Use Case White Paper

TR-ID19.29

WIDE AREA FIRE DETECTION

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Every year, again and again, stories about wildfires make newspaper headlines. Destructive wildfires are regular events around the world, but in 2018, the Woolsey fire in Malibu, California proved to be one of the most destructive wildfires ever with losses exceeding $1.6 billion. With at least 670 structures destroyed by this fire and a burn area of 97,000 acres, the amount of property loss and firefighting costs is shocking. Whether it is human negligence or malicious intent, wildfires result in a major cost for communities and business to bear and the loss of forested areas, and the risk of human casualties.

Fire is complicated and therefore fire protection is complicated. There are no silver bullets for protecting people and assets from fire, so fire protection solutions employ various prevention, detection and suppression methods. There are two primary mechanisms being used by forestry personnel to detect wildfire: smoke detection and heat (or thermal) detection. Thermal detection uses modern thermal imaging sensors to identify the heat from a fire. Heat is created much more quickly than smoke, so fires can be spotted and suppressed more quickly. However, this modern technology does have its limitations. Here we give a comparison between smoke detection and thermal detection, analyzing their respective strengths and weaknesses.

Thermal Detection of Wildfires

There are many advantages to thermal detection compared to smoke detection. First and foremost is reliability. If the sensor has line-of-sight to the fire, it will be able to detect its heat in daytime, at nighttime, through fog or smoke and in poor weather conditions. Furthermore, the heat signature required to trigger an alert can be obtained from a much smaller fire than one required to generate a detectable smoke column, meaning the fire can be detected and suppressed much more quickly, reducing the loss of life and property as well as cost of suppression.

Thermal Imaging Radar, LLC (TIR) manufactures the award-winning Thermal Radar™, a wide area thermal detection solution that is simply unmatched in the thermal wildfire detection world. Thermal Radar™ provides real-time, continuous 360° wildfire detection awareness by employing a world-class thermal sensor that continuously rotates so that a full 360° detection area can be viewed in real time. Thermal Radar™ software provides a panoramic, 360° view of the detection area and combines powerful, edge-based analytics performing millions of computations per second and best-in-class algorithms that continuously search for a wildfire. Thermal Radar™ analytics and algorithms are able reduce false alarm rates to a very negligible number saving time and efforts of the monitoring personnel.

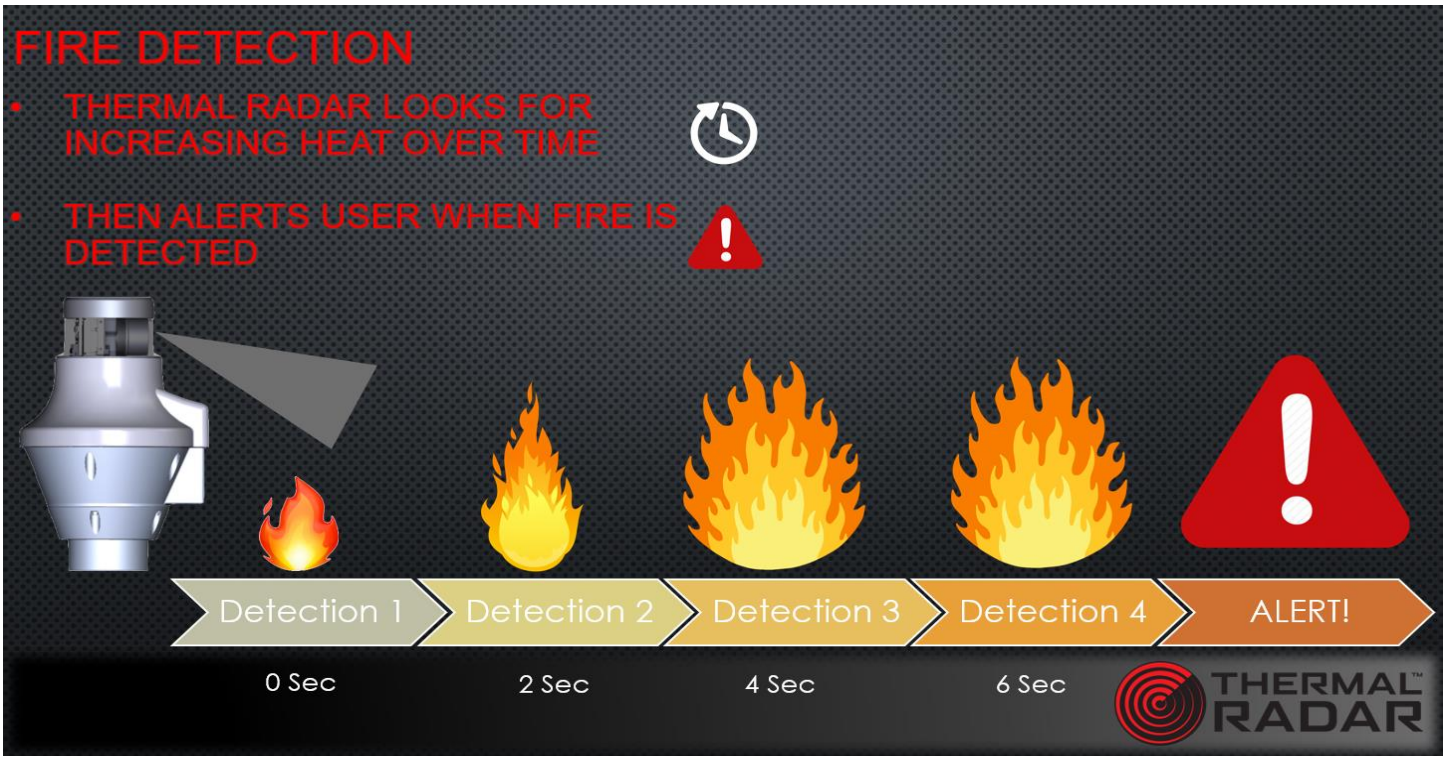
In a recent application in Guatemala where criminal fires and arson of sugar cane fields was reaching epidemic levels, four (4) Thermal Radar™ units were deployed in specific areas of concern. These Thermal Radar™ units were mounted 42m above the ground continuously scanning 10,000 acres per second. Thermal Radar™ uses edge-based analytics and algorithms for wildfire detection eliminating the need for additional equipment and power draw in remote areas.

