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**Title**

Multi-Spectral Microelectromechanical Systems (MEMS) Projector for Testing Imaging Seekers

**SBIR Topic Number**

AF05-310

**Summary Report Type**

Phase I Summary

**Summation**

Optron Systems has demonstrated the feasibility of a multi-waveband (visible, ultraviolet (UV) and mid-wave infrared) flickerless scene projector based on membrane-mirror-on-VLSI spatial light modulator technology. Three modulators can be combined using a novel zero-order block spatial filtering system to achieve true simultaneous multi-band scene projection. The modulators employ a spatially continuous deformable mirror that offers continuous analog gray-scale light modulation and gives a more realistic rendition of the scene than the pulse-width-modulation scheme offered by others. The broadband infrared imaging characteristics of the membrane mirror technology was first demonstrated with a 4x4 array of passive electrodes driving the membrane mirror. Thereafter, a prototype membrane-mirror-on-VLSI spatial light modulator with 85x96 pixels was built in the Phase I program using an existing in-house VLSI chip. Dynamic visible images were demonstrated with this system, thereby proving the general feasibility of the concept. Phase II projector performance goals include: 2,000:1 contrast ratio, 1000x1000 pixels, 120 Hz framing rate and flickerless operation with at least a 6° field of view.

**Anticipated Benefits**

This research is expected to lead to a family of compact, low-cost, high-performance infrared projectors that offer large temperature range, large numbers of pixels, high temperature resolution, highly correlated multi-band spectral output, and compatibility with sensor fusion algorithms. Commercial applications of the technology include large-screen projection displays, mid-wave and long-wave infrared shutters, spatial light modulators for optical signal processing and adaptive optics, systems for industrial inspection and robotic vision, sensors for use in homeland security, medical imaging, police/fire detection systems, and collision avoidance systems.

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