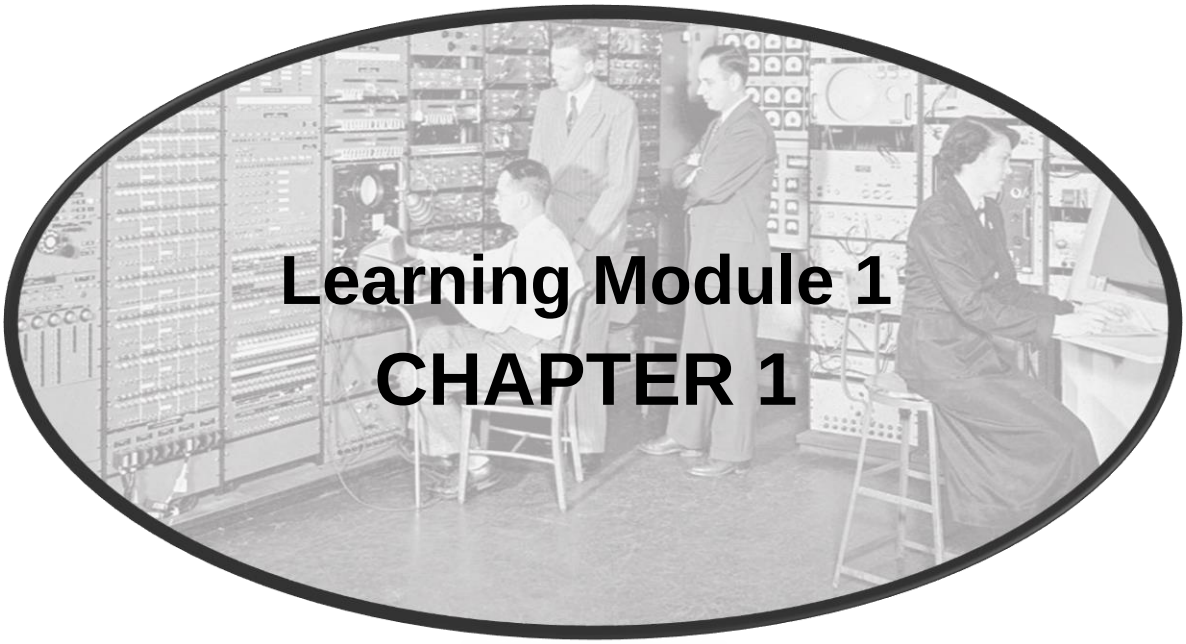
Course Code: ES 3

Course Title: COMPUTER FUNDAMENTALS AND PROGRAMMING



Learning Module 1
CHAPTER 1

MODULE OVERVIEW

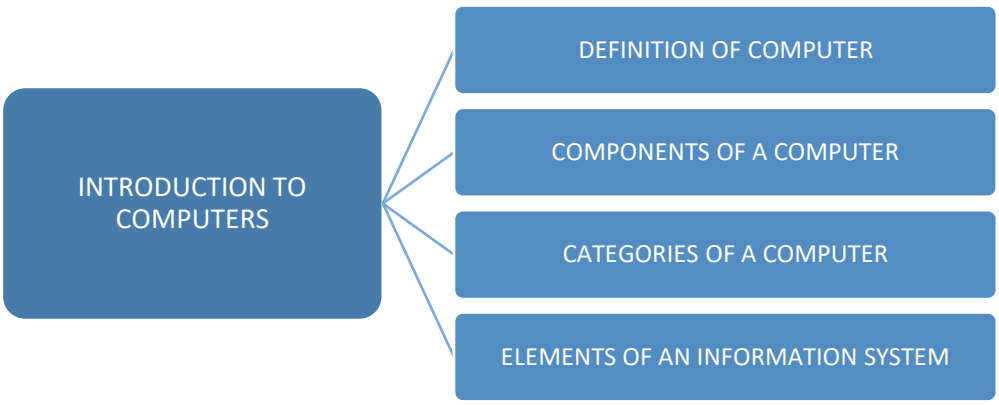
We are currently in the digital age and computers has become a basic tool in most if not all industries. This module will teach the students basic information in Computer parts and accessories. Basic software like Microsoft Word, and Microsoft Excel will also be discussed in this module along with simple Laboratory Exercise that may be done by the students themselves. This module has different sections, Learning outcomes enumerates the different competencies the student must acquire after every chapter. Module map is a learning guide for the topics that will be discussed in the chapter. Introduction gives a brief description of the chapter. Self-assessment questions must be answered to gauge the existing knowledge of the student. Lessons are the topics and is paired with activity to ensure that the students are able to grasp the topics discussed and lastly reference where the references for the chapter is listed. All the answers on the activities must be handwritten on a long bond paper. These are to be submitted before the scheduled mid-term exam.

