

The Advantages of Longview 2 over Thermal Imaging

Dated: July 2012



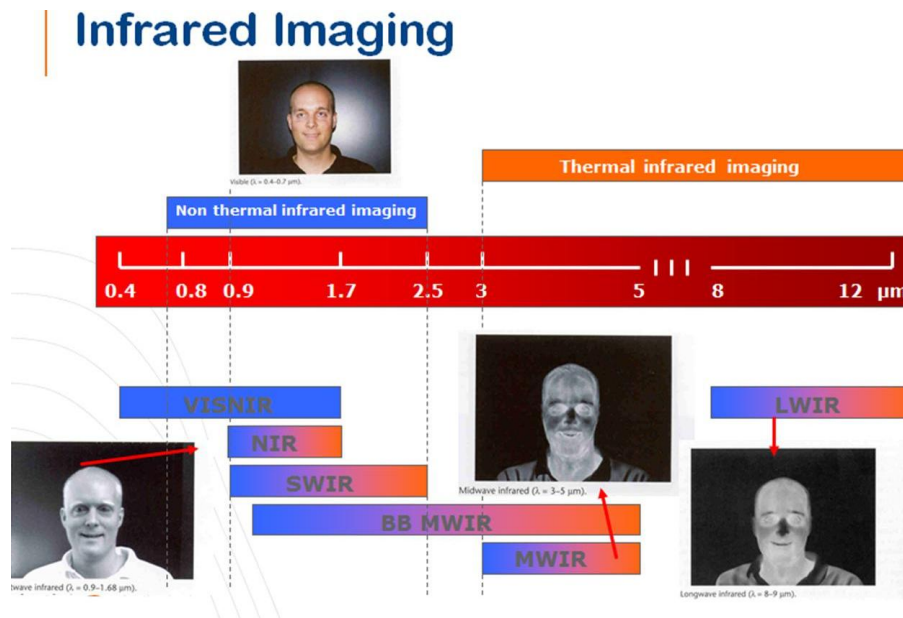
The Technology

VIT specialises in ultra low light and long-range surveillance equipment and manufactures a range of solutions to meet the long range and rapid deployment requirements.

Ultra Low Light and Thermal Camera Technology Explained

Thermal cameras operate at a higher wavelength of light to optical cameras, and this provides some advantages over standard camera systems in low or no light scenarios.

However Thermal cameras operate at a generally lower resolution than visual cameras, and even at higher resolution do not provide the level of detail normally needed to identify a person's features or face.



A graphic offering an outline of how thermal images compare to lower wavelength visual images. As you can see the images vary greatly in recognition or evidential detail.

Thermal cameras also operate through a lens material call Germanium, not glass. This means that the lens choice is smaller than with conventional Glass lenses and optics that can be used in visual spectrum cameras. For example it, is possible to fit a wide range of zoom lenses to visual cameras whereas thermal cameras generally have fixed or stepped focus lenses.

Thermal cameras generally have a finite life of operation, and cooled versions especially have a limited lifetime and more expensive running costs. Visual cameras are uncooled and have a fairly infinite life of operation. We have experience of many cameras being installed over ten years ago still running happily today.

In synopsis, we see the value of thermal imagers over traditional low light cameras in zero light operation.

- We see the advantage in hi resolution colour cameras over thermal units in daylight and good lighting operation.
- We see the advantage of VIT Ultra Low Light cameras over thermal in very low light operation.
- For zero light operation, VIT can offer white light illuminators capable of illuminating to 2km and still producing usable evidential images.

Advantages of VIT specialist low light cameras

The VIT 53 range of cameras operates down to 0.00003 lux making it over 100 times more sensitive than the standard CCD based cameras on the market offering 0.003-lux operation.

More importantly, the VIT camera operates in a different way than standard CCTV CCD units using specialist 'pixel binning' technology that allows it to operate in much lower light, and providing the ability to look into bright area and dark areas in the same field of view and still provide images. This is shown in this document by the images of the car registration plates being viewed through headlights and also the persons being viewed standing in front of a light at 900 metres distance.

The VIT **Longview II®** system combines the advantages of ultra low light operation with the ability to operate through specially developed low light optics giving a 6 to 100x optical zoom range and 570 line high definition images in day and night conditions.

The system utilises a hi-res colour camera for daytime, and the ultra low light cameras sensor for night vision. Both cameras are uncooled and do not have a finite life of operation.

In addition **Longview II®** includes the Fog Camera Contrast enhancing camera option for use in cloudy, foggy or poor weather and significantly improves image quality and surveillance.

We believe the **Longview II®** solution offers the most cost effective, flexible viewing range (from 6 to 100x optical zoom) and best lifetime cost of ownership.

Our use of pixel binning technology gives us a significant advantage in ultra low light and poor visibility

Longview II®

Longview II® is a surveillance platform housing four interoperable cameras and multiple lenses to enable observers to rapidly locate, recognise and assess targets of interest at long ranges and in challenging visual environments.

Used in conjunction with the VIT high-resolution controller and DVR, the Longview II® system offers a fully integrated solution for rugged multi-functional surveillance.



