# Finding Things Fast and Making Durable Goods More Durable. How Close Are We?

## How Tracking Tags Might Save Money and CO2

by Geoff Graham

Questions? Comments? Anything left out? Anything you disagree with? I'd love to hear your thoughts. Email me at gjgraham4health@protonmail.com.

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**Wise and Unwise Ways to Limit Fossil Fuel Use**

Society needs to reduce fossil fuel consumption but trying to control fossil fuel consumption by limiting fossil fuel production raises prices and undermines public support for limits. Worse, periods of high energy prices are also periods of capital shortage and risk a replay of the 1970s and 1980s, where capital shortages severely limited efforts to transition to non-fossil-fuel energy.

Fortunately, there may be ways to provide the same or similar goods and services that society enjoys while using much less energy and perhaps also saving money. In this newsletter, I will discuss (or have recently discussed) several of these. In this issue we look at technologies to rapidly find objects within a home and discuss some non-obvious social consequences.

**Imaginary Jane**

Jane is a bit high-strung, especially when it comes to social engagements. She wants things to go well and worries about them far in advance. Her 25-year high school reunion is approaching, and to get ready for it, she bought a very expensive purse a few months earlier. She wants her old classmates to know that she hasn't done badly.

On impulse, Jane looks for the purse on the closet shelf where she was storing it. However, instead of finding it, she discovers to her shock that it is missing. She checks several times in places where the purse might logically be, but she does not find it.

She has a medical appointment that she wants to keep, and she's about to be late, so she rushes out the door, preoccupied and worried. The purse was not only expensive, but she really liked it. Where is the purse?

When Jane returns from her medical appointment, she remembers that she has a facility on her house computer that she rarely uses because she is usually quite organized. She summons the relevant application to the computer screen and types in "purse." Three items appear and are listed on the screen. She recognizes two of the items as purses that she keeps in a drawer. However, the third purse is listed—surprisingly—as being in her garage.

Then, Jane remembers that painters were painting her kitchen two months earlier and, although she mostly trusted them, she hid the expensive new purse in her garage, just to be extra safe. She clicks on the item, and a picture expands on her computer screen—and, sure enough, it's her expensive purse.

Jane clicks on an option called "beep" and then walks out to her garage.
Once in the garage, she hears a persistent beeping, coming from inside a tattered cardboard box where she had hidden the purse. She retrieves the purse and returns the purse to her closet shelf where it belongs. The beeping stops automatically once she picks the purse up, as directed by the application's default setting.

Jane is not interested in computer technology or especially skilled at using it. However, her friends have been telling her that the computer application that she just used to find her purse, called Presto-Pinpoint, has many other features that she should experiment with.

She had wondered how vendors always seemed to know when she was running short of things like laundry detergent, and now she realizes that it's because the Presto-Pinpoint application has been telling them. She is a bit uncomfortable with strangers knowing her personal habits, but she has to admit that Presto-Pinpoint is convenient.

Jane has been thinking about buying a new credenza constructed in a style that she particularly likes. She had planned to buy a new one, but on impulse she enters "buy a used credenza" into the Presto-Pinpoint app, and then enters the name of the style she likes. Dozens of credenzas scroll past on her computer screen, and she stops at one that looks particularly suitable. She notices that she can see the credenza from any angle and even virtually open the drawers to look inside. She summons pictures of items she owns including expensive dinner plates and sets of silverware, and virtually places them within the opened drawers of the credenza to see if they will fit and how they will look. It's a good illusion; her kitchenware looks as though it is sitting in a drawer of the credenza.

A fellow that Jane met at a party, Derek, had taken some electronic pictures of her and then emailed them to her. He had urged her to use them in online shopping. Jane finds his email, opens the pictures and discovers that she can add them to the picture of the credenza. She does this and remembers that Derek told her that her pictures and the pictures of merchandise would automatically scale to each other. Looking at the combined picture, Jane realizes that the credenza is taller than she expected it to be, with the top being level with her navel. She can see herself standing next to the credenza, viewed from every angle.

Jane postpones deciding whether to buy the credenza, but in the meantime, she has noticed another feature of Presto-Pinpoint, a "Will Lend" list. This is a list of items that people own that they are willing to lend out. Mostly, it's hammers, nails, and saws, but there is some electrical equipment such as hedge trimmers. She notices that several people in her neighborhood have leaf blowers and lawn mowers that they are willing to lend. Jane is a good cook and might bake them something in return.

Like many people, Jane avoids wearing most of the clothes in her closet. Each item has a microtag sewn into the fabric. She wonders if she should put some of them "up for adoption" as the current expression goes. She has never used this feature of Presto-Pinpoint, but she has heard that the microtags automatically communicate with her house computer. This supposedly allows her to put the clothes "up for adoption" on the Internet simply by dragging and dropping their pictures from one folder to another. She decides that maybe she will try it if she can find something she really wants to get rid of. She has heard that her clothes would first go to a

refurbisher such as the Salvation Army or Goodwill; she would not communicate directly with the final consumer.

Jane remembers that she is wearing a pair of shoes that had been worn for years by at least one other woman. The idea still seemed creepy but when she had received the shoes, they had seemed perfectly new.

**How Could Presto-Pinpoint Technology Help Us Save Energy?**

There are several ways in which a system like the imaginary Presto-Pinpoint could help Americans and other people save money and reduce their carbon footprints. One obvious way is to prevent unwanted duplicate purchases. People often buy things that they don't need because they forget that they already own them or cannot be bothered to search for them.

