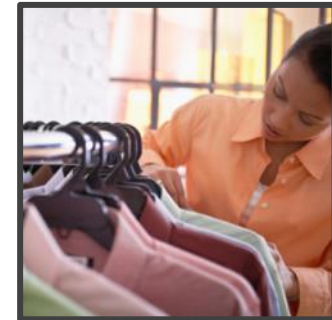


# Passive RFID for the Ultimate IoT



15th Anniversary High Value  
Manufacturing & 4th New Materials &  
Graphene Conference 2017  
2-3 November 2017

[www.cir-strategy.com/events](http://www.cir-strategy.com/events)

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Founder & Chief Executive Officer

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## “A Patented, unique, accurate, passive RFID integrated remote inventory and portal solution”

- Outstanding >99% detection accuracy in real time
  - Wide-area hands free system
  - Portal system-Goods in, DC, Transit
  - Anti-theft ceiling RFID EAS system
  - Point of sales system
- In trials, PervasID outperforms all other passive solutions
- Trials and Deployments with >20 companies to date, including:



## Innovation

- Research at Cambridge University Engineering Department
  - Part of TINA (The **IN**telligent **A**irport) project - EPSRC and Boeing
- Patents filed in 2010, granted in EU, US and China
  - Tag detection and tag location

## National Recognition

- EPSRC ICT Pioneers Award 2011
- The Royal Academy of Engineering (RAEng)
  - ERA Foundation Entrepreneurs Award 2011
  - Sir George Macfarlane Medal 2016

## Passive

## Active

### Advantages

- Simple tag requires no local power source or maintenance
- Low cost

- Long range tag
- Good read reliability

### Disadvantages

- Short range in practice
- Insufficient detection accuracy
  - Due to nulls (typically 20% ER)
- Difficult to determine location

- Battery powered
- High cost (200 times more cost than passive)

Solved by PervasID



Portal

### Hand-held Reader

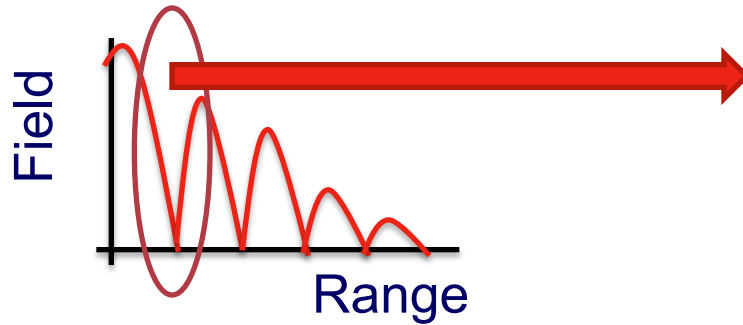


Tracking people

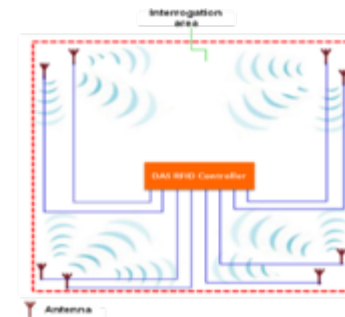
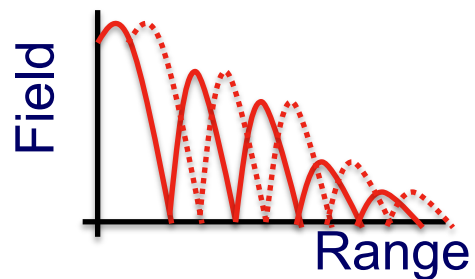
Tag