Key Features:

Feature	Details
Ruggedized Housing	IP66 rated housing with marine grade finish to counter corrosion
Ultra sensitive PTZ	Improved stepper motor for greater pan and tilt accuracy to 11 cm at 1km range
3 + 1 cameras	3 x carousel mounted cameras, electronically selected to offer total versatility in varying light conditions. Additional 4 th fixed camera for colour day and night overview.
Camera 1 – Low Light Camera	0.00003 lux ultra low light camera unit 570 lines TV resolution and night mode 1 + 2
Camera 2 – Hi-res Colour Camera	520 line colour hi-res colour camera 0.1 lux
Camera 3 – Fog Camera	VIT fog camera for penetrating rain, snow, fog, mist, smog and smoke
Camera 4 – Overview Camera	Day/night overview camera 550 TVL resolution
Lens 1	6x to 25x zoom (400mm with 25mm objective)
Lens 2	25x to 100x zoom (1050mm with 115mm objective)
Signal Output	PAL
Pan Speed	Variable Max to 11 degrees per second
Pan Resolution	Max 19cm at 1000m
VIT Controller	Colour screen hi-contrast. Proportional PTZ control via joystick
Remote Operation	Longview is optimised for matrix deployment with multiple cameras deployed to cover interlocking arcs of observation for control and monitoring at a central (as well as secondary and tertiary) control room.

Versatile Control Options	Numerous control options are available which can be facilitated by a number of communication bearers including, wired, STACOM, GSM, wifi etc.
Low Power Consumption	The system operates on 12v DC to allow for installation and operation and servicing without need to have 240 mains power. Simplifies maintenance and reduces through life costs.
Rapid Deployment	All components of the Longview II® system are man portable in a single rugged transport case. Unpacking and set up to full operation can be completed in 10 minutes (5 minutes by an experienced operator).

Recording Solution

To protect the veracity and quality of the recorded data, we offer our **VIT Equaliser rack mounted DVR unit**. This tried and tested DVRS is used by UK Government and many of the UK Police forces for high quality evidential recording.

Some of the key features of our DVRS are:

- Instant playback on any camera (without disrupting live recording)
- Smart search by camera or group of cameras
- Fast, easy and intuitive search, save and download feature
- Seamless transfer of evidence to portable media or hard copy reproduction.

The system is fully IP based making it ideal to link back across communications networks to a central monitoring station or groups of monitoring stations.



Case Study

Panama

AIM

To test **Longview II®** in the identification and tracking of shipping particularly at long range and in very low light and fog conditions.

Method

Longview II® was deployed to a number of vantage points overlooking both the Panama Sea Harbour and the Canal. At each location, the camera was tested at ranges between 2km and 25km, at day, night and in fog.

Test 1 – At the Panama Canal using the overview and colour cameras up to 25x zoom



Range: 600m

Left: The **Overview camera** offers a situational awareness view.

Below: By switching to the Hi-res **Colour Camera** and utilising the smaller 25x zoom lens you can quickly home in on areas of interest.



Test 2 – At the Panama Canal a range of 2km+ using the Overview Camera and Colour Cameras up to 75x zoom and then switching to the Fog camera to enhance the image at 85x zoom.



Range: 2000m

Above: The **Overview camera** gives an effective hi-res image is slight heat haze at 2km

Left: The **Fog Camera** allows us to cut through the haze to see a much higher contrast image of the vessel.

Test 3 – Looking out to sea (through a hotel room double glazing that impedes the resolution) in thick fog at 7km



Range: 7 - 10km

Left: The **Colour Camera** at 100x zoom is unable to deliver useable images and can barely detect the subject.

Below: at 25x zoom with the Fog Camera subject.



Below: at 100x zoom with the Fog Camera subject.



The Fog Camera offers unparalleled images at over 7km in thick fog

Test 4 – Observing people and traffic in light fog at 6km



Range: 6km

Left: The **Overview Camera** looking out to a sea wall causeway in light sea mist

Below: The Colour Camera at 25x zoom offers improved images and can detect trees and vehicles



Below: The **Fog Camera** at 25x zoom offers an entirely clearer picture and can depict people, birds and previously unseen depth context



Case Study

Changi Airport

AIM

To test **Longview II®** in the identification of people and various levels of subject detail at ranges between 400m and 1000m in low light conditions.

Method

Longview II® was set up on the roof of a building on the perimeter side of the airport. This position offered a variety of views along the perimeter fence and back towards the runways and airport terminals.



This overview satellite image shows the camera location at the left end of the yellow line.

This also shows the distance from the building to the service road as 420 metres.

The images below were taken in low light conditions.



Evidential detail at low light - The images above show vehicles at 400m and 440m on and off the service road

Testing of Longview to prove low light ability looking into headlights

The test was carried out at distances from 300 to 400 metres. The Longview system was tasked to pan and tilt to view the persons and also zoom in on them to offer an evidential image of the personnel.

Longview II® was also tasked with identifying a vehicle and read the number plate of the vehicle through its headlights.



Above: This image demonstrates the ability to **look into bright lights at night**.

Right: This image demonstrates the ability to **look into bright lights at night**.



Evidential quality images of the number plate and people standing adjacent the vehicle at over 300 metres, at night, whilst looking into the vehicle headlights

As the personnel walked from beside the vehicle towards the fence line,

Longview II® was tasked to follow them and to capture images of them at the fence line.



Longview II® optic and ultra low light sensor are providing evidential grade images at this range using only the ambient lighting.

Range: 380m

**Evidential quality
images using only
ambient light**



Tracking people in darkness at 900m...

The test continued with a requirement to track two individuals walking in the near total darkness on grass between ranges of 100m and 900m.



The distance from the camera position (on left of yellow line) to the fire station (on right hand side of yellow line) was measured by GPS at 906 metres.



The personnel in this shot are at **100m** from camera position and walking away from camera towards the fire station area.

This image was taken near the access road at over **420m** from camera position in near **zero light conditions**.





Range: 900m

Personnel are standing directly in front of a wall light in the fire station building.



This demonstrates both the power of the 100x maximum zoom lens but also the cameras ability to compensate for backlighting.



These images below show the control tower at **2,400m** in darkness using varying lenses for zoom demonstration