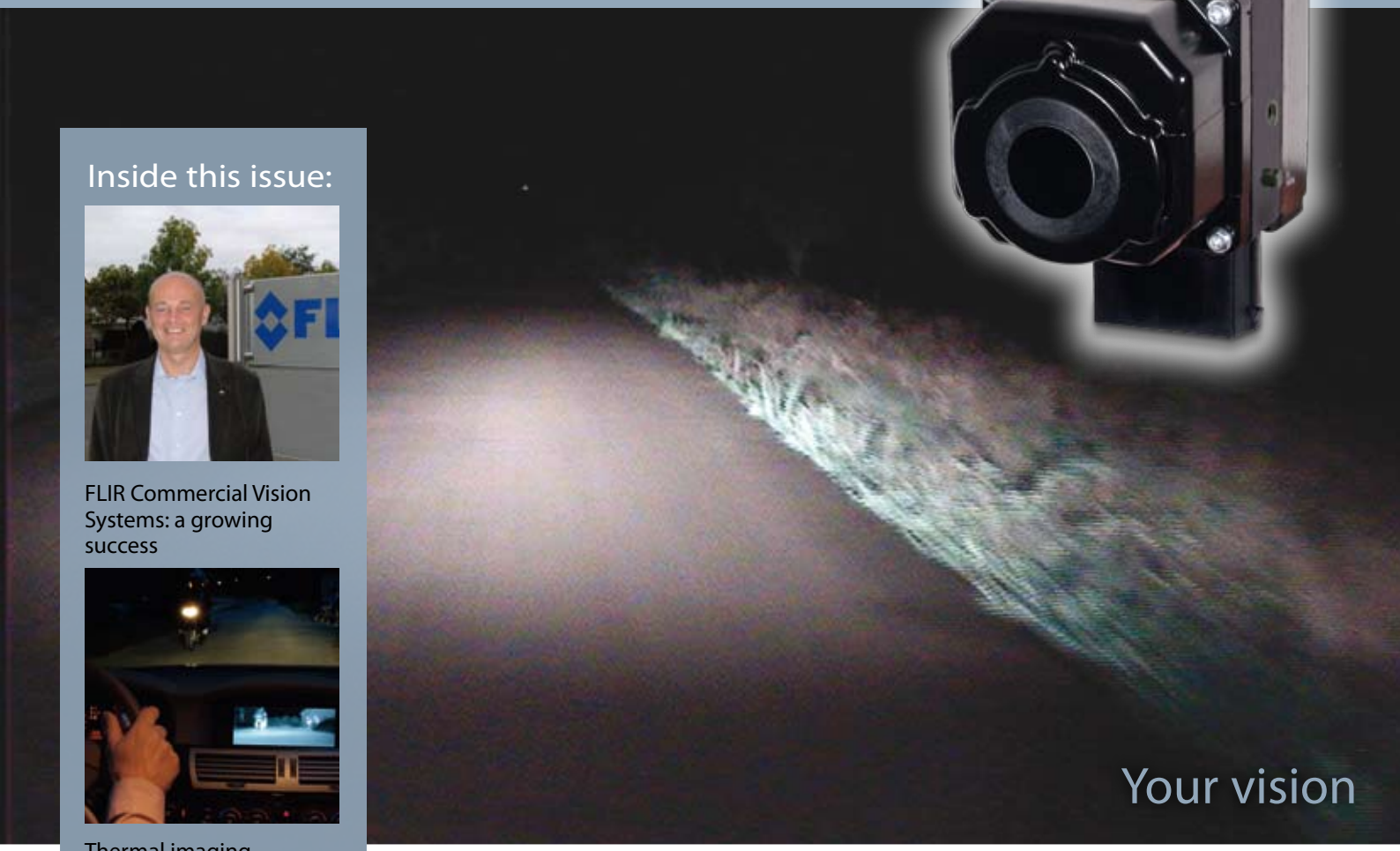
Transportation news

FLIR



Your vision

PathFindIR vision

PathFindIR®: Thermal imaging camera for driver vision enhancement

Inside this issue:

www.flir.com

Transportation news

Content

COLOFON
Responsible editor: Guy Pas
FLIR Systems BV
Production: C. Maras
Printed in Belgium

FLIR Commercial Vision Systems: a growing success

FLIR Systems is vertically organized around its key markets. Although we serve different markets with totally different customers through different distribution channels, all divisions share the same core technology, strategy and brand. This creates valuable economies of scale and makes FLIR Systems the largest manufacturer in the world for thermal imaging products.

