Our Instrumented Life



Greg Conti // West Point // gregory.conti@usma.edu

http://www.nydailynews.com/entertainment/tv/2010/06/07/2010-06-07_a_paparazzo_sits_for_his_portrait.html

The views expressed in this presentation are those of the author and do not reflect the official policy or position of the United States Military Academy, the Department of the Army, the Department of Defense or the U.S. Government.

...

الآراء التي أعرب عنها في زي هذا البيان هو نقطة صاحب البلاغ في الرأي ، لا يعكس السياسة حكومة الولايات الرسمية للولايات المتحدة أو الكلية الحربية في الجيش بو ، وزارة الدفاع المتحدة وظائف القطاع.

...

The view points of views expressed by the author of this statement costumes, and do not reflect the official policy of the University of Bo and the United States Army, Pentagon U.S. government sector employment.

Where are the sensors in your life?



http://www.police.nashville.gov/news/media/2009/09/SuspectATM2.jpg

Sometimes They Find You…



Census Taker



Satellite



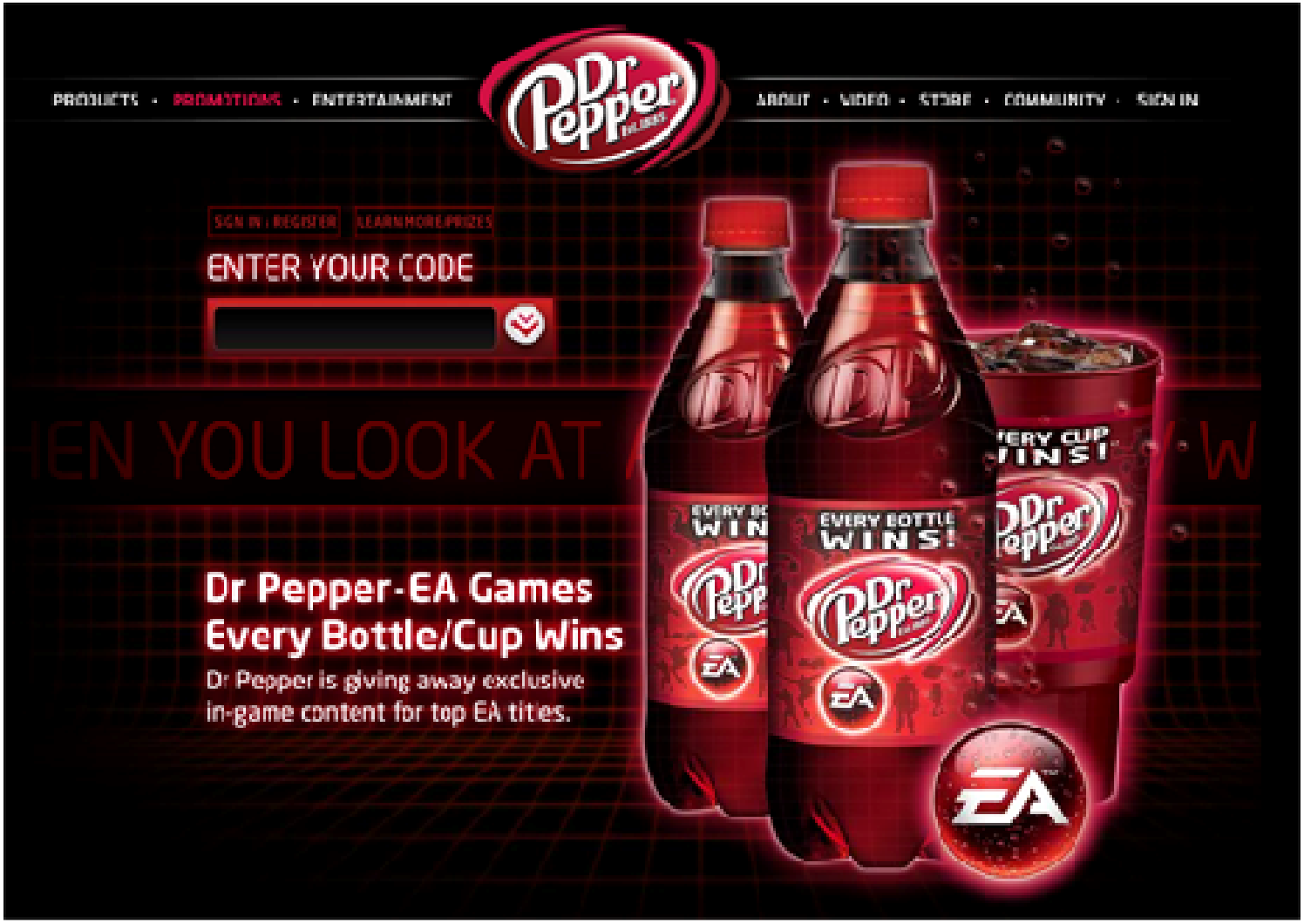
Robocaller



