**Abacus**

Developed ca. 3000BC in Asia Minor

A device consisting of rows of beads mounted on rods. The beads can slide along the rods, and different bead positions represent different numerical values. The operator of an abacus can follow certain well-defined procedures to perform calculations surprisingly quickly.


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**Arithometer**

Invented in 1820 by Charles Thomas de Colmar.

A mechanical device capable of adding, subtracting, multiplying, and dividing. The arithometer was popular as late as World War I. As with a calculator, the user of the arithometer can command it to perform a calculation (by pushing buttons and moving levers), but the arithometer cannot use the results of its calculations to decide what calculations to perform next.


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**Analytical Engine**

Designed ca. 1832 by Charles Babbage & Ada Lovelace

A machine which would have received instructions from punch-cards—pieces of paper with holes punched in them in special patterns. The machine would perform calculations described by the holes using steam-powered gears and cogs. Results of previous calculations could control what calculations it performed next. Finally, it would print its results. Babbage never built the analytical engine.


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**ENIAC**

Developed in 1944 by Mauchly, Eckert, et al.

An electronic device which used vacuum tubes, electrical relays, and other components to perform calculations. Operators wired together some of ENIAC's electrical devices to represent the commands it should execute. It then executed those commands, performing literally thousands of additions in a single second. It could not decide what commands to execute next based on the results of previous calculations. ENIAC was over 150 feet in width and took up a large room.

[UPenn Almanac article: http://www.upenn.edu/almanac/v42/n18/eniac.html]

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**Pentium II Microprocessor**

Developed ca. 1997 by Intel Corp.

A tiny, square wafer of silicon which has been printed with millions of transistors. Each transistor can block or pass a signal based on a second signal which controls it. The pattern printed on the Pentium II allows it to perform millions of computations per second based on commands supplied electrically from pins—small metal prongs which attach to the chip. It provides the results of these calculations and requests new commands or data through other pins. It can store its own commands and choose which to execute based on previous calculations. The Pentium II takes up only a few square millimeters.

[Intel Microprocessor Hall of Fame: http://www.intel.com/intel/intelis/museum/exhibit/hist_micro/]

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**iMac**

Developed in 1997 by Apple Corp.

The iMac is a single system comprised of a monitor, hard drive, CD drive, memory, a PowerPC G3 processor, and the Macintosh (OS X) operating system. An iMac can receive commands from several of its own components, from the internet, or from a keyboard, mouse, or other control device. It can be used to play games, edit documents, or for a variety of other tasks. It also comes in quite a few oddly named colors like “Snow,” “Indigo,” or “Graphite.”

[Apple: http://www.apple.com/imac/g3/]

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**HAL9000**

Developed ca. 1991 by Arthur C. Clarke (sort of)

HAL9000 is an advanced device capable of performing a variety of tasks and interacting with its human users (companions?). The HAL9000 communicates by voice and can control devices such as the pod bay doors on a spaceship. It (he?) has an unfortunate tendency to obsess over inconsistencies in the instructions given it, however. In the events described in Arthur C. Clarke’s “2001: A Space Odyssey,” HAL’s obsessive literalism led to the death of most of its spaceship’s human crew. (Oops!)

[ActivMedia Robotics: http://www.amigobot.com/amigo/techspecs.html]

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**Xbox**

Developed in 2001 by Microsoft Corp.

The Xbox is a gaming system: it reads and executes commands from a DVD along with responding to input from control devices to display games on an attached monitor. The Xbox can be connected to the internet through an Ethernet port, contains a hard drive to store information, and runs on a 733MHz Intel processor. The Xbox, however, has never controlled a mission to space.

[Microsoft: http://www.microsoft.com/xbox/]

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**AmigoBot**

Developed late 20th century by ActivMedia Robotics.

The AmigoBot is a small, wireless, mobile robot. It weighs about 10 pounds (with batteries) and can run for approximately 2 hours before charging. It is equipped with 10 sonar sensors (devices that send out a sound signal and then time how long it takes the signal to return) and other “serial” device or through a wireless modem.

[ActivMedia Robotics: http://www.amigobot.com/amigo/techspecs.html]
<table>
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<tr>
<th><strong>Marionette</strong></th>
<th><strong>Timed Pop-up Toaster</strong></th>
<th><strong>VCR (Video Cassette Recorder)</strong></th>
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<tr>
<td>Popularized mid-19th century by Thomas Holden.</td>
<td>Developed in 1919 by Charles Strite. Using a system of springs, heating element, and timer, the pop-up toaster can toast bread—caramelizing surface sugars to a golden-brown, crunchy consistency—without the need for human supervision.</td>
<td>First commercialized for home use by Sony in 1969. A VCR is a device that transcribes video signals (such as television) onto a magnetic tape. The video signal can then be replayed from the tape. Some modern VCRs can quickly advance or rewind their tapes, leave marks on the tapes to which they can return, or scan past commercials in recordings. Users can also program the VCR to record television broadcasts at certain times and dates.</td>
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A marionette is a puppet controlled from above by strings. Basic marionettes have about nine strings, but more complex puppets can have dozens. Each string controls the position of some part of the puppet. Coordinated movement of the strings (by lifting a fixed framework) can elicit a variety of compelling motions. “Plucking” individual strings can also create interesting movements. Marionettes range widely in size (see Being John Malkovich). |[Encyclopedia Britannica: www.britannica.com, search for “marionette”]|

<table>
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<th><strong>Domestic Cat</strong></th>
<th><strong>The Human Brain</strong></th>
<th><strong>Microsoft Windows</strong></th>
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<td>Domesticated ca. 2000BC in Egypt</td>
<td>The human brain is a large organ situated in the skull of the modern human. Capable of a wide range of tasks from mathematical calculations to identifying Jelly Bean flavors, the human brain coordinates most functions of its associated human. It receives sensory information from many devices (eyes, ears, toes, etc.) and also controls devices that act in the world (hands, voice box, toes, etc.). The structure of the human brain consists of a massive network of interconnected neurons interacting through chemical and electric processes. Physically, it weighs about three pounds. In comparison, a cat’s brain weighs about an ounce.</td>
<td>Developed ca. 1985 by Microsoft Corp. Software which regulates the programs that control a computing device. Windows handles the operation of the machine’s physical devices, presents an interface for the user to the machine’s storage devices, supports other programs’ interfaces, and performs a wide variety of other functions.</td>
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A four-legged creature with a tail, covered in fur and possessed of retractable claws. Cats pretty much do whatever they want. Physically, the domestic cat weighs between about 5 and 20 pounds. |[Natural History Museum of LA County: http://www.lam.mus.ca.us/cats/home.html]|

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<th><strong>Digital Watch</strong></th>
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<td>First developed in 1973 by Seiko.</td>
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A digital watch is a timekeeping device. Unlike an analog watch, the digital watch has no hands. Instead, it uses an LCD (Liquid Crystal Display) to display the time as numerical digits. Each watch has one or more microchips inside to control the LCD. Some can tell time in many different time zones or record “lap times.” The ever-fashionable “calculator watch” can also perform basic calculations. A few can even record calendar appointments and give reminders at appropriate times, store phone numbers, etc. |[Encyclopedia Britannica: www.britannica.com, search for “VCR”]|

![Marionette](image1.png) ![Timed Pop-up Toaster](image2.png) ![VCR](image3.png) ![Domestic Cat](image4.png) ![The Human Brain](image5.png) ![Microsoft Windows](image6.png) ![Digital Watch](image7.png)