

Computers and automation 3421

[Technology](#), [Computer](#)



What is a computer? A Computer is an electronic device that can receive a set of instructions, or program, and then carry out this program by performing calculations on numerical data or by compiling and correlating other forms of information. Thesis Statement:- The modern world of high technology could not have come about except for the development of the computer. Different types and sizes of computers find uses throughout society in the storage and handling of data, from secret governmental files to banking transactions to private household accounts. Computers have opened up a new era in manufacturing through the techniques of automation, and they have enhanced modern communication systems. They are essential tools in almost every field of research and applied technology, from constructing models of the universe to producing tomorrow's

weather reports, and their use has in itself opened up new areas of conjecture.

Database services and computer networks make available a great variety of information sources. The same advanced techniques also make possible invasions

of privacy and of restricted information sources, but computer crime has become

one of the many risks that society must face if it would enjoy the benefits of modern technology. Imagine a world without computers. That would mean no proper

means of communicating, no Internet, no video games. Life would be extremely

difficult. Adults would have to store all their office work paper and therefore take up an entire room. Teenagers would have to submit course-works and projects

hand-written. All graphs and diagrams would have to be drawn neatly and carefully. Youngsters would never have heard of 'video-games' and will have to

spend their free time either reading or playing outside with friends. But thanks

to British mathematicians, Augusta Ada Byron and Charles Babbage, our lives are

made a lot easier. Later, on my investigation about the growth of computers over

the decades, I will be talking about types of computers, how and when computers

were first being developed, the progress it made, computers at present and plans

for the future. In types of computers, I will be talking about analogue and

digital computers and how they function. In the development of computers, I will

be mentioning about the very first electronic calculator and computer. Under

progress made, I will only be mentioning about circuits. For computers of the

present, I will be talking about networking, telecommunications and games.

And

finally, as for planning for the future, I will mention about new and recent

ideas, research and development of new computers heard and talked about in

newspapers and on television. I. MAIN TYPES OF COMPUTERS There are two main

types of computers which are in use today, analog and digital computers, although the term computer is often used to mean only the digital type.

Analog

computers exploit the mathematical similarity between physical interrelationships in certain problems, and employ electronic or hydraulic circuits to simulate the physical problem. Digital computers solve problems by

performing sums and by dealing with each number digit by digit. Hybrid computers

are those which contain elements of both analog and digital computers. They are

usually used for problems in which large numbers of complex equations, known as

time integrals, are to be computed. Data in analog form can also be fed into a

digital computer by means of an analog- to-digital converter, and the same is true of the reverse situation. a) What are analog computers and how do they work? The analog computer is an electronic or hydraulic device that is designed

to handle input in terms of, for example, voltage levels or hydraulic pressures,

rather than numerical data. The simplest analog calculating device is the slide

rule, which employs lengths of specially calibrated scales to facilitate multiplication, division, and other functions. In a typical electronic analog computer, the inputs are converted into voltages that may be added or multiplied

using specially designed circuit elements. The answers are continuously generated for display or for conversion to another desired form. b) What are digital computers and how do they work? Everything that a digital computer does

is based on one operation: the ability to determine if a switch, or

" gate," is open or closed. That is, the computer can recognise only

two states in any of its microscopic circuits: on or off, high voltage or low

voltage, or-in the case of numbers-0 or 1. The speed at which the computer

performs this simple act, however, is what makes it a marvel of modern

technology. Computer speeds are measured in megahertz, or millions of cycles per

second. A computer with a "clock speed" of 10 MHz-a fairly representative speed for a microcomputer-is capable of executing 10 million discrete operations each second. Business microcomputers can perform 15 to 40 million operations per second, and supercomputers used in research and defence applications attain speeds of billions of cycles per second. Digital computer speed and calculating power are further enhanced by the amount of data handled during each cycle. If a computer checks only one switch at a time, that switch can represent only two commands or numbers; thus ON would symbolise one operation or number, and OFF would symbolise another. By checking groups of switches linked as a unit, however, the computer increases the number of operations it can recognise at each cycle. For example, a computer that checks two switches at one time can represent four numbers (0 to 3) or can execute one

of four instructions at each cycle, one for each of the following switch

patterns: OFF-OFF (0); OFF-ON (1); ON-OFF (2); or ON-ON (3). II. WHERE IT

ALL

BEGAN a) The Mother of all Calculators The first adding machine, a precursor of

the digital computer, was devised in 1642 by the French philosopher Blaise

Pascal. This device employed a series of ten-toothed wheels, each tooth

representing a digit from 0 to 9. The wheels were connected so that numbers

could be added to each other by advancing the wheels by a correct number

of

teeth. In the 1670s the German philosopher and mathematician Gottfried

Wilhelm

von Leibniz improved on this machine by devising one that could also multiply.

The French inventor Joseph Marie Jacquard , in designing an automatic loom, used

thin, perforated wooden boards to control the weaving of complicated designs.

During the 1880s the American statistician Herman Hollerith conceived the idea

of using perforated cards, similar to Jacquard's boards, for processing data.

