

Micro robot:-

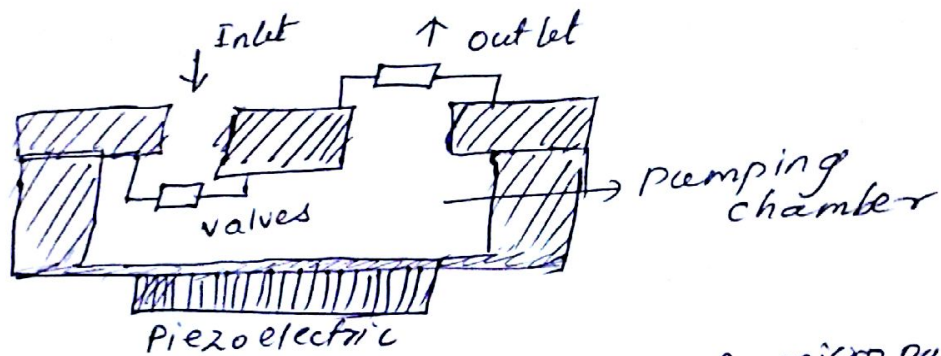
- A micro robot is a miniaturized, sophisticated machine design to perform a specific task or tasks repeatedly and with a precision.
- micro robots typically have dimensions ranging from a fraction of a millimeter up to several millimeters.
- A micro robot, like its larger and smaller cousins, the robot and the nano robot, it can be either autonomous or insect-like.
- An autonomous micro robot contains its own on-board computer, which controls the machine and allows it to operate independently.
- The insect scheme is more common for the micro robots.

Micro Pump:-

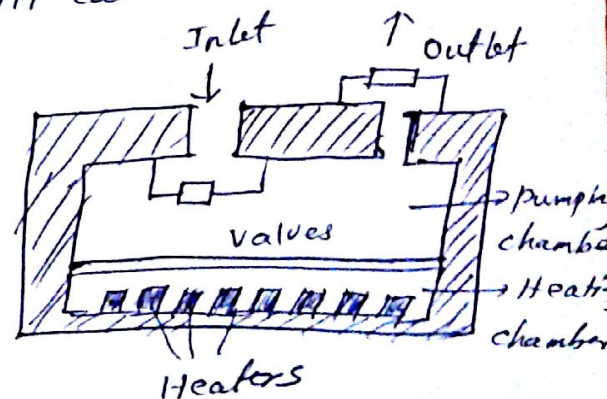
- The controlling fluids and precise measurement of the fluids are very important in drug delivery systems. For these purpose MEMS based micro pumps are used.
- major designs are based on size, pressure and bio compatibility.
- 2 types
  - mechanical type
  - Non-mechanical type
- Egs. Electrostatic, piezoelectric, bimetallic, thermopneumatic & shape memory alloys (SMA)

- In electrostatic type, when the voltage is applied across the pump diaphragm and the electrode, the diaphragm of the pump will go either up or down based on applied voltage.

- In piezo electric type, the applied voltage will cause deformation on the surface of membrane where piezoelectric materials are deposited. This will act as push mechanism to throw the fluid out of the micro pump.



- In case of thermopneumatic type of micro pumps, the chamber under the diaphragm will get expanded and compressed using a pair of cooler & heater. The change in volume will cause momentum for fluid flow by membrane.



- In SMA type, the shape & deformation is used as force to actuate the diaphragm of micro pump.

- In bimetallic type, the deformation caused by two different metals, that causes actuating force in the diaphragm of the micro pump.