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.

Top view

Side view

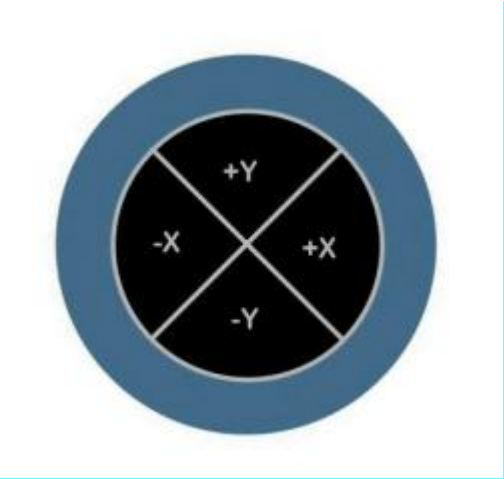
The piezo ceramic expands or contacts when an electric field is applied to the disk. A standard Unimorph disk bows up or down as a voltage is applied between the metal disk and the silver electrode. The Unimorph disk used in this design moves about 0.16 μm/Volt, and its natural resonance frequency is 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

Previous Home Next

Home Simple STM Project Home Project Overview Progress Mechanical Design
Disk Scanner Description How to Make a Disk Scanner Mechanical Approach Mechanism
Mechanical Bill of Materials Electronics Design Electronics Schematics
Electronics Bill of Materials Operating the STM Images

Questions and Answers