Nanotechnology- The Demand of Life

Er. AshishChawla
Assistant Professor, Deparment of Electronics &Communication Engineering,Continental Institute of Engineering and Technology, Fatehgarh Sahib, Punjab, India
a.chawla@live.com

***Abstract*-Nanotechnology is not just technology. It is the ability to look deep into what and how basic elements are created and how they can be manipulated to benefit mankind. Nanotechnology is the engineering of functional systems at the molecular scale. In general, any branch of technology that results from our ability to control and manipulate matter on length scales of 1-100 nm can be counted as nanotechnology. "Nanotechnology doesn't make the products, it makes the products better." Different areas of research in Nanotechnology are - Carbon Nanotube, Optical (or particle-wave based), Crystalline, DNA Computing and Quantum Nanotechnology. Storing trillion bytes of information on a small chip - Computer Industry, Nanorobots to deal with the large variety of diseases like cancer cells - Medicine Industry, to perform delicate surgeries - Nanosurgeons are the few basic applications of the Nanotechnology. But the power of the technology may cause two competing nations to enter a disruptive and unstable arms race. Disruption of the basis of economy is a strong possibility. "Nanotech weapons would be extremely powerful and could lead to a dangerously unstable arms race." But despite of all these dangers and fears, Nanotech will change the vision and the way we see the world around us.**

Key Words: Nano Technology, Benefits of Nano technology

I INTRODUCTION

A basic definition: Nanotechnology is the engineering of functional systems at the molecular scale. This covers both current work and concepts that are more advanced. In its original sense, 'nanotechnology' refers to the projected ability toConstruct items from the bottom up, using techniques and tools being developed today to make complete, high performance products.Nanotechnology can refer to measurement or visualization at the scale of 1-100 nanometers, but a consensus seems to be forming around the ideathat control and restructuring of matter at the nanoscale is a necessary element. "Engineering of functional systems at the molecular scale" is what nanotech is really all about." In general, any branch of technology that results from our ability to control and manipulate matter on length scales of 1-100 nm can be counted as nanotechnology. However, many successes that are attributed to nanotechnology are merely the result of years of research into conventional fields like materials or colloid science. It is therefore helpful to break up the definition of nanotechnology a little.

II DIFFERENT AREAS OF NANOTECH

There are many different types of Nanotechnology available.
In general, they can be classified into the following categories:

- **Carbon Nanotube.**
- **Optical (or particle-wave based).**
- **Crystalline.**
- **DNA and Quantum**.

Each of these categories has a significant impact in the study of Nanotechnology. Nanotechnology is not just technology. It is the study of atoms, and the world as we know it. It is the ability to look deep into what and how basic elements are created and how they can be manipulated to benefit mankind.Of course, like any other "technology" or societal advancement, it can be turned into destructive forces. This advancement is no different. Like it or not, Nanotechnology is the next BIG THING.

III BENEFITS OF NANOTECH

The first products made from Nano machines are stronger fibers, eventually to replicate anything, including diamonds, water and food. Famine could be eradicated by machines that fabricate foods to feed the hungry. In the computer industry, the ability to shrink the size of transistors on silicon microprocessors will soon reach its limits. Nanotechnology will be needed to create a new generation of Computer components. Molecular computers could contain storage devices capable of storing trillions of bytes of information in a structure the size of a sugar cube.Nanotechnology may have its biggest impact on the medical industry. Patients drink fluids containing nanorobots programmed to attack and reconstruct the molecular structure of cancer cells and viruses to make them harmless. There's even speculation that nanorobots could slow or reverse the aging process, and life expectancy could increase significantly.Nanorobots could also be programmed to perform delicate surgeries -- such nanosurgeons could work at a level a thousand times more precise than the sharpest scalpel. By working on such a small scale, a nanorobot could operate without leaving the scars that conventional surgery does. Additionally, nanorobots could change your physical appearance. They could be programmed to perform cosmetic surgery, rearranging your atoms to change your ears, nose, eye color or any other physical feature you wish to alter. Nanotechnology has the potential to have a positive effect on the environment. For instance, airborne nanorobots could be programmed to rebuild the thinning ozone layer. Contaminants could be automatically removed from water sources, and oil spills could be cleaned up instantly. Manufacturing materials using the bottom-up method of nanotechnology also creates less pollution than conventional manufacturing processes. Our dependence on non-renewable resources would diminish with nanotechnology. Many resources could be constructed by nanomachines. Cutting down trees, mining coal or drilling for oil may no longer be necessary. Resources could simply be constructed by nanomachines.

