World of ICTs

IT- INFORMATION TECHNOLOGY

- Information technology relates to all means which facilitate information or data capture, processing, storage and communication or output.

ICT-INFORMATION AND COMMUNICATION TECHNOLOGY

- Information and communication technology refers to the combination of telecommunication and computing technologies to enhance communication.

USE OF COMPUTERS IN DIFFERENT FIELDS

- Art, leisure and entertainment

- Homes

- Offices

- Security

- Business

- Education

- Health care

- Politics and governance

- Industrial, technical and scientific uses

- Transport

- Communications

USE OF ICT IN ART, LEISURE AND ENTERTAINMENT

❖ Plan a vacation

❖ Read a book or magazine online

❖ Retouch a photograph

❖ Compose and edit a video which involves recording and adding special effects to music.

❖ Watch a video or a movie: computers produce movies that are interesting.

❖ Listen to music

❖ Play computer games many games simulate sports such as driving, war combat. The games give a player maximum pleasure in a virtual environment on the screen.

USE OF ICT IN HOMES

❖ Pay bills like water bills, electricity bills through the payment by phone services (PPS)

❖ Budgeting and personal financial management for example balance a cheque book, buy and sell stocks online, prepare taxes, manage investments and family budgets

❖ Entertainment for example through listening to music, watching movies and videos, playing games.

❖ Research and education for example help youngsters to read, write, count and spell, learn to speak a foreign language, produce assignments and report, take lessons on line.

❖ Personal and business communication for example organizing names and addresses, communicate with others.

USE OF ICT IN OFFICES

❖ Creating memos, letters and reports

❖ Create websites to provide selected information and advertise goods

❖ Use of document processing system to facilitate data entry

❖ Calculate payroll, prepare income statements and balance sheets

❖ Track inventory and generate invoices and receipts

❖ Use of telecommunicating so that employees can work away from a company's standard workplace

❖ Use of facsimile, electronic mail, electronic bulletin and video conferencing for communication.

❖ Present projects and ideas by means of presentation graphics software

USE OF ICT IN SECURITY

❖ Computer aided cameras for domestic and business premises security .

❖ Location of enemy positions/targets .

❖ Flying and directing fighter/combat planes by use of radar systems

❖ Manning of gates on business premises

❖ Directing missiles and ammunition by use of military laser and guided missile systems.

❖ Detecting weapons using devices like metal detectors and body scanners.

❖ Alarm systems and smoke detectors all rely on computer technology

ICT IN BUSINESS

- Storing business records like income statements, balance sheets, customers addresses, goods in stock.

- Communication with customers and other partners through e-mails.

- Advertising the business through computer aided presentastions and websites.

- Using telephone banking a customer can ring in to check account balances or pay a bill.

- Online banking or PC Banking can enable you to check on your cash flow.

- SMS banking enables customers use their mobile phones and request for services from the bank such as buying airtime, checking account balances.

- Using ATMs (automated teller machines), cash can be withdrawn at thousands of cash point machines all over the country.

- Millions of cheques are processed each day using MICR (Magnetic Ink Character recognition.)

- Salaries and bills can be paid automatically by Electronic Funds Transfer (EFT) Systems. By use of this system money is transferred from one bank account directly to another without any paper money changing hands.

ICT IN EDUCATION

- Simulations of experiments or real-life situations that may be hazardous.

- Electronic library system for searching, borrowing and returning books.

- The school administration and management system (SAMS) for keeping records of students and producing report cards or other related documents.

- Computer assisted instruction (CAI)-Under this teachers can use computers and other IT equipment to present teaching materials in a more interesting way.

- Computer assisted learning (CAL)-Under this students can use computers and appropriate software to learn at their own pace.

- Computer assisted assessment (CAA)-may involve gathering examination marks for printing mark sheets and writing online exams like graduate eligibility test.

- Distance learning: involves delivery of education from one location while learning takes place at other locations.

- Edutainment: This is a type of education software that combines education with entertainment.

- Access to the Internet and thousands of online databases for educational information.

- Links with other schools or colleges to facilitate education and research through exchange information leading to virtual universities.

ICT IN HEALTH CARE

- Maintaining patients' medical records in hospitals and clinics for example prescriptions and tests administered, hospital admissions, dietary requirements.

- Maintaining databases of organ donors and patients needing transplants mean that when an organ becomes available, a match can quickly be found.

- Implanting computerized devices such as pacemakers, artificial organs and artificial limbs to enable patients live longer and have a fuller life.

- Monitoring patients' vital signs in hospitals and at home 24-hours a day and sounding the alarm if vital signs change for the worse.

- Expert medical systems are used for research and to diagnose diseases often at remote locations far from the care of a specialist.

- Surgeons use computer-controlled devices to provide them with greater precision during operations, such as for laser eye surgery and robot-assisted heart surgery.

- Use of computers to model new drugs and test their effects thereby significantly reducing the time taken for new drugs to come onto the market.

- Doctors use the Web and medical software to assist with researching and diagnosing health conditions.

- Doctors use e-mail to correspond/ communicate with patients.

- Using web sites on computers to maintain lists of doctors and dentists to help you find the one that suits your needs.

- Use of computer aided surgery for training prior to performing surgery on live humans.

