Thru the Eyes of a Bug: MEMS for Beginners



I guess you might never heard of MEMS.. MEMS?

MEMS stands for Micro Electro Mechanical Systems and we have a plenty of them in our daily lives...

Where? Tell me.

Me? Super Ant

 \circ°

In cars, the airbag sensor is one..



Inside of the airbag sensor, a key component is an accelerometer, which detects a sudden motion and send an electrical signal to deploy the airbag.



Let's talk about "micro", then. This is a photo of the accelerometer.



The diameter of a human hair is about 50 t0 100 micrometers. 1,000 micrometers become 1 milimeter.

I am bigger than MEMS!

Anything smaller than micro? It's nano. 1,000 nano = 1 micron

NanoFab&BioMEMS @ UCF

MEMS

This is an array of MEMS mirrors. Yes, the ant is much bigger..



Source: Texas Instrument, http://www.dlp.com/



NanoFab&BioMEMS @ UCF

Source: http://www.dlp.com/

We can also find a MEMS component in an inkjet printer.





	Ink	
Heater		
riealer		



http://mimech.com/printers/inkjet-printer-technology.asp

http://konicaminolta.com/

As we can see, most of MEMS components are either used for measuring and detecting real world conditions (sensors) or for generating a motion (actuators).



In summary, miniaturized sensors, actuators and systems fabricated by the use of lithography and/or other precision techniques are called MEMS.



I will explain...

Need to wear my glasses.



Litho means "stone" Graphy means "writing" Original designs are drawn on a hard surface (like a limestone) and they are transferred to a soft substrate (like a paper).



The traditional lithography technique uses ink for the pattern transfer.

In MEMS technology, a "mask", "light" and a "photoresist" are used. A mask is similar to a film in a camera. The original design on a mask is transferred to a photoresist. The photoresist is sensitive to light and changes its chemical structure upon exposure.



Instead of paper, we use a silicon wafer and coat it with a photoresist, then expose it under the mask. Using lenses we can reduce the size of the image easily.

Yes, down to the micron level.



The exposed photoresist can be dissolved(+) or left behind(-) after a chemical treatment.







Repeating this photolithography process with deposition and/or etching, we can create complex multilayered structures like this →











Welcome to the world of MEMS!

> Source: NanoFab and BioMEMS Lab @ UCF Silicon Sensing Systems Ltd., Lucas NovaSensor, Sandia National Lab

Produced by Prof. H. J. Cho "Ant" character created by A. Wesser

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Coming up... soon.

Thru the eyes of a Bug -BioMEMS for beginners

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