system or any other component

E-governance

- **E-governance:** It is the use of information and communication technology (ICT) to enhance the access and delivery of government services to benefit citizens, business partners and employees. It transforms the traditional government using ICT to make it clear, effective and accountable. E-governance is more than just a government website on the internet. It establishes a relationship between government accessible online, promoting citizen participation by enabling citizens to interact more conveniently with government.
  - **Importance/advantages of E-Governance**
    Speed – Technology makes communication speedier. Internet, Phones, Cell Phones have reduced the time taken in normal communication.
  - **Cost Reduction** – Most of the Government expenditure is appropriated towards the cost of stationary. Paper-based communication needs lots of stationary, printers, computers, etc. which calls for continuous heavy expenditure. Internet and Phones makes communication cheaper saving valuable money for the Government.
  - **Transparency** – Use of ICT makes governing profess transparent. All the information of the Government would be made available on the internet. The citizens can see the information whenever they want to see.
  - **Accountability** – Once the governing process is made transparent the Government is automatically made accountable. Accountability is answerability of the Government to the people. It is the answerability for the deeds of the Government. An accountable Government is a responsible Government.

Disadvantages of E-Governance:

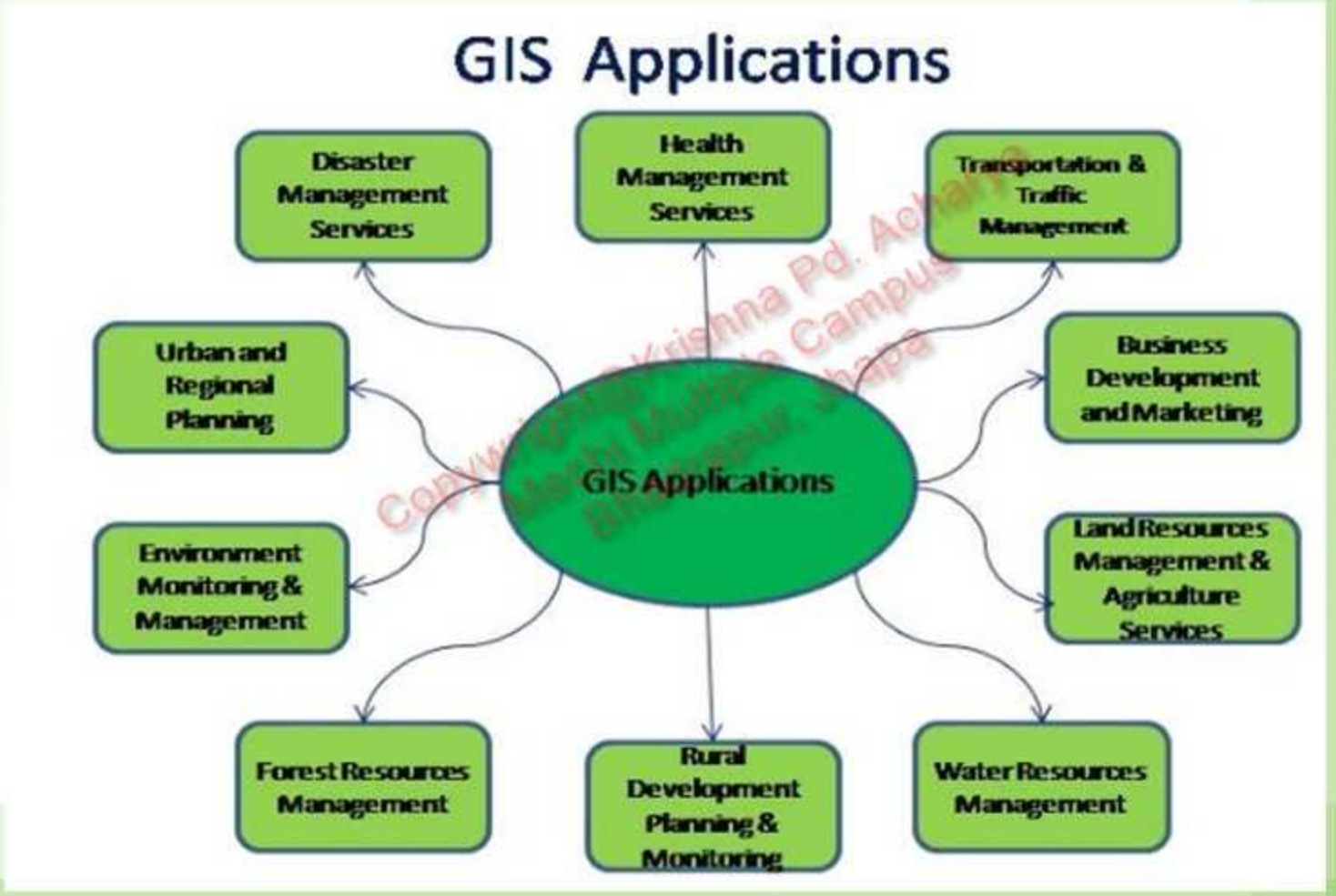
The main disadvantage of an electronic government is to move the government services into an electronic based system. This system loses the person to person which is valued by a lot of people.