- Through telemedicine, health-care professionals in separate locations have live conferences on the computer. For example, a doctor at one location can have a conversation with a doctor at another location to discuss a medical condition.
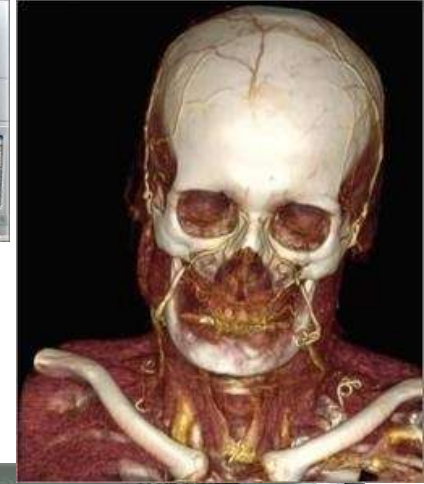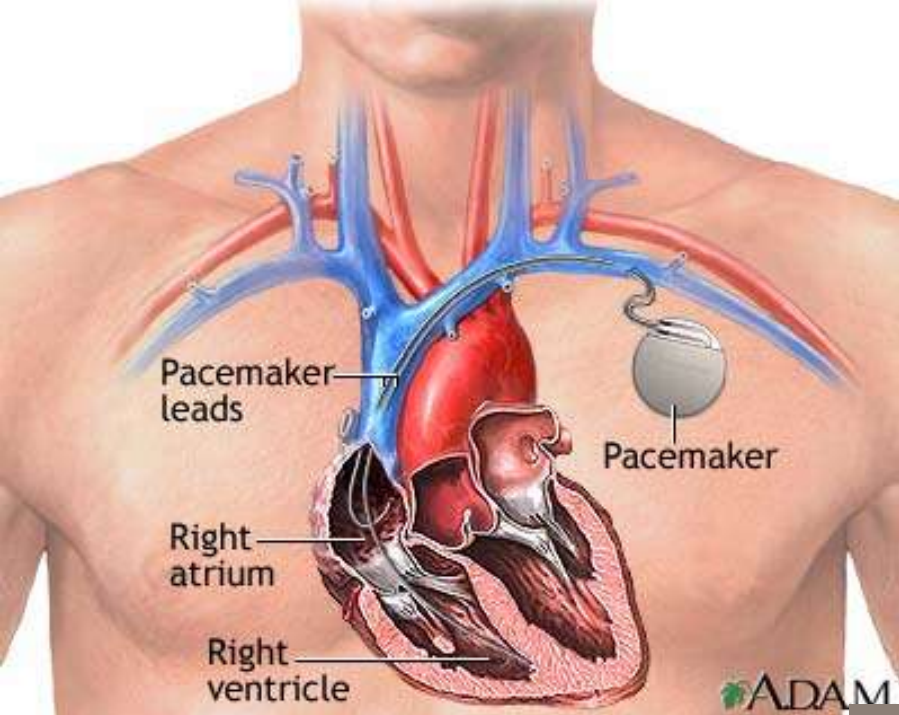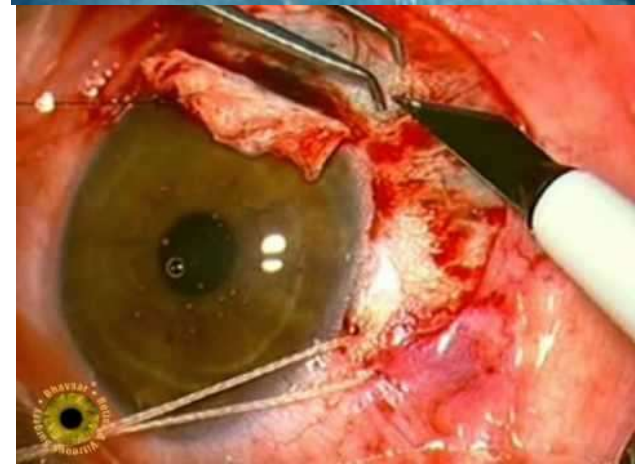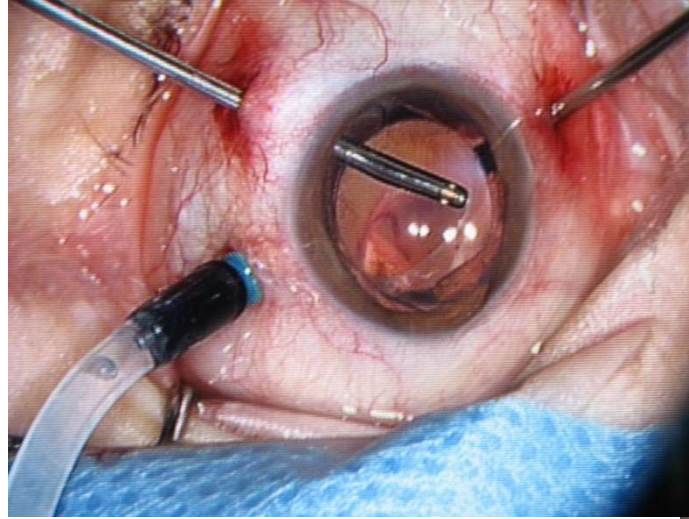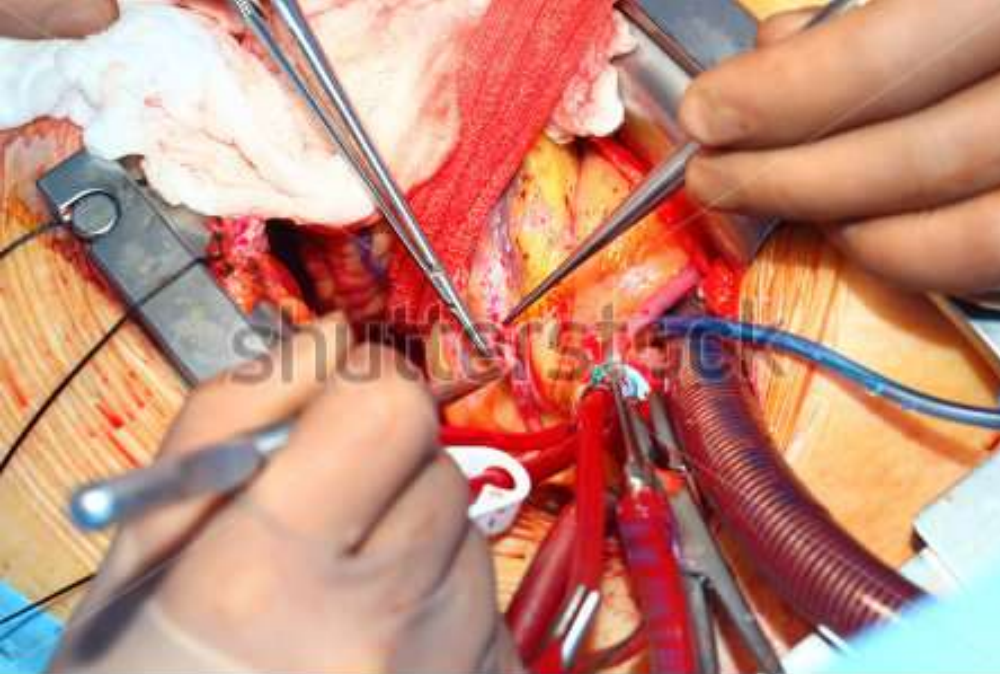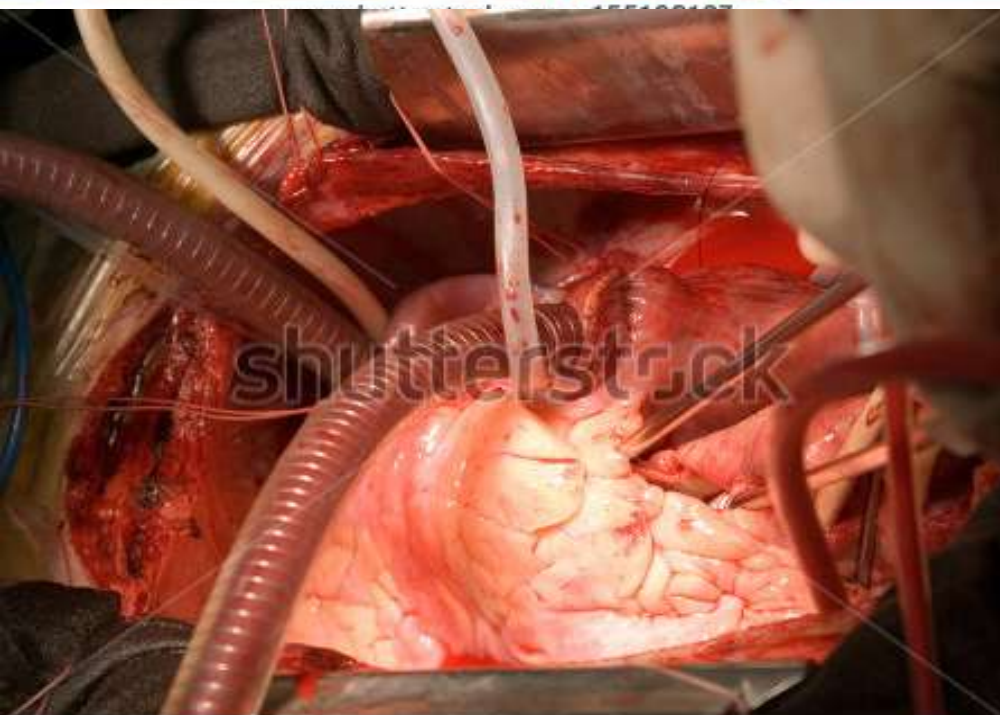
Pacemaker leads
Pacemaker
Right atrium
Right ventricle

