NANO - ROBOTICS
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Introduction

Robot

- Robot is a machine which does the particular work. It is the combination of mechanical & electronics engineering. Robots are of two types:--
  1. Robot which does the predetermined work,
  2. Robot which uses the intelligence
Nano :-

- What is Nano?? Basically Nano means (10-9).

For example

- 10-9 th part of 1meter..
- In simple words, If there is a circuit which is having area of 1meter. In Nano - technology, the size is reduced by 109 times. So the 1meter area circuit can be implemented in a very small part. The size of the hardware can be reduced. And we can get more size for technology improvement.
Definition of nanotechnology

A basic definition:-

- Nanotechnology is the engineering of function 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 to construct items from the bottom up, using techniques and tools being developed today to make complete, high performance products.
**Definition of nano-robotics**

- Nanorobotics is the technology of creating machines or robots at or close to the microscopic scale of a nanometers (10-9 meters). More specifically, nanorobotics refers to the still largely hypothetical nanotechnology engineering discipline of designing and building nanorobots.
Few Words About Nanorobotics :

Research in Nanorobotics began in the late 1980’s. Around this time, K. Eric Drexler published his research on nano systems.

- From there research developed along with two paths: - 1. Design and simulation of robot with nano scale dimensions.

- 2. Manipulation or assembly of nanoscale components with microscopic instruments.

- Nanorobot are nano machine embedded in our body performing their duties as disciplined soldiers.
According to current theories, nanorobots will possess at least two-way communication.

A network of special stationary nanorobots might be strategically positioned throughout the body, logging each active nanorobot as it passes, then reporting those results, allowing an interface to keep track of all of the devices in the body.

Simulation is an essential tool for exploring alternatives in the organization, configuration, motion planning, and control of nanodevices exploring the human body.
Nanorobot Design

1. For Molecular Manipulation
   nanorobot uses actuators.

2. Nanorobot navigation -
   Uses plane surfaces (three fins total)
   - Propulsion by bidirectional propellers :
     Two simultaneously counter-rotating screw drives.
   - navigational acoustic sensors
**Nanorobot IC Layout:**

**CMOS:**
It enable high performance to production of nanodevices.

- FI-CMOS with wireless communication is a feasible way to interface with nanorobots i.e., tracking, operation, diagnosis.
Sensing Methodology

Decision planning

Motion: random, chemical, thermo chemical

Medical target delivery

Behaviors activation
Control mechanism of Nanorobotics:--

Types of control mechanism

- Internal control mechanisms
  - Active control
  - Passive control

- External control mechanisms
Internal control mechanisms:

Nanorobots for Cardiology
Blood Pressure Monitoring
/ Drug Delivery

Such control activation parameters could be used for biomedical applications.
External control mechanisms:

- Some scientists plan to control and power nanorobots using MRI devices like this one.
Applications Of Nanorobotics:--

- **In Medical Area**
  - Tumors
  - Arteriosclerosis
  - Kidney Stones
  - Burn and wound debriding
  - Blood clots
  - Diabetes
Tumors:--

- DRILLERS, PEEPERS, STRINGERS ENGAGE IN A DELICATESURGICAL OPERATION TO REMOVE A CANCER TUMOUR
Arteriosclerosis:

- This is caused by fatty deposits on the walls of arteries. The device should be able to remove these deposits from the artery walls.
Kidney stones

- Nanorobots might carry small ultrasonic signal generators to deliver frequencies directly to kidney stones.
**Burn and wound debridining:**

- The nanorobots can also be used to clean wounds and burns.

**Blood clots:**

- By using a nanorobot in the body to break up such clots into smaller pieces before they have a chance to break free and move on on their own.
Nanorobots for Diabetes:

patients must take small blood samples many times a day to control glucose levels.

Such procedures are uncomfortable and extremely inconvenient.
In Space-ship :

- Nanorobots could improve the performance of spaceships, spacesuits and equipment used to explore planets and moons.
- Protecting the astronauts by including layers of bio-nano robots in their spacesuits. The outer layer of bio-nano robots would respond to damages to the spacesuit, for example to seal up punctures. An inner layer of bio-nano robots could respond if the astronaut was in trouble, for example by providing drugs in a medical emergency.
Benefits of Nanorobotics:

- Speed up of Medical Treatment.
- Faster and More Precise Diagnosis.
- Verification of Progress and Treatment.
- Minimum Side Effects.
- Nano-structuring is expected to bring about lighter, stronger and programmable materials.
- Non-degradation of Treatment Agents.
Limitations of Nanorobotics:--

- Nano particles will penetrate living cells and accumulate in animal organs, and can perhaps enter the food chain.
- There is no regulatory body dedicated to check this potent and powerful invasion.
- Their impact on environment is unknown e.g. Nanotubes of carbon use gallium & arsenic and minute traces of gallium arsenide in the body could prove toxic.
- Changes in the proteins due to the presence of nano particles in the bloodstream could trigger dangerous effects like blood clotting.
Future :-

1. In Industry and Manufacturing
2. In supercomputer
3. In Brain Augmentation
4. To Improve Healthcare
Conclusion:--

- From these types of inventions, it will be useful for man to cure many diseases & to lead a fantastic life.
- The same technique is used in various treatments like cancer, breaking kidney stones, brain surgery, heart surgery. With in ten year several advancement technologies.
- However, finally we wish all the best for all scientists, who are going to implement the nano-robots in future.
- One day will be come thousands of microscopic robots inhuman surroundings.
ANY QUESTIONS...
Thank You