**Definition:** Micro-electro Mechanical System (MEMS)

Micro-electro mechanical system (MEMS) is a tiny mechanical module that is driven by electricity. It is a combination of nanotechnology and nanoelectromechanical systems (NEMS) although dissimilar from the theories of molecular electronics and molecular nanotechnology.

MEMS are small components that are 1 to 100 micrometres (0.001 to 0.1 mm) in size but generally are around 20 micrometres to one millimetre. A micrometre is a millionth of a metre and a millimetre is one thousandth of a metre. A human hair is around 50 micrometers wide.

MEMS are comprised of several components such as:

* Microsensors
* Microactuators
* Microprocessors
* Central units for processing data
* Components for interacting with exterior elements

MEMS have a large surface area to volume ratio. They are constructed using silicon fabrication technology. The basic fabrication methods include deposition of thin film layers, imprinting a mandatory form and prefiguring using photolithography.

MEMS also have a variety of uses and come in a wide array of fabrication design approaches taking advantage of various components, miniaturization and new standard integrated electromechanical systems.

The main principle of MEMS is that there are at least some elements having certain mechanical functionality with or without elements that can move.

**Explanation:**

Micro-electro mechanical system (MEMS) is a small device that merges computers with mechanical modules like sensors, actuators and mirrors. They are cost effective systems that use modified device fabrication technology.

MEMS can be used for wet etching like potassium hydroxide (KOA), dry etching such as deep reactive-ion etching (DRIE), molding and plating, electro discharge machinery (EDM) and other technologies that produce small devices.

A MEMS device encompasses micro-circuitry that is placed on a small silicon chip used with mechanical components. The technology supports a large variety of devices that control, sense or activate mechanical processes while functioning as an array or individually.

The three basic features of MEMS are microelectronics, multiplicity and miniaturization. Microelectronics allows the fusion of actuators, sensors and has closed-loop feedback logic. Multiplicity is in reference to batch production used in semiconductor processing which supports millions of components. Miniaturization provides a structure of compressed and fast-acting devices.

In some standpoints a MEMS application is categorized by its type of use such as an actuator, sensor or structure. MEMS can also be characterized by the field of application which may include:

* Accelerometers: Airbags in some present automobiles, game controllers and cell phones
* Inkjet printers: Thermal bubble ejection or piezoelectricity to distribute ink on paper
* MEMS gyroscopes: Activates dynamic stability control or a roll over bar in automobiles
* Pressure sensors: Blood pressure and automobile sensors, airplane wings that change surface resistance
* Displays: Digital light processing (DLP) technology using thousands of micromirrors
* Optical switching: Aligning data communication and switching technology
* Bio-MEMS: Biosensors and chemosensors utilized in medical labs

Presently MEMS encompasses a single distinct microsenor or microacuator into the architecture but there are more complex levels of assimilation in the future. The next development may be incorporating many individual distinct features into one system.

**Sources:**

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Synonyms:

MicroElectroMechanical

Microelectronic Systems

MicroElectroMechanical Systems

Micromachines (in Japan)

Micro Systems Technology (in Europe)

Smart Matter

Similar Terms: