ICT Applications

Communication applications

Newsletters

- Paper based communication used to inform people about their interests
- Schools use these to inform parents about events/dates

Advantages

i. Released regularly
ii. The recipients have a permanent copy

Disadvantages

i. Requires distribution
ii. There are no special effects; sound/video/animation
iii. There are printing costs; paper/ink

Websites

- Collection of webpages, text, graphics, video and sound
- Hosted on a web server on the internet
- Need to write code or use a web authoring application
- Hyperlinks to other pages can be added
- Interactive websites require programming knowledge
- Can use a camera, scanner or microphone to input data
- Usually hire space from a web hosting company

Advantages

i. Ability to add sound/video/animation
ii. Links to other websites/hyperlinks
iii. The use of hot spots
iv. Buttons to navigate/move around the website
v. Hit counters to see who has visited the website

Disadvantages

i. Can be hacked and modified or viruses introduced
ii. Need for a computer and internet connection
iii. Lack of portability compared with paper based system
iv. Need to maintain website once it is set up

Multimedia Presentations

- Uses a mixture of media to present information: animations, videos, sound, transition, hyperlinks
- Produced using software packages
- Used with a projector so large audience can view

Advantages

i. Use of sound and animation/video effects

ii. Interactive/hyperlinks built into presentations
iii. More likely to hold audience's attention

Disadvantages

i. Need for special equipment-expensive
ii. May require internet access

Musical Scores

- Music samplers and mixers allow original tracks that were recorded in a studio to be modified
- Electronic instruments can play back through electronic effects machines
- Synthesizers combine simple wave forms to produce complex music creations
- Electronic organs can mimic any other instrument
- Music scores can be generated from music itself using software
- Software can automatically correct music notes in a score
- There is no need to understand musical notation to write a music score
- Music notes are automatically printed out in the correct format

Cartoons

- Animations can be produced using computer hardware and software
- With 3D animation objects are designed on a computer and a 3D skeleton is produced
- Parts of the skeleton are moved by the animator using key frames
- The difference in appearance of the skeleton in these key frames is automatically calculated by the software and is known as tweening or morphing
- The final stage is to make a realistic image by a technique known as rendering

Flyers and Posters

- A word processor/ desktop publisher is used to create them
- Need a minimum amount of information and be accessible very quickly
- Need to make an immediate impact when people look at them
- Anyone can produce them but there are highly skilled professionals who can produce expert posters
- Some posters require larger prints than A4

Sequence in which a filter or poster is produced on a computer system

- A word processor or DTP application is opened
- The user creates frames, boxes and text boxes
- If necessary, photos are taken using a camera from a CD/DVD, scanned from hard-copy photos or downloaded from the internet
- The photos are saved to a file
- The photos are imported or copied and pasted into the document
- The photos are edited and typed in or imported from a file and then put into required style

Mobile Phones

- Wireless devices that allow users to make phone calls from anywhere with cell reception
- They connect to the telephone system using radio signals
- This requires them to be in range of a mobile tower

- Used for communication via:
    i. Phone calls
    ii. Text messaging
    iii. Social media

Internet Telephone/VOIP

- VOIP (Voice over internet protocol) is a method used to talk to people over internet
- VOIP converts sound (picked up by a microphone) into discrete digital packets that can be sent to a destination via the internet

Publicity and Corporate Image Publications

Business cards

- Miniature printed documents that provide information about the business/organisation
- Usually printed on thick cards
- Easily distributable to potential clients
- Information includes company logo, name, address and contact numbers
- Gives a professional impression

Letterheads

- Found at the top of official printed documents to be mailed to clients for internal use
- Makes it clear to reader who the sender is
- Information includes company logo, name, address and contact numbers
- Gives a professional impression
- Easy to reply to

Flyers

- Generally printed on single sheets of A4 paper
- Handed out directly to people for promotions
- Cheap to produce and easily distributable (locally)
- Information includes company logo, promoted product or service, contact details
- Makes it easier to target a specific audience

Brochures

- Also called leaflets and are like flyers
- Difference is that they are often folded into sections
- Left on counters to pick up rather than handed out
- Information includes company logo, promoted product or service and contact details
- Makes it easier to target a specific audience

Data Handling Applications

Surveys

All data handling starts with data collection:

- Data capture forms can be used for many applications
- Decide what needs to be collected and then what questions should be used to collect it

- Paper and electronic

Rules for creating forms:

- Make them look official
- Spaces should be thought about giving enough space for answers
- Restrict the amount of possible answers, do not use open questions
- If open questions are used there us limited amount of space available

- Asking for 'name' needs to be carefully thought about

  What names do you want?

