360° Situational Awareness and Slew-to-Cue Integrated on CROWS II

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Executive Summary

- **Problem:** Even with the advent of the Remote Weapon Station, Warfighters remain exposed in threatening environments to achieve situational awareness
  - Existing Systems offer too narrow a field of view or imagery without positional context

- **Solution:** Add 360° SA with Slew-to-Cue onto the RWS
  - 360° imaging increases the operational effectiveness of the Warfighter by allowing the Soldier to see the entire battlefield instantaneously and continuously while to remaining under armor
  - Slew to Cue and other system integration (ASD, Muzzle Flash Detection) complement the CROWS II and make the Remote Weapon Station (RWS) operator more effective.
The Color Daylight camera on CROWS II provides a field of view up to 45 degrees

- With a 45° Field of View camera you are only able to observe where the RWS is pointed leaving over 80% of the Battlefield unseen
  - The platform is open to an attack from the unseen battle space
- Soldiers experience a “Soda Straw” effect, forcing them to constantly slew the RWS resulting in increased operator fatigue.
The addition of a 360° Sensor brings new capabilities to the Warfighter:

- Complements existing CROWS II by expanding the Soldier’s FOV = *Improved 360° Local Situational Awareness*
- It allows the Soldier to observe and interpolate targets of interest *without pointing a weapon* = *Reduced Escalation of Force*
- It provides weapon Slew-to-Cue and other sensor integration = *Improved Lethality*
- Integrated through existing CROWS slip ring = *Back Fit Ready*
An integrated *Staring 360° system with a selectable zoom window* allows the Soldier to:

- Interrogate a target without the visual cue of rotating the sensor in its direction
  - The target is unaware that it is being observed
- Maintain the weapon in a safe direction and only bring it to bear on target if necessary
- Have superior close-in Reconnaissance, Surveillance, and Target Acquisition (RSTA)
- Engage targets directly with the CROWS *And* continue to observe the battle space around him
To be effective, the 360° image must be stabilized and have azimuth orientation correction applied to the entire image
- The center of the image will always be the vehicle 12 o'clock position.

The Soldier is able to maintain positional context while the vehicle is moving or RWS is slewing

The 360° sensor display must make the Soldier aware of all systems and their position in the battlefield
- Intuitive visual cues are provided on the display to ease the Soldier's job:
  - RWS Crosshairs on 360° image,
  - RWS sensor feed to the display,
  - Slew to Cue Command,
  - Vehicle indicator with weapon and RWS feed,
  - Area of Interest zoom window, etc…
The Sensor Head contains no moving parts
- fixed cameras and optics increase system reliability and reduces system complexity

Digital Stabilization of the image eliminates the need for Fiber Optic Gyros
- Stabilization is performed using an Inertial Measurement Unit (IMU) located inside the sensor head

Image processing is used to present the data to the Soldier in real time (30fps at less then 100ms latency)
- This performance is achieved through a hardware based solution
Leverage Industry Advancements by Maintaining an Open Architecture

- **Systems must adhere to open standards to allow for advancements in sensor technology**
  - As Camera performance increases, system must be able to accommodate new technology without major modifications

- **Easy 3rd Party algorithm implementation**
  - To integrate evolving capabilities such as Muzzle Flash Detection, Acoustic Sniper Detection Systems, and other features such as Auto Track and Image Fusion

Acoustic Sniper Detection Integration COMPLETE
360° imaging technology brings enhanced capability to the Warfighter

- ONE360 complements the RWS E-O while not overloading the operator
- Eliminates the “Soda Straw Effect” and opens the entire situation to the RWS gunner
  - Real time imaging (30fps) is key when operating a moving vehicle or the weapon system.
- Requires minor modifications to the RWS to avoid a long down time and high cost of the upgrade.

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