LEARNING OUTCOMES

After completing this chapter, the student shall be able to:

1. Explain why computer literacy is vital to success in today's world
2. Define the computer and describe the relationship between the data and information
3. Discuss how society uses computers in education, finance, government, health care, science, publishing, travel and manufacturing.

MODULE MAP



INTRODUCTION

Engineering drawing is a crucial subject for engineering students. In the practice of Engineering, the professional will be looking at different kinds of plans. Drawing is considered to be a universal language, if you show a drawing of a dog to a foreigner who speaks a different language they will easily understand what it is despite of the differences in language. Plans are basically drawings that are prepared by a designer detailing the specifications of a project. If a drawing is not complete, of the details presented are not in order, plans may easily be misinterpreted and the outcome might differ from the design thought of by the designer. Under this chapter, the students will be introduced to the different concepts in engineering drawing that will be useful once they are already in the professional world either as a planner/designer and implementor/contractor.

SELF ASSESSMENT QUESTION

1. What is a computer?
2. What are the advantages and disadvantages of using/owning a computer?

LESSON

Lesson 1. INTRODUCTION TO COMPUTERS

Computers are everywhere: at work, at school, and at home. People use all types and sizes of computers for a variety of reasons and in a range of places. While some computers sit on top of a desk or on the floor, mobile computers and mobile devices are small enough to carry. Mobile devices, such as many cell phones, often are classified as computers. Computers are a primary means of local and global communication for billions of people.

Consumers use computers to correspond with businesses, employees with other employees and customers, students with classmates and teachers, and family members and military personnel with friends and other family members. In addition to sending simple notes, people use computers to share photos, drawings, documents, calendars, journals, music, and videos. Through computers, society has instant access to information from around the globe. Local and national news, weather reports, sports scores, airline schedules, telephone directories, maps and directions, job listings, credit reports, and countless forms of educational material always are accessible. From the computer, you can make a telephone call, meet new friends, share opinions or life stories, book flights, shop, fill prescriptions, file taxes, take a course, receive alerts, and automate your home.

At home or while on the road, people use computers to manage schedules and contacts, listen to voice mail messages, balance checkbooks, pay bills, transfer funds, and buy or sell stocks. Banks place ATMs (automated teller machines) all over the world, so that customers can deposit and withdraw funds anywhere at anytime. At the grocery store, a computer tracks purchases, calculates the amount of money due, and often generates coupons customized to buying patterns. Vehicles include onboard navigation systems that provide directions, call for emergency services, and track the vehicle if it is stolen.

People also spend hours of leisure time using a computer. They play games, listen to music or radio broadcasts, watch or compose videos and movies, read books and magazines, share stories, research genealogy, retouch photos, and plan vacations.