- Are you asking for sensitive information?

  People may not feel comfortable being truthful

- Date of birth

  What format do you want it in?

- Give instructions about how to answer questions
- How will the data be collected?

Paper surveys are scanned using OMR or OCR

<u>Advantages</u>

- Faster to get results
- Fewer errors
- It is easier to do statistical analysis
- Less expensive to carry put; requires fewer people

Online questionnaires

- Usually use radio buttons
- No data preparation needed
- Results sent directly to database for analysis

<u>Address Lists</u>

An address book on a computer or mobile phone might have a contact's home address, phone number, email address, and personal information like the date of birth etc.

<u>Clubs and Society Records</u>

- Need to keep a record on member usually in a database
- Usually payment details, contact details and interests
- It makes it easy to match people with interests and send information about what they are interested in
- This can be done using mail merging
- Easy to check memberships and send out reminders

- It is important to follow the data protection act

School Reports

- Database applications such as SIMS store large amounts of data which can be used to create annual and termly school reports
- Things able to be gathered from here are:
    i. Data of each individual student- test/ exam results
    ii. Student progress- if the target grades are being met or not
    iii. Number of absences- can create a percentage of amount of days attended school
    iv. Teacher's comments

Measurement Applications

- Sensors are used to send data to a computer where data is processed
- The computer simply reviews the data from the sensors (by comparing it to data stored in memory) and updates its files and/or gives a warning signal if the values are outside given parameters
- No changed to the processes are made
- Examples: scientific experiments and weather stations

Analogue and Digital Data

- Digital data: discrete, fixed value (used by computers)
- Analogue data: continuous value that varies smoothly
- Sensors measure physical and analogue quantities
- Analogue data from sensors needs to be converted into digital data using and analogue to digital converter (ADC) so that the computer understands and processes the data from the sensors
- If the computer sends signals to motors, valves, etc. then this data needs to be converted to analogue using a digital to analogue converter (DAC) so that the computer can effectively control these devices

Analogue to Digital Convertor (ADC)

- Used when you want to attach an analogue input device to a digital device
- This is so the analogue data can be understood/processed by the computer since computer can only comprehend digital data

Digital to Analogue Convertor (DAC)

- Used when you want to attach an analogue output to a digital device

Pollution Monitoring

Example: monitoring oxygen levels in a river

- Sensors read data from the river (oxygen levels and acidity levels using a pH sensor)
- The data from the sensors is converted into digital data using an ADC
- The computer stores the received data
- The oxygen levels and acidity levels are compared to the historical data stored in memory and they are also compared to alarm levels stored in memory

- One of two things will now happen: either the data is transferred to a CD/DVD or to a memory stick and taken away for analysis later or the computer is connected to a mobile phone network and transmits the data back automatically to the monitoring system

Intensive Care Units in Hospitals

- Sensors read key vital signs (such as pulse/heart rate, temperature, blood pressure, respiration etc.)
- The data from the sensors is converted to digital data using an ADC
- The data is stored in the computer memory
- The results are output on a screen in the form of graphs, and or digital read outs
- An alarm is activated if any of the data is outside acceptable parameters
- The system continues to monitor the patient until the computer is turned off '

Advantages of using Computers in Measurement

i. The computer will not forget to take readings
ii. The computer's response time is much faster
iii. Professionals can get on with other tasks while the monitoring is done automatically
iv. Computer is able to monitor 24/7
v. The recordings tend to be more accurate
vi. Readings can be taken more frequently
vii. It could be potentially safer if the conditions being monitored are hazardous

Disadvantages

- Expensive to purchase and set up
- If performed for educational purposes, reduced practical hands-on experience and learning
- Will not function in a power cut if no backup power is present (expensive to have reliable backup power)

Microprocessors in Control Applications

- Sensors are used to send data to a computer where the data is processed
- The computer reviews the data from the sensors (by comparing it to data stored in memory)
- If the values are outside the given parameters/ pre-set value it acts to try and get the values within acceptable ranges
- It does this by sending signals to devices controlling the process

Turtle Graphics

- Based on a computer language called LOGO and is now usually known as turtle graphics
- It is the control of the movement of a turtle on a computer screen by several key instructions which can be typed in
- The use of 'repeat' instructions make a piece of code more efficient

