



TECHNOLOGY SOLUTION

Optics



Image Credit: NASA

Plenoptic Camera

[Multi-spectral imaging for metrology using plenoptic camera technology](#)

NASA's Langley Research Center has developed a plenoptic camera that can image two-dimensional (or in some cases three dimensional) spatial information as well as color, where in the final image each pixel contains a spectrum of the imaged scene. Plenoptic technology measures image brightness as well as the direction of the light rays. This enables new imaging capabilities, such as refocusing the acquired image to different depths and viewing the same scene from slightly different perspectives. As an imaging pyrometer, the camera can measure 2D temperature (and possibly emissivity) distributions.

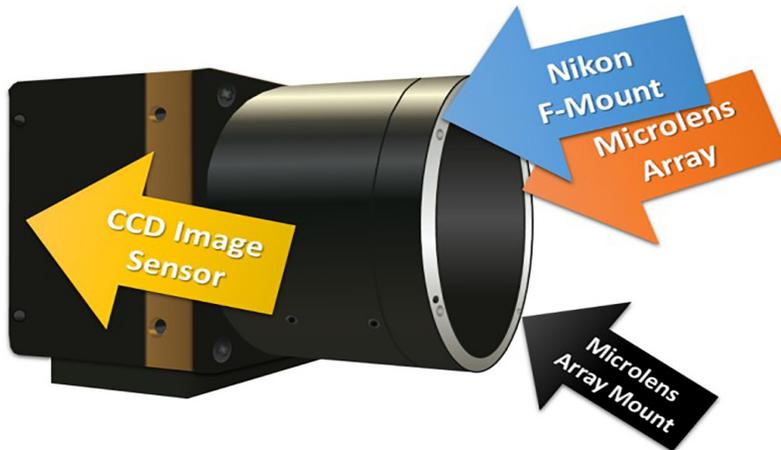
BENEFITS

- Inexpensive to produce
- Very easy to modify the filter arrangement to obtain different spectra
- Versatile -- the camera can be used for one application, and with a quick change of filter used for a completely different application



THE TECHNOLOGY

This camera incorporates an array of 470 x 360 microlenses, with each microlens producing an image onto a 14 x 14 pixel array. Specific colors or spectra can be continuous or arbitrarily determined; and can be easily and inexpensively modified. Modifications of the collected spectra can be useful for different applications where the emitted light needs to be analyzed to determine qualitative or quantitative information about a flow, object, or scene. The sensor can measure fluid, mechanical, thermodynamic, or structural properties of gases, liquids, and solids.



Plenoptic camera diagram showing positions of microlenses and image sensor. Image Credit: NASA

APPLICATIONS

The technology has several potential applications:

- Imaging pyrometer
- Emission spectroscopy imaging
- Smokestack pollution detection
- Flow temperature sensing
- Tomographic particle image velocimetry
- Astronomy / solar observations

PUBLICATIONS

Patent No: 11,115,573

National Aeronautics and Space Administration

Agency Licensing Concierge

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