Chapter 6: ICT Applications

ICT Theory – Revision Presentation – ICT Applications

ICT Applications

6.1 Communication applications
6.2 Data handling applications
6.3 Measurement applications
6.4 Microprocessors in control applications
6.5 Modelling applications
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6.8 Booking systems
6.9 Banking applications
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6.1 Communication Applications

Paper Based

Types of Communication & Purpose	Use of Computers
News Letter: Used by companies to communicate certain information to staff and customers. May contain information on recent events and identify success company may have experienced. **Brochures/Leaflet:** Can be used to advertise a company or to be informative. Brochures are normally printed on glossy paper with a high quality finish. **Flyers:** Informative document which can be distributed to promote or create awareness of an up and coming events. **Posters:** larger then flyers and are strategically positioned to promote and create awareness. Displayed on billboards, notice boards, buildings as part of an advertising campaign to target a specific target audience.	• **Save and insert pictures from clipart, Internet, scanned images & digital camera.** • **Adjust the page layout.** • **Create and Insert Tables/charts** • **Formatting the layout of the document.** • **Applying effects to images (crop, colour scale, rotate etc.)** **Text Formatting** • **Font Style** • **Bold** • **Alignment (left, centre, right and fully justified)** • **underline** • **Italic** • **colour**

Advantages	Disadvantages
• **Not necessary to have a computer or internet connection.** • **You have a physical copy of the document.**	• **These communication would mainly be distributed by hand.** • **Printing costs** • **Restricted to a smaller target audience.**

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6.1 Communication Applications

Computer Based

Types of Communication & Purpose

Websites

- Companies use websites as a means to communicate with existing and potentially new customers.
- Websites can be easily updated and can provide relevant and up to date information.
- Websites can be used to research, social network, online gaming or for online shopping and banking.

Multimedia Presentations

- A common use for presentations is to provide training in businesses or places of education. The presentation will be a focal point on the projector whilst the speaker is presenting.

Advantages	Disadvantages
• **Can include interactive elements such as sound, video, animation and hyperlinks.** • **Can be available on different platforms.**	• **Websites can be hacked and information may be altered.** • **Setting up website and maintaining would be expensive and would require a special skill set.**

Cartoons (Animations)

Animations can also be created using specialist software to promote new products.

Music Scores

Music can now be created and edited on computers. Can be used as part of adverts or slogans.

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6.1 Communication Applications

Mobile Based

Types of Communication & Purpose

Phone Calls: Allows users to make a audio phone calls to each other from any location within the network coverage area.

Text Messages: Allows user to send simple messages to each other even if the recipients phone is turned of or not within network coverage.

Accessing the Internet: Email and social networking applications are now available on mobile phones which makes it easier for users to stay in contact with each other. Businesses can also use these apps to advertise and communicate with customers.

Advantages	Disadvantages
• Mobile phone is portable and can be used on the move. • Mobile phone contracts can offer free minutes and texts.	• Long distance calls or phones calls in different countries could be expensive. • Mobile signal could be weak or non existent in some places.

Voice Over Internet Protocol (VoIP)

When voice calls are taken place over an internet connection (e.g. Whatsapp, Viber).

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6.2 Data Handling Applications

Advantages of Data Handling Applications for Storing Data:

- Data can be updated, organised, sorted and searched in different ways.
- Data can displayed or printed in different formats.
- Data can be backed up or moved using storage media.
- Huge storage space not required (filing cabinets)

Address Lists

Mobile phones include address books which include contact names, numbers, email addresses etc.

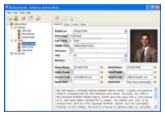
Surveys

Information from surveys could be held on a database so that data could be analysed and queried.

School Records

Student records including assessment and behaviour data. Also staff data could also be held on database

Club/Society Records



Information on current members including names and contact details. Also members methods of payment to pay membership fee.

Libraries

Information on current books which are available to borrow and members of the libraries.

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6.3 Measurement applications

Role of Measurement Applications

Sensors are placed to measure physical variables. The data from sensors are measured in analogue. The analogue signal is then converted to a digital signal using a convertor.

Examples

Weather Stations		**Thermometer for measuring temperature** **Anemometer for measuring wind speed** **Wind vane for measuring wind direction** **Hygrometer for measuring humidity** **Barometer for measuring atmospheric pressure**
Green House		**Sensors are placed in the green house to measure whether plants are growing in the correct conditions:** • **Light, Moisture, Humidity, PH Levels**
Patients Vital Signs		**Sensors will be attached to the body to monitor:** • heartbeat, blood pressure, temperature etc.

1 - Input devices called **sensors** feed data into the computer.

2 - The computer then **processes** the input data.

Sensor readings are compared to the preset values.

3 - As a result of the processing, the computer can send a signal to the **output** devices called **actuators** which could change physical conditions.

