Implications of Emerging Technologies

An emerging technology is one that is just starting to make an impact in the wider world. These are usually very new or are still developing and growing into their full potential.
For example, Virtual Reality has been around for some time but is still very much growing and only recently has started to have an impact on our lives.

While these emerging technologies often have great benefits for us, there are also many drawbacks too.

In this lesson we'll learn about how the following emerging technologies and their impact on organisations, individuals and society:
1. The Internet of Things
2. Artificial Intelligence (AI), machine learning and deep learning
3. Augmented Reality (AR) and Virtual Reality (VR)

Presentation

1. The Internet Of Things (IoT)

When we think of accessing data on the internet, we think of browsing a web page, streaming music, online shopping or posting onto a social media platform.

The Internet of Things (IoT) is a concept whereby any device can share data over the internet. This means the device is able to communicate with other devices that are also connected to the internet.

IoT devices typically rely on a variety of different sensors, such as temperature or heart rate sensors, and networking technologies, such as NFC, GPS, WiFi and 4G/5G mobile broadband. This allows these devices

to detect information automatically and then send that data to another device.

Some examples of IoT use include:

- Warehouses automatically monitoring stock levels via shelf sensors and automatically notify that stock is low.
- Delivery of products is tracked via GPS to allow customers to track progress and companies to analyse efficiency of routes.
- Livestock monitoring technology allowing farmers to monitor the location & health of their livestock.
- Biomedical sensors that alert doctors of patient readings remotely for faster response to emergencies.
- Smart electricity meters allow individuals to monitor their use of energy and automatically provide readings to suppliers for accurate billing.
- Smart home lights, central heating, etc. allow remote control of these for greater efficiency.
- Smart home doorbells, CCTV and alarm systems to provide greater security in the home.

The internet of things has provided a wealth of benefits to businesses and individuals, but comes with certain drawbacks too.

Advantages to Business & Individuals

- Convenience as many IoT devices make common tasks in our personal and work lives quicker and easier to complete.
- Better decision-making as we can collect large quantities of real-time data for analysis.
- Supports a business & individuals in identifying efficiencies and can make tasks quicker to complete which can save money.

Disadvantages to Business & Individuals

- Security issues due to the susceptibility of many IoT devices to hacking attacks as they're online devices and not typically built with security in mind.
- Huge quantities of data is often gathered, sometimes private/confidential data (e.g. health data), which could raise privacy concerns where it is being transmitted over the public internet.
- It puts a large reliance on the internet which means that these devices might not function during network problems which could be inconvenient.
- Some employees will be made redundant as their jobs will be replaced by IoT devices. This can also lead to issues with employee moral due to feeling under threat.

Further Thought

2. AI, Machine Learning & Deep Learning
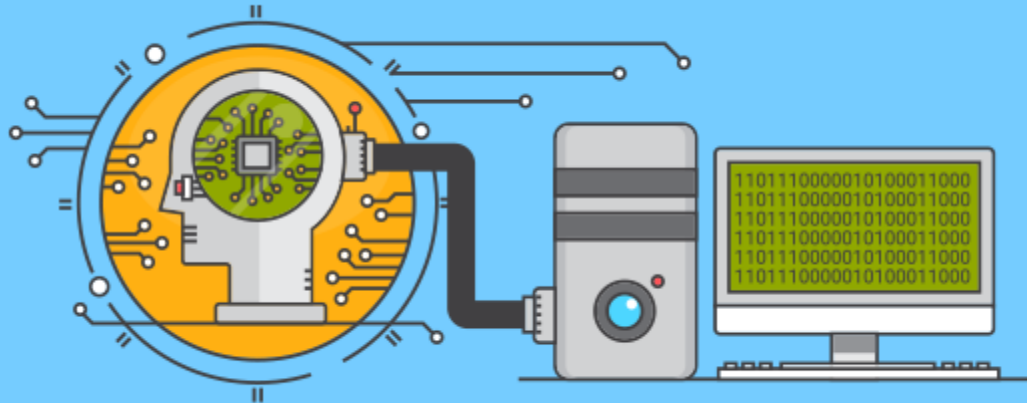
Artificial Intelligence (AI) is the area of computer science focused on creating intelligent machines that work and react like humans. It covers a wide range of computer-based technologies, from simple pattern recognition to more complex forms of reasoning. AI technology has been used in a variety of ways, including:

- Automated customer service agents
- Voice recognition software
- Fraud detection systems
- Robotics
- Game playing algorithms

While the term AI is often used to describe futuristic technologies, such as robots or intelligent machines, it can also refer to more mundane applications, such as automated customer service agents.

