

THE INTERNET OF THINGS: THINGS MATTER NOW



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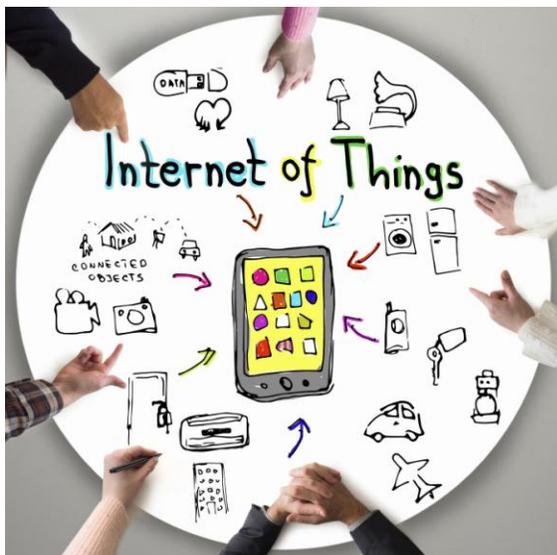
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Introduction

Unless you've been living under that proverbial rock, you've heard of the Internet of Things (IoT). It seems like companies of all shapes and sizes are rushing to ensure they've got their fingers in this ever-growing pie. However, what IS the Internet of Things, really?

IoT technology is really nothing more than the ability of one machine to talk to another. At heart, that's nothing new. Servers and workstations have been doing it for years. However, what is new is the types of "machines" that can now speak to one another across a home or business network. Think light fixtures, refrigerators and garage door openers.



And, not only can these devices communicate with one another, but they can communicate with their owners and users, as well. It's a very big step towards the automated life of the future predicted back in the 1950s and 60s, and it's here today.

Where is this technology leading us, though? What is possible now, and what will be possible in the near future? What impact will the Internet of Things have on our lives? Within this book, we'll take a closer look at why things matter, how they communicate, and what it all means.

The Original Internet of Things

Not that long ago, the IoT didn't exist. Sure, there were ways for machines to communicate with one another, but only specific types of machines could do this. A workstation would communicate with a server over a LAN, or a home PC might connect to a BBS via a dial-up modem. Your refrigerator certainly couldn't provide you with any information. Your lights couldn't be controlled from your Smartphone. Your home's security system was pretty dumb.

Then came barcodes and RFID devices. These enabled a significant amount of automation in the world of inventory control, but for the average consumer, it didn't really mean much, other than possibly a faster checkout experience at the grocery store, or a better likelihood that a store would actually have the item they wanted to purchase, thanks to better tracking and restocking capabilities.

From that point, things changed quickly. Today, the Internet of Things ties directly into perhaps the most important invention of the age – the Internet itself.

The Birth of Broadband Internet

Let's be clear about something. Without broadband Internet access, the IoT wouldn't exist, or it would exist in a far different form. That has several important implications:

- ❖ For areas without access to broadband Internet, and there are some left in many parts of the world, the IoT is pointless, as the support method necessary doesn't exist.

- ❖ During Internet outages, IoT devices revert to their former "dumb" state.

With those caveats aside, high-speed Internet access is more widely available today than ever before, and it's still growing. Smartphone technology is also on the rise, with more and more consumers using these devices night and day.

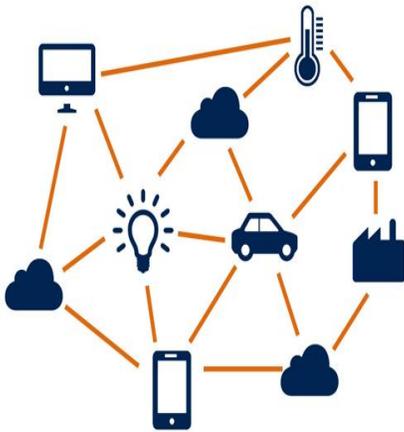
In fact, 2015 marked the first time in history that phone-based Internet access trumped desktop-based access. Finally, consider the fact that materials and technology are becoming cheaper and more affordable. That means more and more people can afford high-tech gadgets in their homes.

What does all that mean? Simply put – the Internet of Things is here, and it's not going anywhere. In fact, you can look for it to become a central part of modern life very quickly.

What Is the Internet of Things?

Thus far, we've danced around the topic a little bit, but what IS the Internet of Things, really? What's it all about today? It's actually a very simple concept. Forbes sums it up well:

“Simply put, this is the concept of basically connecting any device with an on and off switch to the Internet (and/or to each other). This includes everything from cell phones, coffee makers, washing machines, headphones, lamps, wearable devices, and almost anything else you can think of.”



