# CSC 101/CSC 111 – INTRODUCTION TO COMPUTER SCIENCE (3 UNITS) LECTURE 1

BALOGUN JEREMIAH ADEMOLA

ASSISTANT LECTURER,

DEPARTMENT OF COMPUTER SCIENCE AND MATHEMATICS

MOUNTAIN TOP UNIVERSITY, OGUN STATE, NIGERIA

# COURSE OUTLINE

- Definition of Computer
- History and Overview of Computing and Computers
- Evolution of Ideas and Machines from Mechanical Computer to Multimedia Computer
- Introduction to computing system
  - Basic elements of a computer system hardware
  - Block diagram, data/instruction flow, control flow
- Software types, packages and applications
- Characteristics of computer
- Problem solving using flowcharts and algorithms
- Data representation in computer system
- Communications and networks
  - World wide web, network access, network architectures, data communications. Safety and security
- File management in Windows and basic word processors, spreadsheets, presentation, graphics and other applications
- Introduction to programming:
  - Statements, symbolic names, arrays, expressions and control statements

# DEFINITION OF COMPUTER

- A computer is an electronic device, operating under the control of instructions stored in its own memory, that can accept data (input), process the data according to specified rules (process), produce results (output), and store the results (storage) for future use.
  - Generally, the term is used to describe a collection of electric, electronic, and mechanical components known as hardware.

- Computers are everywhere: at work, at school, and at home.
  - In the workplace, employees use computers to create correspondence such as e-mail messages, memos, and letters; manage calendars; calculate payroll; track inventory; and generate invoices.
  - At school, teachers use computers to assist with classroom instruction. Students use computers to complete assignments and research.
  - People also spend hours of leisure time using a computer. They play games, communicate with friends and relatives online and using e-mail, purchase goods online, converse in chat rooms, listen to music or radio broadcasts, watch or create videos and movies, read books and magazines, share stories, research genealogy, retouch photos, and plan vacations.

- At work, at school, and at home, computers are helping people do their work faster, more accurately, and in some cases, in ways that previously would not have been possible.

# DEFINITION OF COMPUTER...


**Figure 1: Common computer hardware components**

# DEFINITION OF COMPUTER...

- **Computers perform four basic operations — input, process, output, and storage.**
  - These operations comprise the information processing cycle.
  - Collectively, these operations process data into information and store it for future use.

- A computer derives its power from its capability to perform the information processing cycle with amazing speed, reliability (low failure rate), and accuracy; its capacity to store huge amounts of data and information; and its capability to communicate with other computers.
- **For a computer to perform operations, it must be given a detailed set of instructions that tells it exactly what to do.**
  - These instructions are called a program, or software.
  - Before processing for a specific activity begins, the program corresponding to that activity is stored in the computer.
- **Once the program is stored, the computer can begin to execute the program's first instruction.**
  - The computer executes one program instruction after another until the activity is complete.
- **All computer processing requires data.**
  - Data is a collection of unprocessed items, which can include text, numbers, images, audio, and video.
  - Computers manipulate data to create information.
  - Information conveys meaning and is useful to people.
- During the output operation, the information that has been created is put into some form, such as a printed report, or it can be stored on the computer for future use.

- People who use the computer directly or use the information it provides are called computer users, end users, or sometimes, just users.
  - Users and computer manufacturers can reduce the environmental impact of computers through green computing.
  - Green computing involves reducing the electricity consumed and environmental waste generated when using a computer.