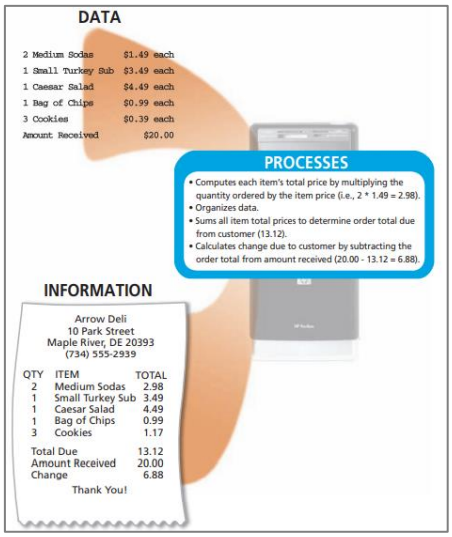
As technology continues to advance, computers have become a part of everyday life. Thus, many people believe that computer literacy is vital to success in today's world. Computer literacy, also known as digital literacy, involves having a current knowledge and understanding of computers and their uses. Because the requirements that determine computer literacy change as technology changes, you must keep up with these changes to remain computer literate.

1.1 Computer Definition

A computer is an electronic device, operating under the control of instructions stored in its own memory, that can accept data, process the data according to specified rules, produce results, and store the results for future use.

1.2 Data and Information

Computers process data into information. Data is a collection of unprocessed items, which can include text, numbers, images, audio, and video. Information conveys meaning and is useful to people. Many daily activities either involve the use of or depend on information from a computer. Computers process several data items to print information in the form of a cash register receipt.



1.2 Components of a Computer

Input Devices

An input device is any hardware component that allows you to enter data and instructions into a computer. Five widely used input devices are the keyboard, mouse, microphone, scanner, and Web cam. A computer keyboard contains keys you press to enter data into the computer. For security purposes, some keyboards include a fingerprint reader, which allows you to work with the computer only if your fingerprint is recognized. A mouse is a small handheld device. With the mouse, you control movement of a small symbol on the screen, called the pointer, and you make selections from the screen. A microphone allows you to speak into the computer. A scanner converts printed material (such as text and pictures) into a form the computer can use. A Web cam is a digital video camera that allows you to create movies or take pictures and store them on the computer instead of on tape or film.

Output Devices

An output device is any hardware component that conveys information to one or more people. Three commonly used output devices are a printer, a monitor, and speakers. A printer produces text and graphics on a physical medium such as paper. A monitor displays text, graphics, and videos on a screen. Speakers allow you to hear music, voice, and other audio (sounds).

System Unit

The system unit is a case that contains the electronic components of the computer that are used to process data. The circuitry of the system unit usually is part of or is connected to a circuit board called the motherboard. Two main components on the motherboard are the processor and memory. The processor, also called a CPU (central processing unit), is the electronic component that interprets and carries out the basic instructions that operate the computer. Memory consists of electronic components that store instructions waiting to be executed and data needed by those instructions. Although some forms of memory are permanent, most memory keeps data and instructions temporarily, which means its contents are erased when the computer is shut off.

Storage Devices
Storage holds data, instructions, and information for future use. For example, computers can store hundreds or millions of customer names and addresses. Storage holds these items permanently. A computer keeps data, instructions, and information on storage media . Examples of storage media are USB flash drives, hard disks, optical discs, and memory cards. A storage device records (writes) and/or retrieves (reads) items to and from storage media. Drives and readers/writers, which are types of storage devices, accept a specific kind of storage media. For example, a DVD drive (storage device) accepts a DVD (storage media). Storage devices often function as a source of input because they transfer items from storage to memory. A USB flash drive is a portable storage device that is small and lightweight enough to be transported on a keychain or in a pocket. The average USB flash drive can hold about 4 billion characters. You plug a USB flash drive in a special, easily accessible opening on the computer. A hard disk provides much greater storage capacity than a USB flash drive. The average hard disk can hold more than 320 billion characters. Hard disks are enclosed in an airtight, sealed case. Although some are portable, most are housed inside the system unit. Portable hard disks are either external or removable. An external hard disk is a separate, freestanding unit, whereas you insert and remove a removable hard disk from the computer or a device connected to the computer. An optical disc is a flat, round, portable metal disc with a plastic coating. CDs, DVDs, and Blu-ray Discs are three types of optical discs. A CD can hold from 650 million to 1 billion characters. Some DVDs can store two full-length movies or 17 billion characters. Blu-ray Discs can store about 46 hours of standard video, or 100 billion characters. Some mobile devices, such as digital cameras, use memory cards as the storage media. You can use a card reader/writer to transfer the stored items, such as digital photos, from the memory card to a computer or printer.