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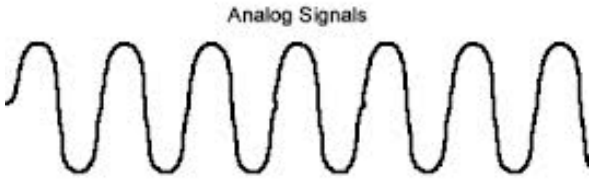
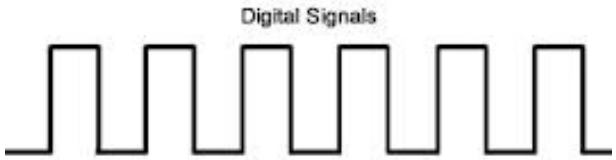
6.3 Measurement Applications



Data collected from Sensors is in Analogue

ADC - Analogue-to-digital converter

Analogue Signal now can be understood by computers.



Why Use Computers to Measure Things?

- Computers do not require breaks .
- Readings are more accurate compared to humans.
- Readings are taking more frequently.
- Data can be analysed and compared with existing data.
- Automatic graphs can be created.
- Sensors can work in extreme conditions which could be dangerous for humans.
- People can complete other tasks whilst the systems works automatically.
- If human intervention is required then a signal will be sent to the buzzer.

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6.4 Microprocessors in Control Applications

Role of Microprocessor in Control Applications

- Sensor readings are compared to the pre-set value which are inputted by the user.
- If sensor readings are below or higher then then the pre-set value then a signal will be sent to the actuator to change the physical conditions.
- Process is constantly will be repeated.

Example	Process Microprocessor	Output
Green House 	**Compares light, temperature, moisture to Pre-set value.** **Sends signal to actuator is necessary. Process is constantly repeated**	• **Light on/off** • **Heater on/off** • **Motor open/close windows**
Patients Vital Signs 	Compares Vital signs (heartbeat, blood pressure, temperature **to Pre-set value.** **Sends signal to actuator is necessary. Process is constantly repeated**	• **Buzzer will alert staff to any vital signs which are below the expected values.**

1 - Input devices called **sensors** feed data into the computer.

2 - The computer then **processes** the input data.

Sensor readings are compared to the preset values.

3 - As a result of the processing, the computer can send a signal to the **output** devices called **actuators** which could change physical conditions.

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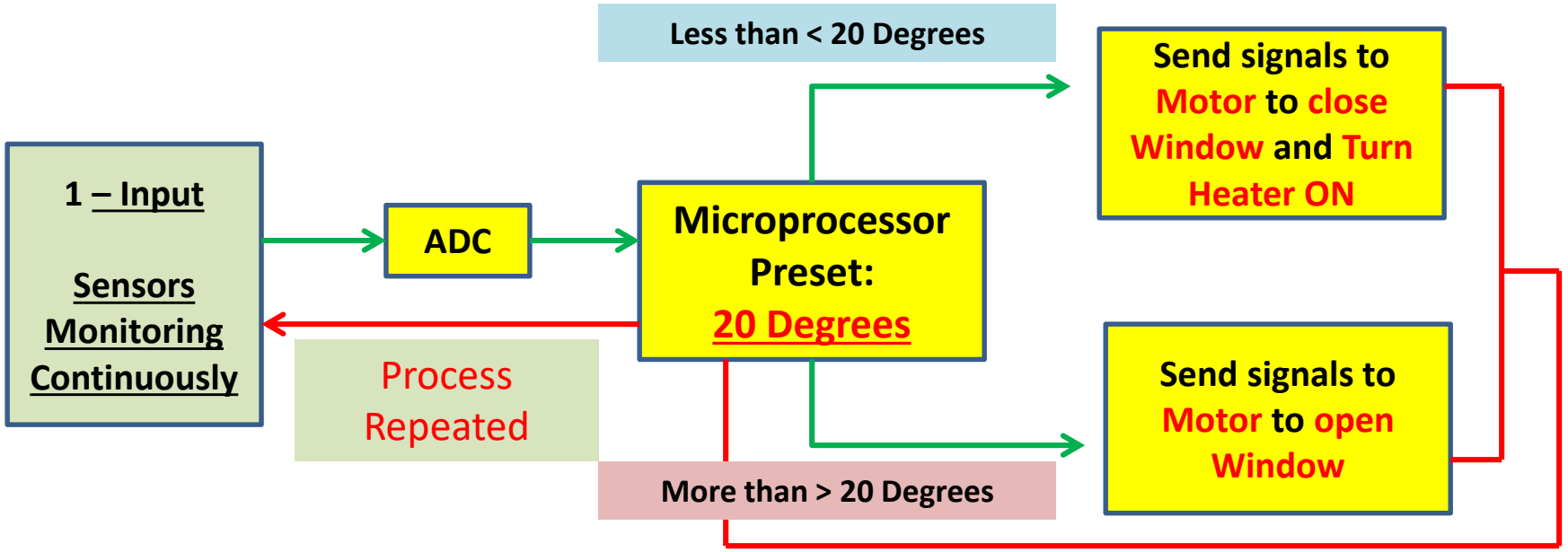
6.4 Microprocessors in control applications

Green House (Temperature Example)



Examples in a Green House

- Light
- Moisture
- Humidity
- PH Levels

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6.4 Microprocessors in Control Applications

Microprocessors Typical Exam Questions

Describe the role of the microprocessor in controlling the oven temperature.

