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# Use of Nanotechnology in Computer Science and its Applications

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**ABSTRACT**

**In this paper, we describe how nanotechnology is being utilized as a part of computer engineering and its applications. Nanotechnology these days turned into the most astonishing investigations created and dynamic research ranges in many fields including material science, concoction building, hardware, and furthermore in software engineering. In present day sciences, nanotechnology is considered as the following mechanical insurgency which it might give more potential outcomes surpass our desires in many fields. In media transmission designing nanotechnology could give viable answers for control productive figuring, detecting, memory augmentation, and human machine association. Nanotechnology in correspondence frameworks likewise gives capacity to makers to deliver PC chips and sensors that are impressively littler, speedier, more vitality effective, and less expensive to make than their present-day modules. In this paper a review of many issues identified with nanotechnology in correspondence frameworks are talked about, and furthermore paper will gives a short thoughts of the potential utilization of different nanotechnology advancements in the correspondence frameworks and the potential for future conceivable outcomes explores that may prompt enhanced correspondence frameworks.**

**Keywords: nanotechnology, computer science, applications.**

## INTRODUCTION

Nanotechnology works at the principal level of association of atoms and moleculesfor both living and anthropogenic frameworks. This is the place the properties and elements of all frameworks are characterized. Nanotechnology guarantees the capacity to construct exact machine and parts of atomic size. In its unique sense, "nanotechnology" alludes to the anticipated capacity to build things from the base up, utilizing methods and apparatuses which are being created to make superior items. This hypothetical capacity was imagined as right on time as 1959 by physicist Richard Feynman. As indicated by National science Foundation and NNI, Nanotechnology is the capacity to comprehend, control and control matter at the level of individual atoms and molecules.

Nanotechnology can give remarkable comprehension about materials and gadgets and is probably going to affect many fields. By utilizing structure at nanoscale as a tunable physical variable, we can enormously extend the scope of execution of existing chemicals and materials. Arrangement of direct particles in a requested exhibit on a substrate surface (self-collected monolayers) can work as another era of compound and organic sensors. Exchanging gadgets and useful units at nanoscale can enhance PC stockpiling and operation limit by a factor of a million. Altogether new organic sensors encourage early diagnostics and ailment anticipation of malignancies. Nanostructured earthenware production and metals have extraordinarily enhanced mechanical properties, both in malleability and quality.

## BACKGROUND

The concepts that seeded nanotechnology were first discussed in 1959 by renowned physicist Richard Feynman in his talk There's Plenty of Room at the Bottom, in which he described the possibility of synthesis via direct manipulation of atoms. The term "nano-technology" was first used by Norio Taniguchi in 1974, though it was not widely known.

In the history of industrial engineering, technology characterized by length only occurred in microelectronics, but now we have nanotechnology. How small is one nanometer? The typical width of a human hair is 50 micrometers. One nanometer is 50,000th of a hair width.

Nanotechnology is the construction and use of functional structures designed from atomic or molecular scale with at least one characteristic dimension measured in nanometers. Their size allows them to exhibit novel and significantly improved physical, chemical, and biological properties, phenomena, and processes because of their size. When characteristic structural features are intermediate between isolated atoms and bulk materials in the range of about one to 100 nanometers, the objects often display physical attributes substantially different from those displayed by either atoms or bulk materials.

Phenomena at the nanometer scale are likely to be a completely new world. Properties of matter at nanoscale may not be as predictable as those observed at larger scales. Important changes in behavior are caused not only by continuous modification of characteristics with diminishing size, but also by the emergence of totally new phenomena such as quantum confinement, a typical example of which is that the color of light emitting from semiconductor nanoparticles depends on their sizes. Designed and controlled fabrication and integration of nanomaterials and nanodevices is likely to be revolutionary for science and technology.

Fullerenes were discovered in 1985 by Harry Kroto, Richard Smalley, and Robert Curl, who together won the 1996 Nobel Prize in Chemistry. C60 was not initially described as nanotechnology; the term was used regarding subsequent work with related graphene tubes (called carbon nanotubes and sometimes called Bucky tubes) which suggested potential applications for nanoscale electronics and devices.