E-learning

E-learning: It applies to a learning about a topic with the help of information and communication technology .it allows us to learn anywhere and usually at any time, as well as we have a properly configured computer, networks, devices etc. E-learning can be CD-ROM based, Network based or internet based.

Benefits of E-learning:

- It is very flexible.
- It is cost saving.
- Travel expenses are reduced.
- Content can be updated quickly
- Interactive online session.



GIS(Geographical information System)

- "GIS is a computer system capable of assembling, storing, manipulating, and displaying geographically referenced information, i.e. data identified according to their locations."
- "A GIS is an organized collection of computer hardware, software, geographic data, and personnel to efficiently capture, store, update, manipulate, analyze, and display all forms of geographically referenced information."
- A system for capturing, storing, checking, integrating, manipulating, analyzing and displaying data which are spatially referenced to the Earth. This is normally considered to involve a spatially referenced computer database and appropriate applications software.

Components

- **Hardware:** Computer System, Scanner, Printer, Plotter, Flat Board Software
- **GIS software:** in use are MapInfo, ARC/Info, AutoCAD Map, etc. The software available can be said to be application specific.
- **Data:** A GIS will integrate spatial data with other data resources and can even use a DBMS, used by most organization to maintain their data, to manage spatial data. Geographic data and related tabular data can be collected in-house or purchased from a commercial data provider.
- **People:** GIS users range from technical specialists who design and maintain.
- **Method:** The map creation can either be automated raster to vector creator or it can be manually victories using the scanned images.

Functions

- **Data Capture:** The input of data into a GIS can be achieved through many different methods of gathering. For example, aerial photography, scanning, digitizing, GPS or global positioning system is just a few of the ways a GIS user could obtain data.
- **Data Storage:** Some data is stored such as a map in a drawer, while others, such as digital data, can be as a hardcopy, stored on CD or on your hard drive.
- **Data Manipulation:** The digital geographical data can be edited, this allows for many attribute to be added, edited, or deleted to the specification of the project.
- **Query And Analysis:** GIS was used widely in decision making process for the new commission districts. We use population data to help establish an equal representation of population to area for each district.
- **Visualization**: This represents the ability to display your data, your maps, and information.

Advantages

- GIS allows us to view, understand, and visualize data in many ways that reveal relationships, patterns, and trends in the form of maps, globes, reports, and charts.
- A GIS helps you answer questions and solve problems by looking at your data in a way that is quickly understood and easily shared.
- GIS give the accurate Data. Better Predictions and Analysis.

Disadvantages

- Excessive damage in case of internal fault.
- Long outage periods as Repair of damaged part at site may be difficult.
- Expensive software. Integration with traditional map is difficult.

E-Banking

- The provision of retail and small value banking products and services through electronic channel , such products and services can include deposit taking , lending , account management , the provision of financial advice , electronic bill payment products and services such as electronic money.
- The electronic banking provides wide variety of products and services to the customers, some of them are
  - Automated Teller Machine
  - Mobile Banking
  - Phone Banking
  - Internet Banking
  - Electronic Fund Transfer
  - Debit card
  - Credit card etc.,

Advantages

- The e-banking provides wide variety of opportunity or benefits to bank itself and also provide more facilities and services to customers. It increases the organizational efficiency, easier expansion, cost reduction, attracting high value of customer and e-marketing.
- Lower cost for accessing and using the bank service
- It save the time and increase comfortability
- Transaction can be made at 24 hours without going bank
- Quick and continues access to information
- Globalization of trade in rural areas are also possible
- Growth in customer number and people use more banking service
- Better management of cash diffusion is possible
- The rural society has benefited from the development of e-finance

Disadvantages

- Comparing to urban people or urban area the usage of net banking facility is low in rural areas. The main reason for low usage of e-banking in rural area are as follows: Psychological challenges.
- Operational challenges
- Security challenges
- Lack of education
- Lack of adequate infrastructural facilities
- Lack of awareness about e-banking and internet
- Lack of knowledge about information technology
- Fear to perform bank transactions on machine
- Economically backward situation.

