CBIRD - Chemical Biological Incident Response Detector

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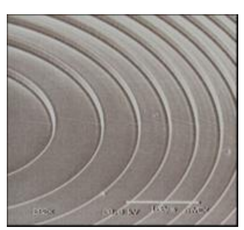
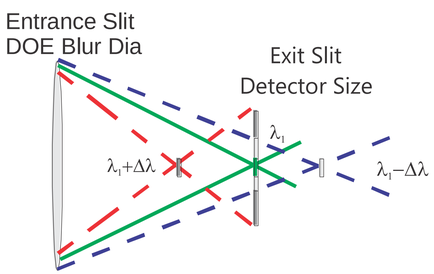
Objective

- Goal is to demonstrate an extremely small hyperspectral imaging technology that can be configured for different applications; mini-UAV platforms, ground-based robotic vehicles, man carried and fixed position mounted
- This program is a “proof of concept” development effort for a mini-hyperspectral imaging system for standoff detection of respiratory threats, (gas phase chemical warfare agents and TICs)
- The proof of concept will demonstrate the detection of gases and aerosols from an elevated position such as the roof of a building and detect the threat at a slant range of 1 to 5 km with tracking capability for 15 minutes
- Real-time infrared video will be displayed on a computer monitor showing the gas as it is tracked over time
- Proof of concept system will be field tested at the Navy Surface Weapons Center Dahlgren facility

Foundation of Technology

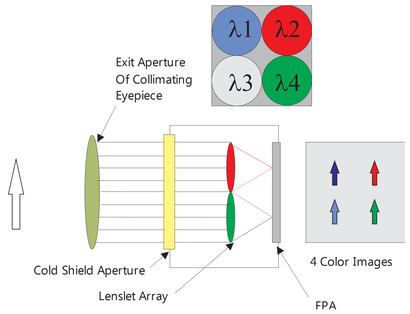
Diffractive optics have 7 times the chromatic aberrations as compared to conventional optics. This technology exploits this for applications in hyperspectral imaging. In doing so, a system only requires a single optical element to image and disperse the light into its spectral information.





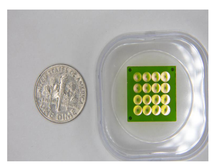
Simultaneous Multispectral Imaging

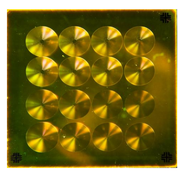
Using MOEMS photolithographic processing the diffractive optical elements can be made in an array of lenses where each lens is tuned with a different blaze for a unique wavelength. Then using division of aperture multiple different color images of the scene can be imaged in each frame of the camera.



Lenslet Array Spans SWIR & MWIR

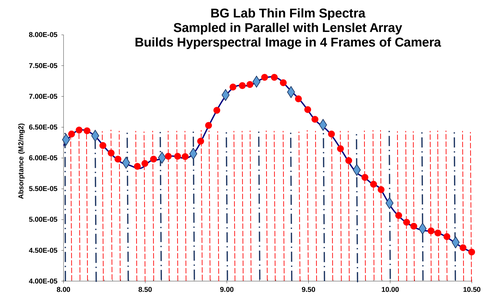
Shown here is the lenslet array that is about the size of a dime. Each lenslet is blazed with a different wavelength from 1.5 to 4.0 microns and is mounted in a baffled holder that sits 7 mm above the Focal Plane Array.





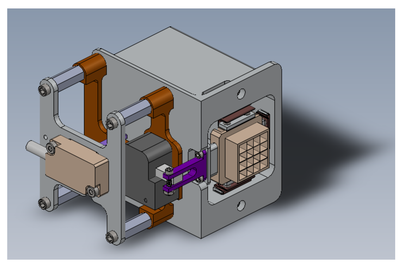
Multispectral to Hyperspectral

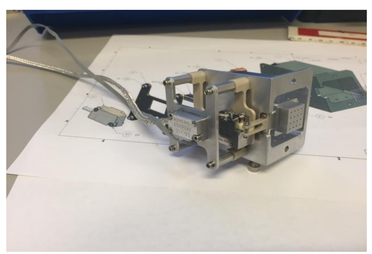
Shown in this graph and indicated by the blue triangles are 16 different blazed spectral lenses in the 4 x 4 lenslet array. By translating the lenslet along the focal length the wavelength between the blue diamond can be imaged in subsequent frames. In less than a second an entire hyperspectral image data cube can be collected.



Lenslet Array Actuation System

Actuation system consists of piezo electric motor driver with optical encoder.
Lenslet array holder is cooled and isolated from the actuation system.





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TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

Title

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