## **Nanobots**

## **What Are Nanobots?**

The field of nanotechnology is concerned with the research and development of technology approximately one to 100 nanometres in scale. Therefore, nanorobotics is focused on the creation of robots that are around this size. In practice, it’s difficult to engineer anything as small as one nanometer in scale and the term “nanorobotics” and “nanobot” is frequently [applied](https://www.sciencedaily.com/terms/nanorobotics.htm) to devices which are approximately 0.1 – 10 micrometers in size, which is still quite small.

It’s important to note that the term “nanorobot” is sometimes applied to devices which interact with objects at the nanoscale, manipulating nanoscale items. Therefore, even if the device itself is much larger, it may be considered a nanorobotic instrument. This article will focus on nanoscale robots themselves.

Much of the field of nanorobotics and nanobots is still in the theoretical phase, with research focused on solving the problems of construction at such a small scale. However, some prototype nanomachines and nanomotors have been designed and tested.

Most currently existing nanorobotic devices fall into [one of four categories](https://learn.g2.com/nanobots): switches, motors, shuttles, and cars.

## **How Are Nanobots Created?**

The field of nanorobotics is at the crossroads of many disciplines and the creation of nanobots involves the creation of sensors, actuators and motors. Physical modeling must be done as well, and all of this must be done at nanoscale. As mentioned above, nanomanipulation devices are used to assemble these nano-scale parts and manipulate artificial or biological components, which includes the manipulation of cells and molecules.

Nanorobotics engineers must be able to solve a multitude of problems. They have to address issues regarding sensation, control power, communications, and interactions between both inorganic and organic materials.

The size of a nanobot is roughly comparable to biological cells, and because of this fact future nanobots could be employed in disciplines like medicine and environmental preservation/remediation. Most “nanobots” that exist today are just specific molecules which have been manipulated to accomplish certain tasks.

Complex nanobots are essentially just simple molecules joined together and manipulated with chemical processes. For instance, some nanobots are[comprised of DNA](https://phys.org/news/2020-02-dna-based-nanorobot-cancer-diagnostics.html), and they [transport molecular cargo.](https://futurism.com/nanobots-made-of-dna-can-now-carry-and-sort-molecular-cargo)

## **What Are Nanobots Used For?**

 the first uses for nanobots [will likely be in](https://electronics.howstuffworks.com/nanorobot1.htm) [the medical field](https://www.nbcnews.com/mach/science/these-tiny-robots-could-be-disease-fighting-machines-inside-body-ncna861451). Nanobots could be used to monitor for damage to the body, and potentially even facilitate the repair of this damage. Future nanobots could deliver medicine directly to the cells that need them. Currently, medicines are delivered orally or intravenously and they spread throughout the body instead of hitting just the target regions, causing side effects. Nanobots equipped with sensors could easily be used to monitor for changes in regions of cells, reporting changes at the first sign of damage or malfunction.Beyond medical applications, research is being done regarding the use of nanobots for the purposes of environmental cleanup and remediation. Nanobots could potentially be used to remove [toxic heavy metals](https://www.sciencealert.com/graphene-based-nanobots-could-clean-up-the-metal-from-our-oceans) and [plastics](https://www.pbs.org/newshour/science/this-new-nanotech-could-help-clean-up-earths-microplastics)from bodies of water. The nanobots could carry compounds that render toxic substances inert when combined together, or they could be used to degrade plastic waste through similar processes. Research is also being done on the use of nanobots to facilitate the production of extremely small computer chips and processors, essentially using nanobots to produce microscale computer circuits.