That’s right – you’ve been using IoT devices for years now without even knowing it. Have a smartphone? You’re part of the IoT. Use a wearable, maybe a Fitbit fitness tracker, or perhaps an Apple Watch? You’re part of the IoT. Control your TV from your Smartphone? You’re part of it. Use your phone to listen to music through remote speakers? You’re still part of the IoT.

Think of the Internet of Things as a giant network that connects you with almost everything in your life, from your watch to

your phone to your toaster. Why does it matter, though?

Why the IoT Matters

You don’t have to look very far to see that manufacturers in almost every single industry are embracing connectivity in a big way. The shift is already on and, soon, anything that can be connected will be.

Not convinced?

Consider the fact that one company recently released a frying pan that connects with an app on your Smartphone to tell you the temperature of the pan. There’s a showerhead on the market that alerts you to your water usage while showering and can also track and communicate that water usage over time through an app.

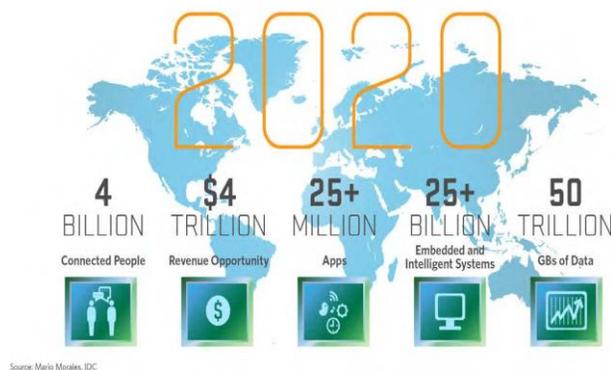
Want more proof? Think of Nest, the home thermostat acquired by Google. It can communicate with your Smartphone or tablet and do more than just change the temperature. It can:

- ❖ Detect you from across the room and brighten the display so you can see the temperature
- ❖ Display a leaf icon to show when your home is saving energy

- ❖ Learn how long it takes to heat or cool your home and predict when it will reach the temperature you specify
- ❖ Automatically adjust temperature based on real-time weather information

The real beauty of Nest is that it currently features 10 different sensors for tracking your home's temperature and how it fluctuates. In fact, it's sensor technology that has really enabled the IoT to grow at such an exponential rate. It's about more than just machines communicating with other machines. It's about sensors and how they enable machines to do more, and communicate better with one another, and with us.

Let's have a look at prediction done by IDC for IoT. The opportunities are tremendous.



The Role of Sensors

Let's be clear. Sensors are just one element of IoT devices, but they're very crucial. They allow machines to do many things, including sensing temperature, determining the ambient light level, adjusting for the number of people in a room, and more. It's this combination of sensors and machines that really makes the Internet of Things possible.

What do those sensors do? It's simple – they gather information. The machine can then leverage that information in a number of ways, ranging from using it to adjust things like temperature or light level, or sending it to an end user via their Smartphone, watch, tablet, TV, PC or another device.

Of course, that information isn't of much use to anyone without a way to get at it and utilize it. There must be an underlying infrastructure in place to USE that data gathered by sensors. That's where apps come in. Cloud-based apps allow machines to parse the information gathered by their sensors, and for users to interact with the machines in their lives.

Without applications, the Internet of Things grinds to a halt. Without applications, all that other technology is useless.

Let's go back to the Nest thermostat as a prime example of how apps allow us to use IoT devices better and smarter.

The Nest app features a home screen that shows important information at a glance. You know the weather at your home, as well as the exterior temperature. You can tap the thermostat icon and change the temperature for the home, or even for individual rooms (based on sensor locations within the home itself). In fact, the app can control up to 20 different thermostats in a single home, ensuring that they work together to create the most comfortable living environment.

You can do other things from the app, as well. Tap the schedule button and you can set the temperature you want ahead of time, but Nest will actually learn your preferences and create a schedule for you. Tap the "away" icon and you can adjust the temperature of the home, or even certain areas of the home during the time you're out of the house. Finally, tap the fan speed icon and you can adjust the speed of the fan

and even the amount of time the fan blows at that speed.

All this is possible not by interacting directly with Nest, but by using the accompanying app from your Smartphone. The same concept is possible with almost anything else, even things that aren't technically "machines".

