



How Indoor Location and IoT Technologies Add Value to Businesses? A Quick Guide

The Internet of Things (IoT) revolution is one that abounds with potential and its future will have an impact on everything that we do as consumers, employees, business owners, and citizens. With every new device that comes online and joins the global hivemind, it creates new opportunities for us to transform that data into insights, actions, and decisions that can make our lives easier, more efficient, and ultimately more fulfilling.

This will have an impact not just on a macro-scale, but at every layer of abstraction all the way down to one individual building. In this whitepaper, we're going to explore what IoT can accomplish in these indoor settings and what it holds for the future of business.



What is Indoor IoT?

The Internet of Things (IoT) refers to the rapidly growing global ecosystem of internet-connected devices that can collect data, communicate with other devices, and play a role in a wider technological ecosystem.



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The range of devices is near-infinite here and the interplay between different classes of items often becomes a feature that exponentially improves the performance of the network. When we consider indoor IoT, we're thinking on a smaller scale – typically within a building or a wider campus. The advancements in wireless communication and the improvements in devices across the board mean that almost any device within an organizational framework can become a node of an IoT network – thus providing the range of benefits that such technology allows.

When you tie this all together into a system that suits your company, you can completely transform the way it operates. That's what gets us excited and that's what we're working to enable for our clients here at Vicinia.²

¹ <https://www.zdnet.com/article/what-is-the-internet-of-things-everything-you-need-to-know-about-the-iot-right-now/>

² <https://vicinia.io/hardware/>

Localization

Let's start by discussing the key differentiator that makes indoor IoT such a useful addition to your technology stack. One of the most useful components is being able to precisely locate people and objects in internal spaces. This is not something that can be accomplished with traditional GPS and instead requires its own collection of hardware and software instantiations to make this work. The core of this technology³ is that it becomes possible to have a real-time indoor location feed that can then become a foundational layer for various applications and use cases to be built on top of it. When combined with indoor mapping, this can create the context and precision that you need to be very strategic with how you manage your internal spaces and the digital communities that sit on top of them.

When you apply indoor localization technology effectively, you gain entirely new insights into your internal operations in real-time – and that knowledge is powerful.

³ <https://vicinia.io/core-technologies/>



Combining Localization with Indoor Mapping

Indoor maps⁴ are already useful by themselves without having to invest in any additional hardware. You can explore the insides of buildings, search for POIs and even undertake nuanced wayfinding. This is often the starting point for companies who want to get a better understanding of their environment.

But you can take things further when you combine these indoor maps with advanced indoor location technologies, and when you do that, you unlock entirely new avenues of potential. Here are just some of the applications that can become useful when you embrace this version of indoor IoT:



⁴ <https://vicinia.io/indoors/>

Improving Building Flow

Having strong indoor mapping functionality with precise indoor location can help you understand the flow of people through your locations – which can then be used to improve your usage of the space. This information can make a big difference when considering logistics and planning for events of all types – resulting in a smoother experience for all.

Wayfinding⁵

Having an intuitive internal map available to visitors makes finding specific places much easier – especially in large and complex buildings. By offering this to your customers in real-time so that they can see where they are, it alleviates confusion, reduces friction, and improves the quality of their visit.

Contextual Notifications

In line with the above, understanding where someone is within a building also allows you to push contextual and highly relevant notifications to users based on where they are in a building and the sort of behaviors that they are demonstrating.⁶

⁵ <https://vicinia.io/ways/>

⁶ Wei, Hou & Le, Hao & Shu, Xin & Chen, Caiyuan. (2018). A Context-Aware Smart Office Application System. 959-966. 10.1007/978-3-319-61542-4_97.

⁷ <https://vicinia.io/assets/>

Emergency Response

In times of an emergency, it's worth its weight in gold to have precise internal mapping that can be used to understand the lay of the land. This greatly improves the efficiency of first responders and it can also be used to plot an evacuation plan that is best suited to the unique configuration of your building and where people and objects are currently situated.

Asset Management⁷

Digitally tracking the position of assets within your ecosystem is also a powerful use case because it makes inventory control that much more powerful. By being able to use geofencing you can trigger location-based functionality that serves to simplify your operations and help you to make data-driven decisions. Not to mention the protection against theft – which is an underrated part of this solution.



These are just a few of the reasons that make this technology so powerful and that's what a well-integrated IoT system can provide. It's a significant asset for internal use within your organization, but also as a public-facing source of information that makes the lives of your external stakeholders that much easier.

With the right data at your fingertips, you can then create value through differentiation and true data-backed decision-making at scale.⁸

⁸ 'Smart Buildings: How IoT technology aims to add value for real estate companies' by Surabhi Kejriwal and Saurabh Mahajan. <https://www2.deloitte.com/us/en/insights/focus/internet-of-things/iot-commercial-real-estate-intelligent-building-systems.html>

Sensors

Location isn't the only pillar of value that the IoT ecosystem creates – and in fact, there are a range of other forms of data that can also be valuable when crafting a world-class organization. Sensors⁹ epitomize this, enabling automated monitoring of internal environments, providing real-time insights crucial for informed decision-making. With sensors capturing diverse aspects of operations, organizations gain comprehensive data sets to optimize processes and enhance efficiency.

