



Naval Surface Warfare Center

*Two Band Imaging System
US Patent # 6,969,856*

Mini Market Study

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Prepared for:
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Technology Synopsis

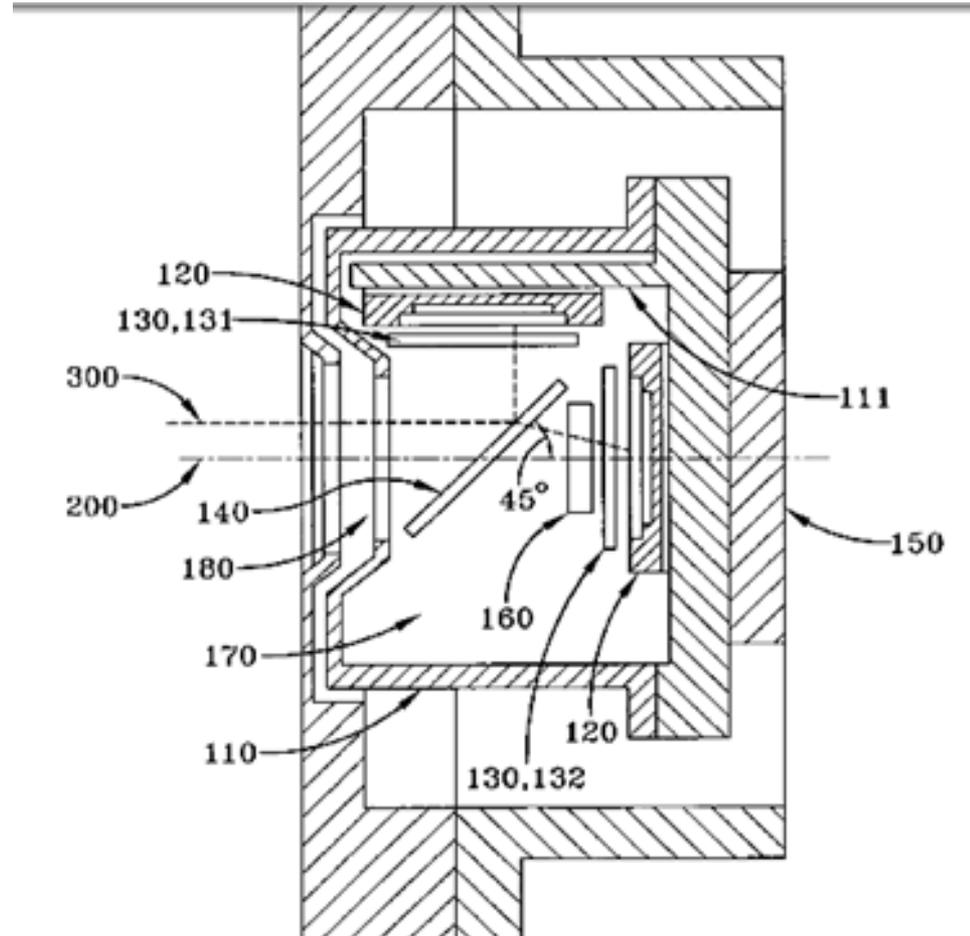
Two Band Imaging System

Problem

- Current technology limits the spectral bandwidth of any single focal plane sensor.

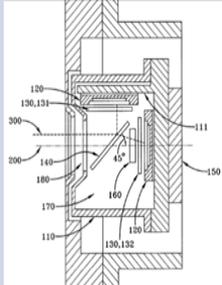
Solution

- Allows simultaneous imaging of both radiance level and temperature enabling end-user to better differentiate the target from a decoy.



Manufacturing Cost: Approx. \$230, 000

Key Competition & Competitive Advantage

Company Name/Inventors	Product/Technology	Features
 <p><i>Army Research Laboratory</i> A. Goldberg, T. Fischer and S. Kennerly</p>	Dual-Band Imaging of Military Targets Using a QWIP Focal Plane Array	<ul style="list-style-type: none"> • Focal plane arrays (mid-wave & long wave) • Quantum-well infrared photo detector • Use to gather image data on military targets • Image fusion techniques
<p><i>Distant Focus Corporation</i> <i>The MITRE Corporation</i> U. S. Army</p>	Dual-Band Imaging System Based on a Compact Coaxial Folded Optic Architecture	<ul style="list-style-type: none"> • Simultaneous acquisition of images from a common scene • Basic folded lense • Coaxial configuration
 <p>NAVSEA Eric Hillenbrand</p> 	Two Band Imaging System	<ul style="list-style-type: none"> • Real time radiance & thermography • Compact & inexpensive • Flexible • Superframes • Can be used in daylight & night • Can withstand cold conditions (70K)

