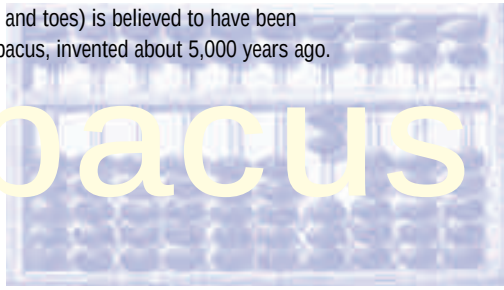
The Evolution of Thinking Machines

What we think of as the computer started out as a bank of wired machines that filled a 30-by-50-foot room and weighed 30 tons. Today, a handheld calculator has more computing power than the first true electronic brain of the 1940s. As you see on this episode of FRONTIERS, the trend toward miniaturization continues. Computers in the future may be carried in your shoe or worn as part of your eyeglasses or clothes. They may also be quite different in brain power and applications from what we use today. You will probably talk to your future computer and it may even remind you of appointments and assignments or the names and faces of people you meet.

Ancient Times

The earliest computing device in the world (after fingers and toes) is believed to have been a primitive abacus, invented about 5,000 years ago.

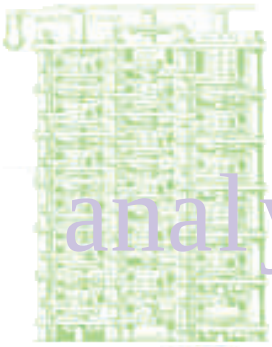


17th Century

In 1642, the French philosopher Blaise Pascal invented a mechanical adding machine at the age of 19 to help his father, a tax collector. Pascal's calculator is considered a forerunner of the digital computer.

19th Century

In the 1830s, British mathematician Charles Babbage designed mechanical calculating machines (Difference Engine and Analytical Engine) that used punched cards to solve math problems. American statistician Herman Hollerith invented a machine that used perforated cards to tabulate data for the 1890 U.S. Census.

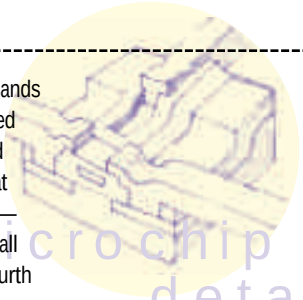


Early 1940s

British mathematician Alan Turing put his theories about computers into practice during World War II, when he helped build the Colossus to crack enemy codes. In 1944, U.S. scientists built the Mark I, an automatic digital computer. By today's standards, these two machines would seem slow, but they could do math calculations faster than a person.

1940s and 1950s

Wartime research launched the Information Age in 1946, with the first electronic computer built to compute artillery trajectories. The 30-ton Electronic Numerical Integrator and Computer or ENIAC, powered by 18,000 vacuum tubes, could do in a day what it took one person a year to calculate. The invention of the transistor in 1947 made smaller and more reliable computers possible. In 1952, UNIVAC became the first computer to accurately predict the results of a U.S. presidential election.



1960s and 1970s

The third generation of computers put thousands of transistors on a board, called the integrated circuit. In the 1960s, the Cold War generated research into a communications network that could operate in the event of nuclear attack — the foundations for today's Internet. Putting all the components on chips of silicon in the fourth generation enabled computers and electronic devices to become smaller, faster, cheaper and more efficient.

1980s and 1990s

Continued miniaturization made the microprocessor and personal computer possible; computers continued to shrink in size but grow in brain power. In 1982, the word "Internet" appeared for the first time. Internet usage has grown exponentially in the 1990s as millions of people rush onto the Information Superhighway. Office and home computing networks link people around the globe, while scientists tinker with the next generation of computers.