In the early 2000s, the field garnered increased scientific, political, and commercial attention that led to both controversy and progress. Controversies emerged regarding the definitions and potential implications of nanotechnologies, exemplified by the Royal Society's report on nanotechnology. Challenges were raised regarding the feasibility of applications envisioned by advocates of molecular nanotechnology, which culminated in a public debate between Drexler and Smalley in 2001 and 2003.

Meanwhile, commercialization of products based on advancements in nanoscale technologies began emerging. These products are limited to bulk applications of nanomaterials and do not involve atomic control of matter. Some examples include the Silver Nano platform for using silver nanoparticles as an antibacterial agent, nanoparticle-based transparent sunscreens, carbon fiber strengthening using silica nanoparticles, and carbon nanotubes for stain-resistant textiles.

## NANOTECHNOLOGY APPLICATIONS

The 2000s have seen the beginnings of the applications of nanotechnology in commercial products, although most applications are limited to the bulk use of passive nanomaterials. Examples include titanium dioxide and zinc oxide nanoparticles in sunscreen, cosmetics and some food products; silver nanoparticles in food packaging, clothing, disinfectants and household appliances such as Silver Nano; carbon nanotubes for stain-resistant textiles; and cerium oxide as a fuel catalyst. The Project on Emerging Nanotechnologies estimated that over 1300 manufacturer-identified nanotech products are publicly available, with new ones hitting the market at a pace of 3-4 per week.

Nanotechnology is being used in developing countries to help treat disease and prevent health issues. The umbrella term for this kind of nanotechnology is Nanomedicine. Nanotechnology is also being applied to or developed for application to a variety of industrial and purification processes. Purification and environmental cleanup applications include the desalination of water, water filtration, wastewater treatment, groundwater treatment, and other nanoremediation. In industry, applications may include construction materials, military goods, and nano-machining of nano-wires, nano-rods, few layers of grapheme etc. Also, recently a new field arisen from the root of Nanotechnology is called Nanobiotechnology. Nanobiotechnology is the biology-based, application-oriented frontier area of research in the hybrid discipline of Nanoscience and biotechnology with an equivalent contribution.

### Applications by Type

- Nanomedicine
- Nanobiotechnology
- Green nanotechnology
- Energy applications of nanotechnology
- Industrial applications of nanotechnology
- Potential applications of carbon nanotubes
- Nanoart
- Computer Science Applications

- Bio Medical Application
- Cosmetics & Paints
- Agriculture & Food
- Defense & Security

## APPLICATONS IN COMPUTER SCIENCE

Nanotechnology has a wide range of applications and has impacted the telecommunications industry in several ways.

**Wireless technology**

The telecommunication enterprise will radically get changed into the brand new Nanotechnology. Nanotechnology effect in operation of both cellular as well as core network, and by addition perfection in security and the better effect on the sensor makes the nanotechnology the hugest from previous traditional technologies [10] . Wireless technology industries have promised at the implementation of the intelligent operations that allows to ensure that the computation and communication are to be had as desired. The advent of intelligent and Nano technology concepts in the mobile devices will assist in embedding the devices inside the human environments that can create a brand new platform on the way to permit the ever present sensing, and computing. The Nano devices may be loaded to achieve some capabilities like self-powering, sensible to the environment or smart interaction with other systems.

**Internet of Things (IoT)**

Technology Internet of Things (IoT) is the arrangement of physical articles or things introduced with equipment, programming, sensors and network system to enable it to achieve more essential regard and organization by exchanging data with the executive and other related objects. Nano Intelligent Things, could be the accompanying possible thing that could hit within the near future. Nano bio chips can be prepared for pass the data or information among themselves or to the machines or to the general population and are self-learning by illustration affirmation, upgrading themselves by each time they play out the mission. The nanotechnology with the internet of thing will provides a Nano size of things able to communication together with the ability to interact with human or machines in a good and efficient manner.

**Body Area Network**

Body area network devices now can be coordinated into dress or body. Much work has been finished by many research groups on improvement of intelligent Nano materials and combination of microelectronics into garments or implanted in the human body. Therapeutic devices such as pacemakers, prosthesis, and stents are now becomes really used in medical. One case is a sensors focused at congestive heart failure patients, these sensors may planted inside body and communicate to each other by the way of interbody. The embedded sensors in a size like a grain of rice can be utilized to measure many medical metrics inside the body such as measuring the flow rate of blood in the arteries within the human body, a complex surgical, internal survey of vital parts of the body and likewise be utilized for medication treatments for nerve or tissue incitement.