AI(artificial intelligence)

- AI is the study of how to make the computers think and perform. The ability of computer to understand natural language ,speak command, capacity to see surrounding and have thinking power, is called AI.
- AI (artificial intelligence) is the simulation of human intelligence processes by machines, especially computer systems. These processes include learning (the acquisition of information and rules for using the information), reasoning (using the rules to reach approximate or definite conclusions) and self-correction.
- Particular applications of AI include expert systems, speech recognition and machine vision.

Application areas of AI:

- **Voice recognition**: The computer with voice recognition accepts data or instruction by having commands spoken into the computer microphone.
- **Natural language processing**: It is the ability of the computer to understand and translate natural language.
- **Logic and inference**: AI is used to make deductions and then to draw inferences(guess).
- **Search**:
  - Finding an object within a collection of objects.
  - Finding a preferred answer or best answer to a problem.

AI(artificial intelligence)

- **Robotics**: It is the area of study dealing with the design, construction and operation off robots. A robot is a machine that can be reprogrammed to carry out a complex task. Robots are used for dangerous jobs, such as dangerous jobs, such as bomb disposal, ocean exploration ,outer-space probes, cleanup of a chemical or nuclear accident etc.
- Robotics is a branch of engineering that involves the conception, design, manufacture, and operation of robots. This field overlaps with electronics, computer science, artificial intelligence, mechatronics, nanotechnology and bioengineering.
- Applications: Outer Space Application, Military Applications, Intelligent, Home Applications, Industry, Health Service etc.

Ambient intelligence (Aml)

- Refers to electronic environments that are sensitive and responsive to the presence of people. Ambient intelligence is a vision on the future of consumer electronics, telecommunications and computing that was originally developed in the late 1990s by Eli Zelkha and his team at Palo Alto.
- In an ambient intelligence world, devices work in concert to support people in carrying out their everyday life activities, tasks and rituals in an easy, natural way using information and intelligence.
- Ambient Intelligence is the artificial intelligence which is totally humancentric. simplest example is the door that opens when it senses your presence.

VR(Virtual Reality and Augment Reality)

- Virtual reality (VR) is a computer-generated scenario that simulates experience through senses and perception. The immersive environment can be similar to the real world or it can be fantastical, creating an experience not possible in ordinary physical reality.
- It is most commonly used in entertainment applications such as gaming and 3D cinema. Consumer virtual reality headsets were first released by video game companies in the early-mid 1990's.
- Beginning in the 2010's, next-generation commercial tethered headsets were released by Oculus, the HTC Vive and PlayStation VR, setting off a new wave of application development.
- 3D cinema has been used for sporting events, pornography, fine art, music videos and short films. Since 2015, virtual reality has been installed onto a number of roller coasters and theme parks.

Augmented Reality(AG)

- A combination of a real scene viewed by a user and a virtual scene generated by a computer that augments the scene with additional information.
- An AR system adds virtual computer-generated objects, audio and other sense enhancements to a real-world environment in real time.
- Augmented Reality is a field of Electronics which deals with combination of reality with the computer generated data.

Augmented Reality(AG)

- A combination of a real scene viewed by a user and a virtual scene generated by a computer that augments the scene with additional information.
- An AR system adds virtual computer-generated objects, audio and other sense enhancements to a real-world environment in real time.
- Augmented Reality is a field of Electronics which deals with combination of reality with the computer generated data.
- Augmented Reality(AR) is a combination of three factors .These are : 1.Real and virtual world. 2.Interaction in the real time. 3.3D world.

APPLICATIONS:

- EDUCATION: Augmented reality applications can complement a standard curriculum. Text, graphics, video and audio can be superimposed into a student's real time environment.
- MILITARY: Augmented reality displays could also highlight troop movements, and provide hidden place for them in the nearby surrounding.
- Sports and Entertainment: AR has become common in sports telecasting. Sports and entertainment venues are provided with see-through and overlay augmentation through tracked camera.
- Medical Augmented Reality can provide the surgeon with information, which are otherwise hidden, such as showing the heartbeat rate, the blood pressure, the state of the patient's organ, etc. as an X-ray with another such as video.

Bitcoin

- **Bitcoin** is a cryptocurrency and worldwide payment system. It is the first decentralized digital currency, as the system works without a central bank or single administrator. The system was designed to work as a peer-to-peer network, a network in which transactions take place between users directly, without an intermediary.
- These transactions are verified by network nodes through the use of cryptography and recorded in a public distributed ledger called a blockchain. Bitcoin was invented by an unknown person or group of people under the name Satoshi Nakamoto[and released as open-source software in 2009.

