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The IoT Prepares To Tackle Global Problems

News stories about the Internet of Things (IoT) tend to focus on fun, new consumer gadgets like an Internet-enabled doorbell that sends audio and video to your smartphone. But the real story of the Internet of Things will be industrial machine-to-machine communications (M2M) connectivity.

Our network topologies and capabilities will expand with new technologies and billions of new devices. We'll keep existing equipment connected and communicating as well, as much of our legacy infrastructure is too complex and too valuable to be cast aside. Short-term goals will include eliminating unplanned device downtime and optimizing asset performance. But IoT technology will also help us address the macro trends that pose genuine threats to future prosperity.

CLIMATE CHANGE

Media hyperbole aside, it has become increasingly obvious that we have entered an era of global climate change caused by carbon dioxide. If we want to cut carbon emissions we'll have to use energy far more efficiently than we do now. Shutting down the world's economy isn't an option.

IoT technologies will prove indispensable. They'll greatly increase efficiency in virtually everything we do, and they'll help us attack the carbon problem in other ways as well.

Located on the California-Nevada border, the new Ivanpah Solar Electric Generating System can produce nearly 400 MW without generating any carbon dioxide. It relies upon hundreds of thousands of reflecting mirrors that must be continually positioned to aim their light at a single focal point *(see the figure)*. The Earth rotates, so the mirrors must keep moving as well. Until recently, there would have been no practical way to keep so many mirrors aligned. But with the IoT, managing enormous numbers of remote devices will be commonplace. We're already doing it.

NATURAL RESOURCES

Population growth, along with rising living standards and consumption, is increasing the pressure on all of our natural resources. Improved extraction techniques can only increase short-term supplies. They can't increase the total quantity of a finite resource. We'll need to find ways to make more efficient use of everything from natural gas to irrigation water.

IoT Technologies can coordinate the rotation of the hundreds of thousands of mirrors to maximize energy production at the Ivanpah Solar Electric Generating System on the California-Nevada border. *(courtesy of Business Wire)*

The Ogallala Aquifer under the North American Great Plains provides a useful example. It supplies drinking water for nearly 2 million people in eight Great Plains states, as well as 30% of the irrigation water used in the entire United States. It's being drained at a prodigious rate, though, and at current usage levels it may only last for another 25 years. It would take nature 100,000 years to replace it.

No single solution will solve the problem, but there's already one IoT technology that can make a big difference. It's estimated that as much as 50% of irrigation water is wasted due to evaporation or runoff. So in Europe, a prototype of the new "WaterBee" smart irrigation system is being tested.

Older irrigation systems typically used timers, but the WaterBee is far more sophisticated. It monitors soil conditions in real time with a network of wireless sensors, and it uses the data to determine where and when water actually needs to be released. The WaterBee test sites have already reduced water usage by an average of 40%.

POPULATION

After growing slowly and steadily throughout human history, the world's population passed 1 billion somewhere around 1820. Population growth then began to explode. By 1920 there were 2 billion people. Half a century later it had doubled to

4 billion. The world's population is currently over 7 billion. Every time the population doubles we theoretically need twice as much of everything, from food to transportation systems—that's if we want things to stay the same, much less improve.

But you can achieve the same effect if you make existing systems twice as efficient. By extending intelligence to the edge of our networks, collecting and analyzing unprecedented quantities of real-time data, and making intelligent decisions, IoT technologies will vastly increase efficiency. And when you increase efficiency in a system, you've increased its capacity.

AGING

Studies indicate that population growth has begun to slow down. But at the same time, people are living longer with profound social and economic impacts. Over time, a steadily increasing percentage of the world's population will be made up of the elderly.

IoT technology will help us keep up. For example, NEHI (formerly the New England Healthcare Institute) has estimated that poor medication adherence alone accounts for up to 13% of total health care expenditures, or $290 billion annually in unnecessary costs. Patients fail to take their pills according to the correct schedule, and sometimes they forget to take them at all. A "smart" prescription bottle could compare prescriptions to actual usage and alert the appropriate person if a scheduled medication has been forgotten.

Future intelligent remote devices will let users monitor and test many aspects of their own health without leaving home, and they'll be able to upload the data to be analyzed in the cloud. IoT technology may not be able to talk you into changing your diet or getting more exercise, but it will make health care incredibly more efficient. We'll need that efficiency as the elderly population and their associated health care costs continue to grow.

WHAT'S NEXT

As we face the problems of the future, the deployment of IoT technologies will become increasingly important. Intelligent doorbells will only help us fend off small problems like pesky siding salesmen. Industrial IoT technologies will help us face the problems that really matter. ed

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