The **only** technology able to:

- **Use any band, sensor or focal plane**
- **Able to transform different images into a single image**
- **Able to effectively repress temperatures**
- **Distinct processor-Carry out super framing capability to image correlation**



Potential Applications

Industry Segments	Uses	Market Size
A. Military*	<ol style="list-style-type: none"> Soldiers: Target identification and Recognition (Weapon Sight) Soldiers: Missile Warning Systems 	\$3.3B
B. Scientific**	Researchers: Research and Development Process	\$144.4B (2011)
C. Medical***	Physicians: Early Detection of abnormal health conditions	Millions of dollars per year
D. Manufacturing	Manufacturing companies: Spot/check for defects and issues within the manufacturing process	\$4.5T (2010)
E. Commercial	Thermographers: Diagnostics of engines including internal combustion, jet engines, and gas turbine	\$1.5B
F. Space	<ol style="list-style-type: none"> Satellites/Telescopes: Infrared images and spectroscopic observations of stellar phenomena Meteorologists: To study the Earth's weather during both the day and night 	\$257B

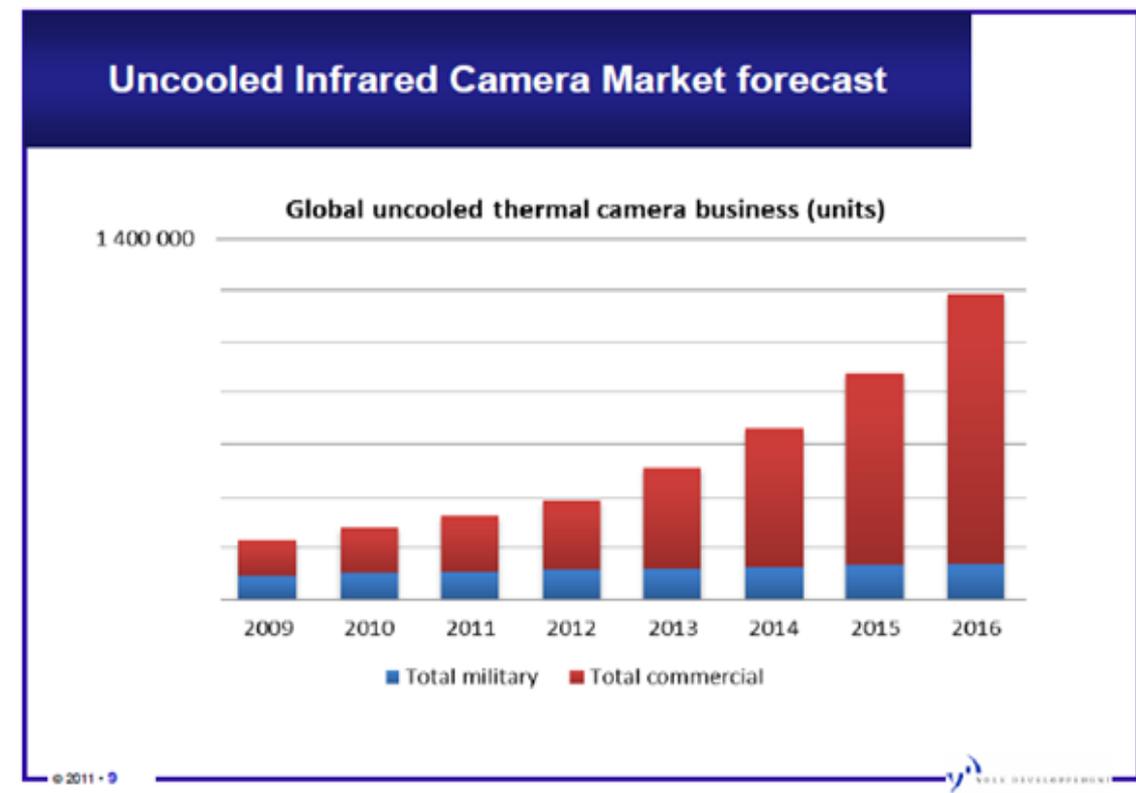
*Primary Market Focus

**Secondary Market (Great potential for solving critical problems in the research and development process)

***Will require additional R&D

Market Opportunity

- The infrared (IR) night vision imaging and thermography market:
 - \$4.8 billion annually,
 - \$3.3B is derived from pure military applications
 - \$1.5B from commercial and dual-use applications