Today FLIR Systems consists of three independent divisions: Government Systems markets a complete range of thermal imaging cameras for governmental and military users, Thermography produces infrared cameras with temperature measurement capability for the most demanding predictive maintenance and R&D applications, Commercial Vision Systems markets a wide range of products for night vision applications.

Although it is the "youngest" division within FLIR Systems, it was founded only three years ago, FLIR Commercial Vision Systems is rapidly expanding in all the markets it is serving.

"The demand for thermal imaging cameras coming out of transportation market has increased drastically.", says Guy Pas, Vice-President Sales Eurasia, FLIR Commercial Vision Systems. "When FLIR Commercial Vision Systems started about 3 years ago, thermal imaging was a very exotic technology in the transportation markets. Today more and more users are discovering that, for driver vision enhancement, during the night, in all weather conditions, thermal imaging cameras have a lot of advantages to offer over other technologies."

"A big contribution to the popularization of thermal imaging in the automotive markets was done by BMW. They were the first car manufacturers to offer a thermal imaging camera as an option on selected 5-, 6- and 7-series models."

More than passenger cars only

"But not only passenger cars are being equipped with thermal imaging cameras like the FLIR Systems PathFindIR. PathFindIR thermal imaging cameras are being installed in huge quantities in trucks, busses, emergency vehicles, trains, metros and other types of vehicles. Not only in new vehicles but in existing ones as well."

"Another indication of the growth in the transportation market is the number of distributors we are having today. More and more companies are interested in distributing the FLIR Systems PathFindIR in this growing market."

Thermal imaging: conquering the world

"The trend that thermal imaging cameras are becoming increasingly popular is not only present in the transportation market. In other markets where FLIR Commercial Vision Systems is active we see the same. More and more yacht owners are installing a thermal imaging camera on their yacht for night time navigation. We are also getting our first success in the Commercial Shipping markets. Tow boats, off-shore supply vessels, … are being equipped with a thermal imaging camera."

"For security and surveillance we are noticing a huge increase in turnover, as well. But even more important, we are seeing an even bigger increase in the number of cameras we have sold. This means that not only high-end applications are using thermal imaging. Smaller, simpler and cheaper thermal imaging cameras are finding their way increasingly to security. Finally, we are noticing an increasing interest from OEM manufacturers that want to integrate thermal imaging modules like the Photon, in their own products."

"For the future I expect that the number of cameras we will be putting in the market will further increase drastically. FLIR Systems will continue to put innovating products into the market that will soon reach an extremely large audience."

Mr. Guy Pas
Vice-President Sales Eurasia

PathFindIR®

Thermal imaging camera for driver vision enhancement

Thermal imaging is a powerful driver vision enhancement system, which significantly reduces the risks of night-time driving and allows you to see up to 5x further than with headlights.

Thermal imaging produces clear images in total darkness, smoke, rain and light fog. It needs no light whatsoever to operate. Thanks to thermal imaging, drivers can more quickly detect and recognize potential hazards and avoid deadly accidents.

The FLIR Systems PathFindIR is a compact thermal imaging camera that significantly reduces the hazards of night time driving. It enables drivers to see much further, with improved clarity, than with standard headlights. Drivers can detect and monitor pedestrians, animals, or objects on or near the road, allowing more time to react to any potential danger. PathFindIR helps to detect and recognize potential hazards in total darkness, smoke, rain and snow.

The PathFindIR module can be easily integrated in any type of vehicle. Passenger cars, trucks, busses, emergency and military vehicles, mining equipment and many more, it can all benefit from the power of thermal imaging.

Excellent image quality

The PathFindIR incorporates an uncooled 320 x 240 pixels microbolometer. This maintenance free system delivers crisp video images which can be displayed on virtually any display that accepts composite video. The PathFindIR is equipped with a 19 mm wide angle lens. It gives you an extremely wide field of view (36°), resulting in excellent situational awareness.