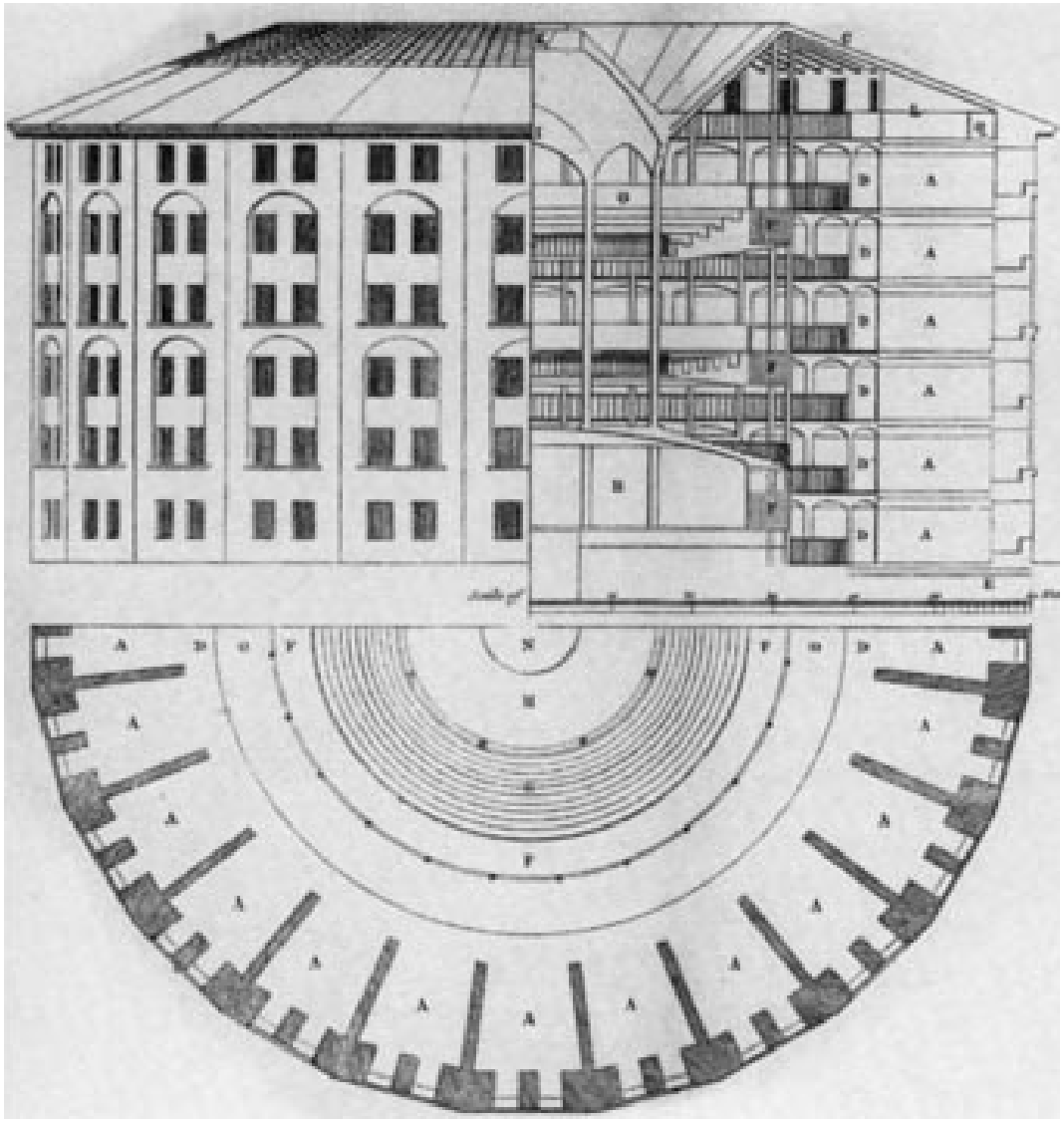
Streetview

http://en.wikipedia.org/wiki/File:Cisco7960G.jpeg
http://img.thesun.co.uk/multimedia/archive/00763/googlemain_763166a.jpg
http://rst.gsfc.nasa.gov/Intro/Part2_26e.html
http://2010.census.gov/mediacenter/img/DSC_0500.JPG

Sometimes You Go To Them…



http://www.drpepper.com/promotions/ea/



http://en.wikipedia.org/wiki/File:Panopticon.jpg

Predictive Models

"The long-term danger is extraction of self. That others know more about you than you know about yourself."

"At such a point, we don't lose just individuality, we lose the individual"

- Marc Rotenberg
  Executive Director
  EPIC

Garfinkel, Simson. Database Nation, p. 252
http://www.nytimes.com/2005/06/26/weekinreview/26fount.html?ei=5090&en=72e68bdc3771199d&ex=1277438400&adxnnl=1&partner=rssuserland&emc=rss&adxnnlx=1277384672-tCFhZleWqKM6UymOmrcuTg

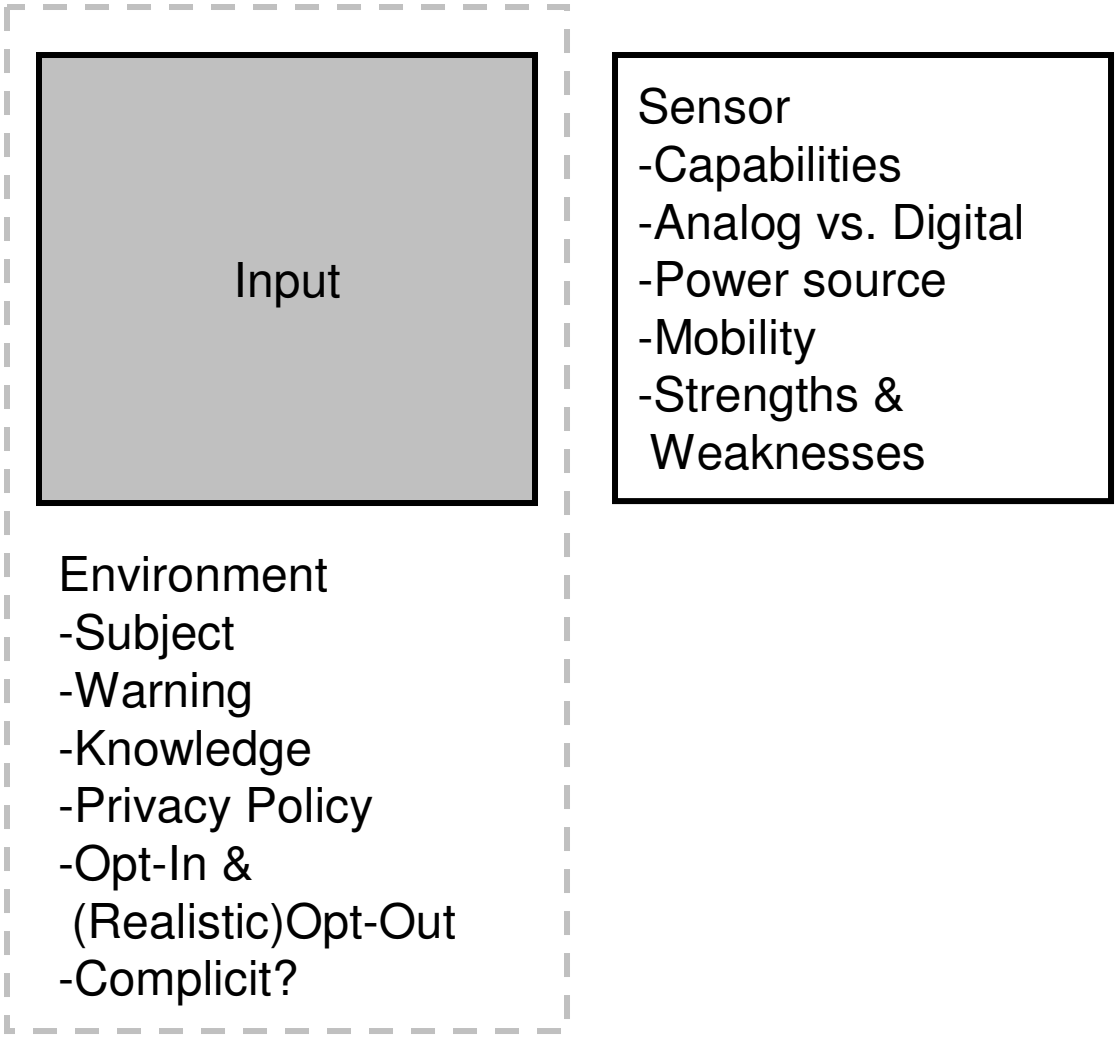
Our Instrumented Lives

- The Problem
- Your Person
- Online
- Your Home
- Your Community
- Countermeasures
- At Look to the Future