Automatic Washing Machines

- Have a microprocessor in them which contains the software which controls the washing machine

Inputs

- Pressure sensor on the door to detect if open or closed

- Sensor to detect if the required level of water is inside
- Temperature sensor to check temperature

Outcome

- Clothes have been washed

Outputs

- Heater
- Motor to spin drum
- Lights on machine to show user stage the cycle is at
- Actuators to turn the inlet valves to allow hot and cold water into the machine
- Actuator to turn the outlet valve on to let the water out of the machine when the wash is complete
- An actuator to control the pimp

Processing

- Software to make decisions which will allow the clothes to be washed

Time taken before next inputs

- Timer as part of the software
- Timer as a part of the software
- Time different cycles (when to add soap/conditioner etc.)
- Time delay in measuring temperature
- Needs to be time for changes to have effect

Unmanageable situations

- Door may not be shut
- Needs to draw user's attention
- Usually a buzzer and light

Central Heating System

Inputs

- Inputs from the user: room temperature required, time system turns on/off
- Inputs from the system: actual room temperature, clock giving time

Outcome

- Heating or cooling room during the required times

Outputs

- Boiler
- Air conditioner

Processing

- Check time against the one input and switches on when that time is reached
- Same done to check when to turn off
- When on microprocessor reads temperature from sensor and compares it with desired temperature

- If too low, it will heat up by turning the boiler on and if it's not too high it will turn the air conditioner on
- These will stay on until desired temperature is reached

Automatic Cookers

- Have temperature sensors and timers with manual controls to set start and end times, and temperature for cooking
- Works similar to Central Heating System

Burglar Alarm

Burglar alarms detect any intrusion

- Sensors such as motion sensors, door and window sensors, magnetic sensors, multi-functional sensors measure the physical quantity and inputs the value to a microprocessor
- The microprocessor compares the input values with the pre-set values, if changes are detected, the microprocessor sends signals to the actuator
- The actuator activate the sirens or give a phone call or messages the input mobile number

Glasshouse

- Temperature controlled the same as central heating system
- Humidity must also be controlled:
    - Humidity sensor tells computer how humid it is
    - Computer then decides to turn the water supply to sprayers
- Windows also operated by the computer:
    - Need to find the balance of how often to have windows open
- Blinds that can be computer controlled:
    - Light sensor measure light intensity
    - When sun is strong the computer actuates electric motors which close blinds
- Control in glasshouses is more likely to be used in commercial areas or large glasshouses not in gardens

Modelling Applications

- A mathematical computer model is created to manipulate variables and see real time changes in terms of figures
- Used to find how mechanisms control a system

Advantages

i. Cheaper than building physical system to test
ii. Safer than building system and experimenting
iii. Easier to experiment with various scenarios
iv. Quicker as no need to build system
v. Near impossible test involving space and volcanic scenarios can be modelled risk-free

Applications in Manufacturing Industries

Robotics

- Robots are used in many areas of manufacturing, from heavy work right through to delicate operations
- Control of robots is either through embedded microprocessors or linked to a computer system
- Programing of the robot to do a task is generally done in two ways:
    i. The robot is programmed with a sequence of instructions which allow it to carry out a series of tasks
    ii. Alternatively, a human operator manually carries out a series of tasks and how each task is done is relayed back to the robot (embedded processor) or controlling computer. The sequence of instructions is remembered so that the robot can automatically carry out each task identically at each time
- Robots are often equipped with sensors so they can gather important information about their surroundings
- Sensors also prevent them from doing 'stupid things' such as stopping a robot from spraying a car is no car is present, or stopping the spraying operation if the supply of paint has run out
- Robots are very good at repetitive tasks
- However, if there are many different task, then it is often better to us human operators

Advantages

i. Robots can work in environments harmful to human health
ii. They can work 24/7
iii. They are less expensive in the long term, however purchases expenses are initially high
iv. Productivity is higher
v. There is greater consisteney- every item coming off a production line is identical
vi. They can do monotonous tasks, leaving humans do more skilled work

Disadvantages

i. Robots find it difficult to do unusual tasks
ii. They replace skilled labour, leading to unemployment
iii. Risk of de-skilling of the work force
iv. Robots are independent skill bases, they can be easily shifted across the globe, causing unemployment

