

TWO-COLOR DYNAMIC SCENE GENERATOR – Project Summary

The overall goal of this SBIR effort is to develop a two-color infra-red (IR) source simulator for flight line testing of missile warning systems (MWS). The source simulator must be capable of varying, in a controlled way, the relative strength of two specific mid-IR bands typical of the emission spectra of a missile plume. The specific goal of the Phase I effort is to design a breadboard system capable of demonstrating the feasibility of OPTRA's proposed approach.

OPTRA proposed the development of a two-color IR source simulator based on fused projected images of two digital micromirror devices (DMDs), one for each spectral band. The proposed system employs a broadband IR (thermal) source whose energy is spectrally filtered via a dichroic beamsplitter and bandpass filters prior to being imaged onto each DMD. The “on” reflected image from each DMD is then recombined by the dichroic beamsplitter, and the fused beam is expanded by a telescope and transmitted towards the unit under test. The relative intensities of the two bands are controlled through the duty cycle of “on” versus “off” of each DMD. Because the IR source temperature is not changing, response will be considerably faster than resistive based simulators. At the same time, this approach provides a broadband simulation, unlike laser simulators, resulting in a more representative target on which the missile warning system trains. The overall approach offers a realistic IR source image of characteristic spectral, temporal, and radiant intensity properties of an actual missile plume.

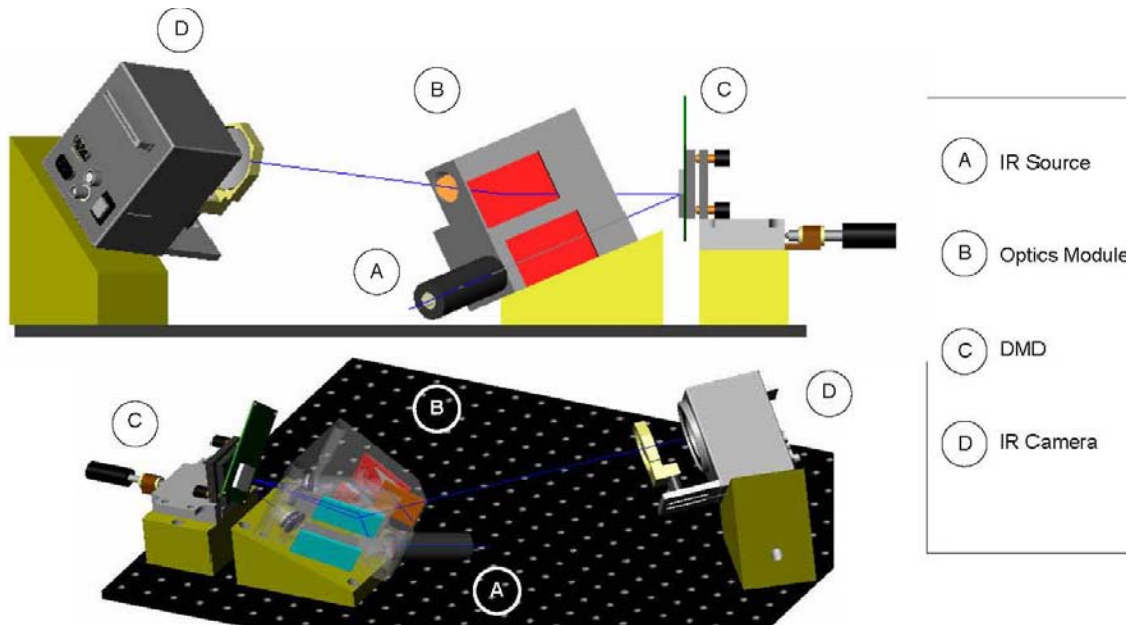


Figure - Breadboard Design. Energy from an IR source (A) is collimated into an Optics Module (B) that separates the IR radiation into two broad bands, are passed through two narrow optical filters and imaged separately onto either side of the DMD (C). The reflected light from the DMD is recollimated and sent to the IR camera (D) for analysis.