# DEFINITION OF COMPUTER...

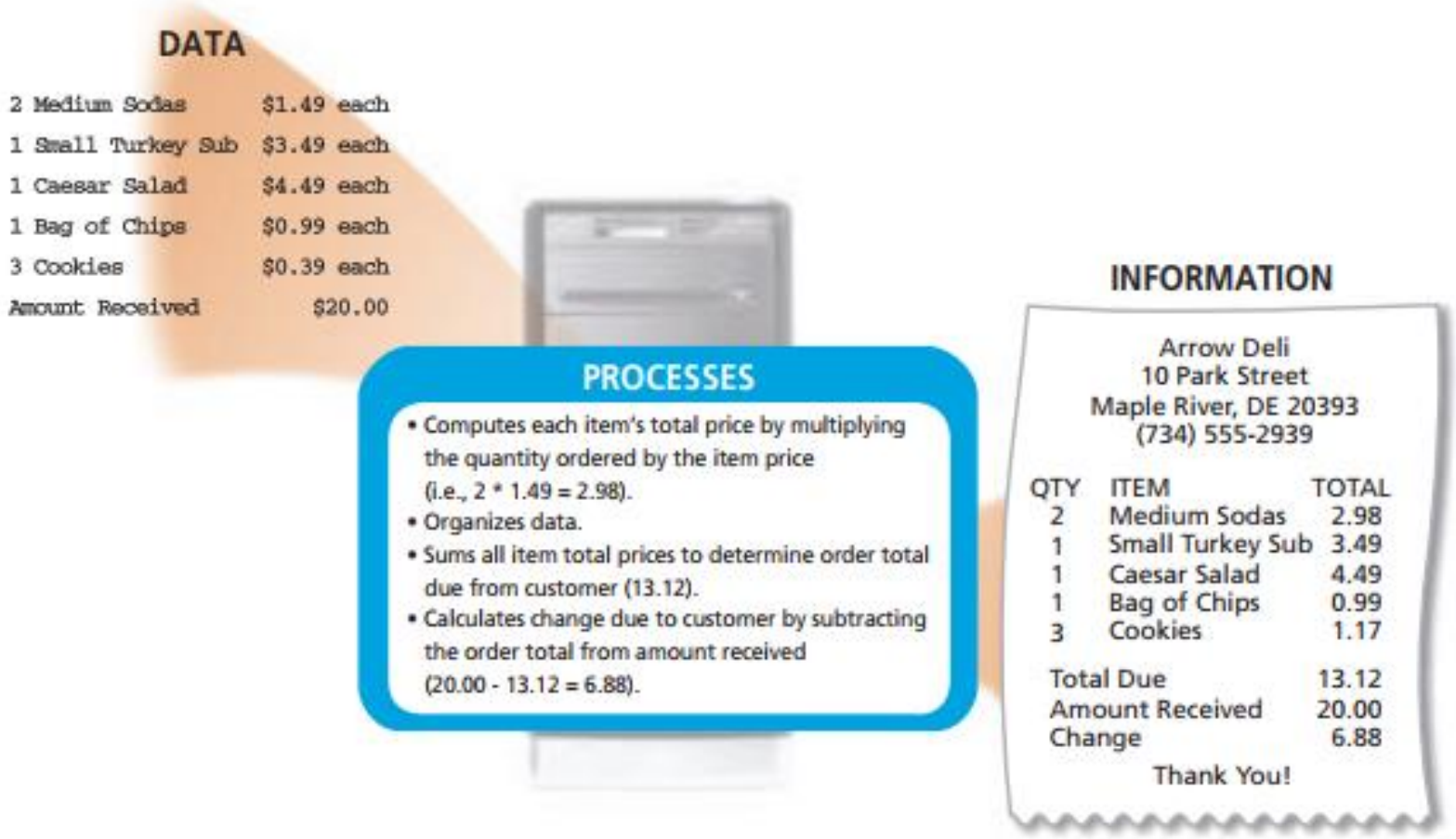



**Figure 2: A computer processes data into information**

# TYPES OF COMPUTERS

- **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 desktop computer** is designed so that the system unit, input devices, output devices, and any other devices fit entirely on or under a desk or table.
  - In some models, the monitor sits on top of the system unit, which is placed on the desk.
  - The more popular style of system unit is the tall and narrow tower, which can sit on the floor vertically.