Systems like Presto-Pinpoint could also bring us closer to a more accurate way of measuring our collective wealth. Nations measure their wealth by their Gross Domestic Product, which is the total value of all goods and services produced in that country over the period of one year. However, conservationists have argued for decades that it would be equally informative to measure the CHANGE in total value of goods and services available over the course of a given interval. Such a measurement could encourage academic researchers, corporations, and the government to value preserving existing possessions over replacing those possessions with new counterparts. However, in order to use this new measure of wealth, we need better data on when durable goods are discarded. The tracking tag system, described above, might give us this information, provided that the tracking tags of durable goods were read and recorded when durable goods were discarded.

Much of the energy we expend, and thus much of the CO2 we emit, is for the purpose of constructing, transporting, and disposing of durable goods. If the useful lives of those durable goods could be extended, we would need fewer of those goods and the amount of CO2 emitted would decrease accordingly.

It has been argued (Reference: White) that many durable goods have shorter useful lives than technology makes possible, that many manufacturers deliberately shorten the useful lives of the durable goods that they sell, and that manufacturers may collude to do this. Further, consumers are not given reliable estimates of the

use that they will get from durable goods, and manufacturers deliberately make it difficult for consumers to repair durable goods.

Several remedies have been proposed for these abuses. The remedies range from imposing mandatory standards for the manufacture of durable goods to mandatory labeling of the total cost of ownership (the original cost plus anticipated cost of repairs and upgrades) per month or per unit of service of durable goods. However, the variety of durable goods sold in the USA is enormous and effective regulation will require accurate statistics about the durability of those goods. Although this information might be provided by enormous, expensive testing laboratories (Reference: White), it could more easily be provided by harvesting of tracking tags on durable goods that are discarded. This same information could also help resource planners.

We need not be limited by the ingenuity of manufacturers. Our government, which spends hundreds of billions of dollars on lethal weaponry, could be ordered to make its best effort to invent, for example, washable shoes that will last 30 years while being reasonably priced or automobiles that can last a century while being designed to accommodate future upgrades. The resulting technology could be made generally available and patent-free.

**How Close Are We to the Goal?**

When, if ever, will we be able to implement a real version of the imaginary Presto-Pinpoint system described here? What is the state of the art?

One would expect tracking tags to be deployed first in warehouses and factories, since these institutions have large amounts of money to spend and might benefit greatly from instantaneous inventory control and process control. In fact, tracking tags are now used in warehouses and factories.

A firm called QuicSolv provides an asset-tracking system for manufacturing or other facilities that must keep track of assets (Reference: QuicSolv).

A second corporation called Kinexon manufactures Kinexon Asset Tags that not only locate assets in storage, but track assets from the time they enter a manufacturing facility to the time they leave as finished products. The Kinexon system uses ultra-wide-band (UWB) communications technology. In addition to

tags, there are anchors to record the sensor data from the tags. The purpose of the system is to increase the efficiency of the manufacturing process. (Reference: Kinexon).

Neither Quicsolv nor Kinexon advertise the prices of their tracking tags and system, but the price seems to be well above $100 per tag. Another company, Zebra (Reference: Zebra), makes tracking tags that cost somewhat more than $100 apiece.

It looks as though the problems remaining to be solved include lowering the prices of tracking tags and supplying the tags with power. Although it might be possible to supply each tag with a long-lasting supply of power at the time the tag was manufactured (the battery in each Kinexon tag lasts for up to 5 years), it is probably better to charge tags as needed using broadcast electric power.

Whether charging tracking tags using broadcast power is feasible depends greatly on the amount of electric power that the tags would require. A recent video by the physicist Sabine Hossenfelder (Reference: Hossenfelder) explains the present use and future prospects of wireless power transmission. The video discusses inductive power transfer, magnetic resonance power transfer, multi-antenna arrays, coherently enhanced wireless power transfer, fast adaptation to a moving source, metamaterials and the need for technical standards. The main conclusion is that wireless power transfer is feasible over short ranges (10 meters or so), that all of the methods are inefficient but some that some improvements have been made, and that uses that require very low power (microwatts or milliwatts) are greatly favored. Hence, as noted above, the most important problem to be solved is designing tracking tags that require very little power and which can be charged wirelessly.

**Privacy Problems**

A Presto-Pinpoint-like tracking system would pose two types of privacy problem for users. The first problem is obvious: people may not want vendors and government agencies to monitoring their purchases, as might occur when durable goods were purchased or discarded. There is already considerable apprehension that the United States and other Western democracies may be developing a Chinese-style social credit system.

The second type of privacy problem is that an electronic eavesdropper might be able to inventory a homeowner's possessions. This might be done by hacking into the house computer via the Internet, by monitoring communications between tags and the house computer from outside the house, or by monitoring those communications from inside the house by a workman such as an electrician or plumber. Thus, it might be necessary to restrict the communications between tags and the house computer to the interior of the house, to turn the system off when strangers are in the house and, of course, to prevent hacking of the house computer.

It would probably be undesirable for communication between tracking tags and the house computer to be active at all times. However, if it were turned off most of the time, items might simply disappear from the house inventory occasionally without leaving a clue as to how they left. In the example involving "Imaginary Jane", above, Jane's son might come home from college when she was not around and borrow something from her without telling her. If the system were turned on, the time that the object left the house, and by which exit, would be known; otherwise, they would not.

## References


**Hossenfelder**

Hossenfelder_S YouTube video. "How close is wireless power technology?"
{https://www.youtube.com/watch?v=a3KkqW3_isE}
Inductive power transfer. At 2:56
Magnetic resonance power transfer. At 4:00
Multi-antenna arrays. At 8:10
Coherently Enhanced Wireless Power Transfer. At 12:58
Fast adaptation to a moving source. At 13:05
Metamaterials. At 13:25
The need for standards. At 14:10

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