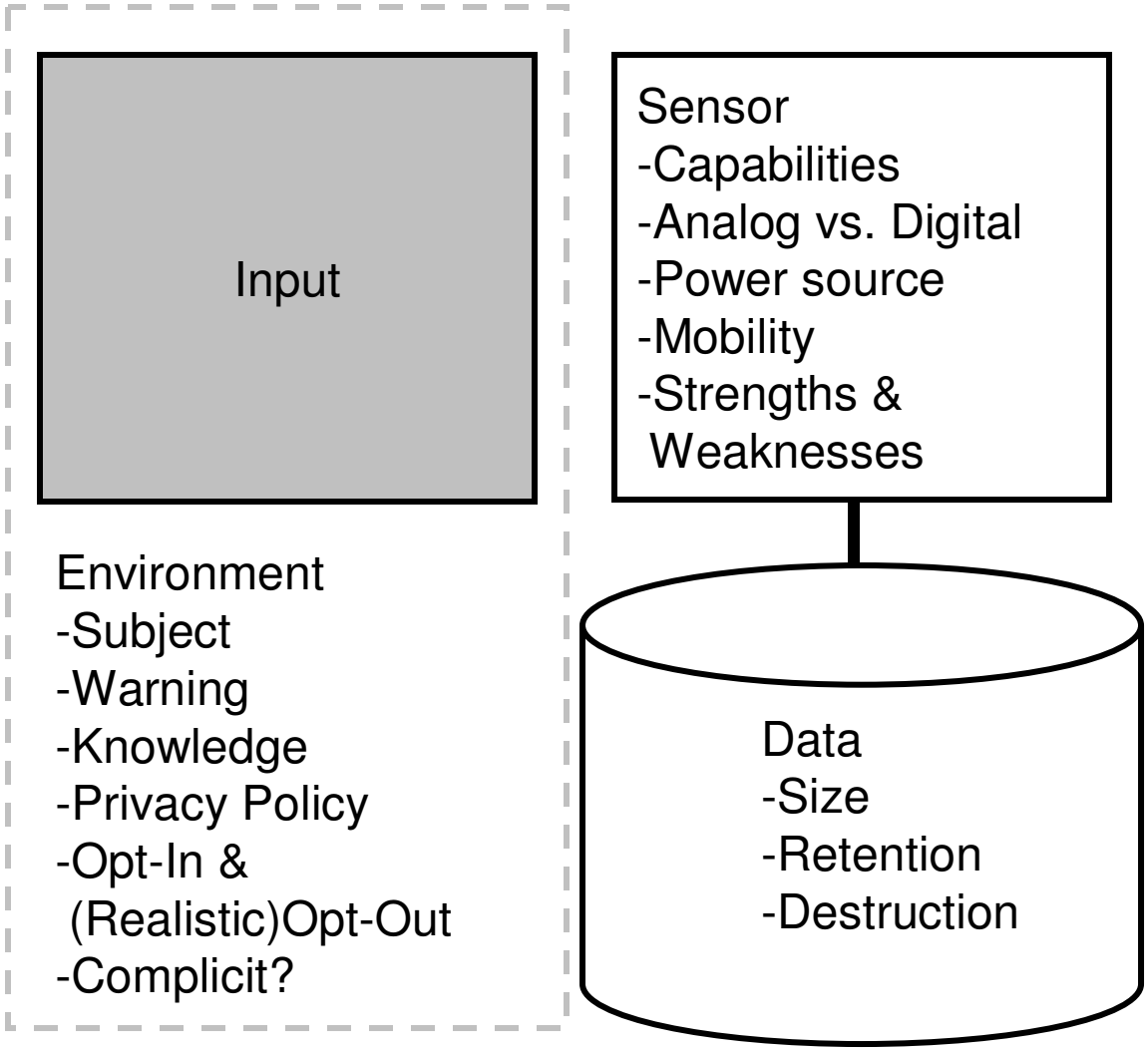
Model

Sensor
-Capabilities
-Analog vs. Digital
-Power source
-Mobility
-Strengths &
Weaknesses

Model


Input
Sensor
-Capabilities
-Analog vs. Digital
-Power source
-Mobility
-Strengths &
Weaknesses
Environment
-Subject
-Warning
-Knowledge
-Privacy Policy
-Opt-In &
(Realistic)Opt-Out
-Complicit?