IV CONCERNS AND FEARS

Assuming that some kind of radical nanotechnology is possible and feasible, the question is whether we should even want these developments to take place. Some 50 years ago it was generally taken for granted that scientific progress was good for society, but this is certainly not the case now. In some quarters, there are calls for a cautious approach to nanotechnology; at the most extreme, there are demands for a complete moratorium on the development of the technology. Regulations controlling the introduction of new materials into the workplace and the environment are, rightly, much stricter now than in the past, and we should appreciate that the properties of materials depend on their physical manifestation as well as their chemical content. But we do not have to assume that all nano-scale materials are inherently dangerous. Imposing a blanket ban would be absurd and unenforceable, simply because we have enough experience of many forms of Nano particles to know they are safe. If we wanted to avoid Nano particles completely, we would have to give up drinking milk, full as it is of nano-scale casein particles. Evolutionary nanotechnology is certainly going to lead to far-reaching changes in society, which we should get to grips with now. It will allow computing that is so cheap and powerful that every product or gadget - no matter the price - will be able to process, sense and transmit information. Radio-frequency identification chips, which are already available, are just the beginning. But the prospect of cheap, powerful, computing - when combined with mass storage and automated image processing - is a totalitarian's dream and a libertarian's nightmare. The public's big fear of nanotechnology - beyond these concrete social, environmental and economic factors - concerns the proper relationship between man and nature. Is it right to take living organisms from nature and then reassemble and reconstruct their most basic structures, possibly with additional synthetic components? By replacing living parts of the body with man-made artifacts, are we blurring the line between man and machine? These fears are at the root of the most far-reaching concern about nanotechnology - the grey-goo problem. Of course, fear of loss of control is a primal fear about any technology. The question is whether it is realistic to worry about it. We should be clear about what this proposition implies: that we can out-engineer evolution by making an entirely synthetic form of life that is better adapted to the Earth's environment than life itself is. Such a feat is unrealistic in the next 20 years - and probably for a lot longer. We simply do not have a detailed enough knowledge of how life itself works. We have the "parts list", but very little understanding of how it all fits together and operate as a complex system. Still, our appreciation of how nature engineers at the nano-scale will grow rapidly, and attempts to mimic some of the functions of life will help us to appreciate how biology operates.

V NANOTECHNOLOGY- FUTURE VISIONS

Nanotechnology is increasingly considered to be the future technology. Instead of "ever higher, ever wider" its motto is "ever smaller, ever faster". Nanotechnology provides access to the world of the smallest things. One nanometer is a millionth part of a millimeter. The diameter of a human hair is fifty thousand times bigger. The possible applications of this technology are immense. Future progress in nanotechnology will also determine the further development of future-oriented branches. Nanotechnology is dealing with research and the construction in the sphere of very small structures: one nanometer is one millionth of a millimeter. Nano (Greek: dwarf) includes research areas in animate and inanimate nature. Applications emerge in energy technology (fuel cells and solar cells), in environmental technology (materials cycles and disposal) or in information technology (new memories and processors) but also in the healthcare area. Nanotechnology is the umbrella term for the most different types of analysis and processing of materials which have one thing in common: Their size is one to one hundred nanometers (one nanometer is one millionth of a millimeter). The mechanical, optical, magnetic, electrical and chemical characteristics of these very small structures do not only depend on their original material but very much also on their size and shape. A precondition for nanotechnology is the discovery of the possibilities of working with individual components of matter as well as the related growing understanding of the self-organization of these components.Nanotechnology develops the basis for increasingly smaller data memories with increasingly larger storage capacity, for highly efficient filters for sewage treatment, for photovoltaic windows, for materials which can be used to build ultra-light engines and body parts in the automobile industry or for artificial joints which are better tolerated by the human body due to organic nano-surfaces.

VI CONCLUSION

As used today, the term nanotechnology usually refers to a broad collection of mostly disconnected fields. Essentially, anything sufficiently small and interesting can be called nanotechnology. Much of it is harmless. For the rest, much of the harm is of familiar and limited quality. But as we will see, molecular manufacturing will bring unfamiliar risks and new classes of problems.The next Industrial Revolution is right around the corner. Fourth generation nanotechnology — molecular manufacturing — will radically transform the world, and the people, of the early 21st century. Whether that transformation will be peaceful and beneficial or horrendously destructive is unknown. Although nanotechnology carries great promise, unwise or malicious use could seriously threaten the survival of the human race.

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