- Microprocessor switches heater on
- Microprocessor receives data from temperature sensor
- Temperature of oven is compared with pre-set value by microprocessor
- If higher microprocessor switches heater off
- If lower microprocessor leaves heater on

Describe how the microprocessor uses data from the light sensor in a green house.

- Microprocessor compares light reading with preset value
- If lower than pre-set value microprocessor sends signal to switch on light bulb
- If higher than pre-set value microprocessor sends signal to switch off light bulb
- process is continuous/ monitoring of sensors is continuous

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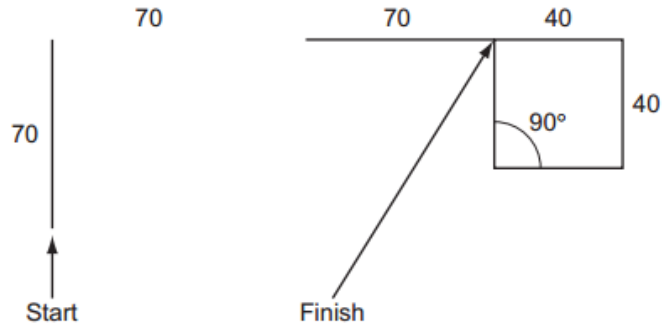
6.4 Microprocessors in Control Applications

Turtle Graphics

INSTRUCTION	MEANING
FORWARD *n*	Move *n* forward
BACKWARD *n*	Move *n* backward
LEFT *t*	Turn left *t* degrees
RIGHT *t*	Turn right *t* degrees
PENUP	Lift the pen
PENDOWN	Lower the pen
REPEAT *n*	Repeat the following instructions *n* times
END REPEAT	Finish the REPEAT loop

Tip: In this question you have to write out the remaining steps.

1st: Work out how many more steps you have to get around the shape. (8)
2nd : It is possible you may have to use a repeat to draw the shape.
3rd: Remember to end the repeat.




```
PENDOWN
FORWARD 70
RIGHT 90
PENUP
FORWARD 70
PENDOWN
FORWARD 70
REPEAT 4
FORWARD 40
RIGHT 90
END REPEAT
```

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6.4 Microprocessors in Control Applications

Turtle Graphics

A student wishes to use a floor turtle to draw this shape which has no two lines the same length:

Name four different instructions which the turtle graphics software could use in order to draw the shape. For each one explain the meaning of the instruction.

Tip: They may actual ask you to write possible instructions and the meanings to draw the shape shown.

INSTRUCTION	MEANING
FORWARD *n*	Move *n* mm forward
BACKWARD *n*	Move *n* mm backward
LEFT *t*	Turn left *t* degrees
RIGHT *t*	Turn right *t* degrees
PENUP	Lift the pen
PENDOWN	Lower the pen

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6.5 Modelling Applications

A computer model is a model which would replicate (simulate) the functions of a real system.

To save **costs** and **time** by **testing a system** before you build it.

e.g. Creating bridges

To **train** people how to use the system in a safe **controlled environment**.

e.g. Flight Simulators.

Why we use Computer Models?

To **investigate** the capabilities of the system in detail by **interrogating** and **manipulating** the computer model.

To make **predictions** of how the system would operate in the future.

e.g. Use of spreadsheets to track profit/loss over time

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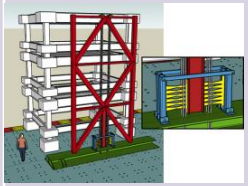
6.5 Modelling Applications

Type of Modelling Application		
Spreadsheets		• Business used can use spreadsheets to forecast spreadsheet models to forecast future profit or loss. • Due to the use of formulas business can adjust certain values to see automatic changes in potential revenue.
Flight Simulator		• Pilots are able to learn how to fly a plane using a flight simulator. • The controls and the interface is the same as real plane. • Different conditions can be tested. • Reduced costs as a plane would not be damaged in the training.
Building Simulator		• Before buildings are constructed simulations take place to ensure they are fit for purpose. • Simulations ensure the potential building could cope with physical demands including earthquake/storm threats.
Traffic Lights		• A traffic light simulator looks at the flow of traffic (data captured from sensors). • The simulator will adjust the lights to best control the flow of traffic.

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6.6 Applications in Manufacturing Industries

Robots are used in manufacturing to help to improve productivity, consistency (in terms of final finish) and to reduce overall running costs. Robots generally make the factory a much more safer environment for workers.

How Are Robots Used in a Factory?

1. **Lift heavy items**
2. **Assemble parts together**
3. **Paint items (Spraying)**
4. **Manufacturing Microchips**




Robots are programmed with a sequence of instructions. The programmer may guide the robot through each step physically or by controlling the robot by remote.

Exact sequence of movement is stored in the memory.