Model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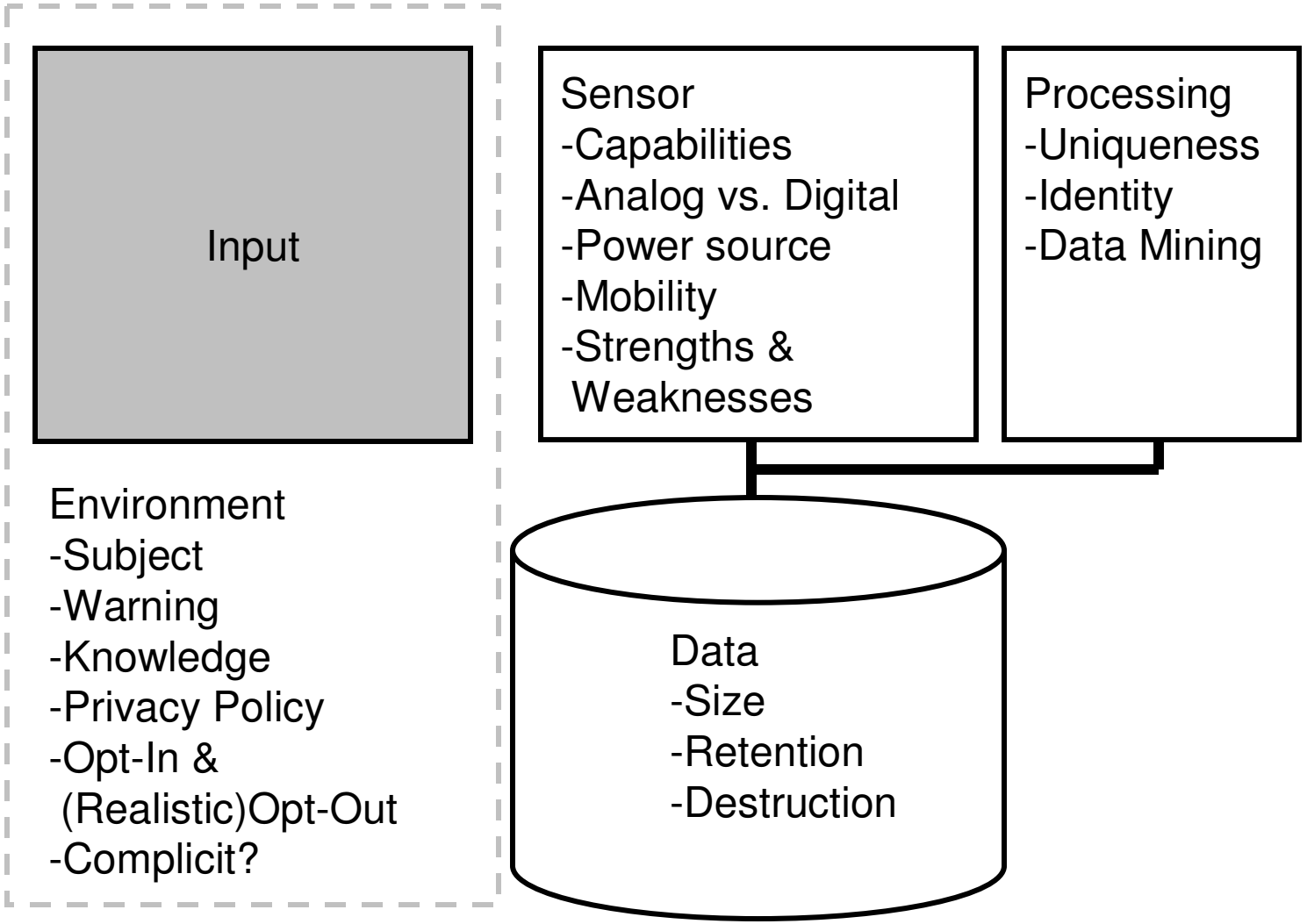
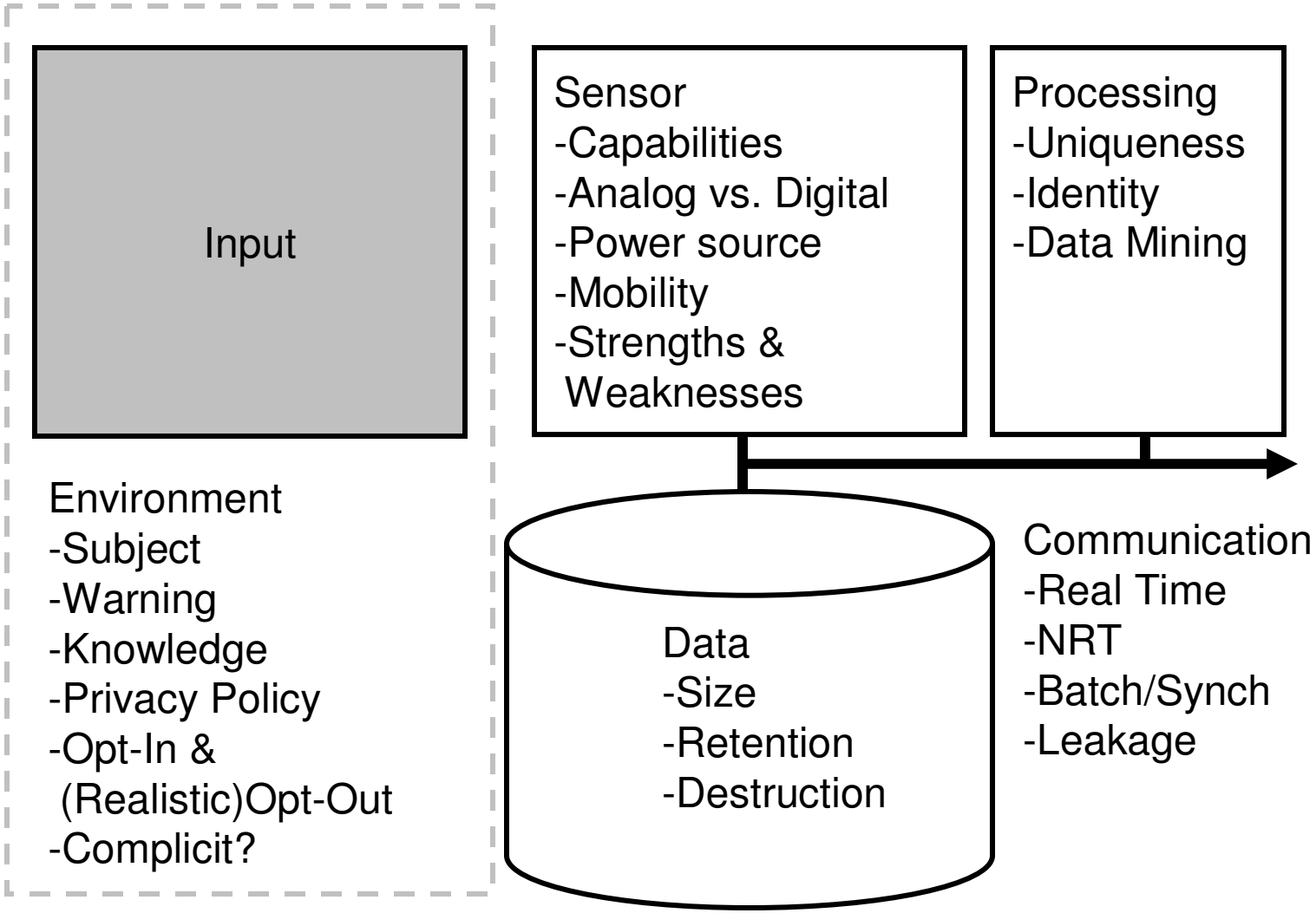
-Knowledge
-Privacy Policy
-Opt-In &
(Realistic)Opt-Out
-Complicit?
Data
-Size
-Retention
-Destruction