While arsonists continue to actively set fire to production sugar cane plantations in Guatemala, the plantations that are using Thermal Radar™ have seen an 85% decrease in burn area while other plantation areas not using the units for fire detection experienced an increased destruction area of 25%.

Figure 1: Picture of Thermal Radar deployed over the sugar cane plantation.

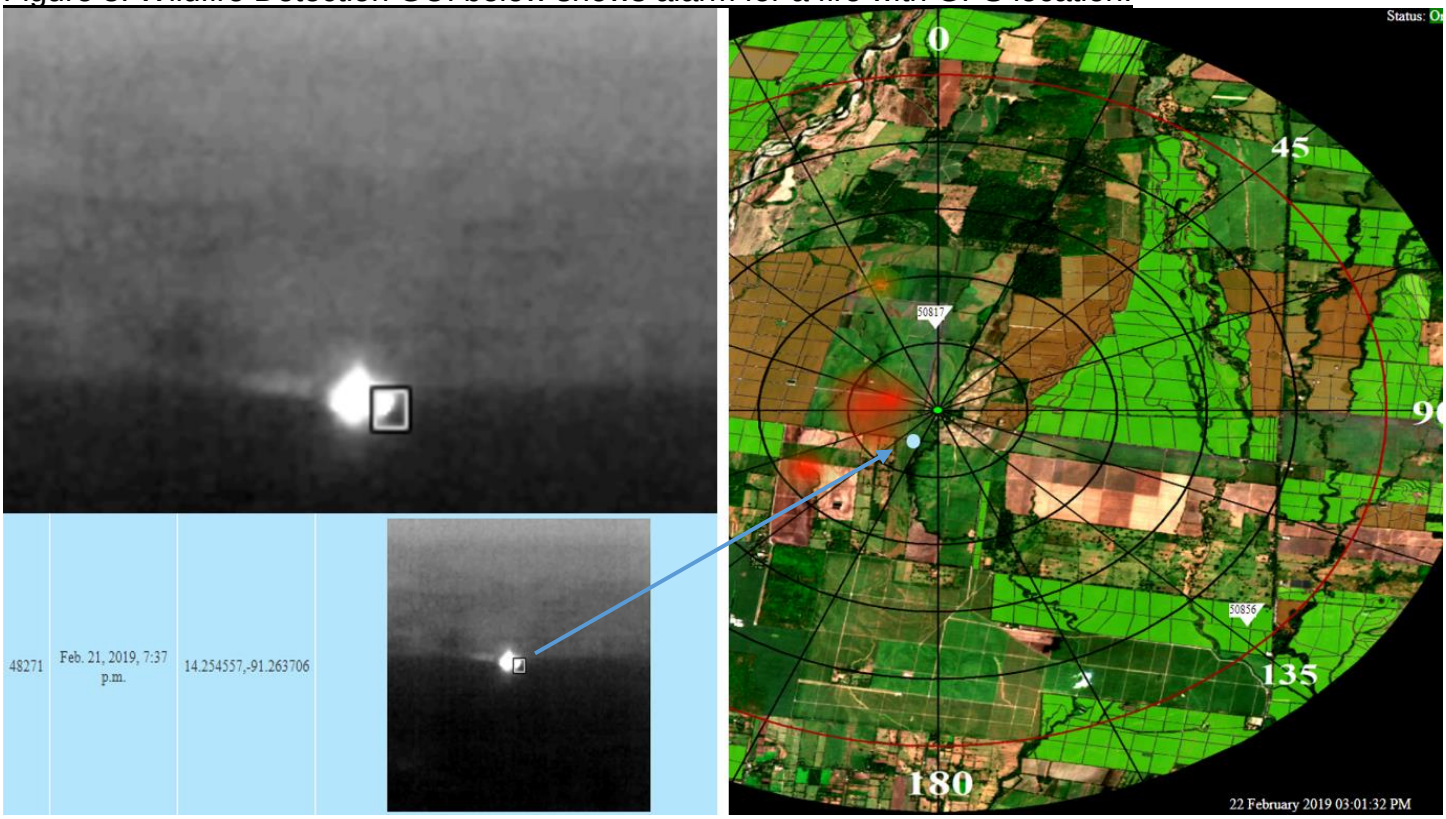
Thermal Radar's best-in-class rules and logic allow for the intensity of the fire to be measured over the course of 2-10 seconds to better ascertain the validity of the fire and to avoid false alarms. By using this process, thermal reflections from lakes, ponds and other standing water as well as added thermal events that do not continue to see increased intensity will not trigger wildfire alarms providing a more streamlined and reliable detection process.

Figure 2: – Thermal Radar analytic detection methodology graphic.



The use case of wildfire detection in sugar cane fields due to arson and criminal activities has also illustrated the point that in addition to active and effective detection methods, special attention should also be given to how the detection alerts and alarms are delivered to response teams on the ground for coordination purposes. In the sugar cane plantations, the Thermal Radar™ units were solar powered and dispatched detection alarm metadata to a cloud-based Graphical User Interface (GUI) using a 4G router. The GUI displays critical information geospatially on the Google Earth map which is effective for response personnel to direct fire trucks and security forces to the location of the fire within minutes, especially in the production areas with developing crops that have a higher risk factor for attack.

Figure 3: Wildfire Detection GUI below shows alarm for a fire with GPS location.

