

UNIT 7

Contemporary Technologies

(13 Hours) — Computer Fundamentals and Applications

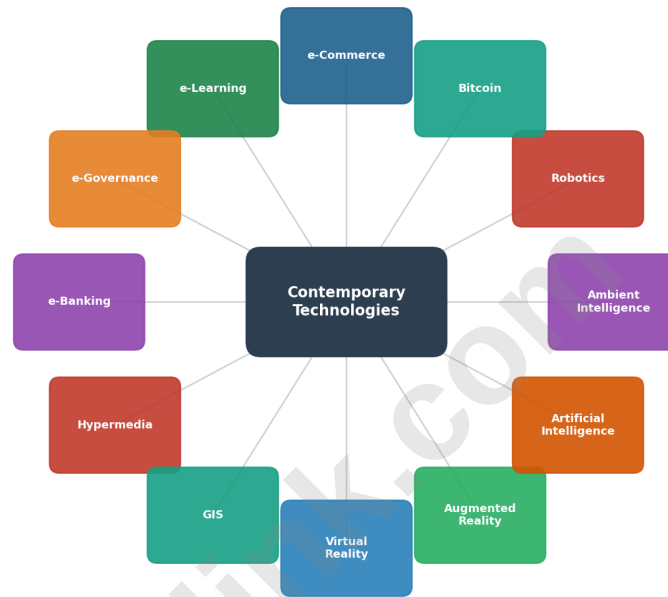


Figure 7.0 — Overview of the contemporary technologies covered in this unit.

7.1 Multimedia

Multimedia refers to the combined use of multiple forms of content — text, graphics, audio, video, and animation — delivered together through a computer to inform or entertain the user. Unlike a single medium such as plain text, multimedia engages several senses at once, making information more engaging and easier to understand.

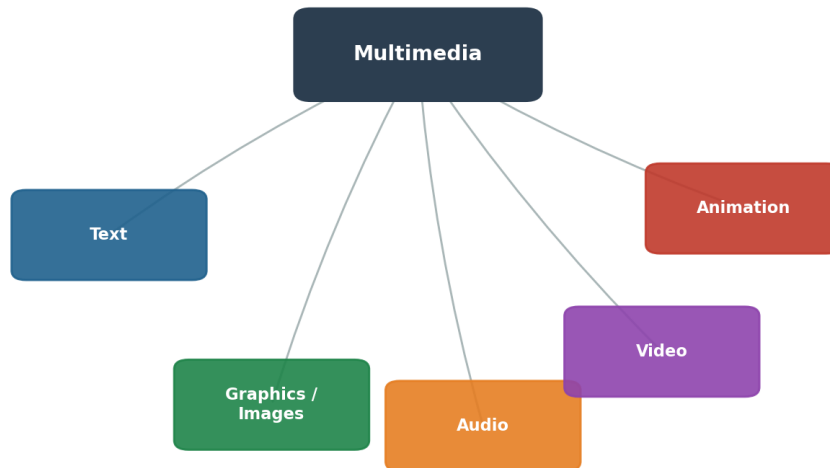


Figure 7.1 — The core elements of multimedia.

Multimedia applications are described as either linear (played back in a fixed sequence, like a movie) or interactive/non-linear (where the user controls navigation, such as in a video game or an interactive tutorial). Common uses include e-learning materials, presentations, advertising, entertainment, and training simulations.

7.2 e-Commerce

Electronic commerce (e-commerce) refers to the buying and selling of goods and services, or the transfer of funds and data, over electronic networks — chiefly the Internet. It replaces or supplements the physical storefront with an online marketplace.

Model	Description	Example
B2C — Business to Consumer	A business sells directly to individual customers	Online retail store
B2B — Business to Business	Transactions between two businesses	Wholesale supply ordering
C2C — Consumer to Consumer	Individuals sell directly to other individuals	Online marketplace listings
C2B — Consumer to Business	Individuals offer goods or services to businesses	Freelance marketplace

Example 7.1 — e-Commerce in Practice

A customer browses an online store, adds items to a cart, pays through a digital payment gateway, and receives a confirmation email — all without visiting a physical shop. Behind the scenes, this involves a web storefront, a payment system, and inventory/order-management software working together.

