



## + IMPROVE VISUAL CLARITY IN LIVE VIDEO w/INSIGHT

**Real-time video is a vital part of nearly all military operations and often the basis for life or death decisions.** Virtually all military vehicles, including manned vessels such as fighter jets, trucks, and tanks, as well as unmanned systems capture live video for ISR. Military applications including drone guidance (piloting, targeting, accuracy and reducing collateral damage), missile guidance systems, aircraft heads-up and helmet displays, armament sighting systems, armored vehicles, static surveillance and many others depend on high quality imagery. However, environmental factors such as poor lighting at dawn, dusk, nighttime, or adverse weather, (e.g., sandstorms) can compromise mission success by obscuring important details.

Because ISR video is so vitally important, military users are always on the lookout for new technology solutions that can improve and enhance image clarity. Since military applications have complex requirements, users seek solutions that they can drop into an existing ISR operation. To address this need, ZMicro developed its Insight real-time video enhancement system. The Insight System enhances live video to reveal remarkable detail in degraded visual environments (DVE) where factors such as fog, rain, dust, smoke, underwater, low light, or bright light can limit visibility.

The Insight System enables users to adjust image quality, home in on areas of interest and extract desired details. It is a rugged appliance designed for plug and play installation into any existing ISR architecture.

The military community is transitioning from standard definition (SD) to high definition (HD), which is bringing dramatic improvement to image quality. Once a user experiences HD quality, they would not consider going back to SD. Similarly, ZMicro's image enhancement system offers a significant improvement in the quality of ISR video and once users experience it they realize they absolutely need it. ZMicro's Insight image enhancement system operates on the principle that image sensors, such as cameras, can capture far more information than can be perceived by the human eye. ZMicro's patented technology uses all the image information and automatically adjusts contrast and color to improve visibility and highlight important details. On ISR missions, users must make critical decisions and in those situations the ability to improve the quality of video can help them make better decisions faster.

### UNIQUE LOCALIZED IMAGE PROCESSING

Today's HD video displays offer high resolution and under favorable conditions they provide excellent image

quality. Some display systems even embed basic image processing such as contrast enhancement using histogram equalization techniques. However, their ability to enhance imagery in DVE is limited because they typically rely on global operations that apply statistical methods to the whole image. Consider, for example, a scene where there is a bright light in a dark cave. In a global operation, those two elements would be negated. To avoid such problems, ZMicro developed unique localized image processing technology that operates on discrete portions of the image independently to bring out much greater detail in both dark and light areas. ZMicro provides the most striking image clarity in the industry due to its patented image enhancement technology. This includes its clarifier enhancement which uses localized operations to bring clarity to degraded imagery with better contrast and its dehaze enhancement which can be used in conjunction with the clarifier enhancement to restore color and remove atmospheric degradation.

ZMicro's enhancements take advantage of the full available dynamic range of the image data. By analyzing surrounding image information, the system is able to enhance both surface and edge detail while extracting that which cannot be seen in under-lit or over-lit regions of the image. As noted, ZMicro's clarifier enhancement compensates for images with overly bright and/or dark areas and corrects for them simultaneously.

### HIGH-PERFORMANCE MULTI-PROCESSOR ARCHITECTURE

The Insight System uses a high-performance heterogeneous multiprocessor architecture that ensures there is no discernible latency (less than a single frame time) in processing real-time video. The Insight System is compatible with a wide variety of video sources, including wide dynamic range infrared cameras and high definition broadcast quality cameras. Users simply connect the digital video stream into the back of the Insight System and connect the output cable into a screen or recording device to immediately start receiving real-time enhanced imagery. An important consideration when deploying a video capture system in ISR applications is that it must be able to perform consistently under extreme duress over a wide operating temperature range and meet military standards for shock and vibration, electromagnetic interference (EMI), avionics equipment, shipboard equipment, and dust and water ingress. The Insight System is ruggedly built, shielded from dust and particles with no ventilation holes, and uses commercial connectors making it suitable for rugged applications such as ground control stations. For more stringent requirements, the Insight System is also available in a full mil-spec enclosure ensuring the ultimate reliability and durability.

