

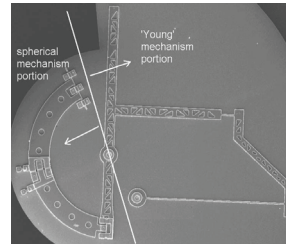


Spherical Bi-stable Mechanism (SBM) and Three-degree-of-freedom Platform (3DOFP)

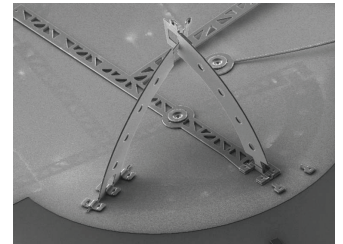
BYU #2005-32, #2005-34

DESCRIPTION

Researchers at BYU, using spherical kinematics, developed two novel mechanisms with applications to microelectromechanical systems (MEMS): SBM and 3DOFP. The SBM consists in bi-stable mechanisms and devices that can be manufactured in a plane, but can provide large out of plane motion. The 3DOFP relates to systems and methods for manufacturing spherical structures to be formed in a single plane, but that selectively move a platform in at least three degree of freedom.



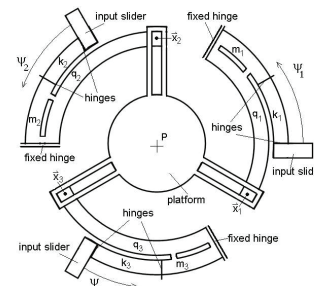
SBM in its fabricated position, which is the first stable position.



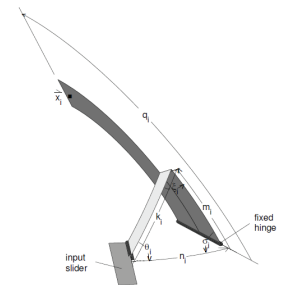
SBM in its second stable position.

PROBLEM SOLVED

There is a need for accurate, low power mechanisms for the out-of-plane positioning of MEMS. Such mechanisms are useful in mirror arrays and in erectable structures. MEMS are usually fabricated using planar processing methods which complicates the design of devices capable of complex motions. For applications that need a micro mechanism that rotates out of the plane of fabrication with an in-plane rotational input, or that rotates spatially about a point, SBM and 3DOFP may represent appropriate solutions.



3DOFP in its fabricated position.



3DOFP showing the assembly in an actuated position.

KEY ADVANTAGES

- » Robustness against small disturbances
- » Useful in MEMS design
- » Planar fabrication

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APPLICATIONS

SBM - useful in applications such as 2D optical mirror arrays or in erecting out-of-plane structures.

3DOFP - because the platform can tilt away from the horizontal, the system could be used as an orientable mirror in 3D optics applications.

Issued Patents:
US 7,763,818 B2
US 8,336,421 B2



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