

# **NANOROBOTS IN HEART SURGERY**

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## Abstract

The evolution and revolution of Nanotechnology activities is increasing in all the area to fulfill the human applications. Nanotechnology is defined as a technology, which is used to produce the objects in nanometers ( $10^{-9}$ ) that is one billionth. Using that much of size of the Nanotechnology is highly used in biomedical field to remove the defects without human interference. In the polluted environment, most of the humans are affected by heart block. Nanotechnology helps to reduce the effect of heart block. In that case, Nanorobotics is an important one for this application. Nanorobotics is a robot, which enable to clear this blockage by applying external control. Nanorobotics is designed to different techniques. The Nanorobots will be sent to the affected area by means of injection to our human body. By this method , it is also used to reduce the allergy after the operation. In this paper we are dealing with nanorobots in heart surgery and automated nanorobots for medicine delivery. From these medicine delivery technique we produce the artificial human parts. If this medicine delivery come into existence, then there will be no end for our human life.

## INTRODUCTION

Nanotechnology (or) molecular technology deals with manipulation and control of atoms and molecules for creation of useful products. The techniques used for producing the objects in atomic&molecular level are Dip Pen Lithography (DPN), Nanotweezers, Nanomanipulator, scanning probe microscopy (SPM), Atomic force microscopy (AFM). This technology has become a next big technology to almost all technology at present. Because of the molecular level operation it is used to produce our own DNA artificially in genetic engineering. Due to its nano-sized structure it takes off the knife from the doctor's hand and doesn't allow the doctor's hand to touch the patient's body. Computer chips with protein based, molecular size circuits are still a fantasy. Yet a transistor manufactured in atomic level. We get the Pc equal to (or) smaller than our hand size. The research on nanopowders and nanomaterials are going in advance to produce the parts of human being.

**HEART ATTACKS**

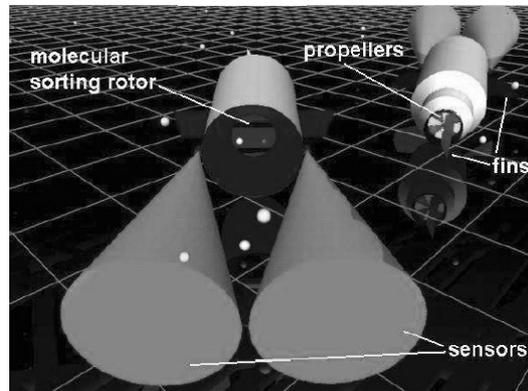
**Blood vessels play an important role in supply a blood to all parts of the body. Due to the fatty deposition on the walls of blood vessels blood will not move freely to all parts of the body these leads to heart attacks and damage the vital organs.**

**In general the most common methods of surgery used for heart attacks is**

- **By-Pass surgery**
- **Angio Plaster**

#### **NANOROBOTS IN HEART SURGERY**

**Both of the above methods are risky and number of side effects. As a result patient becomes very weak. But a surgery-using nanorobot is very simple one. Doctors do their treatment even without touching the body.**



**(Structure of NanoRobots)**

**The above figure shows the structure of the nanorobots. It is constructed with various nanomechanical devices and nanosensors like.**

- **Molecular sorting rotors**
- **Propeller**
- **Fins**
- **Sensors**

### **Types of Sensors**

- 1. Chemical sensors -> To find the fatty deposit.**
- 2. MicroWave generated sensing -> To generate movement.**
- 3. Chemotactic sensors -> To find cancer cells.**
- 4. Acoustic sensors -> To guide the nanorobots**

## **MOLECULAR SORTING ROTORS**

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It is made up of carbon nanotubes. Simply a sheet of carbon atom forms a carbon nanotube . A roll having only one sheet of carbon atoms thickness is known as single walled carbon nanotubes (SWNT). Thus the electrical properties of SWNT's can be used to generate mechanical motion from electrical energy. One of the main advantages of these SWNT's is, operating at the molecular level. Nanotube substitutes with nanogears with axle used for changing the direction of movement.

## **PROPELLOR**

The word propeller in ship is used to drive forward the device against water. Like that in nanorobots it is used to drive forward against the blood stream. Fins are fitted along with the propellers which are used to propel the device.

Sensors are fitted externally and internally with the nanorobots to receive the signal for correct guidance. There are several techniques to do the heart surgery with the nanorobots. We have to know how to

**inject nanorobots into our body, how to move it to the destination place, how to control and remove the device after surgery.**

## **INJECTION OF NANOROBOTS**

**We have to find a way to introduce nanorobots into the body for surgery and allowing it to do the operation without ancillary damage. So nanorobots should be made smaller than the blood vessels thus making it to travel. Femoral artery in the leg is considered to be the largest artery in our body. So we inject the nanorobots through this artery.**