The robot is now able to carry out the same sequence of instructions over and over again.

Advantages	Disadvantages
• Robots can work 24/7 with the same consistency and accuracy compared to humans.	Robots cannot easily adapt to a situation which is beyond their sequence of instructions.
• Robots can be more productive than humans.	Robots can be expensive to buy and maintain.
• Robots can work in extreme conditions not suitable for humans.	Some workers may loose their jobs as robots can do more labor intensive jobs.
• Robots do not need to be paid.	People are deskilled due to robots doing more complicated jobs.

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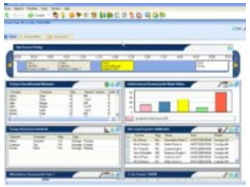
6.7 School Management Systems

School Management Systems are now used in schools by staff to complete a number of tasks on a daily basis.

Learner Registration and Attendance	• Teachers will be able to click on a particular class and complete the register. • Once this is saved then other users of the management system can see who has been register for that particular period. • This is useful as it allows teachers to see who should be attending their lessons. • Data of attendance can then be easily analysed.
Exam Timetables	• Exam Timetables can be produced using management systems and teachers who are not teaching could be easily allocated to invigilate exams.
Creating Timetables or Cover	• Timetables can be produced using management systems. • They are generally quicker to create and less prone to errors compared to a paper based system. • Timetables can also be produced cover classes when teachers are absent and lessons need to be covered.
Learner Performance	• Teacher are able to log student data (grades/applications/reports/behaviour) into a school management system. • This data is then available (central storage of data) to anyone other members of staff. • The data can analysed and reports can be produced.
Benefits to school/parents	• Parents are able to log in and access student reports online. • They can be kept up to date about exam results and general student progress in subjects. • Also they can receive immediate feedback. There would be no need for printed reports which would reduce costs.



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6.8 Booking Systems

Online booking systems use real time processing which allows users to make and confirm bookings instantly. Once payment has been received and booking is confirmed then booking can not be double booked.

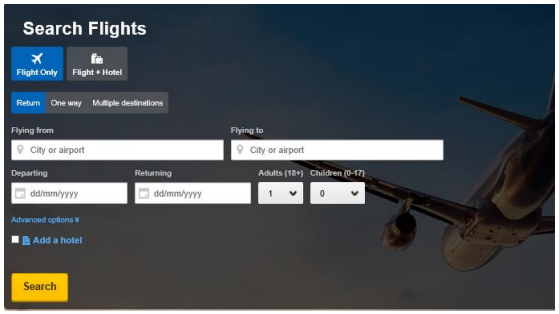
Example Uses:
Transport: Flight, Trains and Buses
Entertainment: Theatre, Cinema and Stadium
Accommodation: Hotels, Apartments and Villas

Advantages:	Disadvantages
• User can check availability of tickets and compare prices on comparison websites. • Confirmation message is sent instantly once payment has been authorised. • They prevent double booking as the process is real time. This means if somebody makes a booking then it instantly becomes unavailable. • You may receive special offers if you regularly book using a particular booking website.	• It may be difficult to cancel a booking and get your money back. • Online booking services have known to crash to high level of traffic to the website. • You are unable to receive specific advice on your booking if it is done online. • Websites may not be user friendly and may make the booking process more difficult.

Input: User will select the **requirements** of the booking. E.g. date of flights, Airports, Location etc.

Processing : involves checking if bookings are possible (availability)

Outputs:
booking confirmations /rejections alternatives/Payment



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6.9 Banking Applications

Electronic Fund Transfer (EFT) allows money to be transferred electronically from one account to another.
An example of EFT is when an Employer pays their employees their salaries.

Advantages:	Disadvantages
• No physical money is transferred which makes the transfer more secure. • Transfer of salaries can be regulated by the government (e.g. Used in Qatar to ensure employers are paying their employees on time). • Customers can set up standing orders (direct debit) to pay bills on specific dates.	• Money could be transferred from the incorrect account. • Incorrect amount of money could be transferred by mistake. • If you have a poor credit rating then you may not be declined to use EFT as a method of payment (e.g. paying monthly for a mobile phone contract).

