# RAIN Q&A with Kevin Ashton

# RFID and the Internet of Things

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RAIN RFID

## *Questions and Answers between the RAIN RFID Alliance and Kevin Ashton*

***RAIN RFID ALLIANCE:*** *You originally coined the term "Internet-of-Things" (IoT) around your vision of connecting everyday things, and the RFID industry has now connected more than 15 billion things (which exceeds the sum total of all other networked devices combined), yet few people outside our industry equate RFID technology with the IoT. Why is that, and when/how do you see perceptions changing?*

**Kevin Ashton:** Well, the idea of the Internet of Things is still a bit confusing for some people. In the twentieth century, computing was all about devices: things you plugged into the wall, either all the time, or some of the time, with buttons and interfaces. I meet a lot of people that think the Internet of Things means connected devices (toasters and refrigerator are perennial favorites, for some reason), and that's totally wrong. The Internet of Things is just a way of saying ubiquitous sensor network. We supplement human data entry, via keyboards and others interfaces, with automatic data entry via sensors. And, because it's automatic, you don't need buttons and stuff—in fact, you don't even need to know it's there. More automation means less attention. And so people don't notice it. RFID is a classic example. We sell about a billion more RFID tags than smartphones every year, but few people notice RFID, even though everyone notices smartphones. RFID is an amazing technology, doing amazing things, and it has seen amazing innovation during the past fifteen years or so. It has a very bright future, but, like a lot of Internet of Things infrastructure, even though it is everywhere it may not be visible to people who have that toaster-centered view of the world.

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***RAIN:*** *Tell us about your vision in 1999 and the RFID solutions you envisioned back then?*

**Ashton**: I had a big, fast moving supply chain to manage, and it was very inefficient, and I thought RFID, and other sensing technologies, could help. That gave me a glimpse of how much information there is in the world, and how little of it is being captured. The Internet of Things is about capturing as much of that information as possible. Once you start seeing things in those terms, it's hard not to get excited.

***RAIN:*** *In your opinion, how has the Internet of Things developed since then, and how is RFID evolving to enabling the growing IoT ecosystem?*

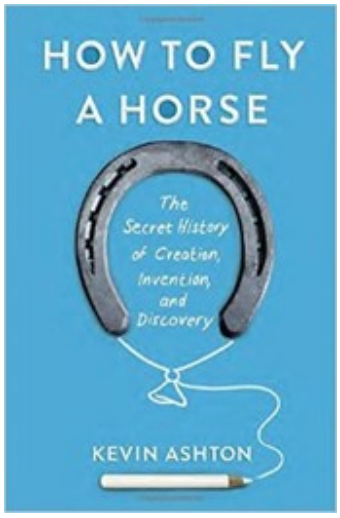
**Ashton:** It takes effort to remember how much has changed. When I first started working on the Internet of Things, Internet access was mainly dial-up, there was no WiFi, cellular networks were for voice and SMS, there was little to no digital photography, and GPS was only for the military. There wasn't even DVD. If you wanted to watch a movie at home, you went to Blockbuster and hoped you could find a video cassette you wanted to rent. Now we take high-bandwidth wireless networking, digital media, and sensors like digital cameras and GPS systems very much for granted. RFID has changed dramatically too, and that's not unrelated; instead of paying dollars for a device with a few feet of range and relatively slow data transfer, we now get tens of feet of range and high bandwidth for pennies. Most of the challenges for RFID are at the back end now—around data sharing and processing and so on. And those are getting solved. RFID's next fifteen years are going to be really interesting.