IoT and Non-traditional Applications

We've gotten used to seeing connectivity provided with various electronic devices. Our Smartphones and tablets come with Wi-Fi capabilities. Even our TVs can connect to the network and the Internet. Our thermostats, our light fixtures and more can all communicate with one another. However, IoT and app technology can be used with nontraditional applications – non-machines.

For instance, the US is facing an impending crisis with roadways, bridges and other infrastructure elements. This leads to more than just a significantly greater number of potholes on your morning commute. Think bridge fatigue and collapse. By using IoT technology and sensors embedded in the

bridge's structure, an application could tell engineers exactly what condition the bridge is in and allow repairs well before the tipping point is reached, saving lives and a great deal of money.

It goes farther than that. Those same sensors could detect catastrophic failure and send a warning to oncoming automobiles equipped with smart technology. Drivers would then be able to avoid the bridge and potential catastrophe.

There are plenty of other examples of how Internet of Things technology and apps can benefit our lives in ways you might have never imagined.

Healthcare

E-Health is a thing today. It's also growing rapidly. The ability to remotely manage a patient's health has serious implications for both the physician and for the patient.

We've seen the barest hint of growth in this area with the development of apps that can detect things like glaucoma. In the future, IoT technology and smart apps will be able to monitor a patient's health completely from afar.



It goes deeper than just monitoring current health, though. With IoT technology, app developers could harvest information to provide it to physicians and specialists, with a real-time, accurate health history, including things that a patient might not even be aware of. That offers immense benefits to medical practitioners, who are able to offer better, more complete care, and to patients, who enjoy better health without any additional complications or hassles.

Freight Hauling

Trucks, trains and cargo ships are really what make the world go round. They distribute goods from one part of the world to another, allowing consumers and businesses to buy, build, grow and live. However, freight hauling is pretty inefficient. There's a great deal of wasted

time, fuel and money involved. With IoT technology, that will begin to change.

One forecast is that smart technology from connected devices and sensors will usher in an age of significantly streamlined freight hauling and logistics. This applies to inventory tracking, certainly, but it has larger implications. It can have a huge effect on things like fuel expenditure and wastage, as well as driver/hauler time spent, and even the amount of cash outlay necessary to get a shipment from one point to another.

Intelligent Cities

Think that IoT technology is only of benefit to homes or businesses? Think again. This tech has enormous potential for urban areas. Smart technology can have an incredible impact on the quality of life within urban areas.



This applies to almost anything imaginable, from operating stop lights and traffic cameras to sprinkler timers in parks, and even emissions controls in densely populated areas. Think EV monitoring and charging, smart banking with advanced ATMs, intelligent electricity metering and more.

Retailers

One area that is expected to benefit the most from IoT technology is the retail sector. There are tremendous implications from Internet of Things devices. Obviously, inventory tracking is one of those, but that's just the barest hint of what's possible here.

Another very important advancement is the use of beacon technology (technically machines) that interacts with shoppers' Smartphone to increase marketing through things like proximity alerts, push notifications and the like. This is already in use by many forward thinking retailers, and many leaders in the global retail industry have adopted things like RFID technology (Wal-Mart mandated this as early as 2004).



Challenges with the Internet of Things

While the Internet of Things offers incredible possibilities and benefits, it's not without its drawbacks. Security is one of the most important, and an area where many manufacturers currently producing connected devices are failing. There have been numerous cited examples of hackers gaining access to these devices without the user's knowledge, including one in which an Internet-connected doll could actually be used by hackers to spy on the child playing with the toy.

Other potential problems include hackers utilizing weaknesses within connected

devices to hack into a home's entire network, or even into a business network. While manufacturers are struggling to adapt to this need for greater security, app developers have stepped forward to offer expertise and protection for both home and business use.

Finally, there's the question of what to do with all the information generated by IoT devices. That information can be very sensitive (think health and financial data). It must be correctly safeguarded, stored and protected from unauthorized access. It's also important that consumers know businesses handling this information do so ethically, with no fears that their data will be sold to the highest bidder.

Openxcell

At OpenXcell, we're proud of our work with Internet of Things technology and our stance as one of the leading app developers in the industry. We helped pioneer mobile app development services, and have been part of the industry since its birth.

Our vision is, "to become a one stop destination for all mobile app and web app development needs," and the Internet of Things is an integral part of that. IoT device adoption is only going to grow, as more businesses and consumers realize the impact of this technology on their lives and futures, and OpenXcell is proud to be an integral part of this.

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