

# The Internet of Nano Things

## About a potential biological-technical wave

#IoNT #Robotics

Many people probably do not think much about why an ocean wave actually manifests itself. If taking a closer look, one may find that an ocean wave does not just happen by chance, but is rather caused by a more or less strong energy within the water molecules that oscillates from the ocean floor to the surface. It is this energy, captured within the water molecules, that pulls water masses from behind because of the shallow shores. Since the energy is more powerful than even gravity for a while, it lifts the flat water surface upwards. Waves can flood entire shorelines and are able to either completely destroy, or at least permanently alter adjacent landscapes.

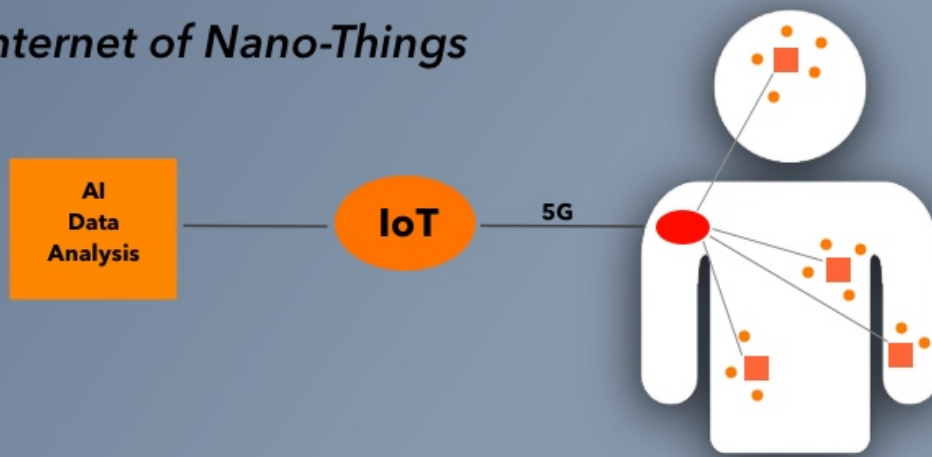
A particularly large wave seems to hit us over the next few years in form of society-transforming technologies; an energetic elevation of the surface, which many do not want to perceive under any circumstances.

Every smartphone has computing powers for which large supercomputing centers needed to be built some 15 years ago. At the same time, our phone computers have access to 4th generation (4G) mobile Internet connections almost everywhere now. The next generation 5G mobile technology network is in the starting blocks and has already been implemented in some countries. 5G will enable up to ten times faster mobile Internet connections on the go than our current Internet connectivity out of the wall. At the same time, not only will the size of 5G transmitting antennas be tiny, down to a few square millimeters, but the range of 5G network cells will also decrease enormously: instead of several square kilometers that a single 4G radio tower can cover, the area of even the most powerful 5G antenna will be only one or two city blocks.

The 5G mobile network is a necessity for the so-called "Internet of Things" (IoT) technology wave, which will almost certainly roll towards us over the next few years. This wave will enable a multitude of smaller objects and devices to be coupled with a blazing fast mobile 5G Internet connection. Not only miniature cameras, weather stations, medical and many other devices will be equipped with 5G connectivity, but also autonomous driverless cars, which may not take off unless the Internet of Things becomes a reality. Autonomous vehicles' improved driving skills may only come along with fast 5G Internet connections, which would enable a rapid exchange of massive amounts of traffic and driving data.

However, a potentially next wave following the coming IoT revolution is already emerging on the horizon. With it comes another miniaturization of the Internet, this time into the molecular or atomic nanoscale level, which is why **this wave is called the "Internet of Nano-Things" (IoNT)**.

## IoNT - Internet of Nano-Things



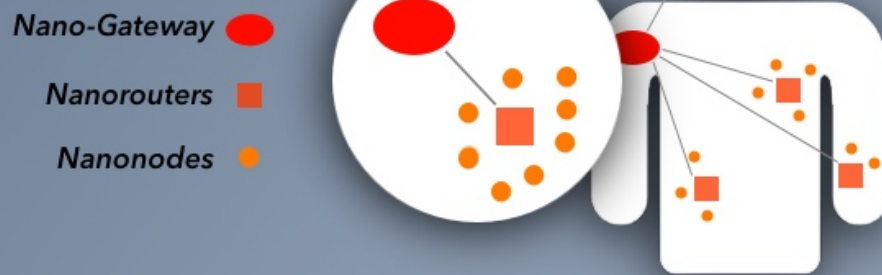
Research projects have been in full swing since the conceptual invention of nanotechnology in 1959, and have by now generated a multi-billion dollar IoNT industry. It probably started with research in health care, where it was realized years ago that nanobiochemical substances within living organisms can behave similar to tiny electrically charged wires. Current research is looking among other things at how to extend this capability into a some sort of nano transistor on atomar levels, the basic component of any computer.

Recently, we developed the possibility to build and analyze matter with only a few atoms. The universal applicability of nanostructures is fascinating: for example, a few metallic atoms can form sensitive nanowire sensors on the one hand, and be used in medicine because of their antibacterial effect on the other.

Prof. Dr. Rainer Adelung, University of Kiel, Germany

The nano network technology has already been given names: the entire network, which contains nano sensors including devices to transport their information to the Internet is called **WNSN, which stands for 'Wireless Nano Sensor Network'**. Important components of WNS networks are first of all the many tiny nano nodes within an organism, which will serve as fine sensors for their respective molecular environments. These will pass on their information to the so-called nanorouters, information collection points where a very large number of nanonodes connect to. The nanorouters in turn will be connected to one or more nanogateways, the point where a living organism's information is being forwarded to the external Internet.

## WNSN - Wireless Nano Sensor Networks



Via a high-speed 5G Internet that will soon be available anywhere, a nanogateway could transmit data about the state of a living organism - permanently and in real time. This data could be picked up by medical data centers for example, which could use AI software to automatically notify medical emergency teams without any human interaction as soon as the automatically monitored condition of a living organism deteriorates. An entirely new type of medical system with tremendous capabilities and also dangers could potentially emerge.

IoNT applications are of course not limited to the medical field but equally interesting for the agricultural sector, industrial production industries, and certainly also to the military. A number of global corporations are engaged in research and development activities in many IoNT areas, including Intel, Cisco, IBM, Siemens and SAP.

Apparently, some IoNT research expertise is also located at universities in Saudi Arabia, whose crown prince **Mohammed bin Salman announced in 2019** that he intends to transform the desert-rugged, northwestern corner of his country into a thriving landscape with flying cars, robotic dinosaurs, a giant artificial moon, plus the "best job opportunities for the world's best minds."

Is he one of the rare few who had spent sufficient time watching the waves rolling in at the coastline ?

<https://www.sun24.news/en/the-internet-of-nano-things-about-a-potential-biological-technical-wave.html>