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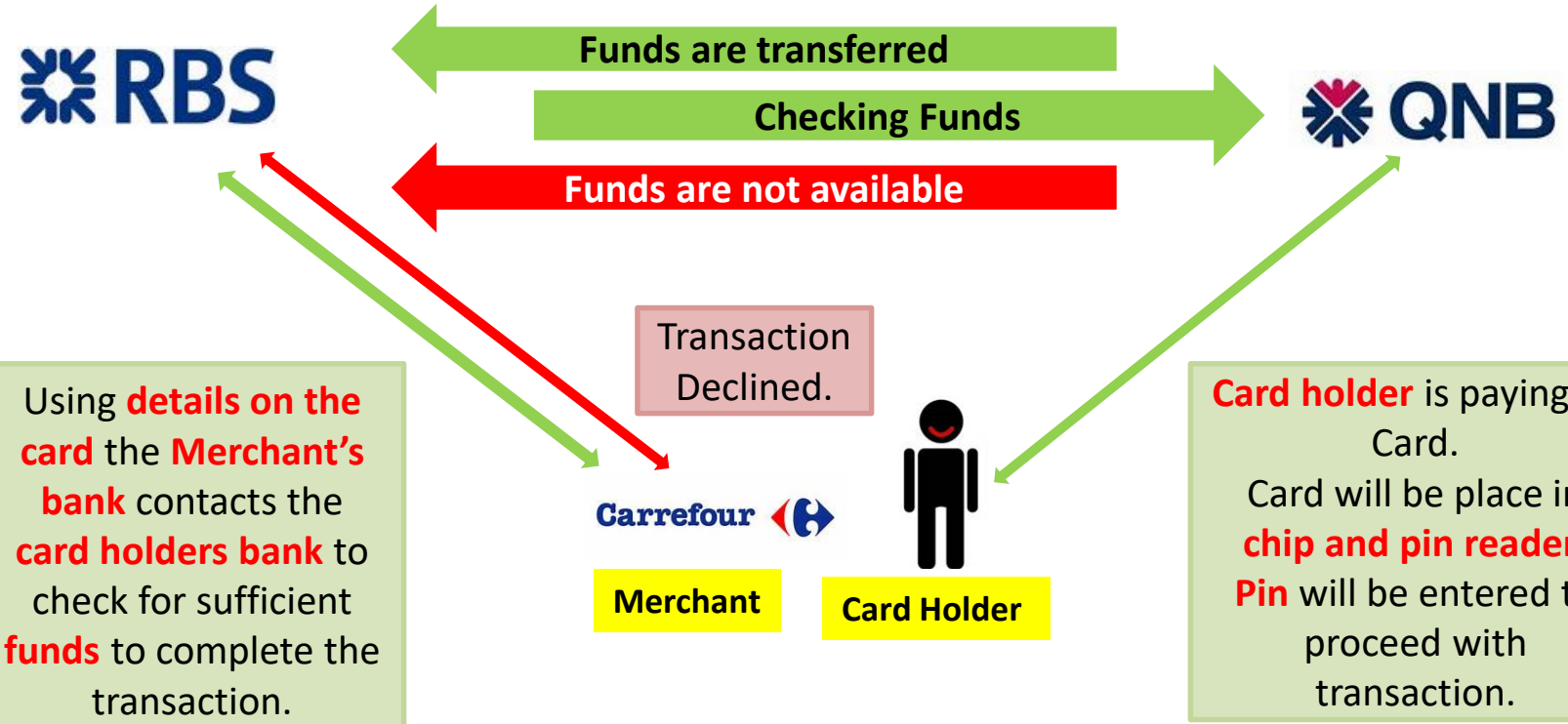
6.9 Banking Applications

Processing credit/debit card Transactions

QNB Customer's Bank (Card Holder's Issuing Bank)

RBS Merchants' Bank (Acquiring)



Using **details on the card** the **Merchant's bank** contacts the **card holders bank** to check for sufficient **funds** to complete the transaction.

Card holder is paying by Card.
Card will be place in **chip and pin reader**.
Pin will be entered to proceed with transaction.

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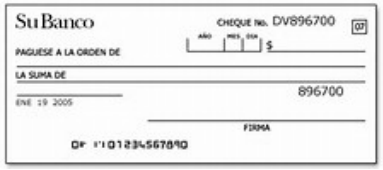
6.9 Banking Applications

Clearing of Cheques

You receive a check from your employer which you **pay into your bank account**.



You

QNB

The cheque is then sent to a **clearing centre** where it is **sorted** and **cheque data is created**.

RBS

The **cheque data is sent electronically to the payers bank** (the person who wrote the cheque).

Employer

RBS

RBS

The **payers bank checks** for **fraud** and also checks if **sufficient funds** are available.

RBS

If **funds are available** then the **money is sent electronically** to the **bank of the person who paid in the cheque.**

QNB

Money is received electronically from the **cheque payers bank and deposited into the account** of the person who **paid in the cheque**.

QNB

After **4 working days** the person who paid in the cheque should have access to the money.

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6.9 Banking Applications

ATM (Cash machines) can be used for various purposes (including cash withdrawal/deposit, checking/printing statement).

Customer may be asked to select a language.

The customer types in the PIN.

The PIN number is compared with the PIN stored in the chip. If Pin is the same then the customer can Proceed.

If not customer will be requested to re enter the Pin.

If Pin is correct then the customer will select a service.

Cash Withdrawal
Cash Deposit
Check Balance
Print Statement
Phone Topup

If customer selects the Cash Withdrawal then they are requested to select an amount to withdraw.

The customer's account is checked to see if it has sufficient funds.

The amount is also checked against the card limit or daily withdrawal limit.

If there are sufficient funds and the amount is within the card limit the required notes are issued.

Customer is requested if they would like a receipt. The card is then returned to the customer.

