

## Documents

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**Active Vibration Isolation System (AVIS) using a Voice Coil Actuator to improve Free Space Optics Communication** (2019) *ICSGRC 2019 - 2019 IEEE 10th Control and System Graduate Research Colloquium, Proceeding*, art. no. 8837053, pp. 189-194.

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**Abstract**

In Free Space Optic communication (FSOC), transmitter and receiver's alignment is vital to maintain the line of sight during the whole communication period. This is critical in data transmission over a long-distance. Vibration at either receiver or transmitter, causes misalignment and this affects FSOC. In this paper, AVIS, which can actively isolate FSO devices from low-frequency vibration from the ground, is designed and developed. The main goal is to reduce vibration from the top plate of the system where the telescope of the FSOC system is placed. An analytical model of the active vibration isolation is derived, and then the real prototype is fabricated. An imbalance mass system is used as an exciter for the system. Furthermore, for the cost-saving factor, a voice coil actuator which is modified from a conventional loudspeaker is used as an actuator for the system. LQR controller is implemented by using LabVIEW. The results show that the displacement level of the system with excitation frequencies 6 Hz, 12 Hz and 18 Hz are reduced more than 85 %. Moreover, it is proven that the loudspeaker not only costs lower but also gives a good performance for an AVIS. © 2019 IEEE.

**Author Keywords**

Active vibration isolation; FSO; LabVIEW; LQR; Voice Coil Actuator

**Index Keywords**

Actuators, Electric coils, Loudspeakers, Transmitters; Active vibration isolation, Active vibration isolation systems, Excitation frequency, Free space optics, LabVIEW, Low-frequency vibration, Transmitter and receiver, Voice coil actuators; Vibration analysis

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