Bitcoin Mining

- People compete to "mine" bitcoins using computers to solve complex math puzzles. This is how bitcoins are created. Currently, a winner is rewarded with 12.5 bitcoins.

Why Bitcoins?

- Bitcoins can be used to buy merchandise anonymously. In addition, international payments are easy and cheap because bitcoins are not tied to any country or subject to regulation. Small businesses may like them because there are no credit card fees. Some people just buy bitcoins as an investment, hoping that they'll go up in value.

Advantage of Bitcoin

Freedom in Payment

- With Bitcoin it is very possible to be able to send and get money anywhere in the world at any given time.
- You don't have to worry about crossing borders, rescheduling for bank holidays, or any other limitations one might think will occur when transferring money.
- You are in control of your money with Bitcoin. There is no central authority figure in the Bitcoin network.

Bitcoin Advantages

Control and Security

- Allowing users to be in control of their transactions help keep Bitcoin safe for the network.
- Merchants cannot charge extra fees on anything without being noticed. They must talk with the consumer before adding any charges.
- Payments in Bitcoin can be made and finalized without one's personal information being tied to the transactions.
- Due to the fact that personal information is kept hidden from prying eyes, Bitcoin protects against identity theft.
- Bitcoin can be backed up and encrypted to ensure the safety of your money.

Information is Transparent

- With the block chain, all finalized transactions are available for everyone to see, however personal information is hidden.
- Your public address is what is visible; however, your personal information is not tied to this.
- Anyone at anytime can verify transactions in the Bitcoin block chain.
- Bitcoin protocol cannot be manipulated by any person, organization, or government. This is due to Bitcoin being cryptographically secure.

Very Low Fees

- Currently there are either no fees, or very low fees within Bitcoin payments.
- With transactions, users might include fees in order to process the transactions faster. The higher the fee, the more priority it gets within the network and the quicker it gets processed.
- Digital Currency exchanges help merchant process transactions by converting bitcoins into fiat currency. These services generally have lower fees than credit cards and PayPal.

Bitcoin Advantages

Fewer Risks for Merchants

- Due to the fact that Bitcoin transactions cannot be reversed, do not carry with them personal information, and are secure, merchants are protected from potential losses that might occur from fraud.
- With Bitcoin, merchants are able to do business where crime rates and fraud rates may be high. This is because it is very hard to cheat or con anyone in Bitcoin due to the public ledger, otherwise known as the block chain.

Disadvantages of bitcoin

Risk and Volatility

- Bitcoin has volatility mainly due to the fact that there is a limited amount of coins and the demand for them increases by each passing day.
- However, it is expected that the volatility will decrease as more time goes on.
- As more businesses, medias, and trading centers begin to accept Bitcoin, its' price will eventually settle down.
- Currently, Bitcoin's price bounces everyday mainly due to current events that are related to digital currencies.

Bitcoin

Lack of Awareness & Understanding

- Fact is many people are still unaware of digital currencies and Bitcoin.
- People need to be educated about Bitcoin to be able to apply it to their lives.
- Networking is a must to spread the word on Bitcoin.
- Businesses are accepting bitcoins because of the advantages, but the list is relatively small compared to physical currencies.
- Companies like TigerDirect and Overstock accepting Bitcoin as payment is great. However, if they do not have a knowledgeable staff that understands digital currencies, how will they help customers understand and use Bitcoin for transactions?
- The workers need to be educated on Bitcoin so that they can help the customers. This will definitely take some time and effort. Otherwise, what is the benefit of such large companies accepting Bitcoin if its staff doesn't even know what digital currencies are?

Still Developing

- Bitcoin is still at its infancy stage with incomplete features that are in development.
- To make the digital currency more secure and accessible, new features, tools, and services are currently being developed.
- Bitcoin has some growth to do before it comes to its full and final potential.
- This is because Bitcoin is just starting out, and it needs to work out its problems just like how any currency in its beginning stage would need to.

Assignment

- Explain multimedia and its components.
- Define e-Commerce and explain opportunities using created by e-Commerce.
- Define e-Learning and Learning Management System.
- Explain e-Governance services.
- Define e-Banking. Explain opportunities and challenges in e-Banking.
- Discuss on Hypermedia.
- Define GIS. Explain its applications.
- Differentiate between virtual and augmented reality.
- Define AI. Explain Components of AI.
- Define Robotics. Explain the role of AI in Robotics.
- Define Bitcoin. List the advantages and disadvantages of Bitcoin.