predictive maintenance

Keeping assets up and running has the potential to significantly decrease operational expenditures, saving companies millions of dollars. With the use of sensors, cameras and data analytics, managers in a range of industries are able to determine when a piece of equipment will fail before it does. These IoT-enabled systems can sense warning signs, use data to create maintenance timelines and preemptively service equipment before problems occur.

By leveraging streaming data from sensors and devices to quickly assess current conditions, recognize warning signs, deliver alerts and automatically trigger appropriate maintenance processes, IoT turns maintenance into a dynamic, rapid and automated task.

This approach promises cost savings over routine or time-based preventive maintenance, because tasks are performed only when they are needed. The key is to get the right information at the right time. This will allow managers to know which equipment needs maintenance; maintenance work can be better planned; and systems remain online while workers stay on task. Other potential advantages include increased equipment lifetime, increased plant safety and fewer accidents with negative environmental impact.

Smart metering

A smart meter is an internet-capable device that measures energy, water or natural gas consumption of a building or home, according to Silicon Labs.

Traditional meters only measure total consumption, whereas smart meters record when and how much of a resource is consumed. Power companies are deploying smart meters to monitor consumer usage and adjust prices according to the time of day and season.

Smart metering benefits utilities by improving customer satisfaction with faster interaction, giving consumers more control of their energy usage to save money and reduce carbon emissions. Smart meters also give power consumption visibility all the way to the meter, so utilities can optimize energy distribution and take action to shift demand loads.

According to Sierra Wireless, smart metering also helps utilities:

- Reduce operating expenses by managing manual operations remotely
- Improve forecasting and streamline power-consumption
- Improve customer service through profiling and segmentation
- Reduce energy theft
- Simplify micro-generation monitoring and track renewable power

Asset tracking

According to a study by Infosys and the Institute for Industrial Management at Aachen University, 85% of manufacturing companies globally are aware of asset efficiency practices, but only 15% of those surveyed have implemented such measures at a systematic level.

Infosys and other supporting companies, including IBM, Bosch, GE, Intel, National Instruments and PTC, have launched a testbed to collect asset information efficiently and accurately in real-time and run analytics to aid them in decision-making.

The goal of asset tracking is to allow an enterprise to easily locate and monitor key assets, including along the supply chain (e.g. raw materials, final products and containers) to optimize logistics, maintain inventory levels, prevent quality issues and detect theft.

One industry that heavily relies on asset tracking is maritime shipping. On a large scale, sensors help track the location of a ship at sea, and on a smaller scale, they can provide the status and temperature of individual cargo containers. One benefit is real-time metrics on refrigerated containers; these containers must be stored at constant temperatures so perishable goods remain fresh.

Each refrigerated container needs to be equipped with temperature sensors, a processing unit and a mobile transmitter. When temperatures differ from the optimal mark, crew can be notified and begin needed repairs.

Connected vehicles

Connected vehicles are all the rage now. In simplest terms, these are computer-enhanced vehicles that automate many normal driving tasks – in some cases, even driving themselves. Current systems scan painted lines as one of several detection methods; magnetic rails and other forms of enhanced highways may guide future systems.

Source: The Daily Conversation/Youtube

There are several advantages of self-driving cars. Accident avoidance is a major incentive, because the car can respond faster than a human. The ultimate manifestation is the overall reduction of vehicles, according to *PCMag*. Driverless taxis could replace a family's second car that sits idle all day. More vehicles can travel closer on the road at the same time, and the computer can operate the vehicle more economically than most people.

Cameras, radar and lasers are among the sensors feeding information into the differential GPS. Cameras let the car's computers see what's around it, while radar allows vehicles to see up to 100 meters away in the dark, rain, or snow. Lasers, which look like a spinning siren light, continuously scan the world around the car and provide the vehicle with a continuous, 3-D omnidirectional view of its surroundings.

"These sensors are providing you with raw information of the world. You need very sophisticated algorithms to process all that information, just like a human would," Sridhar Lakshmanan, a self-driving auto expert and engineering professor at the University of Michigan-Dearborn, told *Time*.

Fleet management

For companies that rely on transportation as part of their business, fleet management helps them remove or minimize the risks associated with vehicle investment, improving efficiency and productivity while reducing overall transportation and staff costs.

For example, asset tracking is being used by cities for waste management purposes by giving trash collectors the most efficient routes to collect the buildup of trash in urban environments. Shipping services also use real time traffic feeds and efficiency algorithms to deliver more packages more efficiently, with less wear and tear on drivers and on vehicles.

Source: AT&T Enterprise/Youtube

By 2020, North America is expected to reach 12.7 million active fleet management systems deployed in commercial vehicle fleets, according to a recent study by Swedish machine-to-machine/IoT research firm Berg Insight.