NV-CMOS® Next-Generation Low-Light Imager

Traditionally, daylight and night vision imaging systems require separate sensors in separate cameras. A new SRI sensor will capture images over the full range of illumination from bright sunlight to overcast starlight.

The low-light Night Vision Complementary Metal Oxide Semiconductor (NV-CMOS®) image sensor will combine sensitivity—once the exclusive domain of image intensifier tubes—with the low-cost, ruggedness, flexibility, and convenience of a digital CMOS imager chip.

SRI's low-light CMOS sensor will deliver enhanced sensitivity across the entire visible and near-infrared spectrum, enabling completely new possibilities. For example, in goggles the digital NV-CMOS imager could be fused with a thermal imager to provide enhanced detection and identification capabilities—day or night. Unlike conventional image intensifiers, the SRI sensor will output a digital signal for efficiently recording or sharing video.

A single camera equipped with this sensor will replace separate cameras for day and night use. The result is a substantial reduction in size, weight, and power (SWaP), ideal for applications such as unmanned aerial vehicles and mobile operations. With built-in processing, the NV-CMOS imager will accommodate the entire range of lighting conditions for security, surveillance, and scientific use.

Day and night situational awareness from a single sensor

This current work in low-light CMOS imaging reflects more than five decades of expertise. SRI is a pioneer in the development of CMOS processes tailored to low-light applications including backside illumination. In addition, the company has developed highly efficient methods of image processing to further improve operation across a wide range of lighting conditions from the lowest light levels to bright sunlight, providing unprecedented dynamic range.
### Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Active Pixels</td>
<td>1920 (H) x 1200 (V)</td>
</tr>
<tr>
<td>Pixel Size</td>
<td>8 μm x 8 μm</td>
</tr>
<tr>
<td>Imager Active Area</td>
<td>16.3 mm x 9.6 mm</td>
</tr>
<tr>
<td>Frame Rate</td>
<td>60 FPS</td>
</tr>
<tr>
<td>Resolution at Nyquist</td>
<td>&gt; 50% MTF at 650 nm</td>
</tr>
<tr>
<td>Temporal Noise</td>
<td>&lt; 2 e⁻</td>
</tr>
<tr>
<td>QE</td>
<td>&gt; 90% peak; &gt; 50% at 850 nm</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>400 mW</td>
</tr>
</tbody>
</table>

### Applications

- Soldier-borne night vision devices
- Day/night cameras for passive surveillance and security
- High-resolution cameras for driver assistance and situational awareness
- Unmanned vehicle day/night pilotage and intelligence, surveillance, and reconnaissance (ISR)
- Scientific, medical, and biotech imaging

### Benefits

- Persistent, unified day/night operation; one camera for continuous situational awareness from bright sunlight to below starlight
- Higher contrast, better SWaP efficiency, and longer operating life compared to traditional image intensifiers; no halo; no blooming
- High resolution and low noise, even at video frame rates
- Built-in non-uniformity correction and defect correction for exceptional consistency
- Extended dynamic range (XDR) processing to handle huge variations in intra-scene brightness levels
- Video frame rates to capture fast motion; minimal latency
- Digital output for processing, recording, or sharing with remote systems
- Solid-state reliability reduces maintenance costs, compared to image intensifier tubes
- Low-cost wafer-scale manufacturing for high-volume production

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**Preliminary—All statements and claims are design goals, pending the result of testing**

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**SRI International**

SRI International creates world-changing solutions to make people safer, healthier, and more productive. SRI, a research center headquartered in Menlo Park, California, works primarily in advanced technology and systems, biosciences, computing, and education. SRI brings its innovations to the marketplace through technology licensing, spin-off ventures and new product solutions.

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