Model


Input
Sensor
-Capabilities
-Analog vs. Digital
-Power source
-Mobility
-Strengths &
Weaknesses
Processing
-Uniqueness
-Identity
-Data Mining
Environment
-Subject
-Warning
-Knowledge
-Privacy Policy
-Opt-In &
(Realistic)Opt-Out
-Complicit?
Data
-Size
-Retention
-Destruction

Model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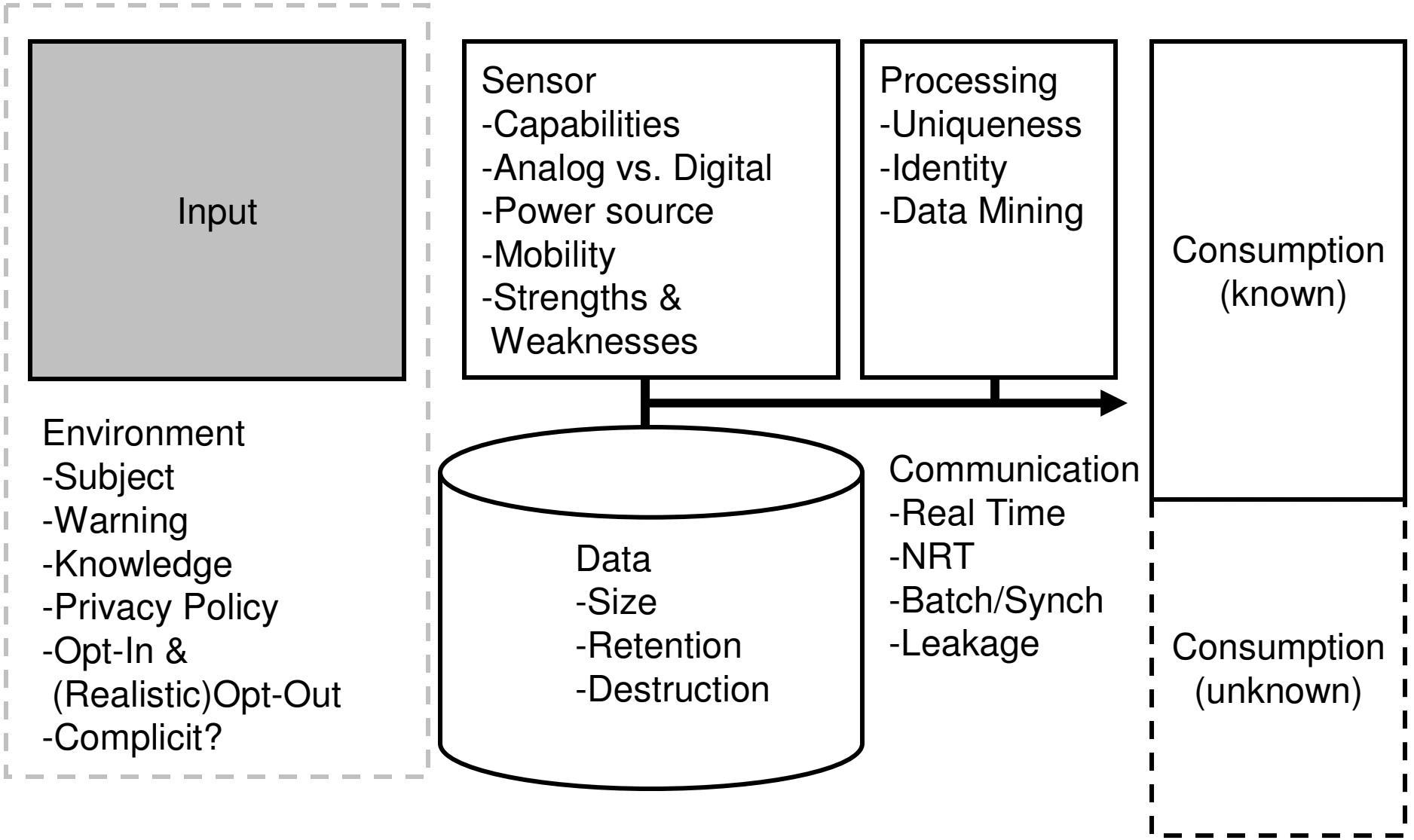
-Opt-In &
(Realistic)Opt-Out
-Complicit?
Data
-Size
-Retention
-Destruction
Communication
-Real Time
-NRT
-Batch/Synch
-Leakage

Model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Data
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-Destruction
Communication
-Real Time
-NRT
-Batch/Synch
-Leakage
Consumption
(known)
Consumption
(unknown)

Processing





- Anonymous Viewers
- 18 or older in EU
- £1000 Monthly prize
- Runners-up included in a “Thank You List””

