Computer a wooden rack holding parallel wires

Computer Industry In USOnly once in a lifetime will a new invention come about to touch every aspect ofour lives. Such a device that changes the way we work, live, and play is aspecial one, indeed. A machine that has done all this and more now exists innearly every business in the U. S.

and one out of every two households (Hall, 156). This incredible invention is the computer. The electronic computer hasbeen around for over a half-century, but its ancestors have been around for 2000years. However, only in the last 40 years has it changed the American society.

From the first wooden abacus to the latest high-speed microprocessor, thecomputer has changed nearly every aspect of people's lives for the better. Thevery earliest existence of the modern day computer's ancestor is the abacus. These date back to almost 2000 years ago. It is simply a wooden rack holdingparallel wires on which beads are strung. When these beads are moved along thewire according to " programming" rules that the user must memorize, allordinary arithmetic operations can be performed (Soma, 14). The next innovationin computers took place in 1694 when Blaise Pascal invented the first" digital calculating machine".

It could only add numbers and they hadto be entered by turning dials. It was designed to help Pascal's father who wasa tax collector (Soma, 32). In the early 1800s, a mathematics professor namedCharles Babbage designed an automatic calculation machine.

It was steam poweredand could store up to 1000 50-digit numbers. Built in to his machine wereoperations that included everything a modern general-purpose computer wouldneed. It was programmed by–and stored data on–

cards with holes punched inthem, appropriately called “ punch cards”. His inventions were failuresfor the most part because of the lack of precision machining techniques used atthe time and the lack of demand for such a device (Soma, 46).

After Babbage, people began to lose interest in computers. However, between 1850 and 1900 therewere great advances in mathematics and physics that began to rekindle theinterest (Osborne, 45). Many of these new advances involved complex calculationsand formulas that were very time consuming for human calculation.

The firstmajor use for a computer in the U. S. was during the 1890 census. Two men, HermanHollerith and James Powers, developed a new punched-card system that couldautomatically read information on cards without human intervention (Gulliver, 82). Since the population of the U. S. was increasing so fast, the computer wasan essential tool in tabulating the totals.

These advantages were noted bycommercial industries and soon led to the development of improved punch-cardbusiness-machine systems by International Business Machines (IBM), Remington-Rand, Burroughs, and other corporations. By modern standards thepunched-card machines were slow, typically processing from 50 to 250 cards perminute, with each card holding up to 80 digits. At the time, however, punchedcards were an enormous step forward; they provided a means of input, output, andmemory storage on a massive scale.

For more than 50 years following their firstuse, punched-card machines did the bulk of the world’s business computing and agood portion of the computing work in science (Chposky, 73). By the late 1930spunched-card machine techniques had become so well established and reliable thatHoward Hathaway Aiken, in collaboration with engineers at IBM, undertookconstruction of a large automatic digital computer based on standard IBMelectromechanical parts. Aiken's machine, called the Harvard Mark I, handled23-digit numbers and could perform all four arithmetic operations. Also, it hadspecial built-in programs to handled logarithms and trigonometric functions.

TheMark I was controlled from prepunched paper tape. Output was by card punch andelectric typewriter. It was slow, requiring 3 to 5 seconds for a multiplication, but it was fully automatic and could complete long computations without humanintervention (Chposky, 103). The outbreak of World War II produced a desperateneed for computing capability, especially for the military. New weapons systemswere produced which needed trajectory tables and other essential data. In 1942, John P. Eckert, John W. Mauchley, and their associates at the University ofPennsylvania decided to build a high-speed electronic computer to do the job.

This machine became known as ENIAC, for " Electrical Numerical IntegratorAnd Calculator". It could multiply two numbers at the rate of 300 productsper second, by finding the value of each product from a multiplication tablestored in its memory. ENIAC was thus about 1, 000 times faster than the previousgeneration of computers (Dolotta, 47). ENIAC used 18, 000 standard vacuum tubes, occupied 1800 square feet of floor space, and used about 180, 000 watts ofelectricity. It used punched-card input and output. The ENIAC was very difficultto program because one had to essentially re-wire it to perform whatever task hewanted the computer to do. It was, however, efficient in handling the particularprograms for which it had been designed.