Employing a system that passed punched cards over electrical contacts, he was

able to compile statistical information for the 1890 U. S. census. b) The Mother

of all Computers Also in the 19th century, the British mathematician and inventor Charles Babbage worked out the principles of the modern digital computer. He conceived a number of machines, such as the Difference Engine, that

were designed to handle complicated mathematical problems. Many historians

consider Babbage and his associate, the British mathematician Augusta Ada Byron

(Lady Lovelace, 1815-52), the daughter of the English poet Lord Byron, the true

inventors of the modern digital computer. The technology of their time was not

capable of translating their sound concepts into practice; but one of their

inventions, the Analytical Engine, had many features of a modern computer. It

had an input stream in the form of a deck of punched cards, a "store"

for saving data, a "mill" for arithmetic operations, and a printer

that made a permanent record. c) Early Computers Analog computers began to be

built at the start of the 20th century. Early models calculated by means of rotating shafts and gears. Numerical approximations of equations too difficult

to solve in any other way were evaluated with such machines. During both world

wars, mechanical and, later, electrical analog computing systems were used as

torpedo course predictors in submarines and as bombsight controllers in

aircraft. Another system was designed to predict spring floods in the

Mississippi River Basin. In the 1940s, Howard Aiken, a Harvard University

mathematician, created what is usually considered the first digital computer.

This machine was constructed from mechanical adding machine parts. The

instruction sequence to be used to solve a problem was fed into the machine

on a

roll of punched paper tape, rather than being stored in the computer. In 1945,

however, a computer with program storage was built, based on the concepts of the

Hungarian-American mathematician John von Neumann. The instructions were stored

within a so-called memory, freeing the computer from the speed limitations of

the paper tape reader during execution and permitting problems to be solved

without rewiring the computer. III. EARLY PROGRESS The rapidly advancing field

of electronics led to construction of the first general-purpose all-electronic computer in 1946 at the University of Pennsylvania by the American engineer John

Presper Eckert, Jr. and the American physicist John William Mauchly. Called ENIAC, for Electronic Numerical Integrator And Computer, the device contained

18, 000 vacuum tubes and had a speed of several hundred multiplications per

minute. Its program was wired into the processor and had to be manually altered.

The use of the transistor in computers in the late 1950s marked the advent of

smaller, faster, and more versatile logical elements than were possible with vacuum-tube machines. Because transistors use much less power and have a much

longer life, this development alone was responsible for the improved machines

called second-generation computers. Components became smaller, as did inter-component spacings, and the system became much less expensive to build. a)

Integrated Circuits Late in the 1960s the integrated circuit, or IC, was introduced, making it possible for many transistors to be fabricated on one silicon substrate, with inter-connecting wires plated in place. The IC resulted in a further reduction in price, size, and failure rate. The microprocessor became a reality in the mid-1970s with the introduction of the large scale integrated (LSI) circuit and, later, the very large scale integrated (VLSI)

circuit, with many thousands of interconnected transistors etched into a single

silicon substrate. To return, then, to the "switch-checking"

capabilities of a modern computer: computers in the 1970s generally were able to

check eight switches at a time. That is, they could check eight binary digits,

or bits, of data, at every cycle. A group of eight bits is called a byte, each

byte containing 256 possible patterns of ONs and OFFs (or 1's and 0's). Each

pattern is the equivalent of an instruction, a part of an instruction, or a

particular type of datum, such as a number or a character or a graphics symbol.

The pattern 11010010, for example, might be binary data-in this case, the

decimal number 210 (see NUMBER SYSTEMS)-or it might tell the computer to compare

data stored in its switches to data stored in a certain memory-chip location.

The development of processors that can handle 16, 32, and 64 bits of data at a

time has increased the speed of computers. The complete collection of

recognizable patterns-the total list of operations-of which a computer is

capable is called its instruction set. Both factors-number of bits at a time, and size of instruction sets-continue to increase with the ongoing development

of modern digital computers. IV. COMPUTERS OF THE 90'S a) Computer Networks

Major changes in the use of computers have developed since it was first invented. Computers have expanded, via telephone lines, into vast nation-wide,

or world-wide, networks. At each extremity of the network is a terminal device,

or even a large computer, which can send jobs over the wire to the central computer at the hub of the network. The central computer performs the computation or data processing and sends the results over the wire to any terminal in the network for printing. Some computer networks provide a service

called time sharing. This is a technique in which software shifts the computer from one task to the another with such timing that it appears to each user at a

terminal that he has exclusive use of the computer. b) Telecommunications

Certain telecommunication methods have become standard in the telecommunications

industry as a whole, because if two devices use different standards they are unable to communicate properly. Standards are developed in two ways: (1) the

method is so widely used that it comes to dominate; (2) the method is published

by a standard-setting organisation. The most important organisation in this respect is the International Telecommunication Union, a specialised agency of

the United Nations, and one of its operational entities, the International Telegraph and Telephone Consultative Committee (CCITT). Other organizations in

the area of standards are the American National Standards Institute, the Institute of Electrical Engineers, and the Electronic Industries Association.

One of the goals of these organizations is the full realisation of the

Integrated Services Digital Network (ISDN), which is projected to be capable of

transmitting through a variety of media and at very high speeds both voice and

non-voice data around the world in digital form. Other developments in the industry are aimed at increasing the speed at which data can be transmitted.

Improvements are being made continually in modems and in the communications

networks. Some public data networks support transmission of 56, 000 bits per

second (bps), and modems for home use are capable of as much as 56kbps.

c) PC

Games and Video CD's CD's have developed a lot over the past decade. At first,

they were used only for music. Now, there are CD's from which we can play PC

games and watch movies. The games at present are usually 3D. This means that the

game seems almost life-like or virtual. One can spend hours playing a games on

CD because they are addictive. This is one of the main disadvantage of computer

games, because the person prevents themselves from doing anything educational or

engaging themselves in any physical activities. Another common disadvantage is

that playing too much on the computer can cause bad eye-sight. But there are a

few educational games for young children to help them learn and understand things better. Games may not be all that good for an individual, but if seen how

they are programmed one will realise that it is not all easy to program a game.

A few years ago, if one was bored, they would usually go to a video shop and rent a movie. Now one can rent Movie CD's and play them on the computer and

special Movie CD player's which are also installed in some new Hi-Fi Systems.