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6.9 Banking Applications

Banking		Advantages	Disadvantages
Online Banking    	Customers can now **access their bank accounts** online on secure websites using **authentication techniques**. Some banks have also developed online banking **applications** to allow customers to access their accounts via mobile phones and tablets. **Customers can use the on-line banking system to:** • Check their balance and print statements • Manage direct debits • Transfer money internally and externally to other accounts using EFT. • Apply for loans or credit cards.	• Can be accessed from various platforms and used 24/7 including whilst on the move. • Save time and costs- No Travelling or money spent on travelling or parking. • Statements can be downloaded from a given time period. • Several layers of authentication.	• Internet connection required. • Less personable for those who would prefer direct communication with a bank representative . • Your account could be hacked or passwords stolen from key logging software.
Phone Banking 	Phone banking is very similar to online banking in that customers can complete similar tasks. Customers will have to enter in their account details to authenticate them to the system. Then they will have to select from various options by the specified numbers keys.	• Can talk directly to a representative from the bank. • Ask additional queries which are not available online.	• Call costs • May be put on hold for a long time. • Call times (9am-5pm) are not flexible.

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6.10 Computers in Medicine

Type	Use of Technology	Advantages	Disadvantages
Information Systems in Medicine 	• Keeping **patient records** in a database so correct diagnosis can be given according to patients medical history. • Monitoring patients (**vital signs**) using measure and control systems • The use **of expert systems** to diagnose an illness.	• Computers can take more accurate an more frequent readings of patients. • Computers can respond quicker to any changes in patients condition. • Staff are available to complete other tasks. • Data can be stored in central place. • Saving physical space which would be required to stored paper records.	• Equipment could be expensive. • Training would be required. • Regular maintenance of the system would be required. • Systems could stop responding.
3D printers 	• **Surgical and Diagnostic Aids** • **Prosthetics** • **Tissue engineering** • **Artificial blood vessels** • **Designs of medical tools and equipment**	• Printing is relatively cheap. • Printing can be faster compared to manufacturing parts.	• Technology is still in the earl stages of development. • Limited selection of materials available.

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6.11 Computers in Libraries

Computers are used in libraries to keep a track on which books have been borrowed by which members. Databases software is typically used to store details of the books and the members.

Issuing of Books	Advantages:
• Books and members can be identified by unique barcodes which can be scanned in directly by barcode scanners. • When a book is taken out the bar code is scanned as well as the barcode on the members card. • The due date is worked out by the date the book was issued.	• Data from the books and the members are entered quickly and more accurately compared to manual methods.

Automatic Processing	Advantages:
• The library's database is checked on a daily basis to check which books are due. • Liberians can quickly check if a book is available to be borrowed or could provide specific dates to members when the book will be returned. • Automatic emails could be sent to the members to remind them of the due date.	• Members would be able to extend the lease period on the book borrowed online.

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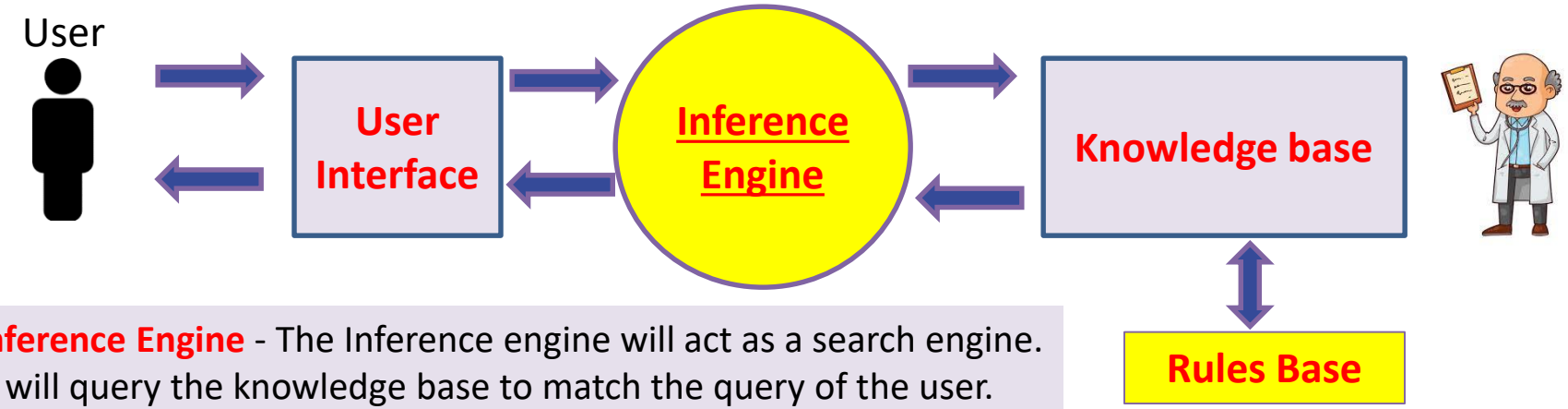
6.12 Expert Systems

Expert systems are used to provide expert opinions without the need for the expert by using a system allowing the user to query the knowledge base to find solutions to their problems.