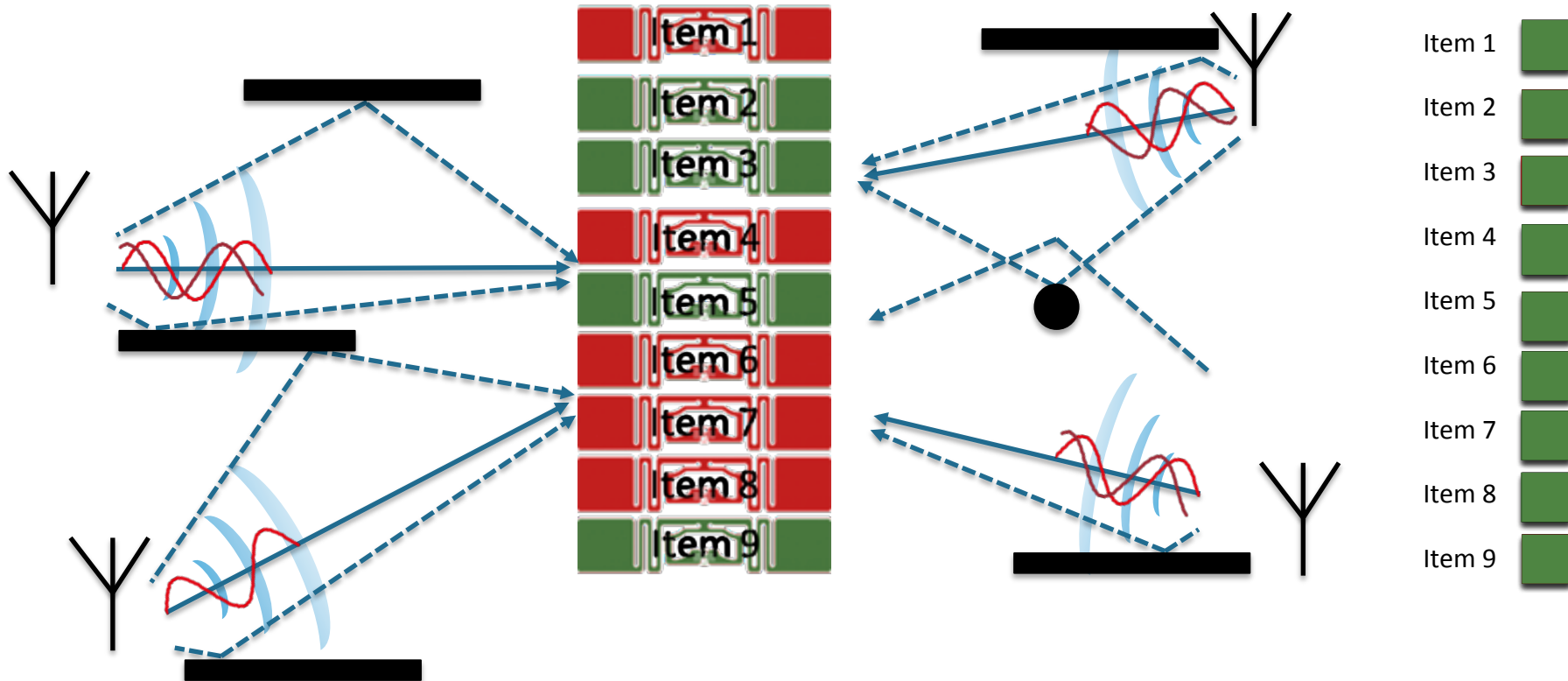
## Conventional Portal



## PervasID



- Our invention exploits multiple antennas to move the locations of the nulls on successive read attempts
- Over a number of reads, nearly 100% tag detection is achieved

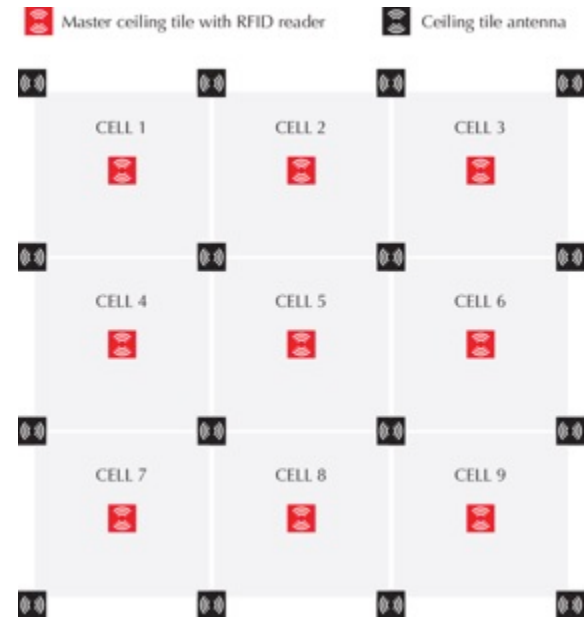


- **Wide-Area Hands Free RFID System (Hardware and Partner Software Solution) – Space Ranger**
  - ✓ The World's first 99+% ceiling RFID reader enabling near real-time stock inventory
  - ✓ Easy to install & no limitation on area which can be covered
  - ✓ Most accurate, quickest & cost effective solution on the market
  - ✓ Great ROI, as provides virtually 100% inventory & location accuracy in near real time.