ICT IN POLITICS AND GOVERNANCE

- A government provides society with direction by making and administering policies.

- To provide citizens with up-to-date information, most government offices have Web sites e.g. http://www.bou.or.ug for bank of Uganda.

- Employees of government agencies use computers as part of their daily routine. Uganda Revenue Authority officers use computers to collect taxes; UMEME uses computers to produce electricity bills

- Legislatures are using computers to manage proceedings and records keeping, enhance the communication process, improve tracking capacity, establish new deliberative platforms and promote better public accessibly.

- ICT has been used in Electronic Voting (also known as e-voting) which is a term encompassing several different types of voting, embracing both electronic means of casting a vote and electronic means of counting votes.

- ICT also helps to make courts system more accessible to the court users and the general public by making the judgments, hearing calendar, court procedures and case information available over the Internet.

- Ministries now use computer databases to pay workers and dispatch money for local governments as per the budget to be contributed by the government.

- The foreign affairs ministry communicates with the outside world regarding any matter using computers for example exchange of information for entry clearance certificates.

# ICT IN INDUSTRIAL, TECHNICAL AND SCIENTIFIC USES

- Process control involves use of computers to control ongoing physical processes like regulating temperature, pressure, fluid flow especially in petroleum refineries and chemical plants.

- Clocking for employee man-hours through card reading computer systems.

- Accident arresting through smoke, fire, poisonous gasses emissions detecting computer installations.

- Computers help to provide scientific data for example mapping the surface of earth from the orbit.

- Meteorologists use computers to forecast the weather as well as analyze experimental data to make accurate and reliable weather predictions.

- Manned and unmanned space explorations are aided by computers.

- Industrial simulations allow some activities that would otherwise be expensive and dangerous in real life situations to be put under test for example a car or plane crash test simulation done on the computer screen using a virtual model.

- Expert systems can be used in a number of ways from calculating the cost of a new multistorey office block to detecting when a batch of beer is ready for the next stage of the brewing process.

- Computer-aided designs are used in thousands of different applications from designing a new jumbo jet to the design of the most aerodynamic material for a ski racer's suit.

- Computer-aided manufacture enables components to be manufactured with the utmost precision for example use of robots to carry out assembly line operations.

- Robots are used in every kind of industry from car manufacture to sorting items on an assembly line. Robots may be used for spray painting, spot welding and car assembly.
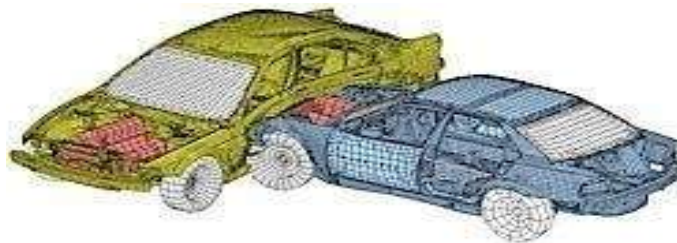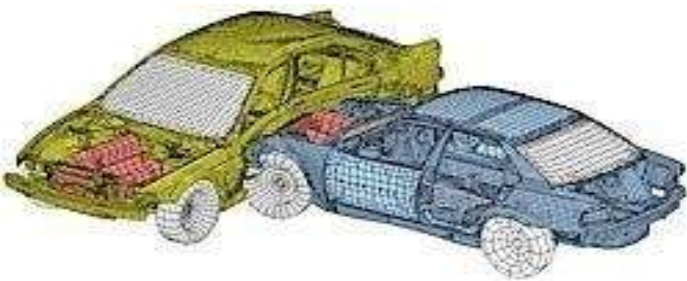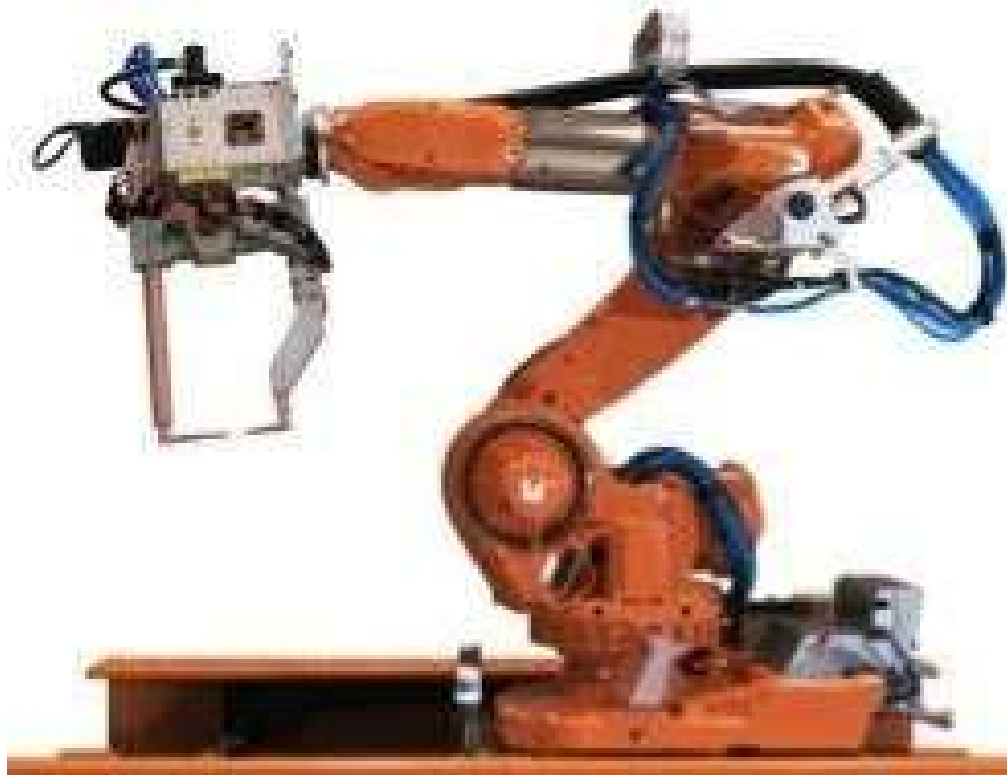
ICTS IN COMMUNICATION

- **Electronic mail**: electronic messages can be sent from one location to another on a data link.

- **Video conferencing**: people in different locations can have real time conversations including a video and audio feed.

