



INTRODUCTION

An **automotive night vision** system uses a thermo graphic camera to increase a driver's perception and seeing distance in darkness or poor weather beyond the reach of the vehicle's headlights. Such systems are offered as optional equipment on certain premium vehicles. The technology was first introduced in the year 2000 on the Cadillac Deville. This technology is based on the night vision devices (NVD), which generally denotes any electronically enhanced optical devices operate in three modes: image enhancement, thermal imaging, and active illumination. The automotive night vision system is a combination of NVDs such as infrared cameras, GPS, Lidar, and Radar, among others to sense and detect objects

NAVIGATION SYSTEM

Some may think that owning a separate GPS unit is overkill. After all, most smartphones are now equipped with GPS navigation. But getting a dedicated navigation system for your car is always a good thing as they have far more superior designs than the ones installed on your phone. Smartphones might have taken over the world today, but there are still some things you might be looking for in a navigation system that you can't get out of a smartphone, no matter how "smart" it is.

A lot of people have benefited from car navigation systems, and its major benefits include promoting safe and relaxed driving. The GPS data provided by these systems may also be used to determine the device's real-time location as well as driver reports to keep you updated on their activity. These are all presented on the device's companion app that is accessible via mobile phone or computer.

The mapping software used by a GPS navigation tracker is also efficient and comprehensive. It gives accurate directions, and the quality is better than that of a free app on your smartphone. There might have been instances when you have relied on the free GPS navigation on your phone and found it completely unreliable. For instance, the phone alerts loudly, "You have arrived at your destination," only for you to look at your surroundings and find out that you actually have not. Then you get frustrated, and then you panic because you have no idea what to do now and how to get to your destination. With a dedicated navigation system, you won't experience such an inconvenience.



AUTOMOTIVE VISION SYSTEM



A GPS navigation device also offers another advantage besides giving accurate directions. In the event that the unthinkable happens and your car gets stolen, you can use the device installed on your car to quickly track down where it is. And in the case of a stolen vehicle, anyone knows that any minute counts. If you take too long, then your car may have been disassembled for parts by that time. You might not want to believe it, but it is a possibility.

Active Night Vision system

Active Night Vision Systems, also known as Active Infrared Night Vision, differ from passive systems by actively emitting and receiving light to enhance visibility in low-light or night time conditions. Instead of relying solely on ambient light sources, these systems use infrared (IR) light sources to illuminate the surroundings. The active approach ensures consistent visibility even in total darkness.

The system typically includes an infrared light source, such as IR LEDs or lasers, and a sensor to detect the reflected infrared light. When the IR light illuminates the scene, objects reflect the light back to the sensor. The sensor then converts the received infrared radiation into a visible image, which is displayed to the user.

Active Night Vision Systems are commonly used in applications such as military night vision goggles, security surveillance, and automotive night vision systems. In the automotive context, these systems can help drivers detect pedestrians, animals, or other obstacles on the road in low-light conditions.

While active night vision systems provide reliable visibility in complete darkness, they may reveal the presence of the system due to the emitted infrared light. The balance between enhanced visibility and maintaining a level of stealth is a consideration in designing and using active night vision technology

Passive Night Vision System

Passive Night Vision Systems, also known as passive infrared or thermal imaging systems, operate by detecting the existing infrared radiation emitted by objects and the surrounding environment. Unlike active systems that emit their own light, passive systems rely on the heat emitted by objects, making them effective in low-light and total darkness scenarios.

These systems capture the infrared radiation from the environment, convert it into an electronic signal, and then create a visible image based on the temperature differences.



AUTOMOTIVE VISION SYSTEM



Commonly used technologies include microbolometers or other thermal sensors, which can detect variations in heat and produce a thermal image.

Passive Night Vision Systems find applications in various fields, including military, surveillance, and law enforcement. They offer the advantage of stealth since they don't emit detectable light. In military operations, for example, soldiers can operate covertly without revealing their positions.

One limitation of passive systems is that they may struggle in situations with no heat contrast, such as viewing objects at similar temperatures. Advances in technology continue to improve the sensitivity and resolution of passive night vision systems, making them crucial tools for enhanced situational awareness in low-light conditions