- **A notebook computer**, also called a laptop computer, is a portable, personal computer often designed to fit on your lap.
  - These computers are thin and lightweight, yet can be as powerful as the average desktop computer.
  - A netbook, which is a type of notebook computer, is smaller, lighter, and often not as powerful as a traditional notebook computer.
  - Resembling a letter-sized slate, the Tablet PC is a special type of notebook computer that allows you to write or draw on the screen using a digital pen.

# TYPES OF COMPUTERS...

- **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.
- Mobile devices, which are small enough to carry in a pocket, usually store programs and data permanently on memory inside the system unit or on small storage media such as memory cards.
  - You often can connect a mobile device to a personal computer to exchange information.
  - Three popular types of mobile devices are smart phones, portable media players, and digital cameras.
- **A smart phone** is a phone that can connect to the Internet and usually also provides personal information management functions such as a calendar, an appointment book, an address book, a calculator, and a notepad.
- **A portable media player** is a mobile device on which you can store, organize, and play digital media. For example, you can listen to music; watch videos, movies, and television shows; and view photos on the device's screen.
- **A digital camera** is a device that allows users to take pictures and store the photographed images digitally, instead of on traditional film Digital cameras typically allow users to review, and sometimes modify, images while they are in the camera.

# TYPES OF COMPUTERS...


**Figure 3: Types of computers**

# TYPES OF COMPUTERS...

- **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.
  - 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.

- **A handheld game console** is small enough to fit in one hand, making it more portable than the standard game console.
  - With the handheld game console, the controls, screen, and speakers are built into the device.
  - Because of their reduced size, the screens are small — three to four inches.
  - Some models use cartridges to store games; others use a memory card or a miniature optical disc.
  - Many handheld game consoles can communicate wirelessly with other similar consoles for multiplayer gaming.
  - Two popular models are Nintendo DS Lite and Sony's PlayStation Portable (PSP).

# TYPES OF COMPUTERS...

- **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.
  - Mainframes also can act as servers in a network environment.
  - Servers and other mainframes can access data and information from a mainframe while 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.

# TYPES OF COMPUTERS...

**Figure 4: A Server (left), Mainframe (center) and Supercomputer (right)**

# TYPES OF COMPUTERS...

- **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:
  - **Consumer Electronics**: mobile and digital telephones, digital televisions, cameras, video recorders, DVD players and recorders, answering machines.
  - **Home Automation Devices**: thermostats, sprinkling systems, security monitoring systems, appliances, lights.
  - **Automobiles**: antilock brakes, engine control modules, airbag controller, cruise control.
  - **Process Controllers and Robotics:** remote monitoring systems, power monitors, machine controllers, medical devices.
  - **Computer Devices and Office Machines**: keyboards, printers, fax and copy machines

- Because embedded computers are components in larger products, they usually are small and have limited hardware.
  - These computers perform various functions, depending on the requirements of the product in which they reside.
  - Embedded computers in printers, for example, monitor the amount of paper in the tray, check the ink or toner level, signal if a paper jam has occurred, and so on.