User interface - Will allow user to interact with the system to receive feedback.
For example the user may be prompted to enter their symptoms for a medical issue.

knowledge base - Information is developed by experts based on a collection of facts and rules.
For Example a medical diagnosis expert system would be developed by doctors.



Inference Engine - The Inference engine will act as a search engine. It will query the knowledge base to match the query of the user.
Additional questions could be to user to provide a more specific diagnosis

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6.12 Expert Systems

Creating an Expert System

1. Data is gathered/collected from experts to create a knowledge base.
2. The rules base is designed/created based on the information from the knowledge base.
3. A user interface screen is designed/created which would provide the user with the ability to interact with the system.
4. The inference engine is designed/created as link between the user interface and the knowledge base.
5. The system is tested.

Examples

Car Diagnostic Expert System

Car engine will connected to the diagnostic expert system. The expert system will automatically test certain functions and provide feedback for repair.

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6.13 Computers in the Retail Industry

POS (Point of Sale) is the place a transaction takes place. Customers can pay by cash or using their debit/credit cards. Stock control systems can automatically update stock records when items are purchased at the POS.

Current Stock Level 10

Bar code scanner used to scan items at POS

6 Cans Purchased

When goods are sold at the POS the stock control system is automatically updated.

- 6 purchased cans

Current Stock Level 4

If Stock Falls Below 5 (Pre-set)

True: Reorder 10

Order is sent to the suppliers.

Suppliers address details stored in database.

The suppliers send a **delivery (10 cans of beans)** to the store.

Stock control system automatically updates the stock levels adding the **delivered goods**.

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6.13 Computers in the Retail Industry

EFTPOS (Electronic Fund Transfer Point of Sale) is when a customer uses a card to complete a transaction.

1. Customer gives **bank card to cashier at POS**.

2. The cashier **enters the card in to the chip and pin reader** and **confirms the value of the purchase**.

3. The customer is requested to **enter their pin**. If **Pin matches the Pin stored on the chip** then the transaction can continue.

4. The shops computer will use the **account details on the chip to connect to the customers bank account** and check the **balance**.

5. If funds are **sufficient** then the transaction will be **approved**.

6. The purchase amount is **subtracted from the customer's account** and **deposited into the shops banks account**.

7. Once the transaction is complete **receipt will be printed**. The cashier will give the card and receipt to the customer.

Pin entered has to be correct for the transaction to continue**. The card will also be checked for validity (expiry date/stolen).**

If **<u>funds are not available</u>** a declined message will be sent to the stores computer. The cashier will then request for another method of payment

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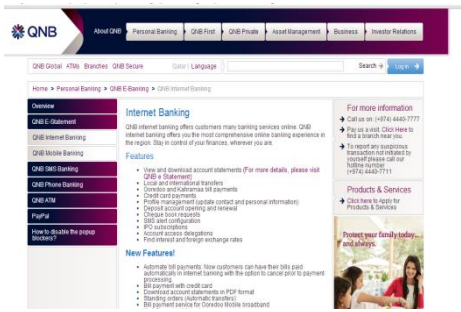
6.13 Computers in the Retail Industry

Internet banking and shopping is becoming more popular to users due to the development of the internet and the advancement of mobile internet technology.

Advantages	Disadvantages
• Internet is now available on **more platforms** including applications available on **phones and tablets**. • Internet can be **accessed 24/7.** • No need to **travel** (saves money on travel/parking) • **Saves time** (No need to que in the banks or shops) • Access to **wide range of goods** on the internet. • Useful for individuals who **find it difficult to travel** and goods can be **delivered directly to your home**. • People can **spend more time doing other leisure activities**.	• Online accounts **could be hacked/cards details could be stolen**. • Users require a **internet connection** and need to be **computer literate**. • Lack of **socialising/exercising**. • You can not **see the goods** before you buy (try on clothes). • **Delays in delivery**.

Effect on the company

- Less retail outlets required which means no rent or utility costs.
- Less staff required in retail outlets however specialist staff would have to be employed to maintain the website and run the dispatch department.
- Online presence would attract more customers (Global).
- Lack of customer interaction.



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ICT Applications

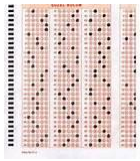
6.14 Recognition Systems

Recognition Systems are used to directly enter data into a computer system. Recognition systems tend to be more accurate and quicker method of entering data into a computer system compared to manual methods.

MICR

Magnetic ink which are found at the bottom of the checks are scanned in to MICR (Magnetic Ink Character Reader).

OMR



Pencil or pen marks are scanned in by the OMR (Optical Mark Reader).

OCR

Scanned text is converted into a format which can be edited.

RFID

Uses radio waves to capture and store information on a tag.

Number Plates

Sensors are used to detect a car (if its gone over the line) and a signal will be send to the microprocessor to **take the image of the number plate**.