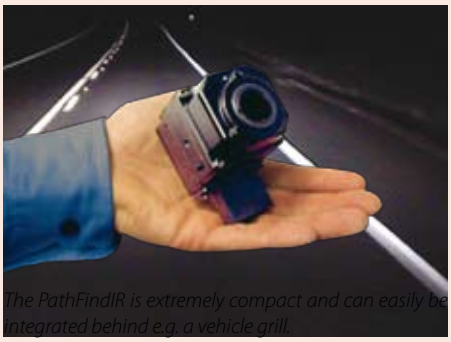
Designed for use in harsh environments

The PathFindIR is extremely rugged. Its vital core is well protected against humidity and water. The PathFindIR can be cleaned with a hose just like any other equipment. The PathFindIR operates between -40°C and +80°C. The PathFindIR has a built-in heater to defrost its protective window. This heater is capable of defrosting a 2mm layer of ice frozen to the window within 15 minutes when ambient temperature is -30°C and wind speed against the window is 100 km/hr. The heater is automatically powered when window temperature is less than +4°C and powered down when window temperature is more than +6°C. This ensures a clear lens and perfect infrared images displayed on your monitor even in extremely cold environments.

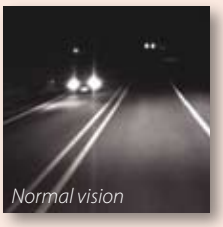
Compact, easy to install

The PathFindIR is extremely compact (5.8 x 5.7 x 7.2 cm) and weighs only 360 grams. This allows for easy integration in any vehicle. The PathFindIR can easily be installed behind a vehicle grill or in any other compact location.

If you would like more information about the FLIR Systems PathFindIR, a thermal imaging camera for driver vision enhancement, please contact your nearest FLIR Systems representative or send us the enclosed fax-back form.



The PathFindIR is extremely compact and can easily be integrated behind e.g. a vehicle grill.

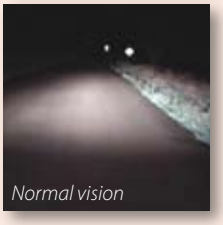


Normal vision

PathFindIR vision

Normal vision

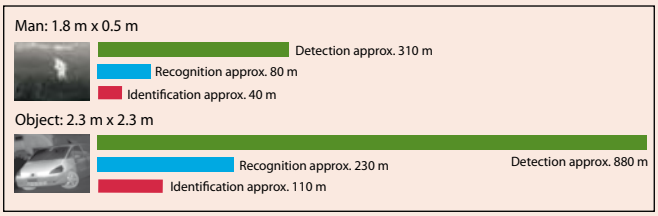
PathFindIR vision



Normal vision

PathFindIR vision

PathFindIR: range performance 19 mm lens



Actual range may vary depending on camera set-up, environmental conditions, user experience and type of monitor or display used.

Assumptions:
50 % probability of achieving objective at specified distance given 2°C temperature difference and 0.85 / km atmospheric attenuation factor.

PathFindIR® installation kit

Complete package for integrating the FLIR Systems PathFindIR in all types of existing vehicles

The PathFindIR is finding its way to more and more enthusiastic users. There is a huge interest for after-market installations. The PathFindIR is being installed in numerous military, mining, emergency and fire fighting vehicles, trucks, busses, passenger cars and other vehicles.

Complete package for mounting the PathFindIR in existing vehicles

As requested by users who want to install the PathFindIR in existing vehicles, FLIR Systems has developed a complete package that provides all the necessary equipment required to install and use thermal imaging technology.

This PathFindIR kit is the ideal tool if you want to equip existing vehicles with the power of thermal imaging. The kit consists of the following components:

- PathFindIR thermal imaging camera
- High resolution 7 Inch LCD monitor which can be mounted either on the dash or on the cab ceiling with included bracket. The monitor has contrast, brightness, and hue adjustments adding flexibility in performance. The monitor kit also includes a protective fuse, quick disconnect from the bracket, and a removable sun shield for daytime operation and glare reduction.
- 6 meter Detachable Pigtail Cable: for routing the PathFindIR's power and video interface into a passenger compartment. On one side the cable connects to the PathFindIR. On the other end it has 2 wires that can be terminated, as required by the user, for hooking into the vehicle power bus and a video cable that is terminated with a BNC connector
- Universal Mounting Bracket and Mounting Hardware to install the PathFindIR in a vehicle
- PathFindIR Users Guide
- LCD Cable, BNC to S-Video, 8.8 meters

Thanks to this complete kit, it becomes extremely easy to install the PathFindIR in almost any vehicle. Information on installation is provided in the PathFindIR Users Guide that is included in the kit.