# TYPES OF COMPUTERS...

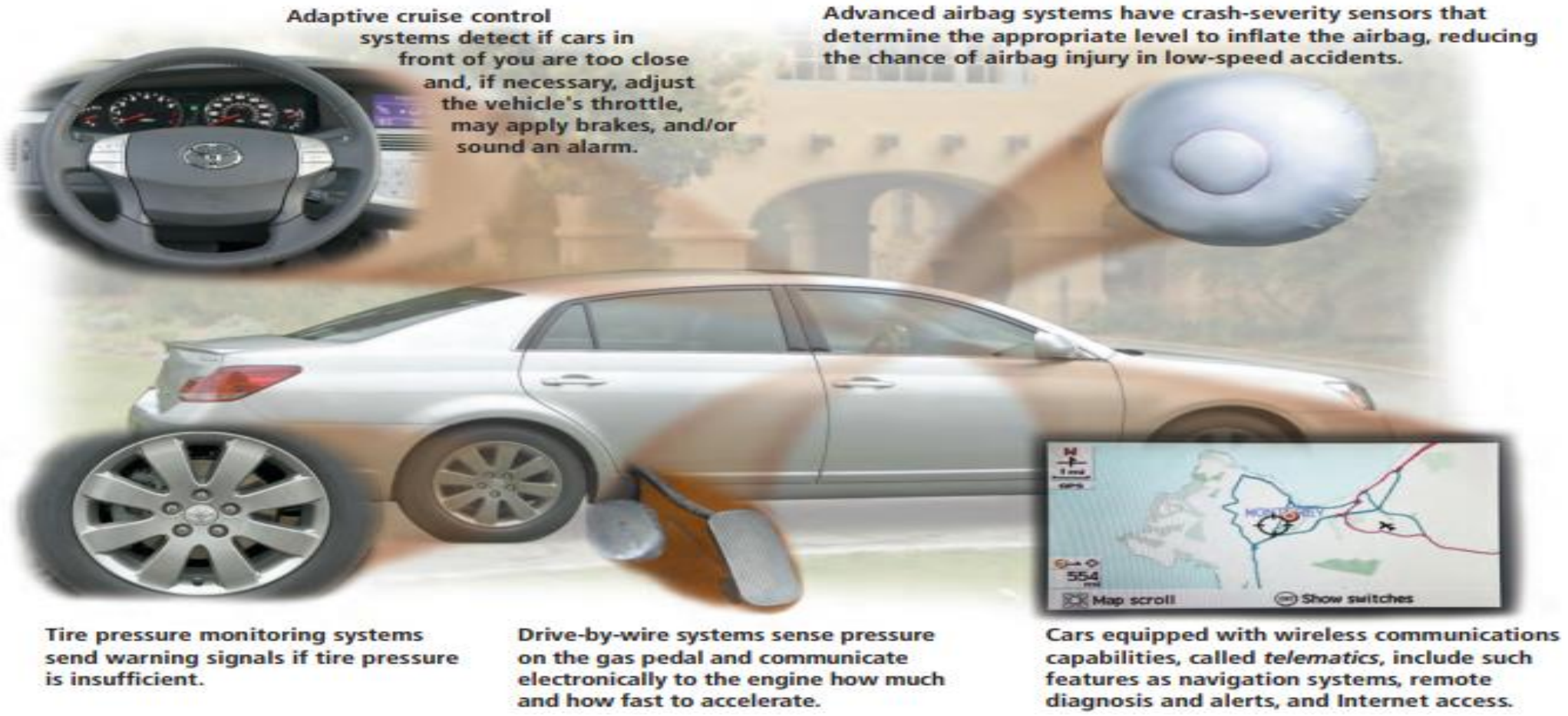



**Figure 5: Some of the embedded computers designed to improve the safety, security and performance of today's automobiles**

# COMPUTER USAGE

## HOME USERS

- In an increasing number of homes, the computer no longer is a convenience.
- Instead, it is a basic necessity.
  - Each family member, or home user, spends time on the computer for different reasons that include personal financial management, Web access, communications, and entertainment
  - On the Internet, home users access a huge amount of information, conduct research, take college classes, pay bills, manage investments, shop, listen to the radio, watch movies, read books, file taxes, book airline reservations, make telephone calls, and play games.
  - They also communicate with others around the world through e-mail, blogs, instant messages, and chat rooms using personal computers, smart phones, and other mobile devices.
  - Home users share ideas, interests, photos, music, and videos on social networking Web sites.
  - With a digital camera, home users take photos and then send the electronic images to others.
  - Using a Web cam, home users easily have live video calls with friends, family members, and others.
  - Many home users have a portable media player, so that they can download music or podcasts, and listen to the music and/or audio at a later time through earbuds attached to the player.
  - They also usually have one or more game consoles to play video games individually or with friends and family members

