

Accelerometry



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Accelerometers: An accelerometer is an electromechanical device used to measure acceleration forces. Such forces may be static (like continuous force of gravity) or dynamic to sense the movement or vibration.

An accelerometer is an electronic sensor that measures the acceleration forces acting on an object, in order to determine the object's position in space and monitor the object's movement.

There are two types of acceleration forces

- i) static forces
- ii) dynamic forces.

Static forces are forces that are constantly being applied to the object (such as friction or gravity).

Dynamic forces are 'moving' forces applied to the object at various rates (such as vibration). That is why accelerometers are used in automobile collision safety systems.

For ex. when a car is acted on by a powerful dynamic force, then the accelerometer (sensing a rapid deceleration) sends an electronic signal to an embedded computer, which in turn deploys the airbags.

Types of accelerometers.

There are three different types of accelerometers, and they are each designed to efficiently function in their intended



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environments. They are,

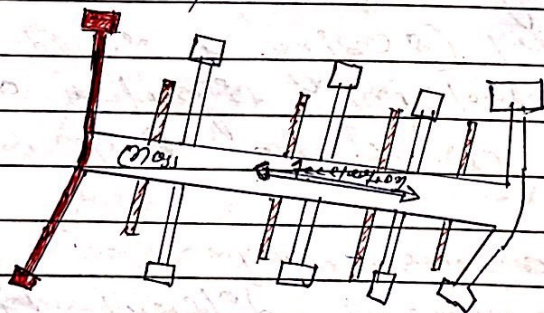
- i) piezoelectric accelerometer.
- ii) piezoresistance accelerometer
- iii) Capacitive accelerometer

ii) piezoelectric accelerometers. A piezoelectric accelerometer utilizes the piezoelectric effect (piezoelectric materials produce electricity when put under physical stress) to sense change in acceleration.

Piezoelectric accelerometers are most commonly used for vibration and shock measurement.

iii) piezoresistance accelerometers are less sensitive than piezoelectric accelerometers, and they are better suited to vehicle crash testing. A piezoresistance accelerometer increases its resistance in proportion to the amount of pressure applied to it.

iii) Capacitive accelerometers. It uses change in electrical capacitance to determine an object's acceleration. When the sensor undergoes acceleration, the distance b/w its capacitive plate changes as the displacement of the sensory moves.



MEMS Capacitive Accelerometer Diagram

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Most of the accelerometers are minute, and they are often referred to as Micro-Electro-Mechanical-System (MEMS) accelerometers. Because of their size and affordability they are embedded in a myriad of hand-held electronic devices such as phones, tablets and video game controllers. In phone and tablet, the ~~accelerometer~~ accelerometer is responsible for "flipping" the screen when the device is rotated.

Accelerometer is ~~responsible~~ also used by zoologists (to track the movement of animals in the wild), engineers (especially in collision experiments) and factories (to monitor the vibration of machinery).