Communications Devices
A communications device is a hardware component that enables a computer to send (transmit) and receive data, instructions, and information to and from one or more computers or mobile devices. A widely used communications device is a modem. Communications occur over cables, telephone lines, cellular radio networks, satellites, and other transmission media. Some transmission media, such as satellites and cellular radio networks, are wireless, which means they have no physical lines or wires.

1.3 Advantages and Disadvantages of using a computer
Society has reaped many benefits from using computers. A user is anyone who communicates with a computer or utilizes the information it generates. Both business and home users can make well-informed decisions because they have instant access to information from anywhere in the world. Students, another type of user, have more tools to assist them in the learning process.

1.3.1 Advantages of Using Computers
Benefits from using computers are possible because computers have the advantages of speed, reliability, consistency, storage, and communications.

• **Speed:** When data, instructions, and information flow along electronic circuits in a computer, they travel at incredibly fast speeds. Many computers process billions or trillions of operations in a single second. Processing involves computing (e.g., adding, subtracting), sorting (e.g., alphabetizing), organizing, displaying images, recording audio, playing music, and showing a movie or video.

• **Reliability:** The electronic components in modern computers are dependable and reliable because they rarely break or fail.

• **Consistency:** Given the same input and processes, a computer will produce the same results — consistently. A computing phrase — known as garbage in, garbage out — points out that the accuracy of a computer's output depends on the accuracy of the input. For example, if you do not use the flash on a digital camera when indoors, the resulting pictures that are displayed on the computer screen may be unusable because they are too dark.

• **Storage:** A computer can transfer data quickly from storage to memory, process it, and then store it again for future use. Many computers store enormous amounts of data and make this data available for processing anytime it is needed.

• **Communications:** Most computers today can communicate with other computers, often wirelessly. Computers with this capability can share any of the four information processing cycle operations — input, process, output, and storage — with another computer or a user.

1.3.2 Disadvantages of Using Computers

Some disadvantages of computers relate to health risks, the violation of privacy, public safety, the impact on the labor force, and the impact on the environment.

• **Health Risks:** Prolonged or improper computer use can lead to injuries or disorders of the hands, wrists, elbows, eyes, neck, and back. Computer users can protect themselves from these health risks through proper workplace design, good posture while at the computer, and appropriately spaced work breaks. Two behavioral health risks are computer addiction and technology overload. Computer addiction occurs when someone becomes obsessed with using a computer. Individuals suffering from technology overload feel distressed when deprived of computers and mobile devices. Once recognized, both computer addiction and technology overload are treatable disorders.

• **Violation of Privacy:** Nearly every life event is stored in a computer somewhere . . . in medical records, credit reports, tax records, etc. In many instances, where personal and confidential records were not protected properly, individuals have found their privacy violated and identities stolen.

• **Public Safety:** Adults, teens, and children around the world are using computers to share publicly their photos, videos, journals, music, and other personal information. Some of these unsuspecting, innocent computer users have fallen victim to crimes committed by dangerous strangers. Protect yourself and your dependents from these criminals by being cautious in e-mail messages and on Web sites. For example, do not share information that would allow others to identify or locate you and do not disclose identification numbers, passwords, or other personal security details.

• **Impact on Labor Force:** Although computers have improved productivity in many ways and created an entire industry with hundreds of thousands of new jobs, the skills of millions of employees have been replaced by computers. Thus, it is crucial that workers keep their education up-to-date. A separate impact on the labor force is that some companies are outsourcing jobs to foreign countries instead of keeping their homeland labor force employed.