**Mobile and wireless devices**

Portable devices for calculation and sensing are becomes a key dreams of remote business to have surrounding knowledge which they are constantly accessible and prepared to serve the client. These devices can attached to human situations like home, office, open spots in conjunction with cell phones. One of the key requirements for implanting devices into physical objects of the world requires that devices able to adjust to their surroundings and turn into a part of the system of devices encompassing them. Such example for that is like organic frameworks which develop and adjust to nature independently.

**Nano communication and networks**

Nano machine is described as mechanical a device that relies on upon nanometer scale parts. the term of nuclear machine is known as a mechanical device that plays out an accommodating limit using fragments of nanometer scale and described sub nuclear structure able conveying, processing, information , detecting or potentially activation other system. Communication based on electromagnetic waves is the most basic strategy to interconnect microelectronic devices and these waves can propagate with low loss along wires or wirelessly. To establish a bidirectional wireless Nano communication, a radio frequency systems should to be coordinated in the Nano machine which required a development in Nano scale antennas for very high frequencies.

**Quantum computing**

By replacing current computers by more progressed and quick preparing quantum computers innovation, the most exceptional innovation that will be in charge of adding new features and means of processing and computing in an intelligent way [37] . In quantum computers, the binary rates in conventional computers are repeated by quantum bitsor qubits, which can be in a state of 0, 1 and superposition simultaneously.

**Information storing and processing**

For information processing and transmission, the development in electronic, optical and optoelectronic components are expected to producing a fast and precise process communication devices. The Photonic crystals will be potentially used for designing purely optical circuits as a basis for future information processing based on light only. Nanotechnology concept in nanoscale storage device that build on CMOS technology by using quantum dabs and carbon nanotubes will achieves a great expectations for storing the large amount of data

**Nano Sensors and Nano Devices**

Nano sensors and nano devices are providing new solutions for many aspects such in environmental and biological sensing that offers a high degree of detection sensitivity, and availability in static or dynamic situation in many applications such as health, safety, and monitoring. Due to the increasing in many applications of industrial facilities and its global distributions, there is an urgent needs to develop new type of sensors and devices that are able to detect and identify rapidly the source of pollutant, and other threat agents at any point. From other side taking deep concept, it's also required to develop sensors and devices that are able to interact with other machines in manufacturing areas, to detect many types of fluctuations during industrial process. Other important application such in healthcare is also becomes an important area that required to develop a new generation of nano sensors and nano devices with rapid response and high sensitivity in nano scale areas may be inside the human body.

**Nanotechnology in Electronics**

Nanoelectronics holds some answers for how we might increase the capabilities of electronics devices while we reduce their weight and power consumption. Some of the nanoelectronics areas under development include:

a. Improving display screens on electronics devices. This involves reducing power consumption while decreasing the weight and thickness of the screens.

b. Increasing the density of memory chips. Researchers are developing a type of memory chip with a projected density of one terabyte of memory per square inch or greater.

c. Reducing the size of transistors used in integrated circuits. One researcher believes it may be possible to "put the power of all of today's present computers in the palm of your hand

## CONCLUSION

Nowadays the use of wireless communication is rapidly increasing and quickly expanding. The fundamental drivers for the utilization of nanotechnology in wireless devices and systems are superior, bring down power utilization and minimized size of communication components. Nanotechnology is set to significantly influence communication systems provoking to less requesting meeting of related advancements, enormous capacity information, minimized limit devices, and higher execution registering. Nanotechnology for Telecommunications covers ask about and developmental issues and what's more future course of nanotechnology as they apply to broadcast communications.

## FUTURE SCOPES IN NANOTECHNOLOGY

These days the utilization of remote correspondence is quickly expanding and rapidly extending. The basic drivers for the use of nanotechnology in remote gadgets and frameworks are prevalent, cut down power usage and limited size of correspondence parts. Nanotechnology is set to fundamentally impact correspondence frameworks inciting to less asking for meeting of related progressions, colossal limit data, limited farthest point gadgets, and higher execution enlisting. Nanotechnology for Telecommunications covers get some information about and formative issues and what's more future course of nanotechnology as they apply to communicate interchanges.

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