

Local Engineers Team Up to Design Novel Space-BorneImager

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[作者] University of Rochester

[单位] University of Rochester

[摘要] November 9, 2006. A new generation of imaging detectors with low-noise and high-speed capabilities may transform imaging applications on NASA space missions, impact biomedical imaging, and aid in homeland defense.

[关键词] Space-BorneImager;biomedical imaging;defense.

November 9, 2006. A new generation of imaging detectors with low-noise and high-speed capabilities may transform imaging applications on NASA space missions, impact biomedical imaging, and aid in homeland defense.

The University of Rochester and the Rochester Institute of Technology have won \$847,000 from NASA's Astronomy Physics Research and Analysis program to build and test a detector that will capture sharper images and consume less power than technology currently in use.

The new imaging sensor, which will function at wavelengths spanning from ultraviolet to mid-infrared, will be able to operate reliably in the harsh radiation environment of space.

"These benefits will lead to lower mission cost and greater scientific productivity," says Donald Figer, director of the Rochester Imaging Detector Laboratory at RIT and lead scientist on the project. The team includes Zeljko Iqbaljotic, assistant professor in the University of Rochester's Department of Electrical and Computer Engineering, and Zoran

The new detector is based on a technology created by Iqbaljotic and his colleagues at the University of Rochester. It will shrink the required hardware on NASA planetary missions from the size of a crate weighing tens of pounds to a tiny thumb

stick chip. It also will enhance images captured by ground telescopes that will rival those from orbiting telescopes, like the Hubble Space Telescope.

Iqbaljotic's chip integrates an analog-to-digital converter at each pixel in a sensor. "Previous attempts to do this on-pixel conversion have required far too many transistors, leaving too little area to collect light," says Iqbaljotic.

"First tests on the chip show that it uses 50 times less power than the industry's current best, which is especially helpful on deep-space missions where energy is precious."

Despite the chip's low power consumption and sensitivity, it is surprisingly resistant to the radiation noise of space. Since each pixel converts the signal from analog to digital before moving it off-chip, the signal is digital and clear before it has a chance to travel and degrade. Coatings applied to the light-

sensitive portion of the sensor will optimize the technology and the ability to detect a range of wavelengths. RIT's Ninkov will explore techniques for bonding the coating to the delicate circuit using industrial microwave ovens. Further testing of the overall system will determine how the sensors hold up in cryogenic environments where the device

In addition to astronomical applications, the detector could improve biomedical imaging devices used in emergency rooms or on battlefields. The technology could aid in homeland security surveillance efforts to watch the nation's borders. Likewise, military applications could adopt the detector for use as airborne or space-

-based lasers designed to shoot down missiles aimed at the United States.