PervasID Flat Tile Antenna

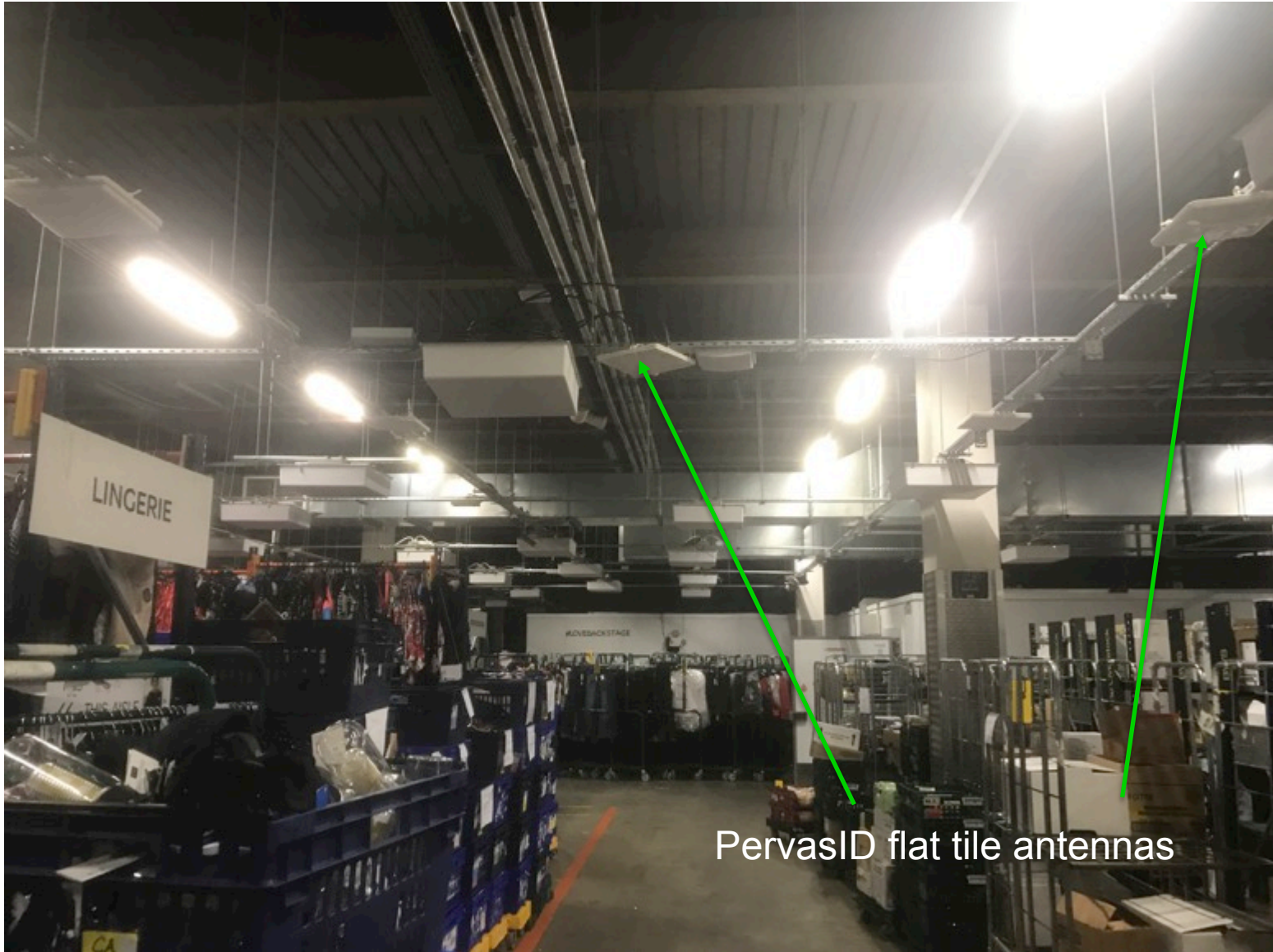


PervasID Reader

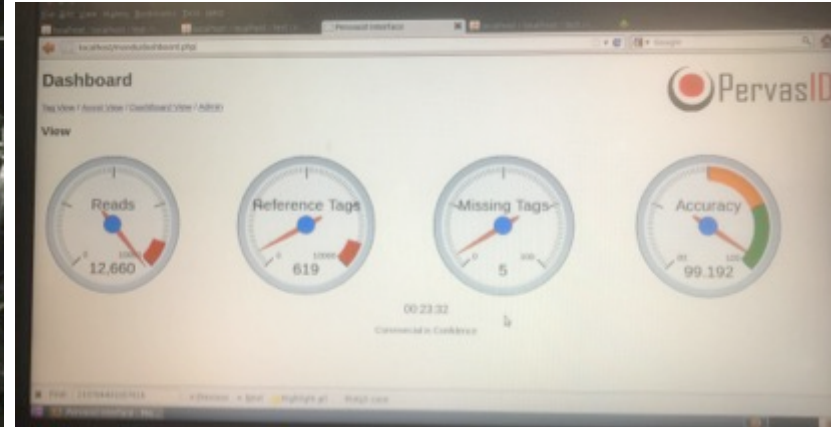


- **DC Extended RFID Portal System (Hardware and Software Solution)**
  - **Dock Ranger**
    - ✓ Automatic 99%+ detection of moving tote/pallet
    - ✓ Accurate count of bulk inbound and outbound
    - ✓ Reduces labour costs
- **Anti-theft Ceiling RFID System (Hardware and Software Solution)**
  - **Gate Ranger**
    - ✓ Reduced false alarms
    - ✓ Higher detection rates
    - ✓ Cost effective wide aisle ceiling solution
- **Point of Sales System (Hardware and Software Solution) –**
  - **POS Ranger**
    - ✓ Automatic detection and de-activation within defined area
    - ✓ Reduces labour costs
    - ✓ Improves customer experience by reducing time spent at checkouts
- **<12 months ROI**





PervasID flat tile antennas



619 items in total moving through dock door

Read time = 7 seconds

Accuracy = 99%+

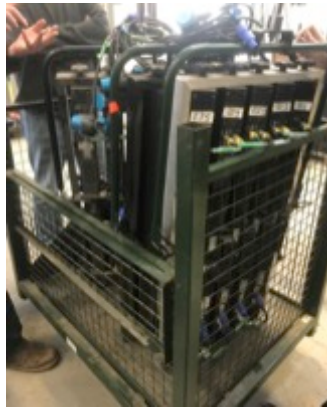
- ✓ Numerous successful installations have been carried out in the retail, healthcare and security sectors
  - QUICK & SIMPLE INSTALLATIONS enabled reliable 99%+ inventory accuracy
    - Successful detection of both close packed and dispersed tags

Total number of tags = 100,000 tags  
Read accuracy = 99%+  
Read time = < 1 hour



M&S Sales area

Total number of tags = 60 tags  
Read accuracy = 100%  
Read time = 2 seconds



Items moving  
through dock door

Total number of tags = 80 tags  