- **Faxing:** documents can be sent from one location to another over a telephone line connection.

- **Voice mail:** one can leave a voice message for one or more people.

- **Social networks:** users can connect with other users who are friends, relatives or who share similar interests.

ICT IN TRANSPORT

- Monitoring highway traffic on busy roads.

- Designing infrastructure for example building better bridges, dams and roads.

- Keeping traffic schedules for vessels, trains, aeroplanes and buses at their respective stations.

- Providing current traffic alerts and emergence calls.

- Traffic light systems coordinate timing of traffic.

- Handling, managing and distribution of cargo at airports, bus stops and train stations.
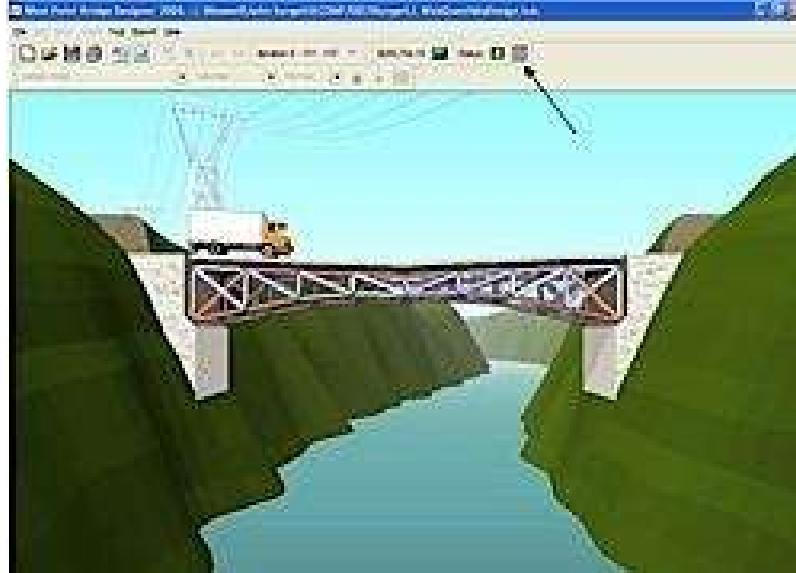
IMPLICATIONS OF USING ICTS

- Along with the many benefits, the use of information technology has often had an impact that has caused concern and influenced people's lives in a negative way.

AUTOMATED PRODUCTION

Advantages of automated production

- Increased efficiency due to the balancing of workload and production capacity

- Improved customer service. Adequate and high quality goods are produced on time

- Efficient utilization of resources such as raw materials, personnel and equipment hence less expenses incurred

Disadvantages of automated production

- High initial cost of setting up an automated system like the cost of buying one industrial robot

- May lead to unemployment in some areas that are labour intensive

IMPLICATIONS OF USING ICTS IN EDUCATION

ADVANTAGES

- Teachers can show experiments that are difficult to perform or dangerous in nature with multimedia.

- Students can learn by themselves when the teacher is not available.

- Students can learn and proceed at their own pace.

- Teachers can present subject matter and explain abstract concepts more clearly with multimedia.

- Students can usually get their results immediately after they have answered the question or taken an action.

- There are rich educational resources on CD-ROMs and the Internet.

- Once the package is paid for, it can be cost effective as few teachers are needed.

- Computers are endlessly patient.

DISADVANTAGES USING ICT IN EDUCATION

- Students can only follow what the CAL packages are predefined to offer.

- Face-to-face interaction between students and teachers may be reduced.

- Increased costs of education and learning.

- Wastage of study time doing or engaging in unproductive work.

- Exposure to illicit material as students adopt negative behaviours

IMPLICATIONS OF USING ICTS IN BUSINESS

ADVANTAGES

- Vast quantities of data can be stored in small amounts of space

- Computers remove the need for huge quantities of paper-work

- Computers can do the work of many people which saves expenses in wages

- The Internet means that companies can share data or even hold meetings in different countries without actually leaving the office

DISADVANTAGES

- Computer failures due to power outages, crashes or viruses can lead to data loss

- Computers can create distractions, especially if employees are provided with full Internet access.

- Security has to be provided to protect personnel and staff from an authorized access.

- Individual privacy may be abused in cases of confidential data on the computers.

- Some staff has to be trained or retrained which adds to operational costs.

- Some jobs may be lost due to use of computers and this can lower the morale of staff members.

IMPLICATIONS OF USING ICTS ON COMMUNICATION

ADVANTAGES

- Easy to make **new friends** in chat-rooms.

- Easy to find people with the **same interests or hobbies** as you in specialist chat-rooms.

- **Cheap Internet phone calls** can be made using VoIP-voice over internet protocol.

- Easy to **spread the news of social events** using social networking.

- **Old or disabled people** can **still interact** without having to leave their homes.

DISADVANTAGES

- You don't actually meet people face to face as much. This is known as **'social-isolation'**.

- Interacting through a computer **does not require much physical activity** and can lead to health problems like **obesity**.

IMPLICATIONS OF USING ICTS IN HOMES

ADVANTAGES

- **Elderly or disabled** people can still carry out day-to-day tasks such as **shopping** and **paying bills**.

- You can find entertainment even if you cannot go outside due to **bad weather**.

- You can carry out **day-to-day tasks** even **if you are sick**.

DISADVANTAGES

- You don't actually meet people face to face as much. This is known as **'social-isolation'**.