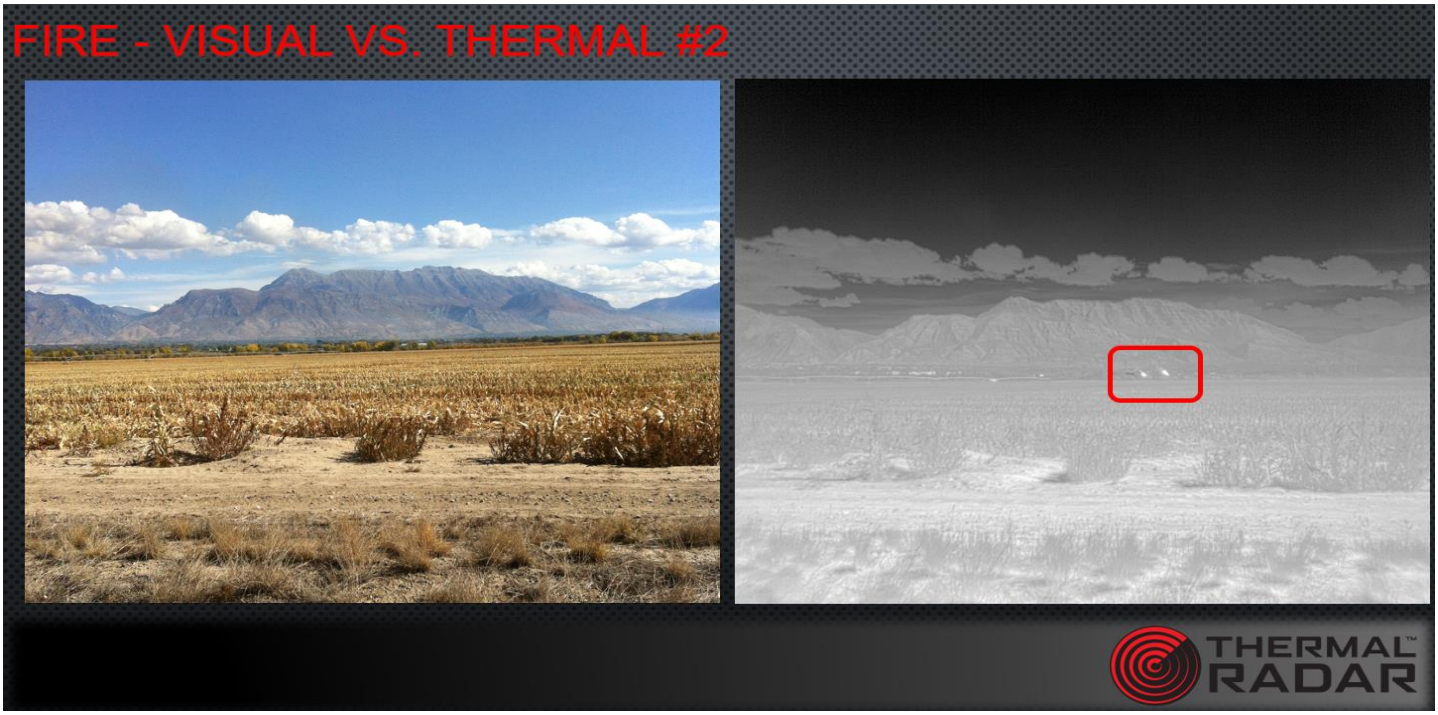


Additionally, the GUI offers users the ability to highlight specific high-risk production areas as well as display the location of fire teams and security personnel allowing for greater situational awareness. The plantation manager remarked during an interview, “Knowing where our response teams are located in real-time combined with the highest risk production areas of the plantation being highlighted allows us to direct and position our teams more efficiently so that they have the live location data of the fire and the resources available to combat the fire and arrest the arsonists”.

In the sugar cane plantation industry, there are scheduled burns as well as criminal arson burns every day during 6-months of the year while the crop is developing and harvested. Cane concentrates its sugar in the stalk, not in the leafy material that accounts for 20 to 25 percent of the plant’s volume. Burning, which eliminates the leaves without harming the stalk, also eliminates the need to haul all that unusable material back to the mill. Burning helps control pests and limits crop-disease dispersal, which is why burning is also a common practice among rice farmers. When sugar cane fires are started, they expand incredibly fast and burn incredibly hot. The sugar cane plantations in Guatemala deployed

Thermal Radar™ units because of the vast 360° coverage area and the capabilities of the Thermal Radar™ to scan and detect fire over such vast areas at a reasonable cost. A final comment from the plantation manager when interviewed, he stated, “The Thermal Radar™ hardware has proven to be very robust in tough environments and we will be increasing the number of units that we deploy for this critical function of fire detection and response”.

Figure 4: Side by side visual and thermal image of two (2) small fires detected at 5km



Thermal Imaging Radar, LLC is a U.S. based company in Orem, Utah and manufactures Thermal Radar™, an advanced 360° thermal detection solution for wild fire detection, equipment monitoring and security surveillance solutions for the industrial, commercial, military, critical infrastructure, public and private administrations, ports, airports, etc. Thermal Imaging Radar has a worldwide customer base and range from new installations to customizations and integrations of existing systems. Thermal Radar™ is an award-winning device for wide area thermal detection, analysis and communications.

Thermal Imaging Radar, LLC also produces a mobile trailer solution that can be deployed in minutes. These trailers are lightweight units that can be towed into remote locations via ATV. These mobile outposts offer an elevated position for Thermal Radar to observe a wide area and provide wildfire detection. These trailer units are solar powered and come with either 4G cellular modems or satellite modems for communication in extremely remote areas.