

Networked Objects

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Spring 2006
Week 8 - March 9th

Location and Identification

We re not lost; we re locationally challenged.

-John M. Ford

What was once a simple thing, to become lost and unrecognized, is becoming increasingly impossible. The ability to locate, triangulate, and recognize is being built into ever smaller devices. From self selected location based systems like GPS and Galileo¹, to genetically imprinted markers discernible through biometric readers; the ability of technologies to isolate precise details about our actions and our selves is increasingly pervasive.

The concepts of location and identification are intertwined, but play different roles and provide different information depending upon their implementation. Each technology also raises questions. How closely should we track ourselves? Our children? Do we need to know exactly where everything is at all times? When we lose a text password we can easily reset it, but what about biometric scans? What are the means, methods, worries, reasons, and rationales for knowing exactly where a package is at all times during it's transit from Shenzhen to Soho?

GPS

A constellation of more than twenty satellites declared fully operational for public use in the early 90's, the Global Positioning System, or GPS, provides 2 meter resolution coordinates over the surface of the globe. Using relatively inexpensive technologies, ranging in size from a microchip to a microwave, it is possible to accurately monitor and track your position and altitude in real time. GPS is a purely location based system, and by default provides no means of identification.

Cellular ID

Just about any device that emits a radio signal can be located. The more receivers that can hear the signal, the more accurate the location technology can become. Cellular Identification is based upon the triangulation² of GSM cellular phone signals by multiple cell towers. Cell ID can be useful in determining a rough location of a mobile phone, but is impacted by the density of cell towers. In heavy covered urban areas it is possible to locate a device to within approximately 200 meters. In less dense areas the accuracy drops quickly to many kilometers.

RFID

Radio Frequency Identification, or RFID, is a highly publicized technology used to implement Real Time Location Systems. RFID is a sought after technology because, unlike other identification technologies, it can be deployed across millions of items relatively cheaply. This is because RFID, in it's most common form, is a passive technology. An RFID tag can be adhered to just about any surface, and consists of only

¹ http://en.wikipedia.org/wiki/Galileo_positioning_system

² Or more accurately, multilateration

a small amount of copper or conductive metal for an antenna, and a small memory chip. Considered an automatic identification technology, this RFID tag will reveal its identification number in the presence of an RFID reader, which emits a radio signal that powers the tag and allows it to transmit its data. In this type of scenario the only expensive piece of technology is the RFID reader, which can be selectively placed only where needed. This means that anything can be cheaply tagged with a unique identification number.

RFID can be considered an invasive technology precisely because it is an automatic identification system. While most readers need to be within a few inches or feet of a device to trigger a signal, it is possible to design an RFID reader with a high gain antenna capable of reading a tag from much greater distances.

Biometrics

While it is increasingly difficult to avoid identification technologies, and increasingly easier for people to steal, crack, or otherwise acquire sensitive passwords and identification materials, most common technologies pale in comparison to the fear and promise afforded by biometric identification. Biometrics measure and quantify physical attributes of an individual to verify their identity. Measurable quantities include:

- finger print
- retina scan
- DNA
- Voice Print
- Thermograms

Resources

- GPS
 - http://www.sparkfun.com/commerce/categories.php?cPath=4_17
- Cellular ID
 - <http://www.cellspotting.com/webpages/cellspotting.html>
- RFID
 - <http://www.ti.com/rfid/docs/products/readers/RI-STU-MRD1.shtml>
- Biometrics
 - <http://en.wikipedia.org/wiki/Biometrics>

Assignment

- Midterm