School Management Systems

Learner registration and attendance

- ID cards with magnetic tapes: The students will have to swipe their ID cards, which contain the student's name, school's name, date of birth and the registration ID, when they enter and leave the school, this way time is saved and the attendance is more accurate
- Biometrics: Every student's fingerprint is stored on a database along with their personal information, the students must put their finger on a fingerprint scanner to enter and leave the school premises

Advantages

i. Fingerprints are unique, so another student can't give their attendance for someone else
ii. ID cards can be lost, whilst fingerprints cannot
iii. Magnetic fields can affect an ID card
iv. Copies of ID cards can be made easily

Disadvantages

i. Collecting every student's fingerprint is initially time consuming
ii. Fingerprint scanners are more expensive than magnetic stripe readers
iii. Damages on the finger will deny access
iv. There is an invasion of privacy in storing fingerprints on a school database

Learner performance

- Spreadsheets can be used to record students' performances. It is easier to compare their performances as an individual students throughout the academic year

Organising examinations

- Makes sure that the students are enrolled for the right exams
- Prints the exams timetables
- Allots examination rooms and the invigilator
- Gathers the results and puts them into a student database

Creating timetables and managing substitution

- Considers the students' choices, availability of teachers and rooms, subject clashes and the number of hours needed for each subject to produce accurate timetables that can easily be made changes to and cover with teacher to be substituted

School Management Systems Analysis

Advantages

i. Absenteeism can be addressed more easily
ii. Parents are kept updates
iii. Reduced workload for teachers
iv. They are helpful for the decision making of the administration department

Disadvantages

i. Operating software will need some training
ii. The initial cost of the software is expensive
iii. Unauthorised access will have to be prevented as there is lots of personal information is available

Booking Systems

Booking systems are used for transport, cinemas and theatres

Theatre booking system

- Customer clicks on the performance they wish to see

- They enter date and time of performance and required number of seats
- A seating display at theatre is then shown on screen and user clicks where they want to sit
- Database searched to check for the availability of selected seats. If seating plan shown on screen, this isn't required
- If seats are available, seat numbers are shown together with total price
- If customer is happy with this, they select 'confirm'
  the seats are now temporarily set as 'no longer available;
- The customer then enters the personal details or indicates that they are a returning customer
- They select a payment method and make payment
- The theatre seats are then booked in the customer's name
- The final details are shown on the screen, together with a reference number
- An email is sent to the customer which they print out as their proof of purchase. In some cases, this also acts as their printed ticket, when they go to the theatre (e-ticket)
- The database is updated with the transaction

Advantages

i. No double booking as minimal delay
ii. Immediate booking and selection of seats
iii. Bookings can be made at any time
iv. Digital ticket; printing and postage costs are reduced/eliminated
v. QR codes for authentication can use scanners reducing labour

Disadvantages

i. Set up and maintenance is expensive
ii. Computer and reliable internet access is required
iii. Sever crashes can result in the bookings completely stopping
iv. Need for website to be well designed to ensure ease of use
v. No special relation built with booking agent who can give special promotions etc.

Types of Online Processing

Real time (transaction) Processing

- It is used in things like booking seats in a flight or theatre
- Required when a query is sent and the response should be immediate to prevent any problems

Real time Process Control

- System usually involves sensors and feedbacks loops continually monitored and input is processed quickly enough to influence the input source

Banking Applications

- Online banking systems rely on the ability to update files immediately, thus preventing double booking which could happen if the system response is slow

Electronic Funds Transfer (EFT)

- Allows money transfer instructions to be sent directly to a bank's computer system

- No actual money is transferred, the whole system relies on electronic transfer of money between accounts
- When an EFT transfer instruction is received, the computer automatically transfers the specified amount from one account to another

ATMs (Automated Teller Machines)

Places where customers can get cash (or carry out certain other banking activities) using their credit or debit card

Sequence at ATM	What goes on behind the scenes
1. Customers puts card into ATM 2. PIN is entered using the keypad 3. A number of options are displayed the customer selects the cash options and several cash options are shown 4. The customer accepts the options or types in a different amount 5. The customer is asked if they want a receipt 6. The card is returned 7. Money is dispensed	➢ Contact is made with bank's computer ➢ PIN is checked to see if it is correct ➢ Card is checked to see if it valid ➢ The customer's account is assessed to see if they have sufficient funds ➢ It is checked to see if they are withdrawing more than their daily limit ➢ Transaction is processes ➢ Customer's account is update

