

The Internet of Things in Tomorrow's Warehouse

What is the Internet of Things (IoT)?

While billions of devices are already connected to the Internet, most of these are traditional networking devices – hubs, routers, servers, pc's, and even mobile phones. Extending beyond usual devices, the IoT revolution is the process of bringing the Internet to non-traditional "things," such as pallets, lifts, and trailers.

- **5.5** million new devices projected to be connected every day in 2016¹
- **30%** increase in the number of connected things this year¹
- **2.7** trillion net profit potential to eliminate supply chain waste over 10 years³

- **96%** of companies will be using IoT in some way within 3 years³
- **.06%** things that could be connected that currently are³
- **94%** of all businesses have seen a return on their IoT investments²

Precise Indoor Locating

Since GPS signals are weak indoors, a combination of alternative technologies, such as Wi-Fi and Bluetooth, allow real-time tracking, positioning, guidance and collision-avoidance within the warehouse.

Real-time Inventory

- High-value stock is fitted with responsive electronic RFID tags to continually update WMS.
- Ground-based or aerial drones roam aisles and scan bar codes and short-distance (passive) RDIF tags

Smart Lifts

Sensors build individual driver profiles, highlighting safety issues or training opportunities. Collisions are detected and communicated, and maintenance is alerted to mechanical problems.

Autonomous Guided Vehicles

AGV's fulfill orders, stock replenish lines, and efficiently respond to warehouse demands.

Robots

Capable of operating 24/7, lights out mode, robots can offer extended work hours and significant labor savings.

Heads-Up Displays

Lightweight glasses overlay the real-world view with task assignments, location and directional guidance, x-ray vision and highlighted pick locations. Training is on-demand, and support techs can see and assist with issues in real-time. Performance KPI's are "gamified," making monotonous work more enjoyable.

Drone Yard Management

Flying autonomously, drones verify trailer location and update the YMS.

Dynamic Trucking

Routes are continuously updated to avoid weather issues, congestion, and accidents far ahead. Real-time location provides product visibility, and truck status and error codes are streamed to fleet managers to preempt mechanical failures.

Smart Trailers

Live tracking enables end-to-end stock visibility, reefers transmit temperature data, and correct truck-trailer pairing is established.

Geo-Fencing

When arriving trucks cross predefined geo-fences, inbound is notified; security is alerted when unauthorized trucks leave the designated area.

- **25 FEET** is passive RFID's current max range, with cost of 5-15 cents each.
- **300 FEET** is approximate Bluetooth max range, but Smart Bluetooth may reach further.
- **4 MILES** is active RFID's current max range; active tags start at \$25⁴.

Driverless Trucks

Fleets of inter-communicating platoons together on freeways; safety is improved with driverless technology, and driving nearly 24 hours per day greatly improves efficiency.

Customer Engagement Sensing

Intelligent shopping systems show what customers are looking at, buying and even how they are using the product, allowing dynamic adjustments to retailers.

Sources:

1. <http://www.gartner.com/newsroom/id/3165317>
2. <http://info.csgl.com/m2m-internet-of-things>
3. <http://www.psfk.com/2014/03/internet-of-things-infographic.html>
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