• **Impact on Environment:** Computer manufacturing processes and computer waste are depleting natural resources and polluting the environment. When computers are discarded in landfills, they can release toxic materials and potentially dangerous levels of lead, mercury, and flame retardants.

1.4 Computer Software

Software, also called a **program**, consists of a series of related instructions, organized for a common purpose, that tells the computer what tasks to perform and how to perform them. You interact with a program through its user interface. The user interface controls how you enter data and instructions and how information is displayed on the screen. Software today often has a graphical user interface. With a **graphical user interface** (**GUI** pronounced gooey), you interact with the software using text, graphics, and visual images such as icons. An **icon** is a miniature image that represents a program, an instruction, or some other object. You can use the mouse to select icons that perform operations such as starting a program.

1.5 CATEGORIES OF COMPUTERS

Categories of Computers

Category	Physical Size	Number of Simultaneously Connected Users	General Price Range
Personal computers (desktop)	Fits on a desk	Usually one (can be more if networked)	Several hundred to several thousand dollars
Mobile computers and mobile devices	Fits on your lap or in your hand	Usually one	Less than a hundred dollars to several thousand dollars
Game consoles	Small box or handheld device	One to several	Several hundred dollars or less
Servers	Small cabinet	Two to thousands	Several hundred to a million dollars
Mainframes	Partial room to a full room of equipment	Hundreds to thousands	$300,000 to several million dollars
Supercomputers	Full room of equipment	Hundreds to thousands	$500,000 to several billion dollars
Embedded computers	Miniature	Usually one	Embedded in the price of the product

A **personal computer** is a computer that can perform all of its input, processing, output, and storage activities by itself. A personal computer contains a processor, memory, and one or more input, output, and storage devices. Personal computers also often contain a communications device.

A **mobile computer** is a personal computer you can carry from place to place. Similarly, a mobile device is a computing device small enough to hold in your hand. The most popular type of mobile computer is the notebook computer. The following sections discuss the notebook computer and widely used mobile devices.

A **game console** is a mobile computing device designed for single-player or multiplayer video games. Standard game consoles use a handheld controller(s) as an input device(s); a television screen as an output device; and hard disks, optical discs, and/or memory cards for storage. Weighing on average between two and nine pounds, the compact size of game consoles makes them easy to use at home, in the car, in a hotel, or any location that has an electrical outlet. Three popular models are Microsoft's Xbox 360, Nintendo's Wii (pronounced wee), and Sony's PlayStation 3.

A **server** controls access to the hardware, software, and other resources on a network and provides a centralized storage area for programs, data, and information. Servers can support from two to several thousand connected computers at the same time. In many cases, one server accesses data, information, and programs on another server. In other cases, people use personal computers or terminals to access data, information, and programs on a server. A terminal is a device with a monitor, keyboard, and memory.

A **mainframe** is a large, expensive, powerful computer that can handle hundreds or thousands of connected users simultaneously. Mainframes store tremendous amounts of data, instructions, and information. Most major corporations use mainframes for business activities. With mainframes, enterprises are able to bill millions of customers, prepare payroll for thousands of employees, and manage thousands of items in inventory. One study reported that mainframes process more than 83 percent of transactions around the world. Mainframes also can act as servers in a network environment. Servers and other mainframes can access data and information from a mainframe. People also can access programs on the mainframe using terminals or personal computers.

A **supercomputer** is the fastest, most powerful computer — and the most expensive. The fastest supercomputers are capable of processing more than one quadrillion instructions in a single second. With weights that exceed 100 tons, these computers can store more than 20,000 times the data and information of an average desktop computer. Applications requiring complex, sophisticated mathematical calculations use supercomputers. Large-scale simulations and applications in medicine, aerospace, automotive design, online banking, weather forecasting, nuclear energy research, and petroleum exploration use a supercomputer.