The Insight System is a sophisticated stand-alone video processing system with accessible integrated control features to satisfy the needs of advanced users. This

## SEE WHAT YOU'VE BEEN MISSING

BEFORE



AFTER



Smog obscures important information in video preventing the user from seeing all the variations in the scene. RTEV excels in smoggy video as it highlights the details otherwise washed-out to the user.

BEFORE



AFTER



Underwater video typically exhibits degradation due to the scattering of light due to the water. RTEV pulls the details of underwater objects out and clarifies difficult to see objects.

BEFORE



AFTER



Snow creates an environment where fine details are lost due to the overwhelming amount of brightness in the video. RTEV increases the dynamic range and lets you see scene variations.

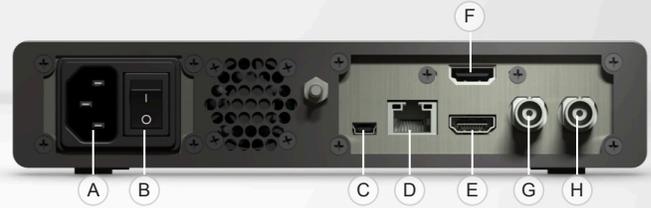
system fulfills the requirements of high-definition digital video markets. It includes a multi-resolution capable Serial Digital Interface port that allows for the transmission and processing of uncompressed, unencrypted digital video streams from SDI standard definition digital NTSC or PAL signals, or IP video to the latest generation of enhanced high-definition 1080p60 video signals via its 3G-SDI capability. The Insight System is an advanced, single-channel enhancement system designed to process and review a single stream of video or still images. For applications that require enhancement of multiple channels,

# COMPLETE USER CONTROL



## 3 WAYS TO ENHANCE YOUR VIDEO

At any time during the operation of the system, you can change enhancements via the system's 1) front panel buttons, 2) API commands, or 3) the on-screen display and immediately see the effect of those changes in your live video.



## PLUG & PLAY SET-UP

- A. Power Connector
- B. Power Switch
- C. Mini USB-B Port
- D. Ethernet
- E. HDMI Input
- F. HDMI Output
- G. SDI Output
- H. SDI Input

ZMicro offers a solution in a MIL-SPEC chassis that houses multiple PCIe form factor circuit boards to simultaneously process up to 6 video streams. Two chassis can be placed in a rack for processing of up to 12 video streams in 3U of space.

In addition to improving visual clarity in live video, ZMicro's Insight System offers the ability to apply chroma-key overlays such as GPS data and supports H.264 decoding of IP video streams. It has intuitive controls for on the fly enhancement adjustments and includes a quick snapshot tool for saving JPEG images of individual video frames.

## INTUITIVE USER CONTROLS

The Insight System combines ease of use with sophisticated high-end video enhancement. ZMicro's enhancements are inherently adaptive so no additional user configuration is required to enhance video imagery as conditions change from day to night or for varying image conditions such as inclement weather or bad lighting. While many users will find that the factory settings are suitable for their application, simplified user control makes it easy to adjust enhancement parameters to achieve optimal results for application-specific video content. At any time during the operation of the system, the user can change enhancement parameters on-the-fly via the systems front panel buttons, API calls, or via an intuitive on-screen display. Each of these methods enable the user to immediately see the

effect of those changes on their live video.

Within the OSD, users can adjust the enhancements by selecting the RTEV (real-time enhanced video) menu dialog and then using the slider tools to set the intensity of Overall Enhancement, Clarity Enhancement, and Dehaze Enhancement. Specific settings can then be saved and assigned to one of the preset buttons on the control panel for easy access.

The Input menu dialog lets users select the input source for the primary video and provides the option to select a second source for a mask input stream to be used as an overlay. The overlay can be a video stream or an image or a green screen for chroma keying. Chroma keying is a visual effects technique for compositing (layering) two images or video streams together. A common example of this is weather forecast broadcasts, where a news presenter is seen standing in front of a large CGI map during live television newscasts, though, in fact, it is a large blue or green background.