- Not leaving the house is bad for you - **lack of exercise** etc.

IMPLICATIONS OF USING ICTS IN HEALTH CARE

ADVANTAGES

- Improved the quality of patient care because the records are more accurate.

- Tens of thousands of people live longer and have a fuller life due to computerized devices.

- Vast amounts of data on symptoms and illnesses are stored in a 'knowledge base' which can help a doctor to arrive at a preliminary diagnosis.

- Computer-controlled devices provide greater precision during operations, such as robot assisted heart surgery.

- Computers can model new drugs and test their effects, significantly reducing the time taken for new drugs to come onto the market.

DISADVANTAGES

- Computers often will distract from interaction with patients as the nurse, aid, or doctor will spend more time chatting.

- When computers fail more strain is put on the staff to perform the same function the same way when they are running.

- Illegal or unauthorized access to patients reduces patients privacy

IMPLICATIONS OF USING ICTS IN POLITICS AND GOVERNANCE

- ICTs improve the efficiency of the government institutions and in return save money and time through better communications.

- Citizens can obtain information at a faster speed and it is possible at any time of the day.

- In addition, moving away from a heavily paper based system to an electronic system would reduce the need for man power.

- It is more convenient to pay your bills or apply for disability benefits when sitting in front of your computer instead of going to the closest relevant office

- In addition, there are cost savings in operating a virtual agency instead of renting (or building from scratch) an office and paying for all of its utilities.

DISADVANTAGES

- An electronic government loses the person to person interaction which is valued by a lot of people.

- Literacy of the users and the ability to use the computer, users who do not know how to read and write would need assistance.

- There is potential for a reduction in the usability of government online due to factors such as the access to Internet.

- Requirements like hardware, software, internet access are costly to invest.

EFFECTS OF ICT ON EMPLOYMENT

- Fewer workers needed to achieve the same amount of work

- Automation in factories (robots doing the work of people)

- Increased telecommuting (working from home)

- Increased need for highly trained ICT specialists

- Decreased need for 'labor intensive' workers (like filing, printers etc)

- Need for workers to be trained more frequently (to keep up with the changes in ICT)

- Fewer 'face-to-face' meetings as video conferences can be held over the Internet (reduced travel time and cost)

AREAS OF INCREASED EMPLOYMENT

a) Network Managers / Technicians: Network managers make sure that computers on the network run smoothly and are secure.

b) Help-Desk Staff

Computer and software companies have help-desks staffed by trained operators who can give advice on using computers and software.

c) Web Design: The Internet has seen a huge demand for both commercial (business) and personal web sites. Web designers create these sites and keep them up to date.

d) Systems Analyst: These workers are responsible for designing new ICT systems.

e) Programmers: Programmers create all the software that can be used on a computer.

f) Computer Engineers: Engineers are needed to build the high-tech computers that we use today.

AREAS OF INCREASED UNEMPLOYMENT

a) Manual Repetitive Jobs: Factory manufacturing, spraying, welding, packing and assembling have seen robots replacing humans.

b) Shop Work: Online shopping (like Amazon) has caused a reduction in the number of shops found on our high streets. More and more people are shopping online because is it generally cheaper and they can get goods delivered.

c) Bank Cashiers: Use of ATM's have reduced the need for bank cashiers.

d) Office Work: Traditional office workers such as typists and filers have been replaced by computers.

e) Telephone Exchange: Telephone operators have been replaced by computer systems that make telephone connections automatically.

BELL TELEPHONE SYSTEM — WAR CALLS COME FIRST

f) Library Work: With the launch of e-books (electronic books) the future of traditional libraries could be at risk. People could easily download an electronic book instead of having to visit a library.

g) Accounting Clerks

- Companies once had large departments full of people whose job it was to do **calculations** (e.g. profit, loss, billing, etc.) A personal computer running a **spreadsheet** can now do the same work.

h) Newspaper Printing

- It used to take a team of **highly skilled printers** to typeset (layout) a newspaper page and to then print thousands of newspapers. The same task can now be performed far more **quickly** using computers using **computer- controlled printing presses**.

IMPLICATIONS OF ICT ON SCIENTIFIC, INDUSTRIAL AND TECHNICAL USES

ADVANTAGES

- ICT enhances flexibility through easier data storage and retrieval.

- ICT enhances making quick changes/set-ups

- Reduce labour costs since robots in manufacturing plants can do tasks requiring thousands of human beings.

- Up to date information for both manufacturers and retailers is available through web sites and computer networks.

- Quality monitoring and measuring via remote cameras is enabled improving product quality.

- Computers are automatic therefore; robots are used for repetitive/dangerous tasks thereby improving working conditions.

DISADVANTAGES

- Security of data is limited

- Risk of data corruption

- Initial investment – plant and training are costly

IMPLICATIONS OF ICT ON ENVIRONMENT

- One of the earliest initiatives toward green protecting the environment from effects of computing was the voluntary labeling program known as Energy Star.

- It was conceived by the Environmental Protection Agency (EPA) in 1992 to promote energy efficiency in hardware of all kinds.

GREEN COMPUTING

- Green computing is the environmentally responsible use of computers and related resources.

PROPONENTS OF GREEN COMPUTING EMPHASIZE:

- Try to do computer-related tasks during close blocks of time, leaving hardware off at other times.

- Power-up and power-down energy-intensive peripherals such as laser printers according to need.

