

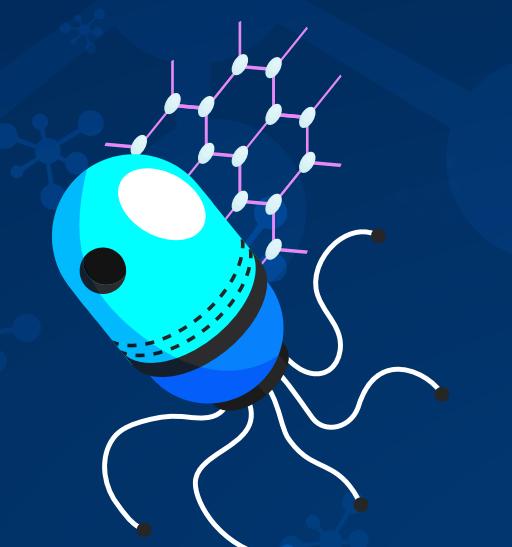
# Microbots - Nanotech Medicine Electronics

Once, robots existed only in our imaginations, but as modern civilization is at its peak, everything we once dreamt of is being pulled into reality. And in that vast sea of fables, we find microbots.

## SO, WHAT EXACTLY ARE THESE “MICROBOTS”?

"Microbots" refers to tiny robots (as small as 1 millimetre), first mentioned by Richard Feynman in one of his iconic lectures. Many predictions about the countless possibilities that nanotechnology could unveil are being made. With the vigorous research happening in nanotechnology, microbots are no more a dream far away.

These bijou critters work with the help of magnetic fields, which help them navigate through and lead their path. Though their size proves to be of great advantage, it makes them more complex to design and work with. With the recent developments brought by scientists, the automation of microbots is a hard nut to crack, but scientists are trying hard to get this technology into our daily lives. Microbots will soon be available with manual control and perform many vital tasks, which till now seemed impossible.



## How do we actualize them?

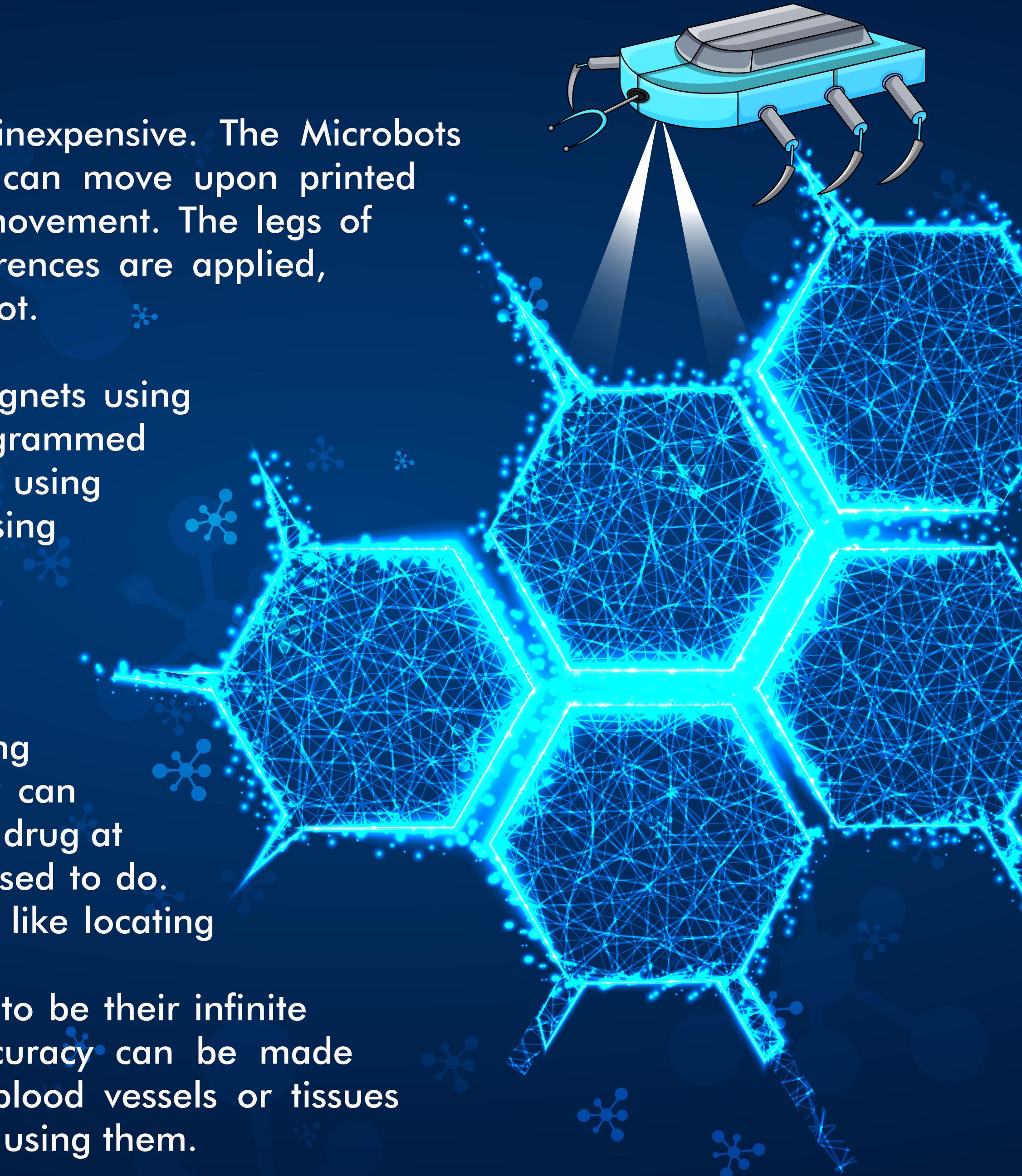
The process of creating microbots should be pretty sophisticated yet inexpensive. The Microbots currently being designed are merely magnets with end effectors that can move upon printed circuit boards that generate varying magnetic fields and govern their movement. The legs of the microbots are of piezoelectric materials, which, when voltage differences are applied, can make the leg either relax or contract and thus propelling the microrobot.

