Hot Spot Detection and Flagging

Because thermopile arrays gather thermal images, it follows that they can be easily employed for hot spot detection applications. There are many fields in which the information about existing or developing hot spots is useful regarding fire prevention, predictive maintenance, and energy savings. Typical applications for fire prevention and detection are stove top monitoring and fire risk detection in waste sorting plants, transportation, or public spaces. Examples for predictive maintenance are bearing temperature monitoring, observation of electrical components and connections as well as hot spot detection in photovoltaic plants.

Stove Top Monitoring

Kitchen fires starting from the stove are the number one cause in fires at home. In most countries there are no requirements for fire detectors in the kitchen because normal cooking procedures cause most fire detectors to give false alarms. But infrared thermopile detectors are not affected by haze or fog. So they can potentially make kitchen life safer. They can be used to monitor the stove top and shut it off before a critical temperature (e.g. ignition temperature of cooking oil) is reached.

In Scandinavian countries stove top monitoring systems of this type are mandatory. Preventing kitchen fires will also improve independence for people in assisted living situations with one big source of danger is eliminated.

Advantages of low-resolution thermopile arrays for stove top monitoring:

- Large temperature range up to 500°C and more
- Independent of haze and smoke
- No privacy issues due to low resolution

Recommended sensors:

- HTPA 8x8d
- HTPA 16x16d

Fire Risk Detection

50% of fires in factories, warehouses and processing plants are caused by faulty electrical connections and components. These fires often develop over hours and days from smoldering and braising fires. They can be detected with infrared thermal sensor arrays at a very early stage, often before the overheating component becomes defective or the electrical connection fails. This is possible because the components and connections get warmer than normal, leading to progressive degradation and early, sometimes catastrophic, failure.

Early fire risk detection systems should be installed in every production facility, warehouse, and every building with critical infrastructure. The consequences of a fire are much greater than the small investment needed. This is especially true for the installation of infrared thermopile array sensors as they are very effective for fire prevention and offer a good price performance ratio. This technology is far beyond conventional smoke detectors or fire detecting systems as it not only recognizes fire, but it foresees the future emergence of a fire event. This allows to prevent fires from arising at the first place and save time, money, and trust.

Fire risk detection systems based on thermopile array technology can also be implemented for fire prevention in waste sorting plants, in transportation like trains, aircraft or large ships or in computer server farms, where the thermal infrared sensor can also be used for predictive maintenance.

From a technical perspective the selection of the suitable sensor has to reflect the application scenario. To observe large areas or see even small fire risk spots higher spatial resolution is needed. This is also true if there is a large distance between sensor and observed area, e.g. in the case of a high ceiling. If small deviations in the temperature must be monitored, this will require also high thermal sensitivity. In many applications only the relative temperature information is important - is it hot compared to the rest of the scene? - and the calibration requirement is much less than for example in the case of human fever and elevated body temperature measurements.

Recommended sensors:

- HTPA 32x32d
- HTPA 80x64d

Predictive Maintenance

Besides detecting fires and preventing them from arising in the first place, thermopile arrays can "see" even more. Even small temperature anomalies in important locations, like e.g., electrical installations, can be detected. This allows prediction of potential failure of important components at an early stage. For example, if you can see machine bearings getting hotter than they should be, which is often a sign of an upcoming failure. The breakdown of a bearing could result in expensive damage and may bring production to a standstill for a long time. If you can predict the failure at a very early stage, the change of the bearing can be done in a routine maintenance, which saves both money and time.

The same principle can be applied to many other fields like heating, ventilation, and air conditioning systems, where clogged filters can be detected. Change in the temperature of electronic parts can indicate an likely future failure. This can be used to monitor photovoltaic plants to see in advance which cell will fail soon. Similarly for battery life management and safety, monitoring with thermal sensor arrays can be used to extend battery life and predict failure to prevent damage.

In principle all types of thermopile arrays can be used for predictive maintenance. In all cases the best sensor for a certain application has to be chosen carefully. Our specialized engineering team at Heimann Sensor will help you to select the right sensor taking into account both price and performance.