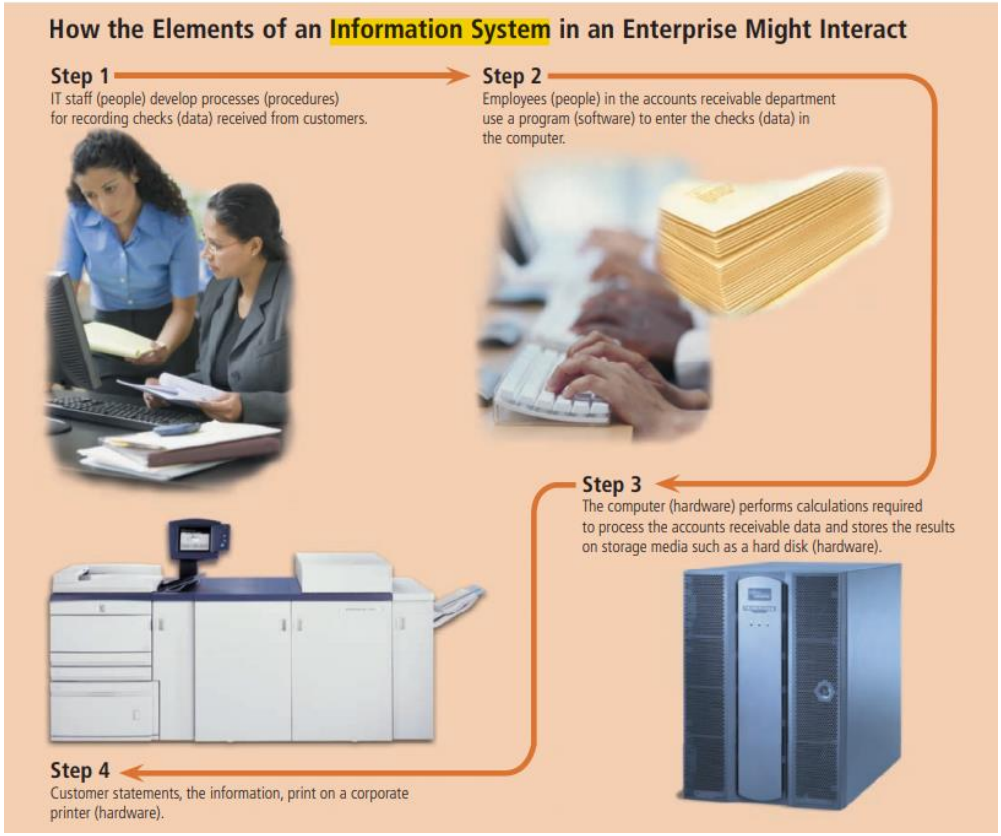
An **embedded computer** is a special-purpose computer that functions as a component in a larger product. Embedded computers are everywhere — at home, in your car, and at work. The following list identifies a variety of everyday products that contain embedded computers.

1.6 ELEMENTS OF AN IMFORMATION SYSTEM

To be valuable, information must be accurate,
organized, timely, accessible, useful, and cost-effective to produce. Generating information from a computer requires the following five elements:

- Hardware
- Software
- Data
- People
- Procedures

Together, these elements (hardware, software, data, people, and procedures) comprise an information system. Figure below shows how each of the elements of an information system in an enterprise might interact.



The **hardware** must be reliable and capable of handling the expected workload. The **software** must be developed carefully and tested thoroughly. The data entered into the computer must be accurate. Most companies with mid-sized and large computers have an IT (information technology) department. Staff in the IT department should be skilled and up-to-date on the latest technology. IT staff also should train users so that they understand how to use the computer properly. Today's users also work closely with IT staff in the development of computer applications that relate to their areas of work. Finally, all the IT applications should have readily available documented procedures that address operating the computer and using its programs.

1.7 COMPUTER APPLICATIONS IN SOCIETY

The computer has changed society today as much as the industrial revolution changed society in the eighteenth and nineteenth centuries. People interact directly with computers in fields such as education,

finance, government, health care, science, publishing, travel, and manufacturing. In addition, they can reap the benefits from breakthroughs and advances in these fields. The following pages describe how computers have made a difference in people's interactions with these disciplines.