- Although ATMs are very convenient for customer, they do have a few disadvantages though:
  i. Often in places where theft can take place unnoticed
  ii. Fake ATMs can be set up to gather information about the card and retain the card
  iii. Some banks charge customers for the use of ATMs
  iv. Shoulder surfing

Clearing cheques

- The recipient deposits the check to their bank where the cheque is sent to a clearing centre
- a sorter/reader reads the sort code (unique 6 figure), cheque number, the account number and amount on the cheque
- Depending on the sort code, the cheque is sent to its respective exchange centre
- The data from the cheque is encrypted and stored in a file called IBDC (interbank exchange) along with a digital signature to certify the cheque's authenticity
- From the exchange centre, the cheque is passed to the respective bank
- The bank's system verifies the digital signature and then has its sorter/reader sort the cheques in order of the cheque's pertaining branch
- The payee's account is checked to see if adequate funds are present
- The cheque's details have to be correct, and if it is correct the money is transferred from the payee's account to the recipient's account
- If the details on the check are incorrect/fraudulent then the check is bounced

Phone Banking

1. The customer calls the bank using a telephone
2. The customer keys in or types in their account number

3. The customer is required to enter a 4 digit PIN
4. The customer will hear various options
5. The customer will chose one of the options and the transaction will be carried out as required

Internet Banking

Using a username and password, logging on to a bank site from your computer or smart phone to may payments, transfer money, view statements, apply for loans etc.

To The Bank

Advantages	Disadvantages
• Reduced costs as some of the branches can be closed • Fewer employees hence reduced wage bill • Less qualified worker are accepted which reduces wage costs	• Personal services are reduced, so customer may move their accounts • Loans are easier to lend face-to-face • IT officials are needed to set up and run online banking • Redundancy cots have to be paid for staff who have lost their job

To The Customer

Advantages	Disadvantages
• Travelling costs and time is saved • Can be accessed 24/7 • Easier way of tracking balances	• Prone to hacking • Lack of personal service that you get at the bank • Cash can't be withdrawn

Computers in Medicine

- Patient records: Database that holds patient details and can be accessed from any computer within the hospital intranet
- Patient identification: Barcodes on wristbands of the patients can be used to access their patient record
- Pharmacy records:
    i. Generates labels for drugs
    ii. Checks if the patient is allergic to a particular drug
- Patient monitoring:
    i. Sensors measure changes in temperature, heart rate, breathing rate, brain activity, blood pressure, blood sugar levels and oxygen levels in the patient's body
    ii. The analogue signals from the sensors are converted into digital signals using an analogue to digital convertor
    iii. Graphs are produced to show trends over time

    iv. The readings are constantly compared with the pre-set values, if the values aren't in the prescribed range, the medical staff are notified
- Hospital management system: all the above-mentioned points come under the hospital management system which holds all of them, and can be used to access data from all the departments
- Expert systems:
    i. The interactive screen asks a series of question for the doctor to answer, using a keyboard or touch screen
    ii. The inference engine compares the symptoms with the knowledge base, using the rules base to find matches
    iii. The system suggests the possible illnesses with a probability of cures and recommendation of the next step to be taken
    iv. The explanation system will explain how that particular diagnosis was suggested
- Using 3D Printers in medicine:
    i. Surgical and diagnostic aids: A CT or MRI is used to produce images of the internal parts of the body. A 3D printer can be used to reproduce the internal organs as a solid object
    ii. Prosthetics: 3D Printer are used to print out artificial body parts. This is a less expensive method of replacing body parts
    iii. Tissue engineering: Used to produce layers cells to replace damaged tissues
    iv. Design of medical tools and equipment: Tools can be made faster and with reduced costs. They can also be made with changes easily, whereas it wasn't the same with traditional methods

<u>Computers in Libraries</u>

- Many library systems are computer controlled
- They usually involve the use of barcodes on the books being borrowed and on the borrower's library card
- The following describes a computerized library system based on barcodes
- There are two files:
    i. Book file, containing information about the book such as the barcodes, book title, name of author etc.
    ii. Borrower's file, containing information about the individual who borrowed the book, such as the borrower's number, borrower's name etc.
- When the borrower's takes out the book, the book's barcode is scanned and the book details are found in the book files
- The borrower's library card barcode is then scanned, the book file is linked to the borrower's file
- Both files are updated to indicate which book has been borrowed and when it is due
- When the book has been returned, the barcode of the book is scanned again and the records are updated to indicate that the book has been returned and is available for others
- On a daily basis, the borrower's file is interrogated by the computer to see which books are overdue for return
- The computer reads a record from the book file and compares the due date with the current date
- If the date is less than or equal to the current date, the book file is linked to the borrower's file and the corresponding record is read from the borrower's file
- A letter or email is automatically sent out