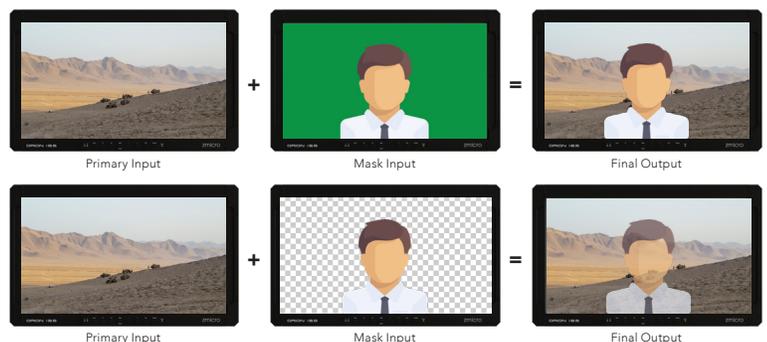
The Blending menu dialog is used to regulate the alpha blending, which is the process of combining an image or a mask with a background to create the appearance of partial or full transparency. This dialog is also used to configure a green screen for chroma keying.

### CHROMA KEY ▶

Allows for compositing two images or video streams together based on color hues. When enabled, a color range in the foreground footage is made transparent, allowing separately filmed background footage or a static image to be inserted into the scene.

### ALPHA BLENDING ▶

The process of combining a translucent foreground color with a background color, thereby producing a new blended color. The degree of the foreground color's translucency may range from completely transparent to completely opaque.



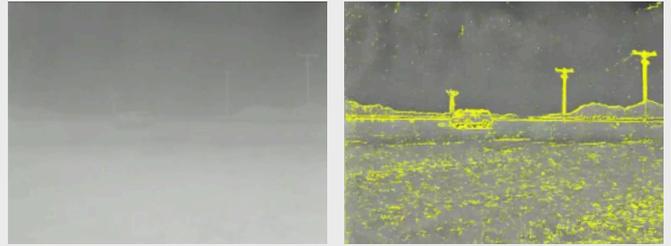
## PLUG & PLAY SOLUTION FOR ENHANCING ISR VIDEO

ZMicro's Insight video processing system significantly improves visual clarity in degraded visual environments such as fog, rain, dust, smoke, underwater, low-light, bright-light providing an operator with more information to support better decisions. It is a compact, rugged stand-alone system that can be plugged into an existing ISR architecture to enable image enhancement capabilities. ++

### INSIGHT FEATURES:

- Improves image clarity in live video
- Processes up to 1920 x 1080 image resolution at a maximum enhanced rate of 60p
- "Plug and Play" installation and operation
- Image sharpening and enhancement
- Enhancement of surface and edge detail
- Color enhancement
- Seamless integration
- Default parameters for most environments
- Intuitive controls for on the fly enhancement adjustment
- Change intensity and processing region of the enhancement with on-screen controls
- HD-SDI and HDMI for maximum connectivity
- Various serial or Ethernet communication configurations
- Quick "snapshot" tool for saving JPEGs
- Integrated USB drive for image capture (JPEG format)
- H.264 decoding of IP video streams
- Chroma-key overlays such as GPS data

## CUTTING-EDGE ALGORITHMS



### EDGE DETECTION

Helps highlight man-made objects in video streams. This can be useful, for example, in search and rescue missions at sea, or recognizing target locations in a military strike, or spotting markers during visual navigation.



### ADAPTIVE TEMPORAL NOISE REDUCTION (ATNR)

Improves image quality by eliminating undesired artifacts, which results from the normal operation of the camera sensors in various environments. ATNR implements advanced techniques which enable it to filter out noise without adding blurring to moving objects.

## INSIGHT PRODUCT SERIES



### PCIe FORM FACTOR

The PCIe circuit board solution fits into any available PCIe slot from which it draws power only. Video streams are received and transmitted via the board's external connectors.



### INSIGHT SYSTEM

The compact, rugged stand-alone system can be plugged into existing architecture to enable image enhancement capabilities.



### INSIGHT ARRAY

This multi-card, rugged chassis solution can house several PCIe circuit boards to simultaneously process up to 6 video streams.

**+ CONTACT US TO LEARN MORE**

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