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ICT Applications

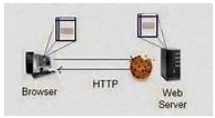
6.15 Monitoring and Tracking Systems

Reasons for Monitoring and Tracking Systems:

- **Surveillance (Potential Criminals/Terrorists)**
- **Tracking released prisoners to ensure they stay within an agreed location(Ankle monitors)**
- **Monitoring customers buying patterns.**

Key Logging

Key logging software monitors which **keys have been pressed**. **Passwords** and **personal details** can be **obtained for malicious** purposes by **hackers**.



Cookies

When a user visits a website a cookie is created which could **store the user browsing preferences**:

- Language settings
- Items in the shopping cart
- Links which have been click on

Cookies essentially **leave an electronic footprint** on user browsing habits.

Call Monitoring

Calls can be **monitored by police** as part of **surveillance operations**.

Calls may also be **monitored as training tool** in call centres to **improve employees performance** the **quality of the customer service**.

Number Plate Recognition

Number plates can be **tracked by cameras situated in specific locations** to keep **track of whereabouts of a specific individuals** to whom the car is licenced too.

ICT Applications

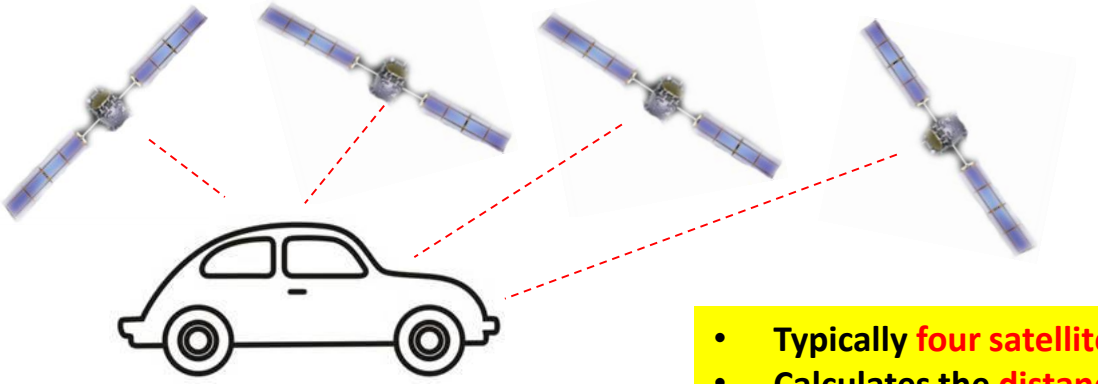
6.16 Satellite Systems

GPS (Global Positioning Systems)

GPS can **determine a specific locations** using **satellite navigation systems**.

- **Cars**, **Ships**, **Planes** can use GPS when **navigating to specific locations**.
- **Walkers** to **locate position on hills/mountains**.
- **Used by runners** to **calculate distance**.

Advantages:	Disadvantages
• Drivers do not have to use maps • GPS can re-route and find quickest routes. • Can provide useful locations of amenities (e.g Petrol stations)	• Loss of signal • Maps have to be updated (New roads may not be shown)



- **Typically four satellites must be visible to the receiver.**
- **Calculates the distance from a receiver to the satellite.**
- **Calculates the position of the receiver.**

ICT Theory – Revision Presentation – ICT Applications

ICT Applications

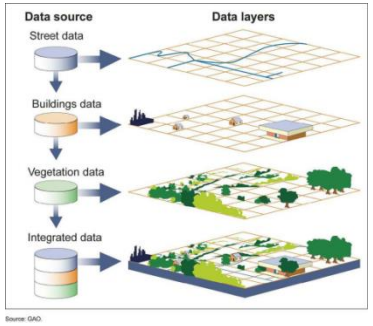
6.16 Satellite Systems

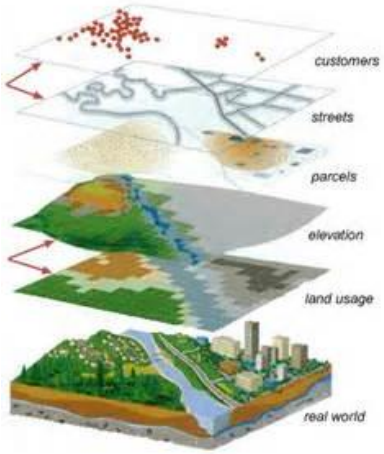
GIS (Geographic Information System)

GIS allows for **potential locations to be analysed based on specific queries**. GIS will allow users to see **specific details on a location**:

- **Road Networks**
- **Community Services (e.g. Schools)**
- **Environmental Features (e.g. Rivers)**
- **Properties Details (e.g. rental properties)**

GIS will then combine these specific details and allow the user to specify certain criteria about a particular location.





Business can use GIS to identify a suitable location for their business taking into consideration:

- **Road links which could be easily accessible for customers and suppliers.**
- **Proximity of Customers to potential retail outlets.**
- **Availability of potential retail outlets mapped by the GIS to give options to the business.**
- **Environmental features to avoid being close to flood risk zones.**