Expert systems

- These are systems that are developed to mimic the expertise and knowledge if an expert in a particular field
- Examples include: diagnosing a car engine fault, diagnosing a person's illness, prospecting for oil and minerals, tax and financial calculation, chess games, identification of plants and animals as well as road scheduling for delivery vehicles

Components of an expert system

- User interface: this is the only thing that the end user sees, allows the user to interact with the system and it often requires training to operate effectively
- Knowledge base: this is a database designed to allow complex storage and retrieval requirements of a computerised knowledge-based management system
- Inference engine: this is software that attempts to derive answers from the knowledge base using a form of reasoning
- Rules base: this is made up of a series of rules which are used by the inference engine to search for answers in the knowledge base

How to set up an expert system

- Expert in the field are interviewed to find out what is needed in the expert system
- Data is then collected from experts and other reliable sources
- A knowledge base is designed and created
- A rules base is designed and created
- An inference engine is designed and created
- The input screen and output format (user interface) is designed and created
- It is also checked to see if it meets the original specifications
- Experts are interviewed about how effective the new system is

Example on an expert system: Oil Prospecting

- An interactive use screen appears
- Questions about the geographical profiles are asked (type of soil, rock and minerals found)
- Answers to the questions and information about the geographical profiles are typed in
- The inference engine searches the knowledge base using the rules base
- The system provides the following results:
    i. Gives the probability of finding oil
    ii. Indicates the depths of the deposit
    iii. It makes predictions about the geological profiles above the soil
    iv. Produces a map showing concentration of minerals, rocks etc.

Advantages	Disadvantages
• Provides consistent answers • Never forget an answer to a question • Reduce time taken to solve a problem • A less skilled workforce is required i.e. cost efficient	• Tends to lack common sense • Errors in the knowledge base can lead to incorrect decisions being made • It can be expensive to set up • There is need to train workers to use the new system

Computers in the Retail Industry

Automatic Stock Control

- Barcodes are attached to all items sold in the supermarket
- Each bar is associated with a stock file which contains details such as prices, stock levels and product descriptions
- The bar code acts as the primary key in the stock file
- At the POS the product's barcode is scanned by the barcode reader
- The barcode is searched for in the stock file, record by record until a match is found
- The price of the item is read and sent back to the POS together with the product description
- The stock level for the item is reduced by one
- The new stock level is written back to the file
- The new stock level is compared to the re-order level
- If the new stock level is equal to or lower than the re-order level then the computer automatically orders another batch from the supplier
- Once goods have been ordered a flag is assigned to the items in the file to avoid double re-ordering until the new items have arrived

Use of EFTPOS

- Card inserted into chip and PIN reader
- Business' bank contacts customer's bank
- Card is checked if it is valid
- If the card is stolen or expired, then the transaction is terminated
- Customer enters PIN using keypad
- PIN is read from chip on card and is compared to one just keyed in
- If they are the same, the transaction is proceed
- Check is then made on whether they have enough funds
- If there are not enough funds available, transaction is terminated, otherwise, transaction is authorized
- Authorization code is sent to the business
- Amount deducted from customer's account
- Same amount of money is credited to the business' account
- Receipt is produced

Internet shopping

To the customer

Advantages	Disadvantages
• Cheaper goods • Wider range of product • Delivery at your doorstep • You can shop 24/7 • Shop internationally • Saves travelling costs	• Quality isn't assured • Security risk of stolen personal details • Packing and postal charged are added • Personal services from stores are eliminated • Returning the products are harder • No relaxation that you get from actual shopping • Bogus sites

To the Business

Advantages	Disadvantages
• No need to pay rents • No fixed working hours • No shoplifting • Sell goods to customer anywhere in the world • Cheaper to contact customers • Site warehouse where rental is cheap • Able to sell goods 24/7	• ICT knowledge needed to set up website • Unemployment • Business abroad is lost if the prices are cheaper there • At times of network failures, there will be no access • Not everybody can access the internet, so a few customers are lost • Customer's personal data can be hacked • Postal charges discourage people at times