***RAIN**: How do you see the IoT evolving over the next 10 years? Do you see a convergence of the Internet of powered electronic devices and the RAIN-enabled Internet of everyday things?*

**Ashton:** One of the big questions about the Internet of Things has always been "what are we going to do with all this data?" That's partly a hangover from the days when information processing had a big human component. The typical business handles information like this: Report > Spreadsheet > PowerPoint > Meeting. The report may be automatically generated by some system like Salesforce, or BusinessObjects, or whatever, but the data it uses was probably entered somewhat manually, via keyboard or barcode, and after that all the analysis is human, as is the decision-making that results from it. That's a horribly inefficient process, and it has a tiny capacity for managing data, and so it is overloaded and of limited value. As a result, most businesses are flying blind—they just don't realize it, because all their competitors are blind too. Flying blind is the norm in business. What's happening now, and what will continue to happen over the next ten years, is the rise of true business vision: ever better machine learning-based systems that analyze vast real-time, automated data streams and turn them into value, either by recommending action or simply taking it automatically. One area where that's apparent already is image recognition. If you upload your personal photos to Google, for example, their expert system will automatically categorize them by what they contain and what is going on, using machine learning algorithms. You can search your images for, say, cups of coffee, and it will pull out a bunch of pictures you never even realized you had, all containing coffee, or something that looks a lot like it. As those kind of expert systems become more common and more powerful, and operate on data other than photos, that big question changes to "where can we get even more data?" As it becomes ever easier to get value from automated, networked sensor systems like RFID, demand for those systems will increase massively.

***RAIN:** 10 years from now, where do you see the Internet of Things creating the most impact?*

**Ashton:** That's a hard one. Right now, I am very excited about self-driving cars, which make full use of the Internet of Things, and, I think, are going to be adopted about as fast as smartphones, only with much, much bigger impacts on all of our lives, starting with the obvious one: safety. Human-driven cars kill more than three thousand people worldwide every day, and maim tens of thousands more. Almost all of those tragedies are due to human failures—they are called "errors," but most of them are the result of stupid but inevitable behavior: speed, distraction, drunkenness, and so on. Then there are the many hours of time we waste driving. And the pollution of traffic. And the land we waste having to build ever more roads. And wasted energy. Self-driving cars will improve all these things. And the list goes on and on.




***RAIN*:** Tell us about your book "How to Fly a Horse" and what motivated you to write this? Did your vision for IoT (and how you came about the vision) play a role in your writing?

**Ashton:** How to Fly a Horse is about how humans create, invent, and discover, and it was most definitely influenced by my work in IoT. First, because I learned a lot about all of those things in the process of making the Internet of Things real; and second because the book started as a talk, which I only gave because people saw my Internet of Things work and asked me to make some general comments about creating and innovating. I learned a lot from the Internet of Things, and I still do. How to Fly a Horse puts a lot of those things in one place.

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Enu Waktola interviewed Kevin Ashton for the RAIN Alliance. Enu is Vice President of New Markets for Smartrac Technology Group, a co-founding member. and on the board-of-directors for the RAIN RFID Alliance.

## About Kevin Ashton


Kevin Ashton
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Kevin Ashton led pioneering work on RFID (radio frequency identification) networks, for which he coined the term "the Internet of Things," and co-founded the Auto-ID Center at MIT. His writing about innovation and technology has appeared in *Quartz, Medium, The Atlantic*, and the *New York Times*. Kevin pioneered the sensor-based technology that powers smart energy grids and advanced metering — the systems at the heart of clean tech today. He even invented the name for this field, "The Internet of Things", which has become one of technology's hottest ideas.

Kevin has a long history as a tech innovator and as an entrepreneur. His new book, *How To Fly A Horse: The Secret History of Creation, Invention, and Discovery* is an inspiring and empowering look at behind the scenes of humanity's greatest creations, revealing the surprising way we make something new.

Visit: http://www.howtoflyahorse.com/

## ABOUT RAIN RFID ALLIANCE

The RAIN RFID Alliance is an organization founded in April 2014 to promote awareness, increase education and support the universal adoption of UHF RFID technology. RAIN members are manufacturers, distributors, resellers and researchers working with the EPC Gen2 UHF RFID specification, incorporated into the ISO/IEC 18000-63 standard.

RAIN RFID is a wireless technology that connects billions of everyday items to the Internet, enabling businesses and consumers to identify, locate, authenticate and engage each item. For more information, visit www.RAINRFID.org.

The RAIN RFID Alliance is part of AIM Global, the worldwide authority on automatic identification, data collection and networking in a mobile environment. AIM is dedicated to accelerating the growth and use of Automatic Identification and Mobility technologies and services around the world. For more information, visit www.aimglobal.org.


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