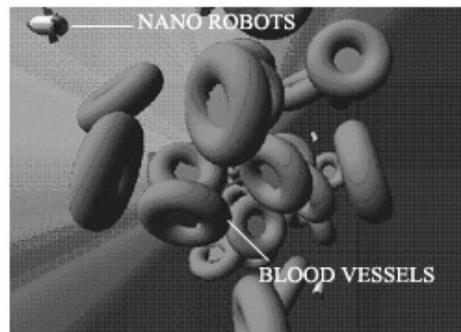
## **NAVIGATION**

**Every living thing needs area to move. Like fishes are moved in water, nanorobots use blood flow for its movement. It must be able to guide the device which makes use of the blood flow. The devices used for navigation are propeller, fins, jet pump, electromagnetic pump. In order to move the nanorobots in blood flow, following things are very important**

- Speed of blood**
- Get through the heart without stuck**

- **React with changes in blood flow rate**
- **Able to change the direction according to the blood stream**

**To satisfy the above consideration we have to make the nanorobots with electric motors turning propellers.**



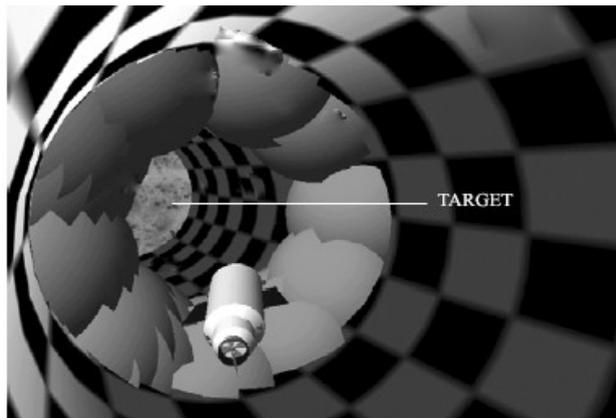
**(Navigation of nanorobots into blood vessels)**

## **POSITIONING**

**To know the location of nanorobots where it goes we use ultrasonic technique. Nanorobots must be able to produce ultrasonic waves by passing a signal to piezoelectric membrane, which is in built with the device. Several signals processing techniques are used to track this ultrasonic signal and finding the location at any time. Instead of ultrasonic wave we use infrared ray for signal processing.**

## **DETECTION**

To locate a blood clot (or) deposit of arterial plaque we use sensors of different types. Already preplanned route is available to reach operation site. With the help of preplanned route we reach the fatty deposited area.

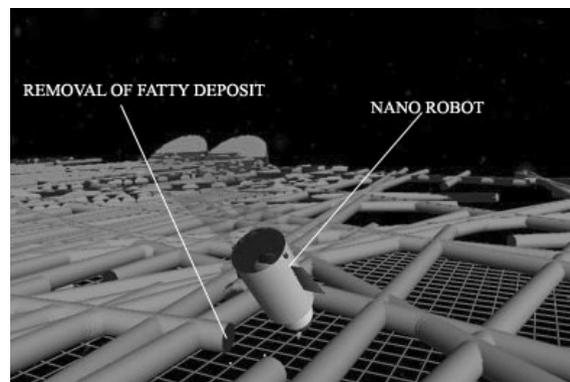


**(NanoRobots towards a destination)**

To control the nanorobots as per our wish, we fit the TV camera in the nanorobots and transmit its picture outside the body to a remote control unit. Solid-state television camera sensors are used to receive the signals from the remote station and do the operations according to signals send by remote control unit. There are preprogrammed microchips available to give appropriate signals so that nanorobots is initiated externally through a computer.

## **DESTRUCTION**

The fatty deposits (or) clots are removed using special blades fitted with nanorobots. Continuous (or) pulse signal is used to activate the blades. These blades physically separate the deposits from blood vessels. Care should be taken in removing the fatty deposits. Small deposits of these fatty materials without removing lead to big problem in future.



(View of nanorobot removing the fatty deposit)

Production of power is very important for every operation to most efficient one in magnetic induction. Our body is full of magnetic field. Rotation of nanorobots cuts this magnetic field, produce power based on *faraday's law*. To take nanorobots from the body we use two methods one is retrace our path upstream another is making small surgery to remove.

## **CONCLUSION**

As per our aim we have proposed the usage in heart surgery. Due to this , number of risks and side effects are reduced. The same technique is used in various treatments like cancer, breaking kidney stones, breaking liver stones, parasite removal only with slight modification. Automated robots used in medicine delivery has evolutionary characteristics such as mutation , crossover, chromosome selection and combination of these automated robots with genetic engineering takes over world to new revolution. With in ten years several advancement technologies should be made by researchers from this nanorobotics.

## **BIBLIOGRAPHY**

### **Books:-**

**Nanotechnology BY Mark Ratner and Daniel Ratner**

**Nanomedicine BY Robert Freitas**

**Fundamentals of Biochemistry BY J.L.Jain**

### **Websites: -**

[www.nano-tech.com](http://www.nano-tech.com)

[www.nanobot.info](http://www.nanobot.info)

[www.nanorobot.com](http://www.nanorobot.com)

[www.nature.com](http://www.nature.com)

[www.adsx.com](http://www.adsx.com)

[www.ieee.org](http://www.ieee.org)