Passive Panoramic Image Fusion (PPIF) for 360 Degree Situational Awareness to Support Operations in Urban Terrain

Presentation to Autoliv Electronics

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### Passive Panoramic Image Fusion (PPIF) for 360 Degree Situational Awareness to Support Operations in Urban Terrain

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PPIF System Benefits

- Provides 360 degree situational awareness to the crew of an armored combat, surveillance, and troop transport vehicle during the day or night. Real time, pixel based fusion of infrared and visual video with pan and zoom capability.

- Aids Armed Urban Operations with:
  - Surveillance
  - Peace keeping operations
  - Perimeter control

- 3 Band Fusion
  - Near IR
  - Far IR
  - Visible
Night Vision (IR) and Visual Image Fusion in Real-Time

Visible image shows:
- Other vehicles
- Blinker, break lights
- Lane markings
- Signs

Infrared image shows:
- Other vehicles
- Persons and animals
- Road beyond headlights

But only infrared image fused with visible light image show all features
Navigator Prototype Kit

Fully Passive 360° Image Fusion Technology for Homeland Defense with Modular Camera Kit
Present Version of System

Rugged version
PASSIVE PANORAMIC IMAGE FUSION (PPIF) SUPPORTING ARMED OPERATIONS IN URBAN TERRAIN

Superior Technology for a Superior Aim

- PPIF was developed in collaboration with Ford and Sarnoff using OTS imaging sensors and software in the VPL

Benefits
- In-theatre MOUT/peacekeeping operations
- Homeland defense
- Surveillance

Supporters
- PM Stryker /BCT
- PM LTV
- PM LAV
- PM TV
- PM FCS
- Pentagon G2 office
- Secret Service

System Integration

Integration of OTS

Marine LAV

HET FT06-07

Stryker FY05-06

Bradley FY06-07
## Features and Possible Options of an Image Fusion System

- **360° Panoramic View with portable display**
- **Systems for high speed convoys**
- **PASSIVE Day and Night System**
  - Far IR
  - Near IR
  - Visible
- **Recording Capability**

### Additional Features:

- **Threat Identification**
- **Automatic “Wakeup” and Warning on Threat Detection**
- **“Zoom-In” Capability**
- **Color Code Areas of Interest**
- **Automatically Track Moving Threats and Illuminate Them**

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**Superior Technology for a Superior Army**

*U.S. Army Tank Automotive Research, Development, and Engineering Center*
Potential High Volume Applications for Night Vision

- High speed convoy (multiple vehicle, lights out driving) - 250
- Border surveillance (Homeland security and military) - 500
- Perimeter security around installations and bases - 200
- Night Vision for light tactical vehicles - 250
- Night Vision for marine search and rescue - 100. For example, Selfridge homeland security base.

Realistic estimate of quantities needed is around 1300 for the first year. Probably 1000 units/yr for the foreseeable future to upgrade and replace.

Cost per unit of under 5K ??
Integration and testing of a smaller and hardened military version of the image fusion system on a LAV or Stryker is of interest. TARDEC could be early users and integrators of the Autoliv cameras.

We need less expensive, more durable infrared cameras and image processing platforms.

How could the cost of the IR cameras come down with large production?