- Use liquid-crystal-display (LCD) monitors rather than cathode-ray-tube (CRT) monitors.

- Use notebook computers rather than desktop computers whenever possible.

- Use the power-management features to turn off hard drives and displays after several minutes of inactivity.

- Minimize the use of paper and properly recycle waste paper.

- Dispose of e-waste according to regulations.

- Telecommuting once or twice a week

WHAT ARE THE BENEFITS OF GREEN COMPUTING?

- Reduced energy usage results into lower carbondioxide emissions saving the environment.

- Conserving resources means less energy is required to produce, use, and dispose of products.

- Saving energy and resources saves money.

- Green computing even includes changing government policy to encourage recycling and lowering energy use by individuals and businesses.

- Reduce the risk existing in the laptops such as chemicals known to cause cancer, nerve damage and immune reactions in humans.

SOCIAL/ETHICAL IMPACT OF ICT

- Destruction of craftsmanship where computers have taken over man's ability to do even simple tasks.

- Change of working patterns like change of work schedules.

- Erosion of traditional moral values, marriage values, sex values (homosexuality, lesbianism)

- Use of computer based communication systems has affected traditional ways like use of the post offices.

- Access to uncensored material as opposed to the well guarded traditional norms and values.

OTHER ETHICAL ISSUES REGARDING ICTS

a) National Identity cards

Argument for:

- It is argued that it will reduce crime and terrorism.
- It will also be convenient for opening bank accounts and so on as proof of identity.
- Have one ID card rather than the usual driving license and passport to prove your identity

Argument against:

- Citizens should not have to prove who they are wherever, whenever
- We already have documents to prove ID - passport, driving license, so why another one
- It is expensive.
- It may not be secure - there is a chance of fake ID cards being used for identity theft

B) CCTV - Closed Circuit Television

The argument for them is that:

- Reduce crime in the street

- Reduce theft from shops

- Improve safety and security

C) DIGITAL DIVIDE

- Digital divide refers to the gap between those who have ready access to computers and the Internet, and those who do not.

- The term also describes the discrepancy between those who have the skills, knowledge and abilities to use the technologies and those who do not.

ADVANTAGES OF USING ICTS

- The high reliability of components inside modern computers enables computers to produce consistent results

- Tasks can be completed faster because computers work at high speeds

- Provided the data entered is correct, computers process large amounts of data and generate error free results.

- Computers with communicating capability can share data and information with other computers

- Computers can store large amounts of data for future use

- Tasks can be completed with little human intervention

DISADVANTAGES OF USING ICTS

- Failure of computer components may lead to a delay or halt in operations
- Individual privacy may be abused in cases of confidential data on the computers
- Some staff has to be trained or retrained which adds to operational costs.
- Some jobs may be lost due to use of computers and this can lower the morale of staff members
- Initial investment costs can be high
- Face-to-face interaction among staff may be reduced
- Easier transmission of computer viruses through the Internet and other computer networks

SAFETY ISSUES WHEN USING COMPUTERS

There are a number of safety issues that can arise from using ICT devices.

Some of these safety issues include:

- Electrocution
- Tripping over wires
- Heavy equipment falling on you
- Fire risks

A) ELECTROCUTION

- Most ICT devices require an electrical power source. Whenever you have electrical power sources you run the risk of the electrocution.

Causes of Electrocution

- Faulty equipment (bare wires).
- Spilling drinks over electrical equipment.
- Opening up an electrical device when you don't know what you're doing.

How to Prevent Electrocution

- Make sure wires are insulated.
- Keep drinks away from equipment.
- Report any malfunctioning equipment to a technician.
- Never open up an electrical device without thorough knowledge.

B) TRIPPING OVER WIRES AND CABLES

- ICT devices with wires can make a room a potential hazard. Trailing wires are easy to trip over if they are not secured or tucked away.

Causes of tripping over wires

- Long wires spread across a floor.

How to prevent tripping over wires

- Hide wires in cable ducts.

- Tuck trailing wires under desks or carpets.

- Use wireless technology to eliminate   the use of wires altogether.

C) HEAVY EQUIPMENT FALLING ON YOU

- Some ICT devices (like computer screens) are fairly heavy and can cause injury if they fall on you. Equipment should be positioned securely on strong desks and tables well away from the edge.

Causes of equipment falling

- Equipment not positioned securely onto desks.
- Poor quality and desks that are not strong enough.

How to prevent equipment falling

- Make sure that equipment is positioned away from the edge of desks.
- Use strong desks/tables that can support the weight with ease.

D) FIRES

ICT devices require power from a mains outlet. If too many devices are plugged into a single mains at the same time it is possible to overload the circuit and start an electrical fire.

Causes of fires

- Too many devices plugged into a single mains outlet.
- Leaving devices plugged in unattended for long periods.
- Covering air vents on devices like laptops.

How to prevent fires

- Make sure that your room has plenty of mains outlets.
- Don't plug too many devices into the same outlet.
- Turn off and unplug devices if you are going to be away for a long time.
- Have a CO_2 fire extinguisher at hand.
- Leave air vents on devices uncovered.

ICT AND HEALTH RISKS

There are a number of safety hazards linked with using computers and ICT devices resulting from prolonged.