# COMPUTER USAGE...

## SMALL OFFICE/HOME OFFICE USERS

- Computers assist small business and home office users in managing their resources effectively.
- **A small office/home office (SOHO)** includes any company with fewer than 50 employees, as well as the self-employed who work from home.
  - Small offices include local law practices, accounting firms, travel agencies, and florists.
  - SOHO users typically have a desktop computer to perform some or all of their duties.
  - Many also have smart phones or other mobile devices to manage appointments and contact information.
- SOHO users access the Internet — often wirelessly — to look up information such as addresses, directions, postal codes, flights, and package shipping rates or to send and receive e-mail messages or make telephone calls.
  - Many have entered the e-commerce arena and conduct business on the Web.
  - Their Web sites advertise products and services and may provide a means for taking orders.
  - Small business Web sites sometimes use a Web cam to show the world a live view of some aspect of their business.
- To save money on hardware and software, small offices often network their computers.
  - For example, the small office connects one printer to a network for all employees to share.
  - SOHO users often work with basic business software such as word processing and spreadsheet programs that assist with document preparation and finances.
  - They are likely to use other industry-specific types of software.
  - An auto parts store, for example, will have software that allows for looking up parts, taking orders and payments, and updating inventory.

# COMPUTER USAGE...
## MOBILE USERS

- Today, businesses and schools are expanding to serve people across the country and around the world.
- Thus, increasingly more employees and students are **mobile users**, who work on a computer or mobile device while away from a main office, home office, or school.
  - Examples of mobile users are sales representatives, real estate agents, insurance agents, meter readers, package delivery people, journalists, consultants, and students.
- Mobile users often have mobile computers and/or mobile devices.
  - With these computers and devices, the mobile user connects to other computers on a network or the Internet, often wirelessly accessing services such as e-mail and the Web.
  - Mobile users can transfer information between their mobile device and another computer, such as one at the main office or school.
- For entertainment, the mobile user plays video games on a handheld game console and listens to music or watches movies on a portable media player.
- The mobile user works with basic business software such as word processing.
  - With presentation software, the mobile user can create and deliver presentations to a large audience by connecting a mobile computer or device to a video projector that displays the presentation on a full screen.
  - Many scaled-down programs are available for mobile devices such as smart phones.

# COMPUTER USAGE...

## ENTERPRISE USERS

- An enterprise has hundreds or thousands of employees or customers that work in or do business with offices across a region, the country, or the world.
  - Each employee or customer who uses a computer in the enterprise is an **enterprise user**.
- Many large companies use the words, *enterprise computing*, to refer to the huge network of computers that meets their diverse computing needs.
  - The network facilitates communications among employees at all locations.
  - Users access the network of servers or mainframes through desktop computers, mobile computers, and mobile devices.
- Enterprises use computers and the computer network to process high volumes of transactions in a single day.
  - Although they may differ in size and in the products or services offered, all generally use computers for basic business activities.
  - For example, they bill millions of customers, prepare payroll for thousands of employees, and manage thousands of items in inventory.
  - Some enterprises use blogs to open communications among employees, customers, and/or vendors.
- Enterprises typically have e-commerce Web sites, allowing customers and vendors to conduct business online.
  - The Web site also showcases products, services, and other company information.
  - The marketing department in an enterprise uses desktop publishing software to prepare marketing literature.
  - The accounting department uses software for accounts receivable, accounts payable, billing, general ledger, and payroll activities.

