

# Omnidirectional scanning mirror

**MEMS mirror for micro-scanner enabling stable control by eliminating nonlinear motion**

## Overview

In recent years, the development of micro-scanner using MEMS scanning mirror has intensified in order to reduce the optical sensor system size such as LiDAR (Light Detection and Ranging).

The **omnidirectional scanning mirror** which is a type of MEMS mirror device, is being researched for its potential application for LiDAR equipped on automated vehicle. One possibility to realize this is to rotate the mirror section by using "gimbal" technology, which has 2 mutually orthogonal axes. However, the rotation around the 2 orthogonal axes interferes with each other, resulting in **nonlinear motion**, making it impossible to control the mirror movement in a stable manner.

This invention can provide an omnidirectional scanning mirror that can **stably control** the mirror movement. This omnidirectional scanning mirror is composed of a mirror, a rotation axis and a support section. The vertical component of the moment of inertia tensor of this mirror is located within a certain range in order to control mirror stability.

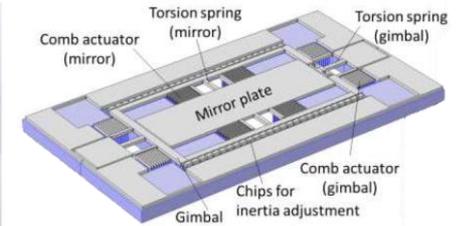
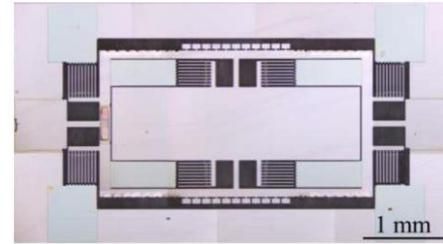
## Product Application

- ❑ Optical sensor technology such as LiDAR, etc.
- ❑ Laser projector, laser display, etc.

## IP Data

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 Inventor : HANE Kazuhiro, SASAKI Takashi  
 Admin No. : T19-571

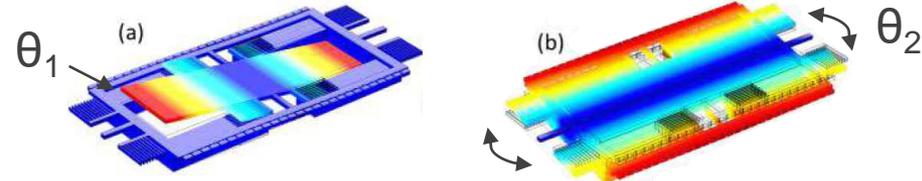
Reference [1]



## Features·Outstandings

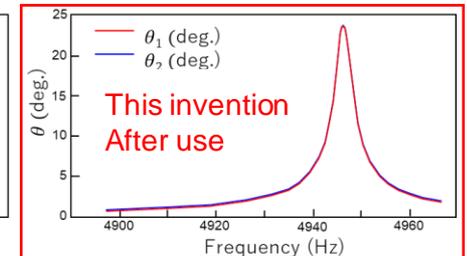
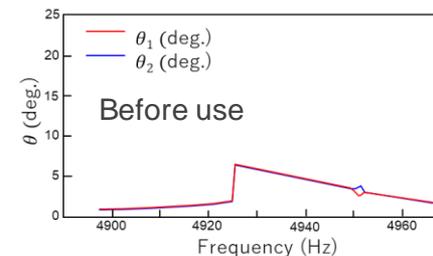
Reference [1]

**The mirror movement can be stably controlled without influence from the nonlinear motion caused by the 2-axis rotation.**



Vibration modes of mirror rotation

Vibration mode of support rotation



**Symmetrical resonance curve with the resonance frequency at center, controllable as a linear motion**

## Related Works

[1] K. Suzuki, T. Sasaki and K. Hane, Proc. 15th Annu. IEEE Int. Conf. Nano/Micro Eng. Mol. Syst. (IEEE-NEMS), 2020, pp. 130-133

## Contact