- Eye defects
- Techno stress
- Body pains
- Headaches

- Back pain
- Wrist pain
- Repetitive
- Fatigue
- Germs from the keyboard
- strain injury

REPETITIVE STRAIN INJURY (RSI)

RSI causes **painful swelling of the wrist and fingers**. Sufferers with really bad

RSI are unable to use their hands at all.

RSI is caused by **doing the same small movements over and over again** across a long period of time. For example, clicking a mouse button repeatedly.

Computer users who **type** and **use a mouse all day long** are commonly affected.

Causes of RSI

- Typing on a computer for too long.
- Using a mouse for long periods.
- Holding the mouse incorrectly.
- Working in a cramped workspace.

How to prevent RSI

- Take breaks to rest your hands.
- Use an ergonomic keyboard/mouse.
- Arrange your workspace so you are not cramped.
- Use a wrist rest.

BACK AND NECK PROBLEMS

- Back ache and neck ache can cause great pain and really affect the quality of your life. Both back and neck ache can be caused by sitting incorrectly and using poor quality chairs without back rests. This is called poor posture

Causes of back and neck ache

- Working in a cramped workspace.

- Not sitting upright in your chair.

- Incorrect positioning of the computer screen.

How to prevent back and neck ache

- Take regular breaks to stretch your body.

- Use adjustable chairs so you can sit in a position suitable for your height.

- Sit upright against the back rest.

- Tilt the computer screen so it is set just below your

eye level.

- Keep your feet flat on the floor.

Bad Posture   Good Posture
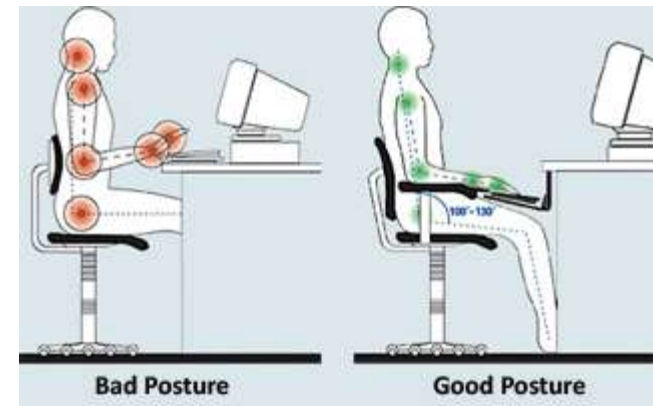
EYE STRAIN AND HEADACHES

Staring at a computer screen for too long can

strain your eyes and cause headaches. Eye strain can cause your vision to blur.

Causes of eye strain

- Staring at a computer screen for a long time.
- Working in a room with bad lighting.
- Using a computer screen with glare or flickers.
- Dirt on the screen.

How to prevent eye strain

- Take regular breaks (every hour or so).
- Use LCD screens rather than CRT as they have less flicker.
- Use an anti-glare screen.
- Ensure that room lighting is good with no direct light causing glare on the screen.
- Keep the screen clean of dirt.
- Have eyes tested regularly.

ERGONOMICS

- Ergonomics refers to incorporating comfort, efficiency and safety into the design of hardware in a work place. Five aspects of ergonomics: Safety, Comfort , Ease of use , performance and Aesthetics (beauty)
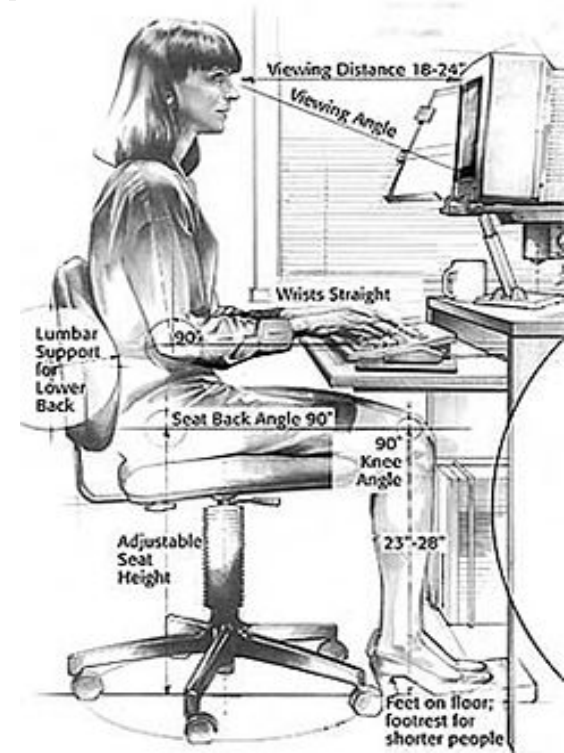
COMPUTER USE ETHICS

- Computer use ethics refer to moral guidelines that govern the use of computers and information systems.

- Not to use a computer to harm other people.
- Not to interfere with other people's computer work.
- Not to snoop around in other people's files.
- Not to use a computer to steal.
- Not use a computer to bear false witness.
- Not to use or copy software for which you have not paid.
- Not to use other people's computer resources without authorization.
- Not to appropriate other people's intellectual output.
- Think about the social consequences of the program you write.
- Use a computer in ways that show consideration and respect.

Study questions

- Identify three health problems associated with use of computers.

- Mention three symptoms, causes and solutions to avert each of the mentioned problem.

- Define the term ergonomics as used with reference to computer use and design.

- List down three major aspects involved in ergonomics.

- What are computer use ethics?

- Outline four computer use ethics that you know.