Improved Antenna Coupled Infrared (IR) Focal-Plane Array for Creating Flexible and Inexpensive Imaging Systems

Advantages
• Increases flexibility of IR FPA sensors
• Allows for smaller, less expensive imaging, surveillance and navigation devices
• Creates IR sensors with a wider variety of applications

Invention
The invention provides the means and materials for the creation of IR detector/sensor antenna units capable of detecting IR radiation of different frequencies or orientations [U.S patent 7,095,027].

Background
Scientists at UCF have developed a novel means for integrating infrared antenna arrays into an infrared focal plane array (IR FPA) system. This method makes use of various antennae attached to the IR sensitive pixels for coupling radiation into the sensors. Variations in the shape and length of the antenna arms allow for sensitivity to different wavelengths of radiation and polarization response. Reductions in the size of these antenna arrays increase the sensitivity of the imaging systems, thus allowing diversity of the image without losing its detailed aspects. This method eliminates the need for beam splitters, optical filters and additional bulky, expensive optics. This invention allows for smaller, inexpensive IR sensors/detectors with sensitivity across a broader range of radiation for a wider variety of uses/applications.

Infrared sensors and detectors are used extensively for chemical applications, night vision, target acquisition and aerial navigation. IR FPA are one of the most common and diverse detectors used for IR applications. These IR FPA consist of an array of light-sensing pixels that are sensitive to infrared light. Currently, infrared imaging systems are only responsive to a small region of the infrared spectrum. They fail to respond to radiations having multiple IR frequencies, severely limiting their application and usefulness. Detecting multiple frequencies of radiation requires multiple detectors, and bulky optical components. These additional components increase the cost, size and complexity of IR sensors and surface mapping technology. In addition, use of multiple detectors slows the system significantly because of the time required to switch the incident light from one pixel to the next.

Application
The technology allows for smaller, inexpensive, more flexible IR FPA sensors. It may be of interest to aerospace and defense industries using remote sensing systems to facilitate and enhance image recognition, feature extraction and image-clutter removal. It may also be useful to the automotive industry, law enforcement and any company seeking to improve navigation and surveillance technology.

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Selected References