Driver Vision Enhancement (DVE) with SWIR cameras

Many current DVE systems utilize a passive thermal imaging system that enhances a driver's viewing capabilities while operating in degraded visual conditions such as darkness, fog, smoke, or dust, see figure 1. However, these systems have limitations. It is difficult to determine what the terrain is, if a person is friend or foe and it can be difficult to know if an object is a threat. Current DVE is often insufficient for drivers to avoid hazards. In short, improving a driver's vision has the potential to significantly reduce safety risks and enhance the overall mission effectiveness.

Figure 1: Example of a currently used thermal DVE system **

SWIR has emerged as a technology that meets the current needs of DVE. Not only does it provide visibility in dark degraded conditions, but it can also address the gaps in the current systems used today. SWIR cameras can see through smoke, dust, and fog. And unlike thermal detectors they provide a natural image like standard visible cameras allowing for the identification of hazards, terrain and IEDs.

Night Vision Capability

The SWIR wavelength range occurs naturally at night and now, due to advances in SWIR sensor technology, the nighttime capabilities can be fully utilized. See Figure 2. New, low-noise SWIR sensors are now capable of low light imaging in HD or standard definition formats.

Figure 2: A comparison of nighttime images. Ambient visibility (Above). Visibility of SWIR at nighttime, no illumination (Below) **.

With the addition of SWIR illumination, like the Megaray MR5400, that cannot be detected by near peers, the night-time visibility is enhanced even further.

Figure 3: Nighttime SWIR imaging with Megaray MR5400 SWIR illuminator **

Image Superiority

In comparison to current imaging technology used in DVE systems, SWIR offers a clear imaging improvement. As you can see in Figure 4, SWIR does not suffer from the thermal washout that happens with current DVE technology at dusk/dawn and in very hot, windy, rainy and humid conditions. It also provides depth perceptions.

Figure 4: Current thermal DVE (Above). SWIR DVE (Below). You can see the difference in clarity between the two images. **

*** Images courtesy of Megaray LLC*

Figure 5: Owl 640 II and Owl 1280 InGaAS camera

- **Visible SWIR technology.** Enables high sensitivity imaging from 0.6µm to 1.7µm
- **High quality sensors.** 99.5% operability, 640x512 15µm or 1280x1024 10µm
- **High Speed Imaging.** Owl 640 II achieves 120 fps and the Owl 1280 achieves 60 fps
- **On-board Automated Gain Control (AGC).**

  Enables clear video in all light conditions
- **On-board intelligent 3-point NUC.**

  Enables highest quality images
- **Active Image Enhancement.** Further increases the image resolution of the 640x512 sensor
- **Easy control of camera parameters.** Control of Exposure, Gamma and intelligent AGC
- **Ultra-compact,**
  Owl 640 II: 50 x 50 x 69.4mm / 282g
  Owl 1280: 50 x 50 x 67.6mm / 247g
- **Rugged, fanless.** *Operation tested up to 2.3 teslas.*

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