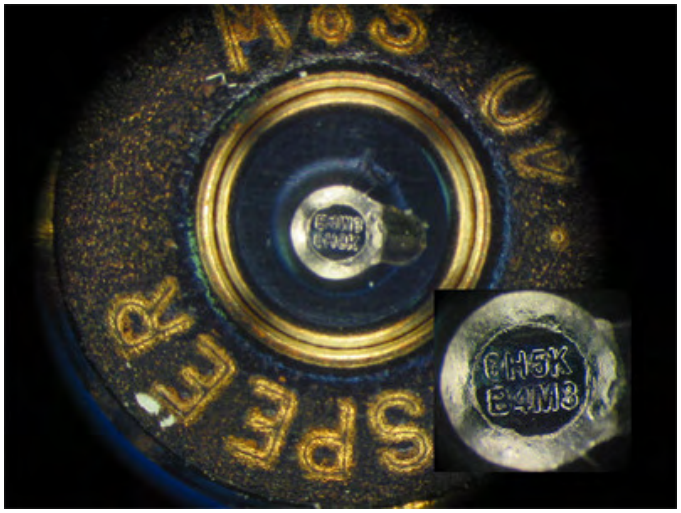
http://interneteyes.co.uk/

Data Spills

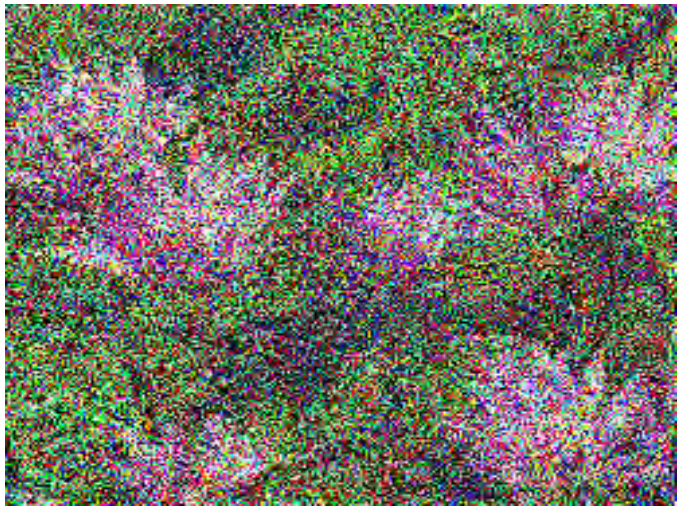


http://upload.wikimedia.org/wikipedia/commons/6/66/Exval.jpeg

Uniqueness



Firearm Microstamping



Pixel Noise In Cameras

- SSN
- Serial Numbers
- Watermarking
- DNA
- RFID
- Registration
- Voice / Fingerprint
- IP / OS / Application
- Typewriters
- Printers / Copiers
- Typing
- Morse code fist
- Handwriting analysis
- Facial recognition
- Bar code
- Gait
- Information disclosure

…

http://en.wikipedia.org/wiki/Ballistic_fingerprinting
http://www.engadget.com/2006/04/23/pixel-noise-said-to-create-unique-camera-fingerprint/

Genital Recognition



Chatroulette Plans Penis-Recognition Algorithm to Block Pervy Users
http://www.popsci.com/gadgets/article/2010-06/chatroulette-plans-genital-scanning-software-block-perverts

http://en.wikipedia.org/wiki/File:YpsilantiWaterTower.jpg

Types of Sensors

- Laser interferometer
- Parabolic microphone
- RFID readers
- Motion
- Breathalyzer
- Pressure
- Accelerometer
- Electro-optical sensor
- and hundreds more…



For over a great overview see http://en.wikipedia.org/wiki/List_of_sensors

film.dc.gov/film/cwp/view.asp?...c34170%7c

Your Person

Your Clothes



RFID Tags
Custom Clothes



Nike + iPod

lhttp://www.apple.com/ipod/nike/run.html
http://doc.mo.gov/mve/images/clothing/Civilian%20Blue%20Shirt%20LS.jpg

Your Phone

- Two microphones
- 5 Megapixel camera
- 3 axis gyroscope
- Wi-Fi, cellular connectivity
- Books, movies, phone, mail, music, web, voice control, map, accessibility
- 200,000 applications
- Automatic updates



iPhone 4

http://www.apple.com/iphone/features/

Your Phone

- Two microphones
- 5 Megapixel camera
- 3 axis gyroscope
- Wi-Fi, cellular connectivity
- Books, movies, phone, mail, music, web, voice control, map, accessibility
- 200,000 applications
- Automatic updates



iPhone 4

Research Topic

http://www.apple.com/iphone/features/

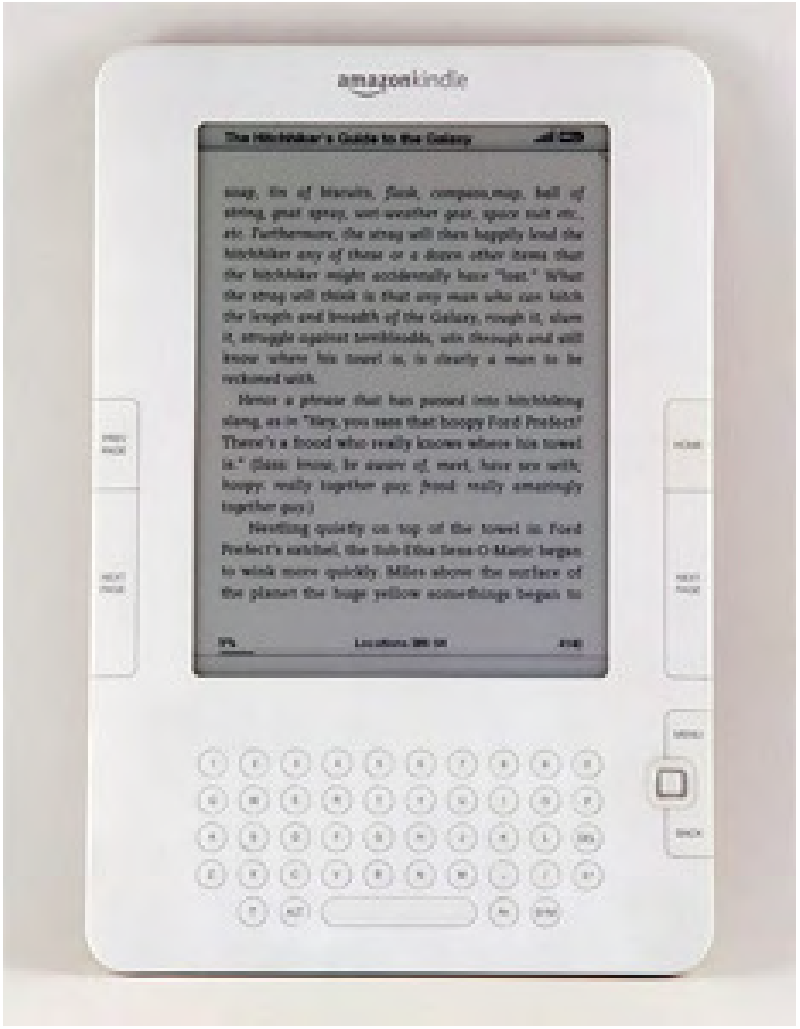
Your Watch



The Garmin FR60 automatically transfers data to your PC or Mac, wirelessly when in range. No cables, no hookups. The data's just there, ready for you to analyze, categorize, and share through the Garmin Connect online community.

http://www.amazon.com/Men-92s-Garmin-Forerunner60-Fitness-Monitor/dp/B001S2RCXC/ref=sr_1_1?ie=UTF8&s=electronics&qid=1276221149&sr=8-1

