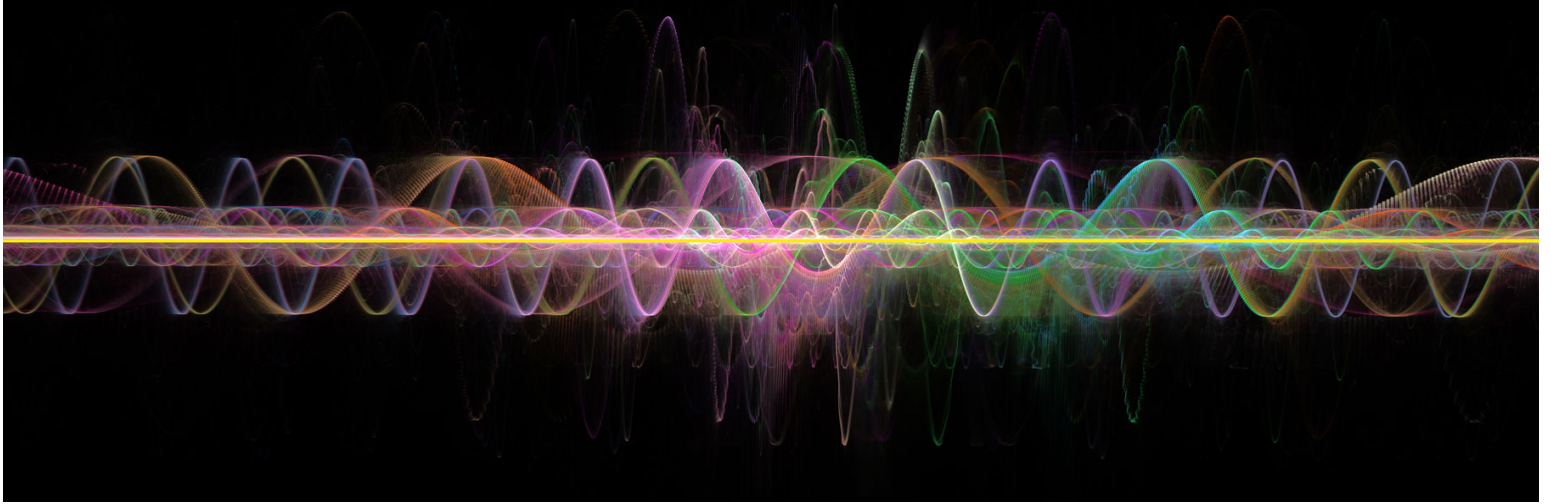


Finding the Signal in the Noise



How Seek Thermal Sensors Help Businesses Achieve Maximum Benefit from IIoT Projects

A Seek Thermal White Paper
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In our world of constantly evolving smart, interconnected technology, the ability to monitor devices and device–human interaction is critical. Data, analytics, and artificial intelligence play integral roles in the development and use of these technologies, especially in industrial settings where safety, availability, and durability are often the top priorities. Yet, the status quo is a hodgepodge of solutions that have emerged to monitor industrial environments, sometimes yielding results that are complex and difficult to interpret, or even contradictory.

As the use of IIoT rapidly grows, so does the number of connected industrial devices. With up to 15.4 billion devices by 2015 and a projected 20.3 billion in 2017, the whole IOT has experienced massive growth and continues to expand. IIoT market size has also expanded rapidly, of course: 100 billion USD in 2016 and 25% growth forecast in 2017. (www.statista.com, n.d.) (www.grandviewresearch.com, 2017)¹

The advances in medicine, finance, security and other industries that have adopted IIoT have been undeniable. Businesses use connected devices to monitor systems, gather and analyze massive volumes of data, and use the data to develop and achieve new best practices in production and manufacturing. In many cases, this data would otherwise have been unavailable to them, or available only through a herculean systems automation and integration program. Typically, once an IIoT initiative has been properly launched, the insights that it can provide to a business far exceed the original intentions. In many cases, IIoT helps businesses achieve a level of automation that creates room for even more efficiency and propels the business forward by reducing cost, time, and workplace injuries.