Extremely affordable high quality package

The PathFindIR after-market kit is an extremely affordable package.All components have been selected by FLIR Systems so that the entire kit complies with the stringent quality requirements for which FLIR Systems is renowned.

If you would like more information about the FLIR Systems PathFindIR installation kit, please contact your nearest FLIR Systems representative or send us the enclosed fax-back form.

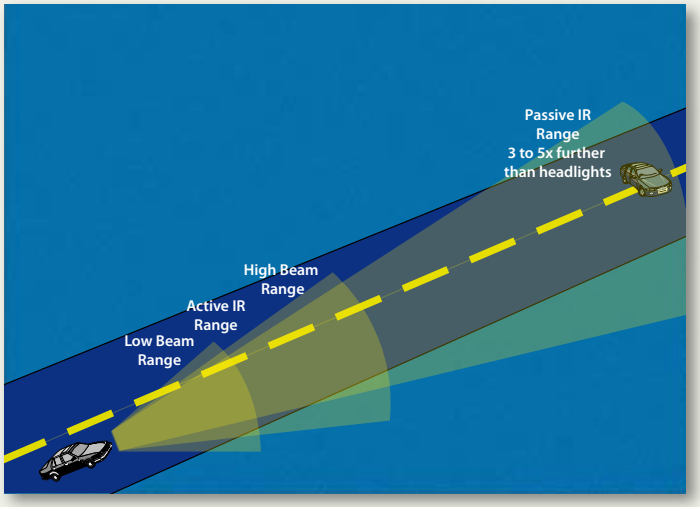

Normal vision


PathFindIR vision

Driver Vision Enhancement

choosing the best technology

The PathFindIR thermal imaging camera has been embraced by BMW. A thermal imaging camera can be ordered as an option on selected 5-, 6- and 7-series models. There are however other car manufacturers that are using another technology for driver vision enhancement applications. Understanding the difference between the various systems is important in order to make the right choice.



Night Vision: two different technologies

There are today two different technologies on the market for night vision systems. Far Infrared (FIR) also called Passive Infrared and Near Infrared (NIR) also called Active Infrared.

The NIR system beams infrared radiation into the area in front of the vehicle. The infrared beamers are often incorporated in the headlights. The NIR system is also called an active system since it needs to beam out infrared radiation itself. This infrared radiation is reflected by objects, the road and human beings and converted to an image which can be displayed on a screen.

FIR, like used in the FLIR Systems PathFindIR, is a passive system. It does not need to beam anything out to produce an image. It detects the minimal differences in heat, or infrared radiation, emitted by objects and human beings. It does not need a separate light source from the vehicle.

Comparing technologies

- **Seeing farther**
  One of the main advantages of FIR, as used by the FLIR Systems PathFindIR, is that it can detect objects and people at a far longer ranges. A FIR system like the FLIR Systems PathFindIR can see up to 5x further than headlights. The range performance of NIR systems is determined by the power of the infrared beamers. But installed in a vehicle, even the most powerful beamers will see hardly any further than headlights.

- **In all weather conditions**
  Another advantage of FIR is that it can be used in practically all weather conditions. Even if the range performance of a FIR system is affected by fog and rain, the driver will still be able to see farther than with the naked eye in practically all cases. NIR systems worsen the effect of fog so that practically nothing can be seen anymore.

- **Safety concerns**
  Another major advantage is that FIR is not sensitive to the headlights of oncoming traffic, street lights and powerfully reflecting surfaces such as traffic signs. Since NIR systems are using light waves as the basis for their image, especially light intensive objects appear brightly on the screen. This also applies to the infrared beamers of a NIR system when it is detected by another NIR system. This means that the driver can be blinded.

  Another disadvantage for NIR systems is that the images are sometimes very bright and therefore tiring for the eyes when driving at night. Reason is that all objects (including items which easily can be seen with the human eye like traffic signs) will appear as an intense object on the display. Due to the overload of objects on the display, it is more difficult for the driver to detect and identify a potential danger, such as a pedestrian or an animal, than with FIR.

