A world of connected sensors

Alex Miller 4 minutes

Tech Innovation Planet-wide ESG

Internet of Things devices are spreading rapidly, and so is the need for connecting them

Legend has it that the world's first Internet of Things device was created at Carnegie Mellon University way back in the 1980s. Long before commercial internet was even a thing, one student wanted to know the status of the Coke supply down the hall and figured out a way to monitor the lights on the soda machine and report back using the internet's precursor, ARPANET.

And while it would be many years later before Internet of Things (IoT) devices became mainstream, that early experiment pointed to the enormous potential value of being able to monitor things remotely.

Today, IoT devices are as familiar as the Roomba in our living room or the Echo device on the table. And the market is growing quickly: The global IoT market is poised to top $1 trillion by 2024, while the IoT sensor market is expected to jump over 1,000% — from $12 billion in 2020 to $142 billion by 2030.

Many of these devices are becoming increasingly familiar to us in our daily lives, but another large group of connected IoT sensors are on track to fill a great many roles in commercial and industrial applications. From monitoring an aircraft engine to a sensor on a utility pole, businesses and governments the world over are discovering how Smart IoT sensors can save money through efficiency, improve operations, address sustainability and a lot more.

So, what are these sensors?

Types of IoT sensors

Here are some common examples of sensors and what they can do:

Accelerometers: Measure static or dynamic acceleration forces, like whether a vehicle has sped up, slowed or stopped.

Gyroscopes: These sensors measure rotation and are often used in navigation on objects from trains and ships to aircraft and space stations.

Image sensors: Lets the end user see objects and locations; handy for robotic devices, security systems and premises monitoring.

Motion detection sensors: Good for security uses as well as retail customer service, energy management and more.

Optical sensors: Different than a remote camera, these sensors convert light quantity measurements into electronic signals. Helpful for monitoring electromagnetic energy and useful in applications from healthcare to aerospace.

Temperature sensors: From controlling air conditioning or heating to monitoring soil or machine temperature, these sensors can also be used in areas prone to wildfire for early warning.

Water quality sensors: Being able to monitor water quality from source to tap can be enormously useful for maintaining safe water supplies.

Other types of sensors include ones that can monitor gas, pressure, humidity and even how level an object is.

As the name implies, IoT sensors all have one core requirement: connectivity. Today, most of them are connected by Wi-Fi or Bluetooth or through cellular networks. In the example of a smart city, where IoT sensors play a role in everything from traffic control to trash pickup scheduling, it's relatively simple to connect them through 5G networks or even Wi-Fi hotspots. Outside more populous areas and even beyond the reach of cellular, connectivity becomes a real challenge even while the need for IoT remains high.

Real-world use cases

Once people become aware of the power of connected IoT sensors, they realize the possibilities are nearly limitless. In Romania, one of the last countries in Europe with large swaths of virgin forest, the problem isn't so much fire as it is illegal logging. A group called Rainforest Connection partnered with a cellular provider to create a "smart forest." Installing acoustic sensors in the trees enables forest rangers to detect telltale sounds like chainsaws or vehicles nearby.

In the shipping industry, cargo containers equipped with sensors can tell both the shipping company and the end user where the container is, if the door is open or closed, the temperature, humidity — in real time. Of course, a shipping container in the middle of the ocean is going to need a way to connect beyond traditional terrestrial networks, which today makes the use of IoT for this industry somewhat limited.

That's also true for industries like agriculture, energy, forestry and many others where connectivity limitations restrict monitoring of activity by IoT sensors.

Satellites and Smart IoT

Satellites don't have the same constraints as terrestrial networks and can reach nearly every corner of the globe. Picture that TV dish on your neighbor's house, though, and it's clear that kind of setup isn't going to work well for connecting a small sensor. There are some options to connect IoT sensors by satellite, but they're too expensive to be deployed large-scale, and even big companies can't justify the cost of todays' satellite links for all the sensors they'd like to have.

E-Space was created for just this scenario, where the enormous potential of IoT can be unleashed by creating a new type of satellite network. Our system will enable the use of small, easy-to-install, easy-to-use and inexpensive devices that can be connected anywhere on Earth. Users can take this vast amount of data and use Artificial Intelligence (AI) to process it and create actionable intelligence. So, where it might today seem impossible to duplicate the Romanian tree project in the wilds of Alaska or remote Ghana, this new generation of satellite-connected devices will make it a reality.

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