

# **Imagery Analysis Enhancement by the Synthetic Sensation Approach to Information Integration (SSAI)**

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Imagery analysis of streaming video from unmanned aircraft systems has focused on two dominant technologies, infrared (IR) and conventional video imagery. Each of these two electromagnetic bands has distinct capabilities, IR is useful in detecting heat and conventional video is useful in detecting visual qualities analogous to those inherent to human vision. In each technology, the perceived technological desire is to increase resolution, enhance magnification, and stabilize the images to reduce motion artifacts. While these are necessary goals, they do not combine the benefits of each technology into a sensor-fused or integrated product. Unfortunately, due to practical, current, considerations of size and weight for small aircraft, usually only one technology can be used at one time, or with larger aircraft platforms, perhaps two sensor packages may be used sequentially. In the best current systems, both sensor packages can be operated concurrently, but their products can be still only viewed, separately. Likewise, the addition of other existing technologies to this mix, such as radar, or radio wave detection are still, separate technologies, and not integrated with either of the above imagery products.

The proposal being forwarded is to merge all four of the previously mentioned technologies into a sensor-fused product that would provide vastly greater capability than current technology sensing packages. In order for this system of systems to be effective, the baseline imagery would have to represent one that human beings can process effectively. Using a multichannel input approach, congruent information would be filtered by an automated process into the various natural channels a human is capable of processing. Vision, being the dominant human channel would be selected as a color image enhanced by IR information for targets of interest. In the same way radar products could create visual qualities either color coded or iconographic to enhance the detection of targets and finally, radio wave information could be input to the human auditory channel. Using this synthetic sensation approach to information integration (SSAI) the input to a human observer would result in a product that relies on naturalistic human processing, using synthetic, machine-derived sensor input. This approach would immerse the observer into a mix of four different technologies, without relying on the arbitrary synthesis of four separate visual screens, such as may now be implemented. Instead a single screen would provide color imagery, enhanced with selective IR qualities, as well as selected radar qualities, and this would be supplemented by radio sensation converted to auditory information. Providing visual images supplemented by iconography and further reinforced by auditory information would allow naturalistic human processing without overload, to a degree not previously attainable, by separate systems. This presentation will detail the advantages to this approach, and demonstrate by example how the product thus created would have dramatic enhancements to imagery analysis.