- **Images**
  FLIR systems, like the BMW Night Vision, are producing a comprehensive image based on the differences in heat radiation of objects and people. Even when these temperature differences are sometimes minimal, a FIR system will detect them and transform them into a crisp image. FIR systems are not affected by light and there is no risk that the driver is blinded by oncoming headlights or other light sources.

A NIR system is giving a complete image of the road, including road marks. Although at a first glance this may seem an advantage, it delays the detection of people and objects within the image. And although the image generated by an NIR system is initially processed more quickly by users, after a period of familiarization with the FIR system the opposite is true. Many drivers prefer the image generated by a FIR system since they can detect objects, animals and people a lot clearer and faster.

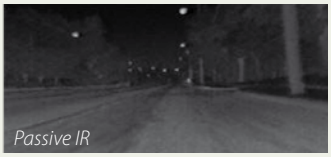
Conclusion

When compared to others, every technology has its advantages and disadvantages. However, for driver vision enhancement FIR has some considerable advantages over NIR. The only advantage for NIR is that the images are more natural, but FIR detects potentially dangerous situations faster than NIR.

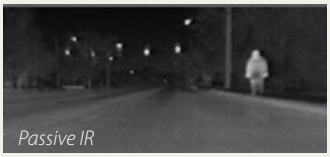
It is exactly for these reasons that BMW, one of the world's leading car manufacturers, has chosen for a FIR system like the FLIR Systems PathFindIR.

If you would like more information about the difference between active and passive infrared systems, please contact your nearest FLIR Systems representative or send us the enclosed fax-back form.


Active IR


Passive IR


Active IR


Passive IR

Avoiding accidents with mining vehicles

FLIR Systems PathFindIR® thermal imaging camera helps to avoid sometimes deadly accidents.

"The mining industry is a huge market in South Africa.", explains Mr. Eddie Smith, founder and Managing Director of Trysome Auto Electrical Parts Distributors. "We supply the mining industry with cameras and other safety systems for their trucks and other heavy equipment. It is of little consequence whether mining is carried out in open cast mines or underground, the equipment utilized is always huge and heavy, and as a result any accidents which occur are usually serious."

Seeing through dust

"When we found out what the FLIR Systems PathFindIR thermal imaging can do, we were impressed. Not only does it produce a crisp image in total darkness, but it can also see through light fog, dust and smoke. Exactly what is required for a mining vehicle."

"We are currently installing the first 68 PathFindIR thermal imaging cameras on board of mining vehicles. They are easy to integrate and are being mounted on the front of the vehicle. The images the PathFindIR produces are displayed on a large LCD screen located inside the vehicle's cabin."

"The driver has the ability to switch on the thermal imaging camera at all times, however the thermal images are automatically displayed on his screen once he reaches a pre-determined speed. In this case we want him to look at the thermal images regularly. Not only during the night, but also in daytime since the PathFindIR assists vision in dusty, as well as foggy weather conditions."

The PathFindIR thermal imaging camera can easily be mounted on front of a mining truck.

Accidents in which mining trucks are involved are always serious. This car was run over by a mining truck.

The thermal images produced by the PathFindIR are displayed on a 7" LCD display inside the trucks cabin. They help the driver to avoid accidents.

Trucks and busses can avoid deadly accidents

Thermal imaging for driver vision enhancement

Modern trucks and buses have become real luxury vehicles. Buying one is a huge investment which needs to be protected at all times. Trucks and buses that are involved in an accident can cause huge damages. Not only can the vehicles themselves be ruined, in case of a truck accident, also the cargo can be lost. If the truck is loaded with dangerous goods, this can also damage the environment.

But even more important, the possible loss of human life, definitely in accidents with buses that can carry 50 passengers or more, is impossible to calculate.

A new tool that can make driving during night time and in bad weather conditions safer is thermal imaging. By allowing drivers to see thermal images of the road ahead - well beyond what headlights illuminate - drivers are able to detect obstacles, curves in the road, ... much sooner and have more time to react.

Thermal imaging also helps drivers to see road edges better, see approaching curves earlier, to overcome momentary blindness from oncoming headlight glare, and to see through smoke, dust, light fog and light rain.

The PathFindIR installed behind the grill of a truck.

