DNA Computing

Cannot imagine a day without checking your email or an posting amazing pic from holidays on your social media account? This is just a tiny part of information technologies impact on our daily routine. Everyone should agree that IT nowadays is much more than that. Have you ever thought what would happen if two major things on which our future is based on - science and information technologies - would merge? And here the DNA computing takes the place.

DNA computing is a branch of [computing](https://en.wikipedia.org/wiki/Computing) which uses [DNA](https://en.wikipedia.org/wiki/DNA), biological [molecules](https://www.britannica.com/science/molecule), instead of the traditional silicon-based [computer](https://en.wikipedia.org/wiki/Computer) [technologies](https://en.wikipedia.org/wiki/Technology).  The organisation and complexity of all living beings is based on a coding system functioning with four key components of the [DNA-molecule](https://en.wikipedia.org/wiki/DNA_molecule). Because of this, the DNA is very suited as a medium for data processing. According to different calculations a DNA-computer with one liter of fluid containing six grams of DNA could potentially have a memory capacity of 3072 [exabytes](https://en.wikipedia.org/wiki/Exabyte). The theoretical maximum data transfer speed would also be enormous due to the massive [parallelism](https://en.wikipedia.org/wiki/Parallel_computing) of the calculations.

In [DNA](https://www.britannica.com/science/DNA) computing, information is represented using the four-character genetic alphabet (A ([adenine](https://www.britannica.com/science/adenine)), G ([guanine](https://www.britannica.com/science/guanine)), C ([cytosine](https://www.britannica.com/science/cytosine)), and T ([thymine](https://www.britannica.com/science/thymine))), rather than the [binary](https://www.britannica.com/science/binary-number-system)alphabet (1 and 0) used by traditional computers. This is achievable because short DNA [molecules](https://www.britannica.com/science/molecule) of any arbitrary sequence may be synthesized to order. An algorithm’s input is therefore represented by DNA molecules with specific sequences, the instructions are carried out by laboratory operations on the molecules (sorting them according to length or chopping strands containing a certain subsequence), and the result is defined as some property of the final set of molecules (the presence or absence of a specific sequence).

By harnessing the power of molecules, new forms of information-processing technology are possible that are evolvable, self-replicating, self-repairing, and responsive. The possible applications of this emerging technology will have an impact on many areas, including intelligent medical diagnostics and drug delivery, [tissue engineering](https://www.britannica.com/science/tissue-engineering), energy, and the [environment](https://www.merriam-webster.com/dictionary/environment).