Machine Learning (ML) and Deep Learning (DL) are two related fields of Artificial Intelligence (AI). Machine Learning focuses on the development of algorithms that can learn from data and improve their performance over time. Deep Learning, on the other hand, is a subset of Machine Learning that deals with algorithms known as neural networks.

Neural networks are inspired by the structure of the brain and are designed to learn in a similar way to humans. While Machine Learning algorithms can be used for a variety of tasks, Deep Learning is typically used for more complex tasks such as image recognition and natural language processing.

AI, Machine Learning & Deep Learning have had a major impact in our lives with many benefits, but there are drawbacks too.

Advantages to Business & Individuals

- AI can help businesses to save time and money by automating tasks that would otherwise need to be carried out by human employees.
- It can also help businesses to make more informed decisions by analyzing large data sets more quickly than a human could.
- It can provide personalized recommendations to individuals, such as recommending products based on previous buying habits.
- It can provide assistance with personal tasks such as managing finances which makes these tasks quicker & easier to complete.

Disadvantages to Business & Individuals

- It can be used to automate tasks in a way that reduces the need for human labor. This could lead to job losses in certain sectors as businesses seek to reduce their costs.
- It could be used to make decisions that are unfair or biased. For example, if a business uses an AI system to select employees, the system may inadvertently discriminate against certain groups of people.
- It could be used to collect and store large amounts of personal data. This data could then be used to manipulate or interfere with individuals, potentially violating their privacy rights.
- There is a risk of becoming too reliant on AI technology, which could lead to errors or unforeseen problems.

Further Thought

Can you think of any applications of AI you have used in your personal life? Remember, it's not just exciting things like robots. Think about some of the more mundane applications you might have seen.

3. Augmented Reality (AR) & Virtual Reality (VR)

Augmented reality (AR) and virtual reality (VR) are two emerging technologies that are rapidly gaining popularity. AR allows users to view digital content in the real world, while VR transports users into a completely immersive digital environment. Both technologies have a range of potential uses, from entertainment and gaming to education and training.

Augmented reality has a number of potential uses. One of the most popular is entertainment, with AR games such as Pokemon Go becoming a global phenomenon.

AR can also be used for educational purposes, such as overlaying digital information on real-world objects to provide additional context or information. For example, the Augmented Reality in Museums app allows users to point their smartphones at certain paintings in a museum and receive information about the artist, the painting itself, or other related works.

AR can also be used for training and simulation purposes. For example, pilots can use AR headsets to view data and information about their aircraft while in flight, without needing to take their eyes off the real world.

Virtual reality can be used for entertainment purposes, such as gaming or watching movies.

VR can also be used for educational or training purposes, allowing users to gain experience in a simulated environment before carrying out a task in the real world. For example, surgeons can use VR headsets to view a 3D rendering of a patient's anatomy and practice procedures before entering the operating room.

VR can also be used for therapeutic purposes, such as treating patients with conditions such as post-traumatic stress disorder (PTSD).

Advantages to Business & Individuals

- Tasks can often be performed more efficiently due to overlayed information that can support a task's completion.
- Employees can be trained to perform hazardous tasks without the actual threat of harm.
- 3D designs can be previewed as they would look without having to actually manufacture the product first.
- Virtual face-to-face meetings can be held without having to actually travel which can reduce stress and environmental harm.

Disadvantages to Business & Individuals

- AR has the potential to distract users from their surroundings and increase the risk of accidents. For example, if a driver is using an AR navigation system and not paying attention to the road, this could lead to a collision.
- VR also has the potential to cause dizziness, nausea, and eye strain, as well as triggering epileptic seizures in some people.
- The technology is still very expensive and this can be prohibitive to those in poorer households or in the developing world.

Further Thought

Think of some example AR or VR technologies that you use in your life and write down what you think the pros and cons of these are.

Lesson Summary

So to summarise what we've learnt in this lesson:
- Emerging technologies are technologies that are just starting to make an impact in the wider world.
- The Internet of Things (IoT) is a concept whereby any device can share data over the internet.
- This provides convenience, better decision making and can provide efficiencies. However, it can create security issues, privacy concerns, overreliance on the internet and make jobs redundant.
- Artificial Intelligence (AI) is the area of computer science focused on creating intelligent machines that work and react like humans. Machine learning and deep learning are subsets of AI.
- AI can help businesses save money, make informed decisions, provide personalised recommendations and assistance in personal tasks. However, it can cause redundancies, make unfair or biased decisions, infringe on privacy and lead to too much reliance on the technology.
- AR allows users to view digital content in the real world, while VR transports users into a completely immersive digital environment.
- They can make us more efficient, train us safely, allow us to preview designs quickly and hold meetings without travel. However, they can also distract users, cause dizziness/nausea and is expensive.