Normal Vision

PathFindIR vision

A monitor displaying the images of the PathFindIR, can be easily displayed on the dashboard. It quickly becomes a natural checkpoint for the driver similar to side view or rearview mirrors.

Extra protection for armored cars when driving at night.

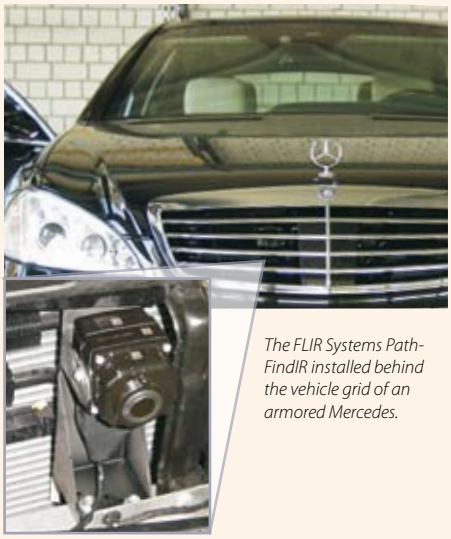
FLIR Systems thermal imaging cameras for driver vision enhancement and increased situational awareness.

Stoof is a worldwide-recognized leader in armored-vehicle production.

Civilian armored cars are in the majority of cases retrofitted versions of series cars. Windows are replaced with bulletproof glass and layers of armor are inserted under the outer skin of the car. A recent innovations is the installation of a FLIR Systems PathFindIR thermal imaging camera in some of the models.

"Although we are producing armored vehicles, we always hope that our clients do not have to use the car's protective abilities. An armored vehicle is designed to protect its passenger in emergency or crisis situations which will hopefully never happen. But when clients are using the vehicle in a day-today environment, they also drive during the night. By detecting other vehicles, pedestrians, animals and other hazards from a far distance, the FLIR Systems PathFindIR helps to avoid accidents when driving at night," says Mr. Klostermann, Stoof International Research & Development Department.

"If an emergency situation should occur at night, the PathFindIR, will help the driver to get away from the hazards as fast as possible. He will undoubtedly have an advantage over a car that does not have thermal imaging technology on-board."



The FLIR Systems PathFindIR installed behind the vehicle grid of an armored Mercedes.

The thermal images generated by the PathFindIR can be displayed on any multi-function LCD display that accepts composite video. In this case on an LCD integrated in the Mercedes dashboard.

Aftermarket installation of a PathFindIR® in a Porsche Cayenne

Improving the driver's night vision

Founded in 1997, Kit Personalización Sport, S.L, better known as KP Sport, is an integrator of aftermarket systems in existing cars. GPS systems, the most sophisticated audio systems, multimedia and many other technologies, KP Sport can seamlessly integrate it in any car.

FLIR Systems PathFindIR: innovative technology

"We are constantly looking for innovative technologies that we can offer to our customers to integrate in existing cars of various makes.", says Mr. Xavier Meseguer Casas , Managing Director of KP Sport. "As a test, I have installed the first one in my own car, a Porsche Cayenne."

Installing a PathFindIR

"Installing the FLIR Systems PathFindIR was a fairly easy job. The thermal imaging camera is installed behind the radiator grid. The PathFindIR is well protected against harsh driving conditions. Rain, salt spray, and small rocks hitting the front of the camera are not affecting it. Once mounted behind the grid, the PathFindIR just needs to be connected to the car battery and to a standard LCD display that accepts composite video. For esthetical reasons I wanted to connect the PathFindIR to the built-in LCD that is already being used for navigation, audio control and various other functions. This could easily be done and now I can look at the thermal images on this same screen."

"I practically always switch the PathFindIR on when I need to hit the road in darkness. Quickly it became a reflex to look to the screen on which the thermal images are displayed, just in the same way as I look into my back view mirror. It helps me enormously to see curves that are coming up in the road on highways and on back ways. In Spain, most of these roads are not very well lit."

"On smaller roads it helps me to spot pedestrians, bicycles and parked and driving cars from a further distance. This way I detect and recognize potential hazards faster and anticipate better what might be happening. In a dangerous situation, it gives me more time to react which means that I will be able to avoid an accident." "The PathFindIR is even useful in broad daylight. We all know these situations when the sun is just above the horizon and blinding you. The PathFindIR is not affected by this and produces a clear image in this situation as well."

