Chapter 5

The effects of using IT

Lifestyle, leisure time and physical fitness

Advantages	Disadvantages
• People no longer have to do manual tasks.	• Can lead to unhealthy lifestyles because of the lack of exercises.
• Give people more time for leisure activities.	• They tend to make people rather lazy because there is a dependence on the devices.
• No longer need to stay home while food is cooking, clothes are being washed…	• There is a potential to lose household skills.
• Control ovens and automatic washing machines using smartphones.	• There is a risk of cybersecurity threats while using the devices connected to the internet.
• Automated burglar alarms give people a sense of security.	
• Smart fridges and freezers can lead to more healthy lifestyles.	

Advantages and disadvantages of microprocessor-controlled labor-saving devices

Lifestyle, leisure time and physical fitness

Advantages	Disadvantages
• Microprocessor-controlled devices save energy as they switch themselves off after inactivity.	• The devices lead to a more wasteful society (getting rid of the devices as they are costly if we repair them)
• It can be easier 'programming' these devices to perform tasks rather than pressing buttons manually.	• They can be more complex to operate.
	• Leaving some devices on standby is very wasteful of electricity.
General Advantages and disadvantages of using ALL microprocessor-controlled devices	

Lifestyle, leisure time and physical fitness

Data security issues

If you are able to communicate remotely with devices in your home then so can a hacker.
These devices are often set with a default or no password, making it easy for cybercriminals to obtain personal details.

It is important to manage passwords and install software updates.

Social interactions

There are both positive and negative impacts of microprocessor-controlled devices on social interactions.
Example: Smartphones

Positive aspects →

- Easier to make new friends.
- Easier to find people who share similar interests.
- Less expensive to keep in touch using VoIP technology.

Negative aspects →

- People don't meet face-to-face
- People are more anxious of meeting people in real life
- People behave differently when interacting online

Monitoring and controlling transport

- Many modern motorways are now called **smart motorways** because the monitoring and control of the traffic and/or the information displayed on the motorway signs is controlled by a central computer system.
- Safely coordinating the large number of trains and planes entering and leaving stations and airports.
- Journeys are also safer because human error is removed.

Monitoring and controlling transport

Advantages	Disadvantages
• Adapt to traffic conditions, reducing traffic jams and minimizing everyone's journey time.	• Hacker could gain access to the computerized system.
• Transport systems are more efficient.	• If the computer fails then the whole system could stop.
• Traffic offences can be automatically penalized using ANPR.	• Poorly designed systems could compromise safety.
• Computerized control systems minimize human error.	• ANPR systems mean that people's movements can easily be tracked.

Advantages and disadvantages of transport monitoring and control systems

Monitoring and controlling transport

- **Autonomous cars, buses and vans**
  - Autonomous cars use sensors, cameras, actuators and microprocessors to carry out their actions safely.
  - Sensors and cameras allow the control systems in cars to perform critical functions by sensing the dynamic conditions on a road such as change gear, apply the brakes and turn the steering wheel.
  - They act as the ‘eyes’ and ‘ears’ of the car.
  - Cameras catch visual data from the surroundings and build up a 3D image.

Monitoring and controlling transport

- **Red traffic light case →**
  - Control system in the car needs to recognize the road sign.
  - Check its database as to what action to take.
  - The microprocessor must send signals to actuators to apply brakes and put the gear into ‘park’ until the light changes to green.

Monitoring and controlling transport

Advantages	Disadvantages
• Safer because human error is removed.	• Very expensive system to set up.
• Better for the environment.	• The fear of hacking into vehicle's control system.
• Reduced traffic congestion –autonomous vehicles will be better at smoothing out traffic flow-.	• Security and safety issues.
• Increased lane capacity.	• The need to make sure the system is well-maintained at all times.
• Reduced travel times.	• Driver and passenger reluctance of the new technology.
• Stress-free parking for motorists.	• Reduction in the need for taxis could lead to unemployment.

Advantages and disadvantages of autonomous vehicles

Monitoring and controlling transport

- **Autonomous trains**
  - Autonomous trains make use of a system called **LiDaR** (Light Detection and Ranging)
  - LiDaR uses lasers which build up a 3D image of the surroundings.
  - Other sensors and cameras are all used for various purposes to help control the train and maintain safety.

Monitoring and controlling transport

Advantages	Disadvantages
• Improves the punctuality of the trains.	• The fear of hacking into vehicle's control system.
• Reduced running costs.	• System doesn't work well with very busy services.
• Improved safety because human error is removed.	• High capital costs and operational costs initially.
• Minimize energy consumption because there is better control of speed and minimal delays.	• Ensuring passenger behavior is acceptable.
• Possible to increase the frequency of trains.	• Passenger reluctance of the new technology.
• Easier to change train scheduling.	• No drivers mean there will be a need for CCTV to monitor railway stations.

Advantages and disadvantages of autonomous trains

Monitoring and controlling transport

- **Autonomous aeroplanes**
  - Some of the main features of a control system on a pilotless aeroplane would include:
    - Sensors to detect turbulence to ensure smooth flights.
    - An increase in self-testing of all circuits and systems.
    - Sensors that would automatically detect depressurization in the cabin.
    - Use of GPS for navigation and speed calculations.
    - Use of actuators to control.

Monitoring and controlling transport

Advantages	Disadvantages
• Improvement in passenger comfort.	• Security aspects if no pilots on-board.
• Reduced running costs.	• Emergency situations during the flight may be difficult to deal with.
• Improved safety.	• Hacking into the system.
• Improved aerodynamics at the front of the aeroplane.	• Passengers reluctance to accept the new technology.
	• Software glitches.

Advantages and disadvantages of pilotless aeroplanes

Potential health problems related to the prolonged use of IT equipment

Health risk	Ways of eliminating or minimising risk
Back and neck problems/strain caused by sitting in front of a computer screen for long periods in the same position)	• use fully adjustable chairs to give the correct posture • use foot rests to reduce posture problems • use screens than can be tilted to ensure the neck is at the correct angle
Repetitive strain injury (RSI) – damage to fingers and wrists caused by continuous use of a keyboard or repetitive clicking of mouse buttons, for example	• ensure correct posture is maintained (i.e., correct angle of arms to the keyboard and mouse, for example) • make proper use of a wrist rest when using a mouse or a keyboard • take regular breaks (and do some exercise) • make use of ergonomic keyboards • use voice-activated software if the user is prone to problems when using a mouse and keyboard
Eyestrain caused by staring at a computer screen too long or having incorrect lighting in the room	• ensure that there is no screen flicker as this can lead to eye problems • change to LCD screens where flicker is less of a problem than with CRT screens • take regular breaks (and try focusing on a point that is some distance away) • make use of anti-glare screens if lighting in the room is incorrect; or use window blinds to reduce sunlight reflecting from the screen • users should have their eyes tested on a regular basis (middle vision glasses should be prescribed if the user has a persistent problem such as eye strain, dry eyes, headaches, etc.)
Headaches caused by incorrect lighting, screen reflections, flickering screens, etc.	• use an anti-glare screen or use window blinds to cut out reflections (incorrect lighting can cause squinting and lead to headaches) • take regular breaks (and do some exercise) • have your eyes tested regularly and use middle vision glasses if necessary
Ozone irritation caused by laser printers in an office area (dry skin, respiratory problems, etc.)	• proper ventilation should exist to remove the ozone gas as quickly as possible • laser printers should be housed in a designated printer room • change to other types of printer if necessary (e.g., inkjet printers)