

MEDIA FOR



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PC-based system detects infested crops

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Early detection of infested crops by ground observers is not possible in very large fields. By the time infestation is detected, large areas are already affected. Such detection requires aerial spraying of chemicals that are costly and may be harmful to the environment.

Because of this, Opto-Knowledge Systems Inc. (OKSI; Torrance, CA) is currently developing an airborne multispectral sensor under a United States Department of Agriculture program. In the system, four CA-D7, 12-bit digital video cameras from Dalsa (Waterloo, Ontario, Canada) are each equipped with a different narrow bandpass filter with spectral ranges based on ground measurements of healthy and infested crops.

"Only a few spectral bands need to be studied in such an application," says Nahum Gat, president of OKSI. "If more than this were required, a more efficient method would be to use a scanning or staring imaging spectrometer," he says.

Data from the cameras are captured over the PCI bus using two Roadrunner frame grabbers from Bitflow (Woburn, MA). "Using the PCI bus and DMA bus mastering, it is possible to transmit data to the host memory at the theoretical rate of 132 Mbytes/s in a burst mode," says Gat. "And four 12-bit 1024 × 1024 cameras running at 10 MHz each requires about 80 Mbyte/s, well within the capabilities of the PCI bus," he says.

To synchronize multiple cameras operating over two frame grabbers, all the cameras are fed with a common master clock that is generated by one of the frame grabbers and then split via RS422 bus receiver/drivers into all cameras. A common external synch pulse then initiates a simultaneous frame transfer in the CCDs of all the cameras.

At present, OKSI has tested a system with two digital cameras connected to a single frame grabber. The two cameras are then pixel-synchronized in read-out speed and pixel registration. To perform early detection of crop infestation, OKSI is currently developing multispectral software to automatically analyze crop images. In the development of such software, it is thought nonlinear effects caused by multiple scattering of photons from objects that have different spectral characteristics may effect the measured signatures. To compensate for this, OKSI is also investigating how to compensate for such nonlinear effects. For further information, contact Nahum Gat at Nahum@oksi.com.

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