# COMPUTER USAGE…

## ENTERPRISE USERS…

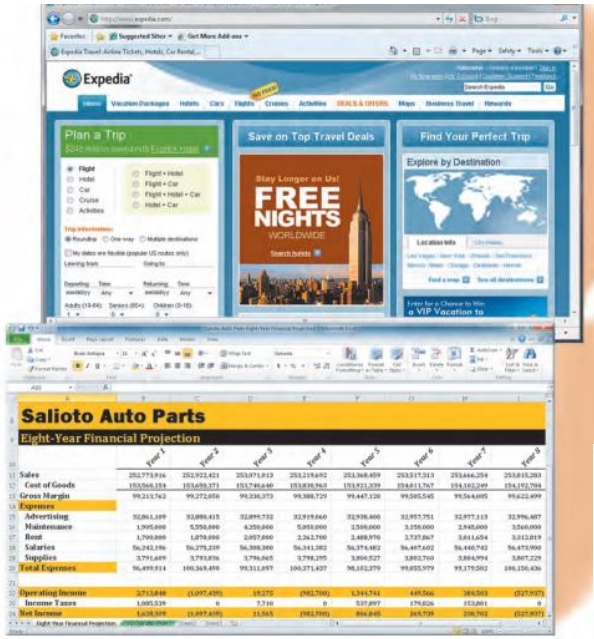
- The employees in the ***information technology (IT) department:***
  - keep the computers and the network running.
  - determine when the company requires new hardware or software.

- Enterprise users work with word processing, spreadsheet, database, and presentation software.
- They also may use calendar programs to post their schedules on the network.
- And, they might use smart phones or mobile devices to maintain contact information.
- E-mail programs and Web browsers enable communications among employees, vendors, and customers.

- Many employees of enterprises telecommute.
  - **Telecommuting** is a work arrangement in which employees work away from a company's standard workplace and often communicate with the office through the computer.
  - Employees who telecommute have flexible work schedules so that they can combine work and personal responsibilities, such as child care and other personal activities thus allowing them to work remotely.

# COMPUTER USAGE

← SOHO USER




HOME USER →


MOBILE USERS →


ENTERPRISE USER ←

**Figure 5: Some of the embedded computers designed to improve the safety, security and performance of today's automobiles**

# 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.

- **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.
    - Many schools and companies equip labs and classrooms with computers.
    - Some schools require students to have a mobile computer or mobile device to access the school's network or Internet wirelessly.
  - To promote education by computer, many vendors offer substantial student discounts on software.
  - Sometimes, the delivery of education occurs at one place while the learning occurs at other locations.
    - For example, students can take a class on the Web.
    - Some classes are blended; that is, part of the learning occurs in a classroom and the other part occurs on the Web.
    - More than 70 percent of colleges offer distance learning classes.
    - A few even offer entire degrees online.

# COMPUTER APPLICATIONS IN SOCIETY…

- **HEALTHCARE**
  - 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.
  - A neural network is a system that attempts to imitate the behavior of the human brain.
    - Scientists create neural networks by connecting thousands of processors together much like the neurons in the brain are connected.
  - The capability of a personal computer to recognize spoken words is a direct result of scientific experimentation with neural networks.

# COMPUTER APPLICATIONS IN SOCIETY...

- **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.
  - Many financial institutions' Web sites also offer online banking.
    - When using a Web site instead of finance software on your computer, all your account information is stored on the bank's computer.
    - The advantage is you can access your financial records from anywhere in the world.
  - Investors often use online investing to buy and sell stocks and bonds — without using a broker.
    - With online investing, the transaction fee for each trade usually is much less than when trading through a broker.
- **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.
    - Many mobile devices such as smart phones have built-in navigation systems.
    - Some mobile users prefer to carry specialized handheld navigation devices.
  - In preparing for a trip, you may need to reserve a car, hotel, or flight.
    - Many Web sites offer these services to the public; e.g., you can order airline tickets on the Web.
  - If you plan to drive somewhere and are unsure of the road to take to your destination, you can use apps like Google Maps.
- **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.
  - Many publishers make their works available online.
  - Some Web sites allow you to copy the work, such as a book or music, to your desktop computer, mobile computer, smart phone, or other mobile device.