Recognition Systems

- Automatic Number Plate Recognition (ANPR) systems: A senor sends signals to a microprocessor, which instructs a camera to capture the front of a vehicle. OCR software is used to read the number plate from the image. The characters are then converted to text format in order to store it in a database
- Processing cheques: the value of a cheque is printed in special ink containing iron particles when a cheque is presented. MICR is used to read the characters at the bottom of the cheque. A batch processing method is then used to process all the cheques at the end of a specific time period
- OMR media in schools:
    i. School registers: paper-based registers are fed into OMR to be scanned and are then stored on a database
    ii. Multiple choice examination papers: the position of a mark is stored in a computer's memory after being read by the OMR device using a template that maps out the X-Y coordinate of each pen/pencil mark
- RFID in passports:
    i. The data on the RFID chip is read when the passport is scanned
    ii. A photo of you is clicked which is then compared with the image stored in the RFID chip
    iii. If the face-recognition passes, some checks are made in turn to make sure you are eligible to enter the country, if you are, the gate opens automatically
- RFID in contactless payments:
    i. The embedded chip on credit/debit cards and the antenna enable customers to wave their card over a reader at the point of sales terminals to make payments
    ii. Smartphone apps can also be used to make contactless payments

Monitoring and Tracking Systems

- Public monitoring/tracking:
    i. Ankle monitor: used RFID chip to give out the person's location and other details. It is tamper proof and will alert authorities if tried to remove
    ii. Phone call tracking: the service provider tracks the calls and the exact position from which they were made

- Worker monitoring/tracking:
    i. Supermarket worker: have the number of items passing through the tills over a period of time monitored
    ii. Internet use is monitored by network managers: they can check sites visited and time spent on that site during working hours
    iii. Emails can be read: employers can check that no personal mails are sent during office hours
    iv. Delivery drivers: their location can be tracked using GPS systems. It can also be checked if they are following the shortest route and aren't speeding.
- Key logging: Software that records the keys pressed by a user on the keyboard. They are used to find username and passwords of a user
- Employee call monitors: allows the employer to listen to the employee's telephone calls. There are 3 ways in which they can be monitored:
    i. Monitor: the manager/supervisor can listen to calls without the employee or the customer's awareness
    ii. Whisper: the manager can help the employee with the call, but the customer can't heat the manager speak
    iii. Barge: both the employee and the customer can hear the manager
- Employee call monitors: allows the employer to listen to employee's telephone calls. Call monitors can be used:
    i. To improve the employee's performance
    ii. To allow manger/supervisor to join a call where necessary
    iii. As a training pool
- Uses Automatic Number Plate Recognition (ANPR) systems:
    i. Traffic enforcement: the system can check if a vehicle is taxed, recognize cars are parked illegally, cars speeding or going through red lights so a fine can be imposed
    ii. Car park management: the system reads the registration number and if allowed into the car park, the barrier is raised
    iii. Electronic toll collection: the system recognizes the vehicle and deducts the fare accordingly

<u>Cookies</u>

- Cookies are small files sent to a user's computer via their web browser when they visit certain websites
- They store information about the users and this data is accessed each time they visit the website
- Without cookies, web server would have no way of knowing that the user had visited the website before
- For this reason, cookies could be used to monitor one's internet activity.

<u>Satellite Systems</u>

<u>Global Positioning Systems (GPS)</u>

- Used to determine the exact location of several modes of transport
- Cars usually refer to GPS as satellite navigation systems
- Satellites surrounding the earth transmit signals to the surface
- Computers installed in the mode of transport receive and interpret these signa;s

- Knowing their position on the earth depends on accurate timing-atomic clocks are used in the satellites which are accurate to withing a fraction of a second per day
- Each satellite transmits data indicating its position and time
- The computer on board the mode of transport calculates its exact position based on the information from at least three satellites

Satellites Navigation

- Used to determine the exact location of a car
- The computer on board can show the direction to a destination

Geographic Information Systems (GIS)

- Used to capture, manage, analyse and display geographically referenced information
- Used to determine the distance between two places
- Used to find nearest points of interest
- Used to protect animal and plant life in certain vulnerable places
- Can be used in geography, science or engineering

Media Communication Systems

- Uses satellite signals for communication
- Used by media companies when sending stories/videos/pictures from remote locations.