Source: http://www.i-micronews.com/upload/Rapports/Yole_Uncooled_Infrared_Cameras_&_Detectors_for_Commercial_Military_2011_report_Sample.pdf

Potential Targets for Licensing

DRS Technologies:
 Leading supplier of integrated products for military forces to perform during critical missions. The company has been recognized as one of the fastest growing defense technology companies in the world and holds the leading market position in thermal imaging devices.

BAE SYSTEMS: The second largest global defense and security company that deliver a full range of products and services for air, land and naval forces.





Industry Insights



- **Terence J. Murphy , President, RSTA Group**
 - Previous Vice President and General Manager of the Infrared Technologies Division. Expertise in the development and production of EO/IR systems and components.
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BAE SYSTEMS

- **Mike Lewis, VP & GM, Infrared Imaging Systems**
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Recommendation and Next Steps

- Contact the **main infrared military systems players**
 - **BAE Systems** for military application, specifically target acquisition (Thermo Weapon sight) application
 - **Contact Infrared Imaging Systems' Mike Lewis** to initiate conversation about current infrared products. Determine the need for the technology within BAE Systems and discuss product integration process.
 - **Phone:** 781-863-3687
 - **Email:** michael.l.lewis@baesystems.com
 - **DRS Technologies** for military application (identification and recognition of targets)
 - **Contact Terence J. Murphy, President, RSTA Group** to discuss DRS's current military products, possible integration of the Two Band Imaging System and potential applications for this technology within DRS Technologies Inc.
 - **Phone:** 973-898-1500
 - **Email:** terence.murphy@drs.com



Recommendation and Next Steps

- Use prototype to conduct performance test against competitors' technologies to quantify competitive advantage
- **To build awareness for technology: Showcase technology at tradeshow and infrared imaging conferences**
 - **Attend the SPIE Defense, Security, and Sensing Conference** as a presenter in the IR Sensors and Systems conference program track.
 - **Paper submission:**
http://spie.org/app/program/index.cfm?fuseaction=conferencedetail&export_id=x12502&ID=x6770&redir=x6770.xml&conference_id=967003&event_id=957483&programtrack_id=966996
 - April 23-27, 2012 at the Baltimore Convention Center in Baltimore, Maryland, USA
 - **Attend the Night Vision 2011 Conference as an exhibitor.**
 - Focuses on military applications of Night Vision and Thermal Imaging
 - November 9-11, 2011 at the Bristol Marriott Hotel City Centre, United Kingdom
- Consider exploring the commercial industry, market data indicates great potential.



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**For further discussions, contact:
NSWC-Crane Division**

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**Chief Technology Officer: Joe Gates
Inventor: Eric Hillenbrand**



Status to Date

Status	Required Tasks
Completed	Draft interview agenda/questions. Obtain mentor approval prior to interviews.
Completed	Perform in person interview with inventor(s) and/or subject matter experts (SME) in accordance with a provided checklist
Completed	Develop a short succinct (1-2 paragraphs) common language description
Completed	Perform a web search for similar / competing products.
Completed	Identify potential markets for the technology including an abbreviated horizontal and vertical analysis and potential company lists.
Completed	For the top 2-3 markets, contact potential companies to determine interest, issues, etc.