IIoT implementations yield especially powerful results when they can take tasks, such as preventive maintenance, that were traditionally undertaken by humans and automate them. One of the key advantages IIoT confers is the ability to monitor environments, courtesy of devices such as video, audio, location tracking, and specialized sensors such as thermal.

The previously cost-prohibitive thermal sensor provides a multitude of information. For starters, all objects give off infrared radiation that registers specific heat signatures. In offices, warehouses, and manufacturing plants, thermal sensors generate valuable information that can lead to deeper understandings of how various equipment operates, causes of possible breakdowns, and, most importantly, when to take action to prevent or remedy them.

Thermal sensors unlock this heat-related information, which can lead to a vast wealth of operational and fiscal improvements. Thermal data also has practical applications in accident

¹ <https://www.statista.com/statistics/471264/iot-number-of-connected-devices-worldwide/>
<http://www.grandviewresearch.com/press-release/global-industrial-internet-of-things-iiot-market>

prevention, safety, security of personnel, merchandise and valuables, including potentially expensive and complex equipment.

Because thermal sensors expose heat signatures regardless of visible light, in many cases it enables users to “see” into otherwise enclosed, dark, or inaccessible spaces. Therefore, thermal can be used to monitor electrical systems, HVAC systems, plumbing, fire-suppression systems, manufacturing equipment—anything that generates heat as it operates.

Practically anything that consumes energy and physically moves using a motor will eventually wear out, and increasing operational temperature is a well-established indicator of imminent failure. Thermal information is invaluable to manufacturers looking to fully automate their factories safely. The safety of the workers within these workplaces can also be vastly improved when thermal sensors are present to help pinpoint equipment failures and alert people to error conditions.

While no one doubts the value of heat-related information, thermal sensors have traditionally been prohibitively expensive, hard to calibrate and use, and too large to be practical field devices for business use. However, recent advancements in the technology, pioneered by Seek Thermal, make it possible to field small, energy and data efficient, feature-rich and inexpensive thermal sensors built for IIoT. Businesses can now combine thermal sensors and the data they generate with industry best practices to achieve the maximum benefit from IIoT projects.