Read accuracy = 99%+  
Read time = 3 seconds



Items moving  
through dock door

Total number of tags = 180 tags  
Read accuracy = 99%+  
Read time = 3 seconds



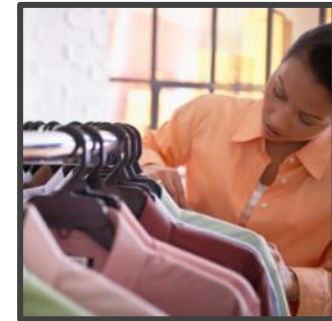
Items moving  
through dock door

<i>Technology</i>	<b>Reliable Read Range in standard tag density</b>	<b>Wide-area detection accuracy</b>	<b>Near Real-time hands free inventory</b>	<b>Moving tag detection</b>	<b>Counting densely packed items on pallets</b>	<b>Location accuracy</b>	<b>ROI &lt;12 months?</b>
<b>PervasID DAS passive</b>	up to 20m	>99% challenging dense retail environment (>100tags/m <sup>2</sup> ) in near real time	Accurate	Accurate	Accurate	1-2m is possible, but today locate by cell/zone	<b>Yes Highest accuracy, in shortest time and lowest cost</b>
<b>Phase array passive</b>	up to 10m	+80% reported by users	Medium	Medium	Medium	1-2m	Unlikely
<b>Conventional passive</b>	up to 2-5m	~60%	Poor	Poor	Poor	Defined by portal	Yes for HH solution only

## With the development of “DAS Passive RFID technology”

- ✓ It is now possible to achieve highly accurate read rates, over a wide area, in a short period of time, with passive UHF Tags
- ✓ “RFID Hands Free” solutions are now cost effective for many applications
- ✓ Rapid highly accurate portal systems are now feasible in dense tag environments.
- ✓ Passive RFID solutions can now replace Active RFID solutions in key applications.

# Passive RFID for the Ultimate IoT



## Questions?