Market Study Goals

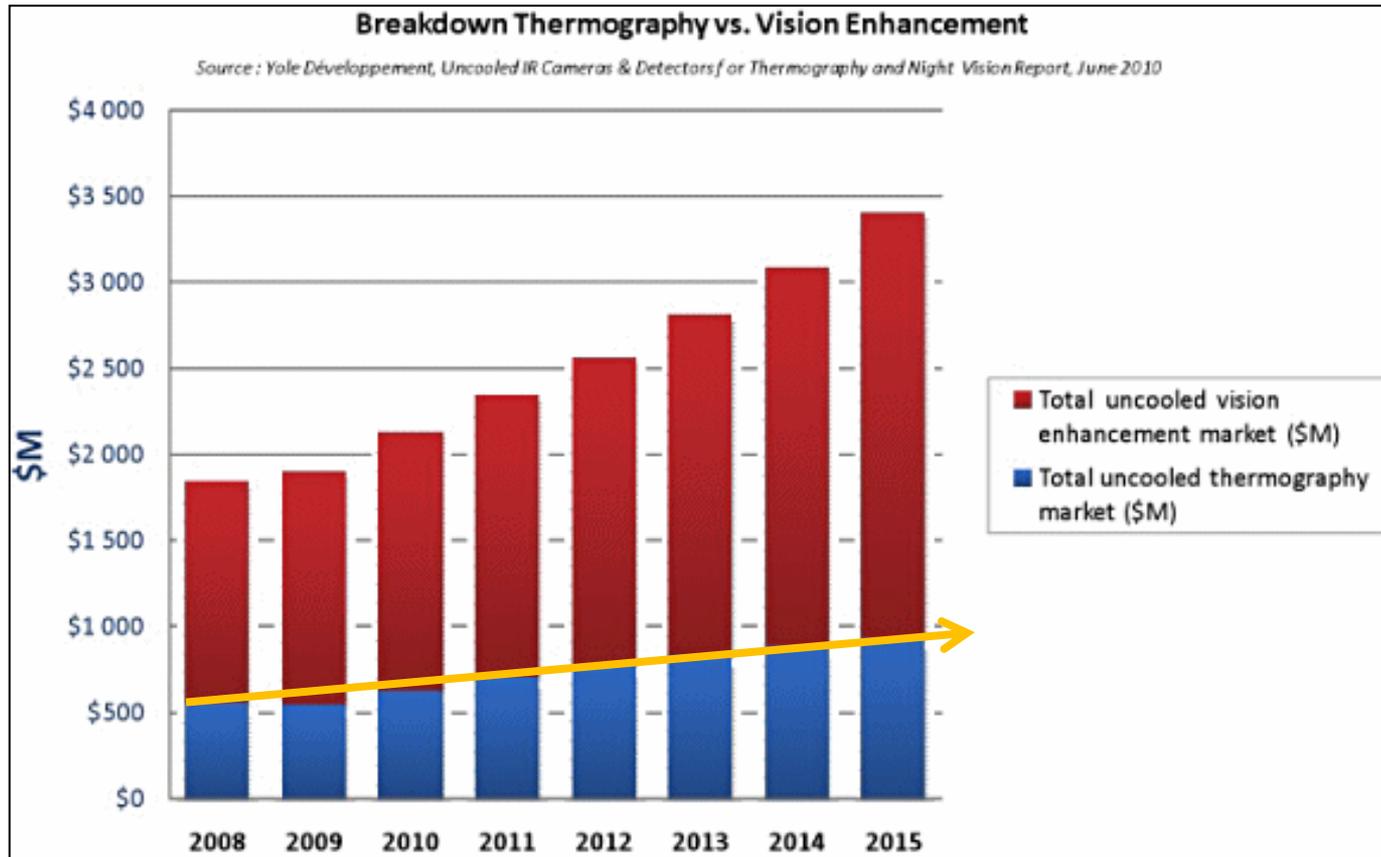
- Conduct an abbreviated market study assessment to:
 - a. Define the technology in common language as a priority for military and commercial applications.
 - b. Create collateral material for industry outreach.
 - c. Validate collateral material communication through primary and secondary research.



Situational Summary

- **Inventor:** Eric Hillenbrand of the NAVSEA Crane Lab
- **Need:** Enable the end-user to view simultaneous images of a common scene in real time and in great detail using multiple bands in both normal and cold temperatures.
- The technology has been used in the military.
- There are potential applications for this technology in the military, scientific, and commercial industries.
- Both primary and secondary research indicate market potential.

Market Opportunity



In its recent study, "Uncooled IR Cameras & Detectors for Thermography and Vision Markets—2010" **projects that upcoming technology advances in IR detectors will continue to drive down camera prices** by as much as **60%**, spurring **24% annual growth** in unit demand over the next five years, and creating a **\$3.4 billion market** for IR cameras for vision enhancement and thermal sensing by 2015.