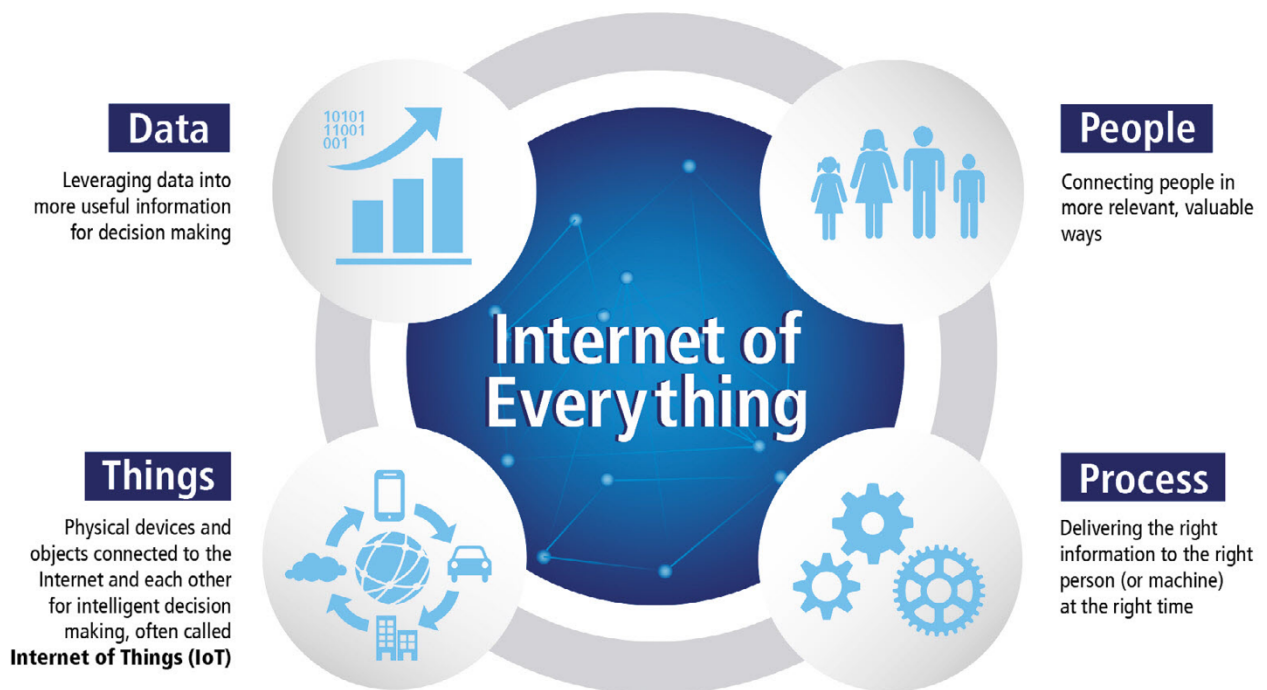
The Four Pillars of IIoT

The IIoT holds tremendous potential, but it is also a complex and multifaceted set of technologies. It can be difficult to fully understand how IIoT can best be put to use to improve business operations. Luckily, a lot has been written about the four pillars of IIoT to help convey what holds the technology itself together and make it functional.

The four pillars are Data, Things, Processes and People:

- **Data** is the lifeblood of the contemporary world. Some even argue that data is more valuable than oil. The value of the IIoT is tightly coupled with the data it produces, and the ways companies work with and analyze data are rapidly evolving. Where data was once sent from one place of origin to another, now open-ended storage platforms, such as clouds and data lakes, provide data not just to people, but also to other machines. This kind of machine-to-machine communication of data is the building block of much of the automation that businesses are enjoying. When devices can access data they need to complete a process, bypassing human analysis and intervention, limitations disappear.

- **Things** are the devices, the hardware and other technology that have been connected to the IIoT, that share data across its networks. In a way, things are analogous to the skeleton of the human body; they give IIoT its material base. Things are the physical entities that the IIoT monitors. Without them, there would be no IIoT.
- **Processes** are the result of the brain power (both human- and machine-based) that accompanies IIoT. They are the innovations, the programs, and the many ideas that stem from the raw potential of the IIoT. The data and the things of the IIoT are all coordinated by the processes to bring about useful advancements, improve efficiency or safety, or make life easier. The processes are the intelligent design that put IIoT in a position to revolutionize the manufacturing industry.
- **People** are the final pillar and are an integral enabler of the other three pillars. Devices depend on people to be put in place; processes are designed by people; and data is a connection between people and technology.



Graphic: (Mulholland, www.slideshare.net/, 2016)

The four pillars provide general guidelines for IIoT implementations, but careful project planning and design are required to maximize potential and functionality. IIoT projects must also be secure and aligned with business needs.

Monitoring plays a key role in any successful IIoT program. In fact, monitoring is typically the primary reason for implementing IIoT. Every business wants to get the most out of its expensive industrial equipment, yet the very nature of repeated and constant use makes these

devices prone to failure, and failure means downtime, increased operating cost and decreased revenue. IIoT plays a significant role in anticipating and preventing breakdowns. Monitoring, in particular using thermal sensors, provides insight into the exact parts that either don't work, have worn out over time, or whose use can bear increasing to increase productivity. IIoT holds the promise of helping businesses save money and uncover ways of increasing efficiency to make even more money.

Aligning IIoT and business initiatives is a critical best practice. Having a clear understanding of the business processes and equipment that are going to be monitored is the first step toward success. If the goal is to monitor equipment to prevent breakage, then critical assets must be monitored by the right sensors taking the right measurement at the right time so that it can be analyzed in a timely manner to provide actionable alerts. Mistakes anywhere along that chain can lead to a false sense of security that can result in component failure. In complex machinery with many interconnected parts, one failure can lead to many. Thermal sensors excel at monitoring industrial machinery and are a valuable asset in many IIoT implementations.

Few doubt that IIoT is ushering in a new era of progress. A whole new level of efficiency can be achieved when aligned with the operational and business metrics of manufacturers. IIoT is extremely valuable when used for preventive maintenance, saving the time and resources typically taken to manually monitor equipment and the money that would go into replacing costly equipment that might otherwise have been lost from the improper maintenance. Not only will businesses and manufacturers save money, but the optimized processes based on sensor data are likely to increase production efficiency.

