TECHNICAL NOTE

Combining visible-light and thermal vision for traffic applications

FLIR ITS-Series Dual AID cameras combine thermal and visual imaging with video analytics to provide a complete automatic incident detection solution.

Traffic authorities today are using visible-light and thermal cameras to get a better view on our roads, to make sure traffic keeps flowing and to prevent traffic incidents from escalating. By combining both vision technologies into one high-performance camera system, a more advanced tool is now available to make well-founded decisions in traffic.

On today's highways, tunnels and interurban roads, traffic cameras are used to monitor congestion and traffic flow speed. Traffic cameras are also enhanced with smart video analytics in order to detect incidents, such as stopped vehicles or wrong-way drivers, which in turn speeds up intervention by traffic authorities and emergency services.

In urban areas, smart traffic cameras not only detect the presence of vehicles, but also of pedestrians and cyclists. As such, cameras have become an indispensable tool for many traffic authorities around the world to control traffic lights, and as a result make sure traffic keeps flowing and road users safe.

THERMAL IMAGING FOR TRAFFIC DETECTION

Traditionally, the traffic community's preferred camera technology has been visible-light imaging. Thermal imaging has been catching up very fast over the past decade. Thermal imaging cameras do not make use of visible light, but rely on heat given off by everything in their field of view. Thermal cameras do not get confused by sun glare, darkness, headlights, shadows, wet streets, snow and fog making them ideal as a 24/7-traffic-monitoring solution.

Thermal imaging cameras can also measure the temperature of any object in their field of view. This unique capability allows them to detect fires at an early stage over the full detection range. Unlike other fire detection technologies, no contact is required with flames or heated gasses, nor is any smoke propagation needed for the camera to detect excessive heat generated by fire or another vehicle malfunction. As a result, thermal cameras are capable of detecting fires within seconds of ignition.

VISIBLE-LIGHT IMAGING FOR TRAFFIC DETECTION

For many traffic monitoring applications, visible-light cameras are the preferred solution. When it comes to CCTV traffic surveillance, full HD color video is still the preference. A thermal video image looks completely different as a visible light CCTV image. Therefore, in cases where forensic

Traffic authorities can make use of superior detection capabilities of thermal cameras and at the same time see the important details with HD visible-light cameras.

evidence is needed or where additional information needs to be gathered after a traffic incident, a full HD color video can be a better tool to provide this information.

Smart visible-light cameras, enhanced with video analytics, are also a very good

solution to detect the build-up of smoke. This technology has been proven and used for decades in many tunnels around the world.

COMBINING FORCES OF VISIBLE AND THERMAL IMAGING

With both technologies having their own unique strengths, combining thermal and visible light cameras into one smart traffic camera system makes perfect sense. This multisensor approach has been used in high-end surveillance and border security applications, where a combination of visible and thermal cameras identify and address a wide variety of security threats.

In traffic applications, combining these two camera technologies into one system enables traffic authorities to use the superior detection abilities of thermal cameras while gaining important details with HD visible-light cameras.

Both camera types can be enhanced with smart video analytics. In a combined camera system, each technology can focus on its own strength, e.g. a thermal camera for the detection of fire and to see through smoke, a visible-light camera to detect smoke plumes. As both camera types can be used for detection, a combined dual-vision system provides a redundant system, thus increasing performance and safety.

AUTOMATIC INCIDENT DETECTION

For the application of automatic incident detection, thermal imaging cameras are far superior to visible-light cameras in detection speed and accuracy. Especially in closed-off environments like tunnels, every second following an incident is critical. Damage can quickly escalate, and secondary accidents are always a possibility, so emergency services need to be warned as soon as possible. For the purpose of real-time or post-incident assessment, visible-light and thermal cameras can provide valuable information for emergency services about the nature of an incident, e.g. the number of people or vehicles involved, type of vehicle, etc.

Unlike visible-light cameras, thermal cameras are able to quickly detect fire incidents in tunnels. An additional benefit of thermal imaging is that this technology enables operators to see through smoke. This can be a life-saving feature in smoke-filled tunnels and can provide valuable information to firefighting teams about the possible location of people.

INTERSECTION CONTROL

Accurate detection of vehicles and vulnerable road users is crucial for efficient intersection control. Thermal cameras can detect the heat given off by cars, cyclists and pedestrians. This detection information can be used to make smart decisions for intersection control in a seconds.

Thermal traffic cameras from FLIR Systems can even make a distinction between cars and cyclists, which enables traffic managers to give both road user categories a separate treatment, e.g. give cyclists a ten-second head start when the traffic light turns to green. This enhances the safety of cyclists, giving them ample time to make it across the intersection. Thermal cameras can also detect the presence of pedestrians and cyclists that are approaching or waiting at the curbside or walking on the crossing, allowing them to cross the street safely. This is all possible 24/7, at night and during the day, and in any weather condition.

Visible cameras can provide operators with valuable information about the traffic and congestion situation at an intersection, which makes a big difference to day-to-day commuters. In the event of a severe accident or road closure, a traffic alert that is made based on camera information can be extremely valuable for a time-crunched commuter.

MAKING BETTER DECISIONS

Both visible and thermal cameras have served the traffic community extremely well. By combining both technologies into one camera system, traffic operators are now offered a more advanced tool to make well-founded decisions. These combined systems offer them extremely fast detection of traffic events and highly detailed real-time or post-incident camera footage for traffic assessment.

IN THE SPOTLIGHT:
Combined visible/thermal traffic cameras

Combined visible/thermal traffic camera solutions are not a thing of the future, but already available today. FLIR Systems, a worldwide provider of traffic monitoring solutions offers intelligent dual vision systems for both urban intersection control and automatic incident detection on highways and bridges, and in tunnels.

FLIR TrafiOne
Smart City Sensor
FLIR TrafiOne is an all-round detection sensor for traffic monitoring and dynamic traffic signal control. Offered in a compact and affordable package, the FLIR TrafiOne uses thermal imaging, a visible-light HD camera and Wi-Fi tracking technology to provide traffic engineers with high-resolution data on vehicles, bicycles and pedestrians at intersections and in urban environments.

FLIR TrafiOne uses thermal imaging to detect the presence of pedestrians and bicyclists that are approaching or waiting at the curbside or walking on the crossing. The sensor is connected to the traffic signal controller via dry contact outputs or via TCP/IP network communication to allow for a more dynamic control of traffic signals based on presence or volume information.

FLIR ITS-Series Dual AID 316L
Intelligent Dual Vision Camera for Automatic Incident & Fire Detection
FLIR ITS-Series Dual AID cameras combine best-in-class thermal and visual imaging technology with advanced video analytics to provide a complete solution for automatic incident detection, data collection, and early fire detection. FLIR's traffic video analytics have proven their effectiveness worldwide along highways, on bridges and in tunnels. They are now combined with the power of thermal imaging that allows traffic operators to see clearly in total darkness, in bad weather and over an extended range.

The FLIR ITS-Series Dual AID camera provides critical traffic information, supporting operators with alerts on stopped vehicles, wrong-way drivers, pedestrians, lost cargo, traffic flow data, and much more.

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