ENIAC is generally accepted as thefirst successful high-speed electronic digital computer and was used in manyapplications from 1946 to 1955 (Dolotta, 50). Mathematician John von Neumann wasvery interested in the ENIAC. In 1945 he undertook a theoretical study ofcomputation that demonstrated that a computer could have a very simple and yetbe able to execute any kind of computation effectively by means of properprogrammed control without the need for any changes in hardware. Von Neumanncame up with incredible ideas for methods of building and organizing practical, fast computers. These ideas, which came to be referred to as the stored-programtechnique, became fundamental for future generations of high-speed digitalcomputers and were universally adopted (Hall, 73).

The first wave of modernprogrammed electronic computers to take advantage of these improvements appearedin 1947. This group included computers using random access memory (RAM), whichis a memory designed to give almost constant access to any particular piece ofinformation (Hall, 75). These machines had punched-card or punched-tape inputand output devices and RAMs of 1000-word capacity. Physically, they were muchmore compact than ENIAC: some were about the size of a grand piano and required2500 small electron tubes.

This was quite an improvement over the earliermachines. The first-generation stored-program computers required considerablemaintenance, usually attained 70% to 80% reliable operation, and were used for 8to 12 years. Typically, they were programmed directly in machine language, although by the mid-1950s progress had been made in several aspects of advancedprogramming. This group of machines included EDVAC and UNIVAC, the firstcommercially available computers (Hazewindus, 102).

The UNIVAC was developed byJohn W. Mauchley and John Eckert, Jr. in the 1950s. Together they had formedthe Mauchley-Eckert Computer Corporation, America's first computer company inthe 1940s. During the development of the UNIVAC, they began to run short onfunds and sold their company to the larger Remington-Rand Corporation. Eventually they built a working UNIVAC computer.

It was delivered to the U. S. Census Bureau in 1951 where it was used to help tabulate the U. S. population (Hazewindus, 124). Early in the 1950s two important engineering discoveries changed theelectronic computer field.

The first computers were made with vacuum tubes, butby the late 1950s computers were being made out of transistors, which weresmaller, less expensive, more reliable, and more efficient (Shallis, 40). In1959, Robert Noyce, a physicist at the Fairchild Semiconductor Corporation, invented the integrated circuit, a tiny chip of silicon that contained an entireelectronic circuit. Gone was the bulky, unreliable, but fast machine; nowcomputers began to become more compact, more reliable and have more capacity (Shallis, 49). These new technical discoveries rapidly found their way into new models ofdigital computers. Memory storage capacities increased 800% in commerciallyavailable machines by the early 1960s and speeds increased by an equally largemargin. These machines were very expensive to purchase or to rent and wereespecially expensive to operate because of the cost of hiring programmers toperform the complex operations the computers ran. Such computers were typicallyfound in large computer centers–operated by industry, government, and privatelaboratories–staffed with many programmers and support personnel (Rogers, 77). By 1956, 76 of IBM's large computer mainframes were in use, compared with only46 UNIVAC's (Chposky, 125).

In the 1960s efforts to design and develop thefastest possible computers with the greatest capacity reached a turning pointwith the completion of the LARC machine for Livermore Radiation Laboratories bythe Sperry-Rand Corporation, and the Stretch computer by IBM. The LARC had acore memory of 98, 000 words and multiplied in 10 microseconds. Stretch wasprovided with several ranks of memory having slower access for the ranks ofgreater capacity, the fastest access time being less than 1 microseconds and thetotal capacity in the vicinity of 100 million words (Chposky, 147). During thistime the major computer manufacturers began to offer a range of computercapabilities, as well as various computer-related equipment. These includedinput means such as consoles and card feeders; output means such as pageprinters, cathode-ray-tube displays, and graphing devices; and optionalmagnetic-tape and magnetic-disk file storage. These found wide use in businessfor such applications as accounting, payroll, inventory control, orderingsupplies, and billing. Central processing units (CPUs) for such purposes did notneed to be very fast arithmetically and were primarily used to access largeamounts of records on file.

The greatest number of computer systems weredelivered for the larger applications, such as in hospitals for keeping track ofpatient records, medications, and treatments given. They were also used inautomated library systems and in database systems such as the Chemical Abstractssystem, where computer records now on file cover nearly all known chemicalcompounds (Rogers, 98). The trend during the 1970s was, to some extent, awayfrom extremely powerful, centralized computational centers and toward a broaderrange of applications for less-costly computer systems. Most continuous-processmanufacturing, such as petroleum refining and electrical-power distributionsystems, began using computers of relatively modest capability for controllingand regulating their activities. In the 1960s the programming of applicationsproblems was an obstacle to the self-sufficiency of moderate-sized on-sitecomputer installations, but great advances in applications programming languagesremoved these obstacles. Applications languages became available for controllinga great range of manufacturing processes, for computer operation of machinetools, and for many other tasks (Osborne, 146).