Education
Education is the process of acquiring knowledge. In the traditional model, people learn from other people such as parents, teachers, and employers. Many forms of printed material such as books and manuals are used as learning tools. Today, educators also are turning to computers to assist with education.

Finance
Many people and companies use computers to help manage their finances. Some use finance software to balance checkbooks, pay bills, track personal income and expenses, manage investments, and evaluate financial plans. This software usually includes a variety of online services. For example, computer users can track investments and do online banking. With online banking, users access account balances, pay bills, and copy monthly transactions from the bank's computer right into their personal computers.

Government
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. People in the United States access government Web sites to file taxes, apply for permits and licenses, pay parking tickets, buy stamps, report crimes, apply for financial aid, and renew vehicle registrations and driver's licenses. To provide these services, some Web sites require users provide personal information.

Health Care
Nearly every area of health care today uses computers. Whether you are visiting a family doctor for a regular checkup, having lab work or an outpatient test, or being rushed in for emergency surgery, the medical staff around you will be using computers for various purposes:
• Hospitals and doctors use computers and mobile devices to maintain and access patient records.
• Computers monitor patients' vital signs in hospital rooms and at home.
• Robots deliver medication to nurse stations in hospitals.
• Computers and computerized devices assist doctors, nurses, and technicians with medical tests
• Doctors use the Web and medical software to assist with researching and diagnosing health conditions.
• Doctors use e-mail to correspond with patients.
• Pharmacists use computers to file insurance claims.
• Surgeons implant computerized devices, such as pacemakers, that allow patients to live longer.
• Surgeons use computer-controlled devices to provide them with greater precision during operations, such as for laser eye surgery and robot-assisted heart surgery

Science
All branches of science, from biology to astronomy to meteorology, use computers to assist them with collecting, analyzing, and modeling data. Scientists also use the Internet to communicate with colleagues around the world. Breakthroughs in surgery, medicine, and treatments often result from scientists' use of computers. Tiny computers now imitate functions of the central nervous system, retina of the eye, and cochlea of the ear. A cochlear implant allows a deaf person to listen. Electrodes implanted in the brain stop tremors associated with Parkinson's disease. Cameras small enough to swallow — sometimes called a camera pill — take pictures inside your body to detect polyps, cancer, and other abnormalities

Publishing
Publishing is the process of making works available to the public. These works include books, magazines, newspapers, music, film, and video. Special software assists graphic designers in developing pages that include text, graphics, and photos; artists in com posing and enhancing songs; filmmakers in creating and editing film; and journalists and mobile users in capturing and modifying video clips.

Travel

Whether traveling by car or airplane, your goal is to arrive safely at your destination. As you make the journey, you may interact with some of the latest technology. Vehicles manufactured today often include some type of onboard navigation system, such as OnStar. Many mobile devices such as smart phones have built-in navigation systems. Some mobile users prefer to carry specialized handheld navigation devices.

Manufacturing

Computer-aided manufacturing (CAM) refers to the use of computers to assist with manufacturing processes such as fabrication and assembly. Industries use CAM to reduce product development costs, shorten a product's time to market, and stay ahead of the competition. Often, robots carry out processes in a CAM environment. CAM is used by a variety of industries, including oil drilling, power generation, food production, and automobile manufacturing. Automobile plants, for example, have an entire line of industrial robots that assemble a car.

ACTIVITY

ES 3 – COMPUTER FUNDAMENTALS AND PROGRAMMING

Chapter 1 Activity #1- Introduction to Computers

Name: _____Student Number:_____ Yr./Blk____/___

"COMPUTERS"

1) Draw five examples of the following components of a computer and explain their function.
   a) INPUT DEVICES
   b) OUTPUT DEVICES
   c) STORAGE DEVICES
2) Write an essay about how computers affected your way of living as a student. Write at least 200 words.
3) Make an infographic/collage on the good and bad side of using/abusing this technology.

REFERENCES

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