



CERI Workshop Presentation



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Specialized Visual Tools for Border Security Unmanned Aircraft System's Operations

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Background

1. Vast areas of border need to be observed 24/7
2. Border areas may be road-less, and remote
3. Border areas may be highly congested and urban
4. Border areas may consist of mountains, rivers, lakes, deserts, swamps or ocean
5. Crossings; legal and illegal; tens of thousands of people per day
6. Human border traffic on either side may be innocuous, but distracting
7. Border crossing may involve personnel who have economic, political, smuggling, or terrorist agendas





UAS's and border surveillance



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How do UAS's provide an awareness of what is going on here, day and night, 24/7?





Basic UAV Surveillance Technologies



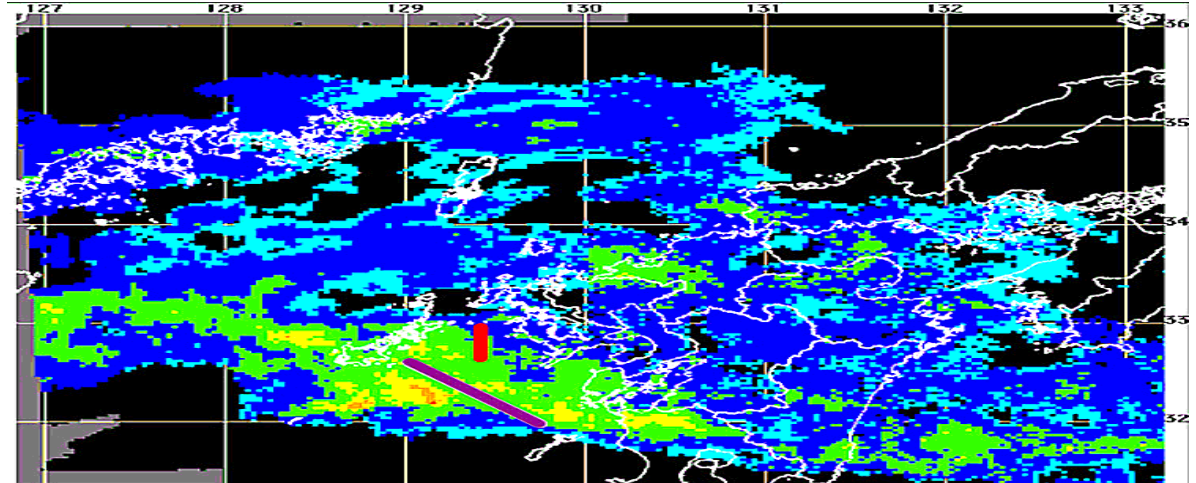
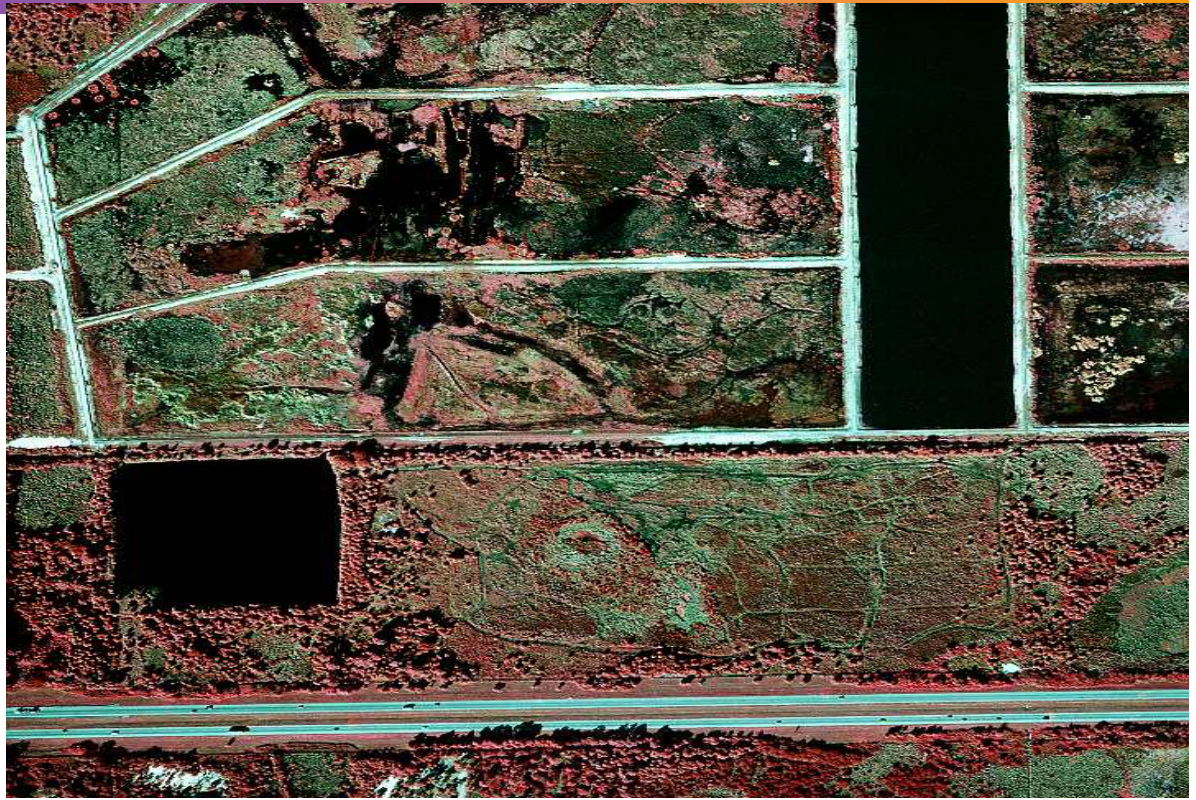
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1. Video/Still Camera
(Photographic and Digital)

2. Infrared Video camera

3. Radar technologies





Example UAS videos



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The following videos show both EO and IR daylight imagery from the US Army UAS Training School. US Army Shadow UAS (Unmanned Aircraft System) is the test platform.

1. EO (Electro optical daylight video)
2. Black hot, IR...this type of black and white video shows heat as darker (black) color





Example UAS video, Electro optical video



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Example UAS video, IR Black Hot



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Example UAS video, Black hot, IR



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Example UAS video, EO



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UAS video discussion



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What are the issues, and observations that can be derived from the previous video segments?

1. The visual quality of the imagery is far from optimal
2. Movement of the aircraft distorts signals/imagery in real time and this may lead to a loss of Situation Awareness.
3. A sense of orientation is sometimes hard to maintain, particularly when a moving UAS is following a moving target.
4. A sense of proportion/perspective is often only gained by zooming in or out to achieve a better sense of Situation Awareness.
5. A target locking tracker is of some help in tracking or relocating a target.
6. The different polarities of the video can lead to cognitive disorientation (foliage resembles snow)
7. Boredom and loss of SA are highly likely



What might improve this process?



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1. Higher resolution imagery
2. Automated tracking and return path overlays
3. Above real time review may provide continuity to real time events that do not seem to be connected
4. Ghost imaging (semi-transparent overlays) showing boundaries, direction and topographic landmarks, (self-selected)
5. Rotate perspective views to change orientation to horizontal type format.
6. Intuitive colorization to match perceptual set



Challenge



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What other methods, technologies, or techniques can be suggested to improve this visual detection, identification and understanding process?





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