Manufacture of these microbots is done by self-assembly of smaller magnets using magnetic fields and attachment of legs and end effectors by preprogrammed microbots. The circuit boards for the movement of microbots are built using Electron beam lithography, which can print circuits with high precision using the electron beams to remove the resist exposing the course.

## Why do we need these tiny devices?

Many developments will be obtained by invasive surgical methods involving microbots. Like, using intravenous bots for targeted drug delivery. They can navigate through the body to find the particular site for the deposition of a drug at a specific spot to be affected like the endocrine glands naturally are devised to do. Microbots can be designed to perform more tedious medical procedures like locating tumors or finding malfunctioning organs.

The primary advantage of using microbots in medical procedures seems to be their infinite accuracy. Many tangled techniques like acupuncture that demand accuracy can be made hassle-free using them. Endoscopy, even Biopsies, capping or cutting blood vessels or tissues (cauterization), treatment of gastrointestinal diseases can be implemented using them.

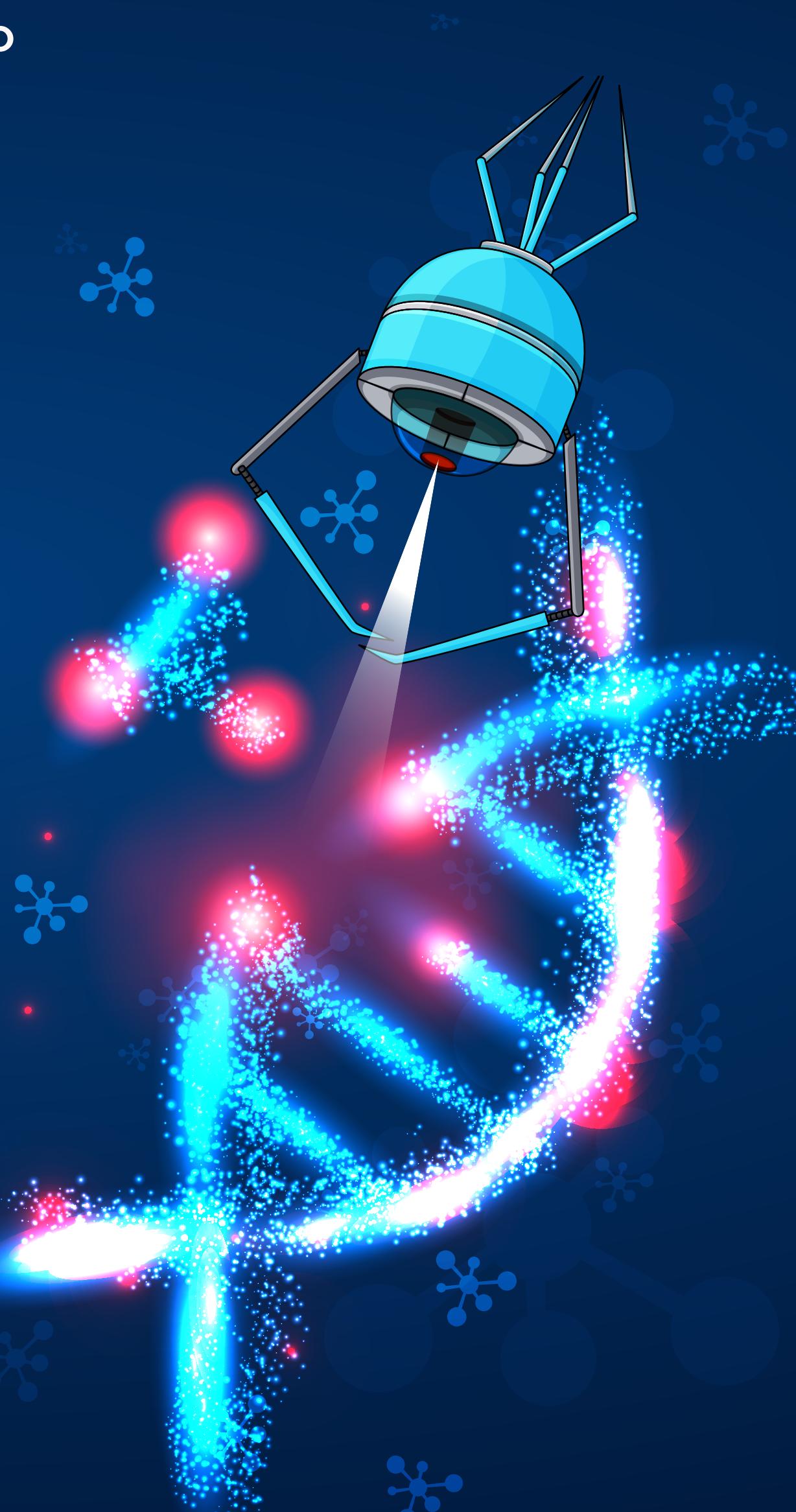


Using microbots, manufacturing industries can put up phenomenal profits with much faster industry operations done by swarms of tiny workers, which they can rely upon. Civil engineering is bound to bear many fruits with its work. Millions of microbots each working simultaneously, some arranging blocks to build structures, while others help fix them in place and check for any deviations in the systems, can make the work faster and with more details and care are the future. Heavy and complex machinery can be easily maintained using a swarm of microbots working through the tiniest gaps inside the machines.

## Are there any downs?

Despite all the benefits that Microbots can fetch, they can also bring in some disadvantages that we should be mindful of, mainly that it is extremely easy to weaponize them. Their size, which makes them go unnoticed, can make them a potential threat to our privacy and make them great spies.

Warfare using microbots can be devastating. As they are merely visible, they, without a hitch, can trigger bio wars, or, in a swarm they can be used as weapons. Even when they get destroyed, they can indisputably be mistaken for dust which means there is no chance of spotting these microbots if they are spying or attacking. Large nations can be brought down using them since they can be easily programmed to act as weapons that can assassinate individuals or destroy vital resources.



# CONCLUSION

Microbots in the coming future are destined to emerge as the most valuable and ever-evolving technology changing our lives into more sophisticated and serene ones. The prototypes of the microbots currently fabricated are meticulously tested, and enhancements are being made for a more advanced, capable, and reliable army of microbots. It wouldn't be long until microbots replace all the man force and machines around us, invading all fields of science.

