



Mini Cryogenic Shutter Assembly

US Patent: 7,117,796

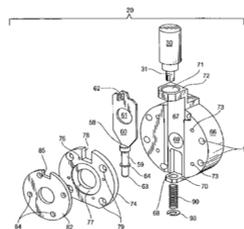
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Situational Summary

- Inventor Eric Hillenbrand of the NAVSEA Crane Lab invented a miniature cryogenic shutter assembly to calibrate zero radiance so that super-framing would be possible on small and medium-sized cameras in very cold environments.
- The technology is used in the military.
- Applications for the device are in the space, commercial and military field.
- Both primary and secondary research indicate market potential.

Technology Synopsis

- Used as a mechanism to calibrate small to medium sized cameras using an “absolute measurement” of light emitted by an object in very cold environments.
- Shutter provides a common zero reference base (zero radiance) that is needed to do true superframing.
- Shutter allows you to superframe which previously could not be done before.
- Superframing is particularly useful for infrared camera systems that are used to image scenes with enormous differences in temperature.



Technology Benefits & Features

- Provides zero radiance referencing.
- Creates true superframed images. No other technology has this capability.
- Used in small or medium format cryogenically cooled infrared cameras.
- Operates at 77K.
- Fabricated of strong and lightweight materials for optimum durability and longevity.
- Operates reliably in cryogenic conditions.

Market Opportunity

- Cooled camera market is very small.
- The value of the world image sensors market is expected to rise to \$11.7 billion by 2012, according to Global Industry Analysts Inc. of San Jose, Calif. 1
- In 2009, FLIR’s revenue was \$1.15 billion most of which came from thermal imaging systems.

1. <http://www.photonics.com/Article.aspx?AID=3645>
 2. [http://www.wikinvest.com/stock/FLIR_Systems_\(FLIR\)](http://www.wikinvest.com/stock/FLIR_Systems_(FLIR))

Applications

Industry Segments	Market Size	Application Segments
Military	\$3.3 Billion	1. Missile Defense and Protection 2. Surveillance: Subjects of surveillance are obscured by ground fire or other thermal camouflage.
Space	\$5.6 Billion: commercial satellites \$8.9 Billion: spent on missile defense agency	1. Satellites/Telescopes: Infrared images and spectroscopic observations of stellar phenomena 2. To study the Earth's weathre during both the day and night 3. Missile defense
Commerical	\$1.5 Billion	1. Thermography: Diagnostics of engines including internal combustion, jet engines, gas turbine, medical imaging, scientific imaging

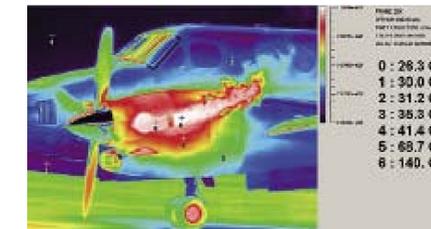


Figure 2:
Super-framed Image

Competition

Company	Product
	Mini Cryogenic Shutter Assembly
	Low Power Cryogenic Shutter Mechanism
N/A	Cryogenic Shutter
	Two-dimesional MEMS microshutter arrays (MSA)