The FLIR Systems PathFindIR installed behind the vehicle grid of a Porsche Cayenne

The thermal images generated by the PathFindIR can be displayed on any multi-function LCD display that accepts composite video. In this case on an LCD integrated in the Porsche dashboard.

The BMW Night Vision system in the new BMW 7-series contains a pedestrian detection system. If the pedestrian is at risk of being hit by the vehicle, an alert is sent to the driver.

BMW incorporates thermal imaging cameras in its cars

Lowering the risks of nocturnal driving

Bayerische Motoren Werke, worldwide known as BMW, is one of the most prestigious car brands in the world. It stands for luxury, high-quality, safe and environmental friendly cars, all equipped with the latest technology.

Making night time driving safer For years, BMW has developed innovative technologies which provide relief for drivers at night and thus at the same time improve general road safety. Innovations include Xenon lights, which provides significantly increased brilliance and range, "Adaptive Headlights", whose horizontally swiveling headlamps ensure considerably improved illumination of the road ahead and "High Beam Assistant" which turns the headlights automatically on and off, are just a few innovations that can be installed in BMW models and help drivers during night time driving.

Another recent innovation to help drivers see better at night and in the most diverse weather conditions, is the "BMW Night Vision" system. The core of this system is a FLIR Systems thermal imaging camera. BMW is the first European premium car manufacturer that started to implement this technology in its cars. "We started to develop the system in 2002.", says Mr. Russ, a BMW engineer who helped head the system's design efforts. "At the end of 2005, we started marketing our Night Vision systems as an option on our BMW 7-series models. Today, the Night Vision system can be ordered as an option on our 7-, 6- and 5-series models."

Far Infrared (FIR) versus Near Infrared (NIR)

When asked the question why BMW has chosen for a Far Infrared system like the FLIR Systems PathFindIR and not for a Near Infrared system, Mr. Russ answers the following: "The decision to choose for FIR technology instead of NIR technology needed to be taken at the beginning of the Night Vision project. At that point in time, FIR was to our opinion the best system. For other purposes NIR may be better suited but, to our opinion, not for the use in vehicles to detect people and other objects. Tests showed that we could see much further with FIR and detect pedestrians and obstacles sooner. Furthermore, the distance that you can see with NIR is not only shorter but it is highly dependant on the power of the infrared beamers.", explains Mr. Russ. "Today we are convinced that FIR outperforms NIR in a large number of situations."

Visual image

Thermal image

Increasing safety and driving pleasure without taking away responsibility

Just like other safety features in a car, BMW Night Vision was created to increase driver and passenger safety. By presenting the driver with additional and early information, potential danger can be avoided. More information is a bonus in road traffic. Up to 50% of all serious accidents are caused by the fact that the driver did not have the information early enough to avoid the accident. The BMW Night Vision system also offers the user more driving pleasure. The increased situational awareness provides relief for the driver during a strenuous nocturnal trip.

Further developments

In order to improve the capabilities of the BMW night driving system, it is now equipped with automatic pedestrian detection software. Once a pedestrian is detected it is highlighted on the vehicle's Night Vision display. To provide an extra margin of safety the system will also analyze the scene content and vehicle dynamics to determine if the pedestrian is at risk of being hit by the vehicle. An alert is then sent to the driver with enough time for the driver to react. This system is today already implemented in the 2009 version of the BMW 7-series.

Order your FREE DVD with informational movies and discover more about thermal imaging and the FLIR Systems PathFindIR

Just fill out the enclosed fax-back form and indicate that you would like to receive a free informational DVD. It contains informative movies about thermal imaging and the PathFindIR.

Not only will you see for yourself how Sir William Herschel discovered infrared radiation and how this led to many useful applications, it also contains a movie about the PathFindIR and clearly shows the difference between your normal vision and the PathFindIR vision.

You will also discover how easy it is to install the PathFindIR in an existing vehicle. An informative video shows you the after market installation of a PathFindIR in a BMW X5

FLIR Commercial Vision Systems B.V.
Charles Petitweg 21
4847 NW Teteringen - Breda
The Netherlands
Phone : +31 (0) 765 79 41 94
Fax : +31 (0) 765 79 41 99
e-mail : flir@flir.com

www.flir.com