IIoT holds the potential to completely transform operations especially for companies and businesses whose profits center on their ability to operate efficiently with rapid response time and high service availability. The quicker they can identify impending equipment failures, the less downtime they will have, which in turn improves reliability. An IIoT solution built around thermal sensors can both save value and create it at the same time. This is the type of technology project that many consider a no brainer, where the value added is undeniable and the ROI is indisputable. Yet, ignoring best practices makes these goals almost impossible to achieve. Businesses can only realize the full benefits of IIoT and minimize the risk of implementation by taking into account data, things, people and processes. With careful planning, a deep understanding of business goals, and the right technology choices, businesses have a lot more to gain than lose from IIOT investments.

Making IIOT Work for Your Business

Companies lose tens of millions of dollars per year in maintenance costs. Some companies manage their assets better than others, but the basic truth is, the longer it takes them to repair devices after they fail, the more it will cost. Small failures often lead to big failures if they aren't repaired in a timely fashion, increasing repair costs and downtime. For those companies whose entire business rests on their ability to respond in a timely manner, what stands to be lost from maintenance can be far too great.

Thermal sensors have the potential to break that mold and offer businesses a proactive approach to maintenance, one that is preventive rather than reactive. With its ability to monitor unlikely spaces and to pick up wear and tear within devices before they malfunction, thermal sensors provide companies with a competitive advantage unlike any other. Maintenance costs alone will fall dramatically, and users can even increase the frequency and consistency of their monitoring, which will ultimately decrease downtime.

Thermal also plays a critical role in safety. Looking at the example of electrical systems, it's easy to see the role that thermal monitoring plays in preventive maintenance and safety. In an environment where the majority of accidents stem from equipment malfunctions, and because electricity generates heat, thermal sensors provide immediate feedback on equipment health. Knowing whether a room is safe to enter or a box is safe to open vastly improves the safety of workers within the environment—and eliminates the need send workers to collect data in unsafe environments. Thermal imagery provides the necessary data needed to track the source of the malfunction directly.

Conclusion

Suitable for numerous IIoT scenarios, Seek Thermal's affordable concept model will include configurable zones for flexible monitoring. Although about the size of a matchbox, Seek Thermal sensors can be provisioned for cloud-based operation and pack in a lot of features such as power over Ethernet (PoE), video and audio capture, and a ¼ 20 threaded mount location. The thermal data they produce is very efficient, easily sent over networks and will help IIoT users find the signal in the noise of their everyday operations. This type of technology, now made cost effective by Seek, will blaze a path forward for the IIoT because it offers so much more data than a mere video or a single thermocouple.

Just as the IIoT is revolutionizing the manufacturing industry, thermal data is revolutionizing the IIoT, and Seek Thermal is revolutionizing the thermal market. Thermal

gives your business the information it needs to run better, save money, and respond faster. As with any successful IIoT program, thermal imaging adds rich data to the monitoring and maintenance practices, thereby improving the business itself. Where thermal was once expensive and difficult to implement for big businesses, Seek Thermal has stepped in to remedy this by providing cost effective yet powerful sensors. By decreasing the cost of thermal sensors, Seek Thermal has paved the way for businesses to leverage thermal data.

Seek's inexpensive thermal sensors give your business the ability to garner and apply invaluable heat-based analysis to improve operational efficiency. Seek's solution makes it possible for businesses to create IIoT success by using heat-related information to tie together the people, processes, things, and data. The insights to be gained from thermal are a competitive advantage that your business can leverage to prevent equipment failure, improve employee safety, decrease downtime and increase profit.

About Seek Thermal

Seek Thermal engineers and manufacturers low-cost, high-resolution thermal imaging cores for commercial, consumer, and IoT applications. Founded by industry pioneers who spent 40 years advancing the state of military and professional-grade thermal technologies, Seek Thermal has developed a break-through line of OEM thermal cores in a small, market-leading size footprint. Designed for small form factor, lightweight and low power consumption applications, Seek Thermal cores deliver high-end thermal capabilities, accuracy, and performance to enable many new applications and products.