Some of the more common IoT sensors include the following:

⁹ <https://vicinia.io/hardware/>





Humidity: Sensors that monitor humidity are a game-changer when it comes to creating the optimal conditions for productive work. Often it just takes awareness of this data to enable a company to proactively improve the situation for the comfort of those who work there. In addition, there are practical applications for storing medical supplies, equipment, and other assets that have specific temperature and humidity requirements. Being able to do all of this in a decentralized way makes it an incredibly powerful tool.¹⁰

¹⁰ 'Humidity Sensor: Basics, Usage, Parameters and Applications' by Nikita Gupta. <https://www.electronicsforu.com/tech-zone/electronics-components/humidity-sensor-basic-usage-parameter>



Light: Getting the right lighting is paramount for consistent productivity and it often plays a much larger role than we realize in the overall experience. However, companies also have to balance these concerns with the cost of providing good lighting on a consistent basis – especially when you are taking into account the true environmental impact. Smart sensors that can provide more granularity here make the world of difference because lights can be carefully managed and triggered by things like motion, timing, and a variety of other factors.



Temperature: Sensors that track temperature are incredibly valuable because it gives companies much better control over their heating and cooling needs across their campus. Being able to track the conditions in real-time and assess their suitability helps to manage the costs associated with maintaining a specific temperature and it also offers nuanced temperature control that can make the experience of those people in those spaces that much more pleasant.



Resource Utilization: Whenever an organization invests in resources like desks, meeting rooms, break areas, and the like – there needs to be a reasonable expectation of a return on that investment in order for it to make sense. Having sensors that track the usage of these resources helps companies to get a better grasp on the impact that those investments are having – so that better choices can be made going forward.¹¹

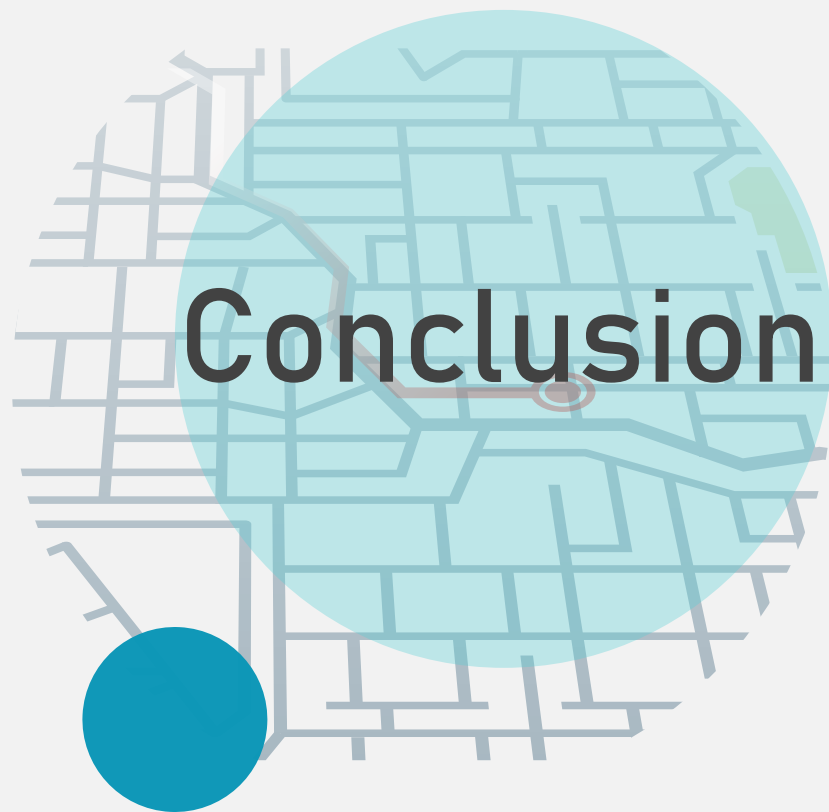
¹¹ '4 Types of Sensors for Better Workplace Management' from fm:systems. <https://fmsystems.com/blog/4-types-of-sensors-for-better-workspace-management/>

These examples of indoor sensors barely scratch the surface of what is possible here but hopefully it gives you a taste of some of the potential in this space . Meshing various sensors together into a coherent network can give you a fully holistic view of what is happening in your space¹², how your assets are being utilized, and the insights that you need to improve the overall employee and customer experience. It's difficult to understate just how powerful this can be when it's done well.

¹² 'IoT sensors: 6 examples powering the smart office of the future' by Chelsea Ingber.

<https://www.officespacesoftware.com/blog/iot-sensors/>





That brings us to the end of our whirlwind tour through some of the many applications of an indoor location and IoT ecosystem. This technology has come an awful long way in the last couple of years and it's finally starting to get the appreciation it deserves as a crucial part of the modern organization. If you care about the experience of your stakeholders, then this is really something you should be considering for your indoor spaces – to get the most out of them.

Here at Vicinia, we help our clients to implement these sorts of solutions in a way that fits seamlessly into the existing organization, while augmenting the capabilities for better decision making across the board. If you would like to explore what indoor location and IoT could look like for your company, be sure to get in touch today, and let's explore.

We can't wait to hear from you!



Vicinia is a digital innovations company that provides software and IoT solutions enabling location-based services in a smart enterprise. Our vision is to empower the digital twin of world-class organizations centered around people.

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