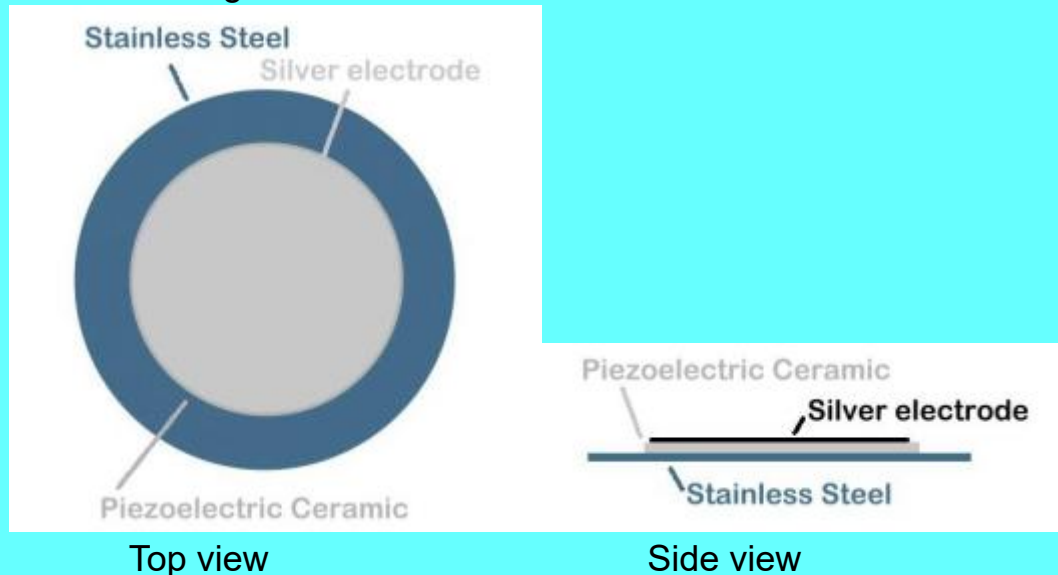


The Wayback Machine - http://web.archive.org/web/20130927064954/http://www.geocities.com/spm_stm/Dis...

Disk Scanner

This disk scanner needs some explanation. It uses a modified Unimorph disk. Unimorph disks are one of the most common piezoelectric devices available. They are most often used for small sound generators, speakers, buzzers. A Unimorph disk is made of two disks bonded together, one is a piezoelectric ceramic the other is metal. The metal disk makes it much less fragile than the ceramic alone.



The piezo ceramic expands or contracts when an electric field is applied to the disk. A standard Unimorph disk bows up or down as a voltage is applied between the metal disk and the silver electrode. The Unimorph disk used in this design moves about $0.16 \mu\text{m}/\text{Volt}$, and its natural resonance frequency is approximately 2.5 kHz.



Bow Up

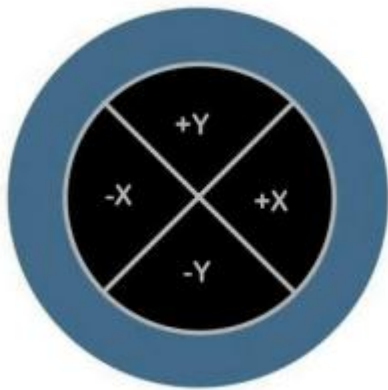


Flat



Bow down

I modified the standard Unimorph disk to get scanner motion in all three axis. My design divides the electrode into four quadrants, and I add a standoff at the center.



As the voltage on opposing electrodes are changed the angle at the center of the disk is changed. Because the voltage causes a change in angle the motion in the X-Y plain is directly proportional to the length of the standoff.



Scanner X,Y motion



Scanner Z motion

References

Patent

[US5866902](#): Atomic force microscope with integrated optics
for attachment to optical microscope

Inventors: John Alexander, Marco Tortonese, and Thai Nguyen

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