7.3 e-Learning

Electronic learning (e-learning) is the delivery of educational content and training through digital technologies, typically over the Internet. It ranges from simple recorded video lectures to fully interactive courses on Learning Management Systems (LMS), often including quizzes, discussion forums, and progress tracking.

- Synchronous e-learning — live, real-time classes or webinars where learners and instructors interact simultaneously.
- Asynchronous e-learning — self-paced content such as recorded videos or reading material, accessed whenever convenient.

Note: e-Learning removes geographic barriers to education but requires reliable Internet access and self-discipline from learners.

7.4 e-Governance

Electronic governance (e-governance) is the use of information and communication technology (ICT) by government bodies to deliver public services, share information, and interact with citizens and businesses more efficiently and transparently.

Interaction Type	Example
G2C — Government to Citizen	Online tax filing, applying for a passport or ID card
G2B — Government to Business	Online business registration, e-tendering
G2G — Government to Government	Inter-departmental data sharing and coordination

7.5 e-Banking

Electronic banking (e-banking) allows customers to perform financial transactions — checking balances, transferring funds, paying bills — remotely through a website or mobile app, instead of visiting a physical bank branch. Security is central to e-banking, relying on authentication (passwords, OTPs, biometrics) and encryption to protect sensitive financial data.

Illustration — A Typical e-Banking Transaction

A customer logs into their bank's mobile app using a password and a one-time PIN sent via SMS, selects 'Transfer Funds', enters the recipient's account details and amount, and confirms the transaction — all completed within a minute, without visiting a branch.

7.6 Hypermedia

Hypermedia extends the concept of hypertext (text linked to other text) by incorporating graphics, audio, video, and animation into a non-linear network of linked content. Rather than reading top to bottom, users navigate by following links in whichever order interests them. The World Wide Web itself is the most familiar large-scale example of hypermedia, where clicking a link on a page can jump to text, images, or video hosted anywhere on the Web.

7.7 Geographical Information System (GIS)

A Geographical Information System (GIS) is a computer-based system for capturing, storing, analyzing, and displaying data that is tied to a specific location on Earth. It layers different types of spatial data — such as roads, elevation, population density, or land use — on top of a map, allowing patterns and relationships to be visualized and analyzed.

GIS is widely used in urban planning, disaster management, agriculture, navigation systems (e.g., Google Maps), and environmental monitoring, helping decision-makers understand where events happen and how location affects outcomes.

7.8 Virtual Reality (VR)

Virtual Reality creates a fully computer-generated environment that immerses the user, replacing their perception of the real world. Using a headset (and often hand controllers), the system tracks the user's head and body movements and updates the simulated view in real time, creating a convincing sense of 'being there'.

Applications include gaming and entertainment, flight and surgical simulation for training, virtual tours of real estate or museums, and therapy for phobias or anxiety disorders through controlled, simulated exposure.

7.9 Augmented Reality (AR)

Augmented Reality overlays computer-generated content — images, information, or 3D objects — onto the user's view of the real world, rather than replacing it entirely. AR is commonly experienced through a smartphone camera or specialized glasses.

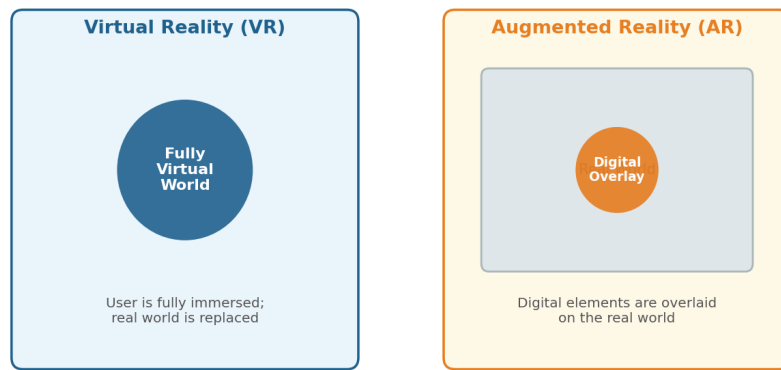


Figure 7.2 — Virtual Reality replaces the real world; Augmented Reality overlays it.