In 1971 Marcian E. Hoff, Jr., anengineer at the Intel Corporation, invented the microprocessor and another stagein the development of the computer began (Shallis, 121). A new revolution incomputer hardware was now well under way, involving miniaturization ofcomputer-logic circuitry and of component manufacture by what are calledlarge-scale integration techniques. In the 1950s it was realized that” scaling down” the size of electronic digital computer circuits andparts would increase speed and efficiency and improve performance.

However, atthat time the manufacturing methods were not good enough to accomplish such atask. About 1960 photoprinting of conductive circuit boards to eliminate wiringbecame highly developed. Then it became possible to build resistors andcapacitors into the circuitry by photographic means (Rogers, 142). In the 1970sentire assemblies, such as adders, shifting registers, and counters, becameavailable on tiny chips of silicon.

In the 1980s very large scale integration (VLSI), in which hundreds of thousands of transistors are placed on a single chip, became increasingly common. Many companies, some new to the computer field, introduced in the 1970s programmable minicomputers supplied with softwarepackages. The size-reduction trend continued with the introduction of personalcomputers, which are programmable machines small enough and inexpensive enoughto be purchased and used by individuals (Rogers, 153). One of the first of suchmachines was introduced in January 1975.

Popular Electronics magazine providedplans that would allow any electronics wizard to build his own small, programmable computer for about $380 (Rose, 32). The computer was called theAltair 8800. Its programming involved pushing buttons and flipping switches onthe front of the box.

It didn’t include a monitor or keyboard, and itsapplications were very limited (Jacobs, 53). Even though, many orders came infor it and several famous owners of computer and software manufacturingcompanies got their start in computing through the Altair. For example, SteveJobs and Steve Wozniak, founders of Apple Computer, built a much cheaper, yetmore productive version of the Altair and turned their hobby into a business (Fluegelman, 16).

After the introduction of the Altair 8800, the personal computer industrybecame a fierce battleground of competition. IBM had been the computer industrystandard for well over a half-century. They held their position as the standardwhen they introduced their first personal computer, the IBM Model 60 in 1975 (Chposky, 156).

However, the newly formed Apple Computer company was releasing its ownpersonal computer, the Apple II (The Apple I was the first computer designed byJobs and Wozniak in Wozniak’s garage, which was not produced on a wide scale). Software was needed to run the computers as well. Microsoft developed a DiskOperating System (MS-DOS) for the IBM computer while Apple developed its ownsoftware system (Rose, 37). Because Microsoft had now set the software standardfor IBMs, every software manufacturer had to make their software compatible withMicrosoft’s. This would lead to huge profits for Microsoft (Cringley, 163). Themain goal of the computer manufacturers was to make the computer as affordableas possible while increasing speed, reliability, and capacity. Nearly everycomputer manufacturer accomplished this and computers popped up everywhere.

Computers were in businesses keeping track of inventories. Computers were incolleges aiding students in research. Computers were in laboratories makingcomplex calculations at high speeds for scientists and physicists. The computerhad made its mark everywhere in society and built up a huge industry (Cringley, 174). The future is promising for the computer industry and its technology.

Thespeed of processors is expected to double every year and a half in the comingyears. As manufacturing techniques are further perfected the prices of computersystems are expected to steadily fall. However, since the microprocessortechnology will be increasing, it’s higher costs will offset the drop in priceof older processors. In other words, the price of a new computer will stay aboutthe same from year to year, but technology will steadily increase (Zachary, 42)Since the end of World War II, the computer industry has grown from a standingstart into one of the biggest and most profitable industries in the UnitedStates. It now comprises thousands of companies, making everything frommulti-million dollar high-speed supercomputers to printout paper and floppydisks.

It employs millions of people and generates tens of billions of dollarsin sales each year (Malone, 192). Surely, the computer has impacted every aspectof people’s lives. It has affected the way people work and play. It has madeeveryone’s life easier by doing difficult work for people.

The computer truly isone of the most incredible inventions in history.