Aspect	Virtual Reality	Augmented Reality
Environment	Fully simulated, replaces reality	Real world enhanced with digital overlays
Hardware	VR headset (immersive)	Smartphone, tablet, or AR glasses
Example Use	Flight simulators, VR gaming	Navigation overlays, furniture preview apps

7.10 Artificial Intelligence (AI)

Artificial Intelligence is the branch of computer science concerned with building systems that can perform tasks which normally require human intelligence — such as understanding language, recognizing images, making decisions, and learning from experience.

- Machine Learning — systems that improve their performance on a task by learning patterns from data, rather than following fixed rules.
- Natural Language Processing — enables computers to understand and generate human language, as in chatbots and translation tools.
- Computer Vision — enables computers to interpret and analyze visual information, as in facial recognition or self-driving cars.
- Expert Systems — encode human expert knowledge as rules to support decision-making in a specific domain, such as medical diagnosis.

Note: AI is often categorized as Narrow AI, which performs a specific task (e.g., voice assistants), versus the still-hypothetical General AI, which would match human-level intelligence across any task.

7.11 Ambient Intelligence (AmI)

Ambient Intelligence describes environments — homes, offices, or public spaces — that are embedded with sensors and computing devices that sense the presence and needs of people and respond automatically, often invisibly, to make the environment more comfortable, efficient, or safe. It draws together ideas from AI, sensor networks, and the Internet of Things (IoT).

Example 7.2 — Ambient Intelligence at Home

A smart home senses that no one is in a room and automatically turns off the lights and lowers the thermostat, then adjusts them again as soon as motion sensors detect someone entering — all without the resident issuing any command.

7.12 Robotics

Robotics is the interdisciplinary field concerned with the design, construction, and operation of robots — programmable machines capable of carrying out a series of actions, often combining mechanical engineering, electronics, and AI for perception and decision-making.

Robots are used in manufacturing (assembly-line automation), medicine (surgical robots), exploration (space and underwater rovers), and increasingly in everyday life (robotic vacuum cleaners, delivery robots). Robots may be fully autonomous, semi-autonomous (partial human oversight), or remotely operated by a human.

7.13 Bitcoin

Bitcoin is a decentralized digital currency (cryptocurrency) introduced in 2009 that allows peer-to-peer financial transactions without relying on a central bank or single administrator. It is built on blockchain technology — a distributed, public ledger that records every transaction across a network of computers, making the record extremely difficult to alter fraudulently.

New bitcoins are created through a process called mining, in which computers compete to solve complex mathematical puzzles to validate transactions and add new blocks to the chain, earning newly minted bitcoin as a reward. Bitcoin's value is determined purely by supply, demand, and market speculation, making it highly volatile compared to traditional currencies.

Note: Bitcoin is one specific cryptocurrency; blockchain, the underlying ledger technology, is also used for many other applications beyond digital currency.

Key Takeaways — Unit 7

- ✓ Multimedia combines text, graphics, audio, video, and animation to communicate richly.
- ✓ e-Commerce, e-Learning, e-Governance, and e-Banking each move a traditional activity onto digital platforms.
- ✓ Hypermedia and GIS both organize information non-linearly or spatially for flexible exploration.
- ✓ VR fully replaces the user's environment, while AR overlays digital content onto the real world.
- ✓ AI enables machines to perform tasks requiring human-like intelligence; Ambient Intelligence embeds this into everyday environments.
- ✓ Robotics brings AI and mechanical engineering together to automate physical tasks.
- ✓ Bitcoin demonstrates how blockchain enables decentralized digital currency without a central authority.

— *End of Unit 7* —