Books



http://en.wikipedia.org/wiki/File:Kindle_2_-_Front.jpg

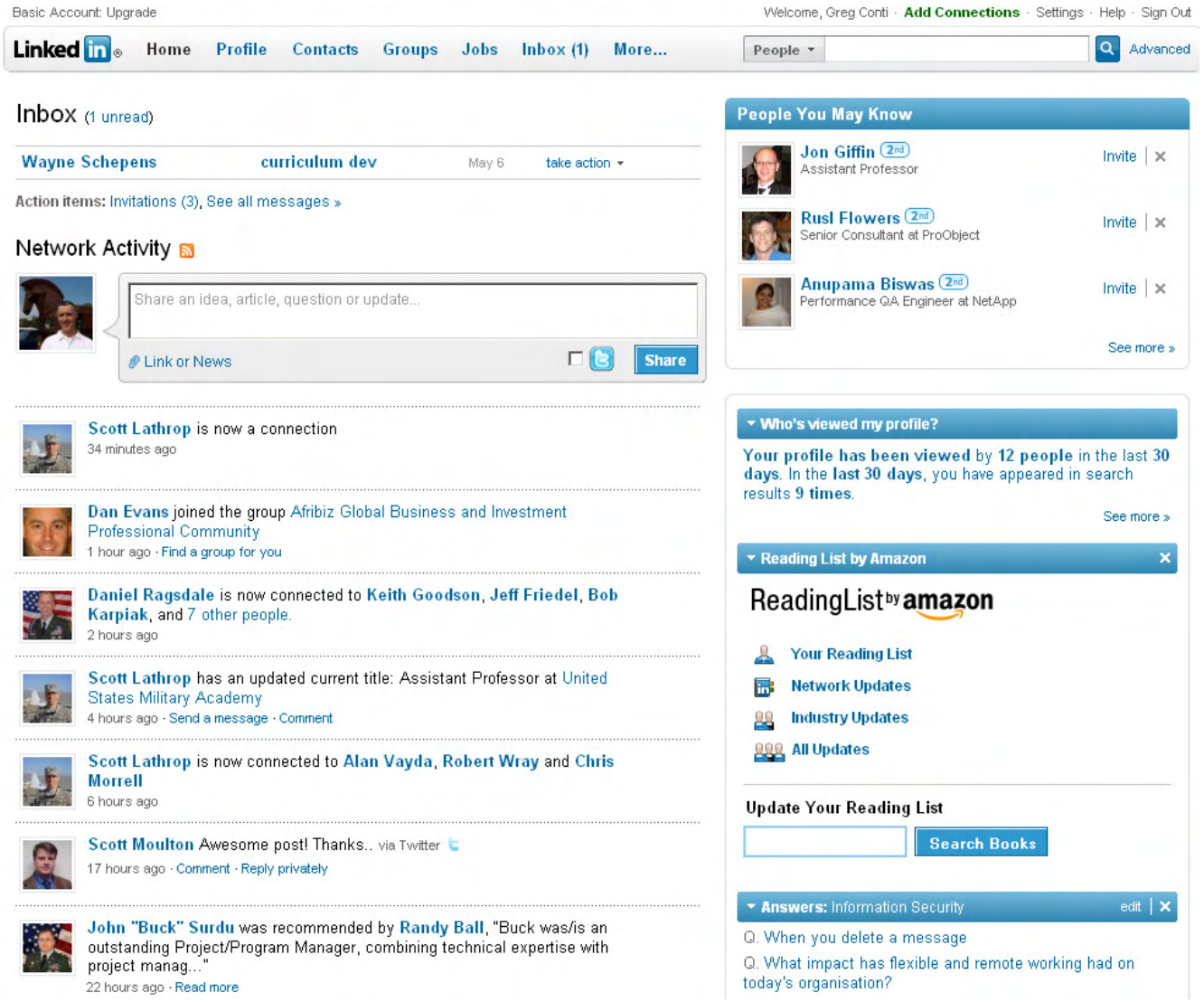
Online

Online Dating Service

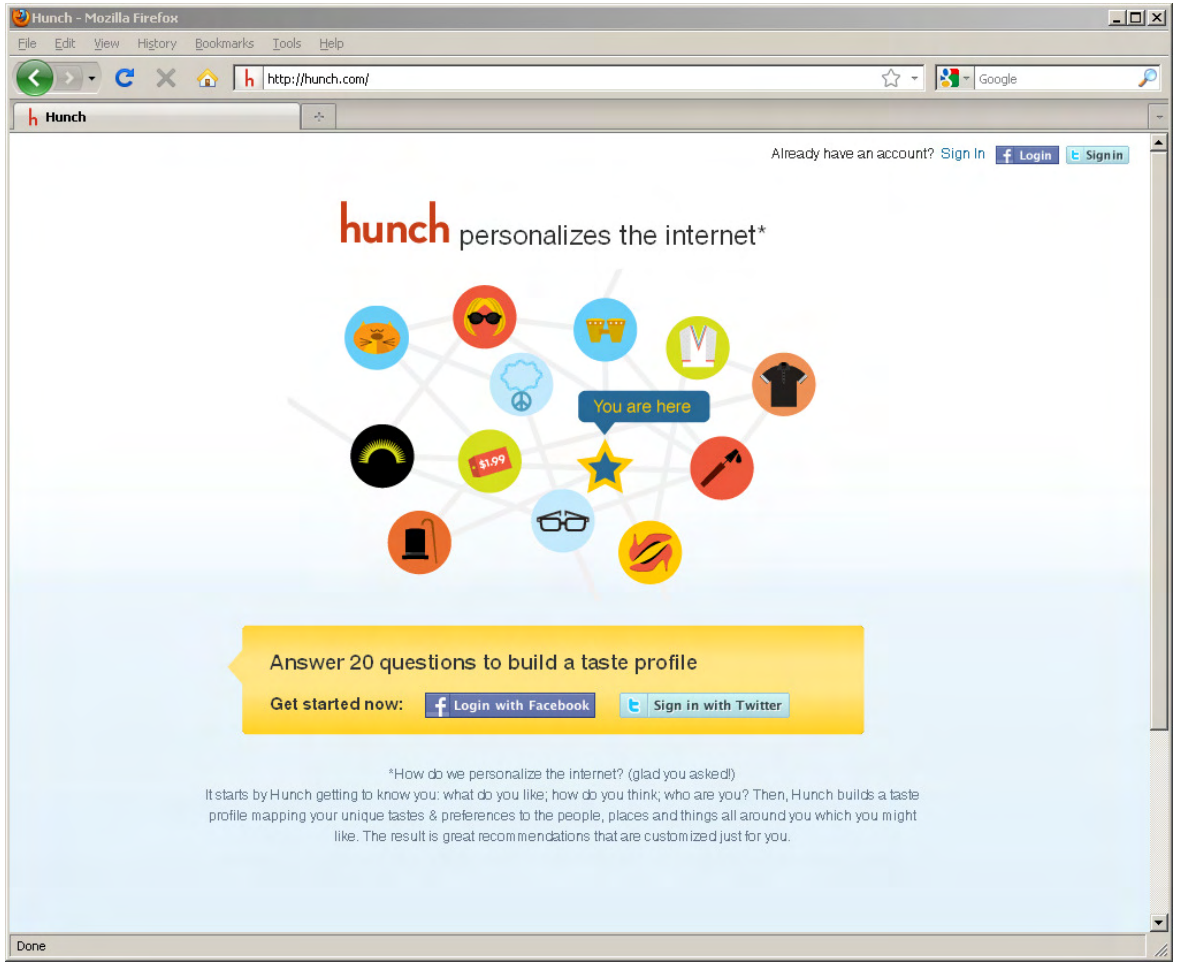


http://www.eharmony.com/

Social Networking



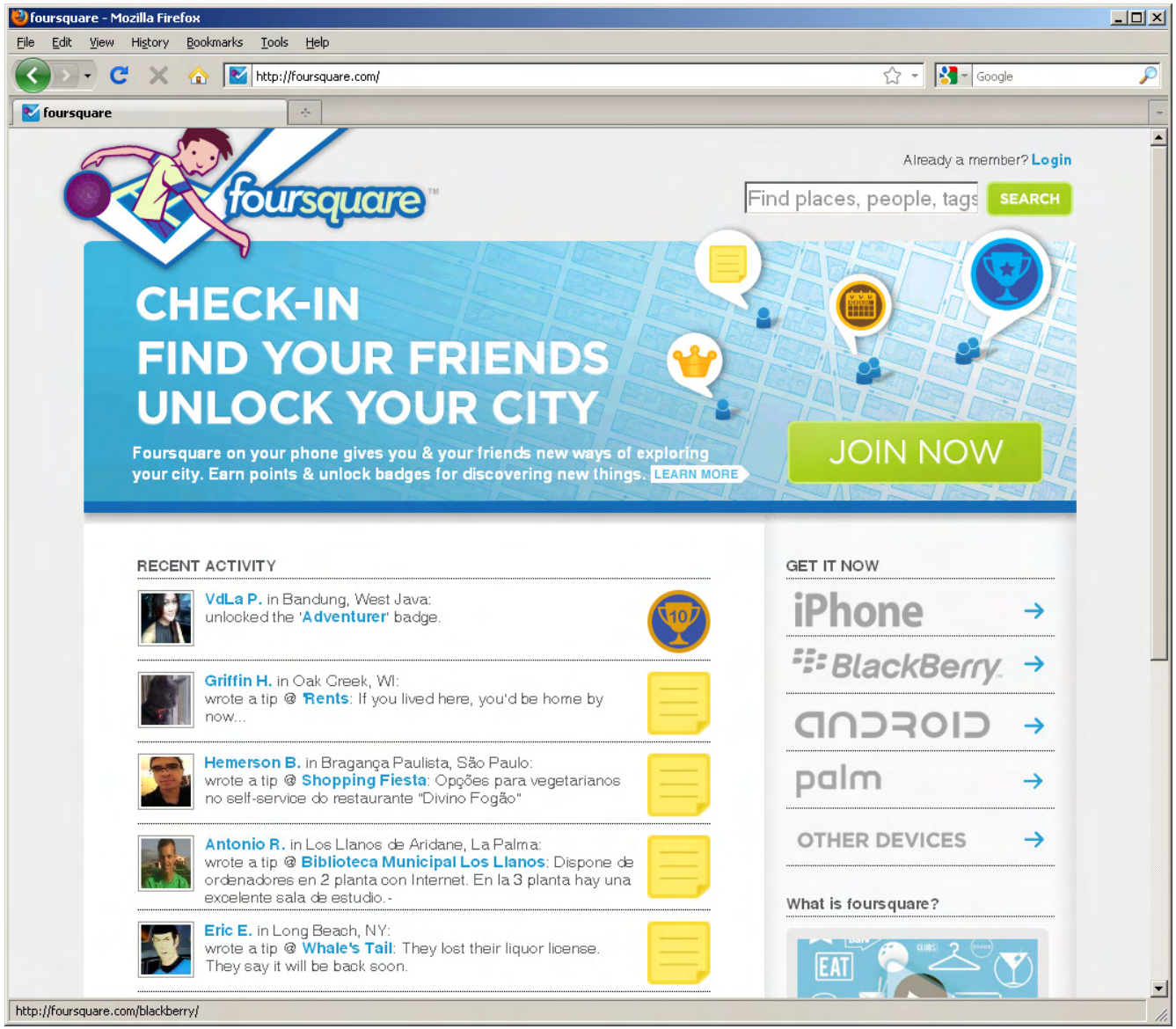
Social Search



"Hunch is arguably the most ambitious social search service... it is getting users to volunteer a truly impressive amount of unique psychographic data."

- Wired

Location Aware



Software


setup.exe
Microsoft Visual Studio 2005 Professional Edition - ENU has encountered a problem during setup. Setup did not complete correctly.
An error occurred during setup and a report was created with useful information about the problem encountered.
Please tell Microsoft about this problem.
By submitting this report, you will help Microsoft improve setup. Microsoft will treat this report as confidential and anonymous.
What data does this report contain?
Send Report
Don't Send Report

Software



Research Topic

Your Home



http://www.firesafety.gov/media/visuals/images/smoke_alarm/InstallAlarmC1_3.jpg

Cable Box

"Cable companies experimenting with different camera technologies built into devices so it can know who's in your living room."



- Experimental stage
- Probably based on body forms
- Assert parental controls
- Targeted advertising

http://newteevee.com/2008/03/18/comcast-cameras-to-start-watching-you/
http://www.comcast.com/MediaLibrary/1/1/Explore/ProductPages/DC/DVR_top_XF.jpg

Computer



- Web cam
- Microphone
- Scanner
- Fingerprint reader
- Printer copier
- Communication facilitator

…

http://en.wikipedia.org/wiki/File:MSI_Laptop_computer.jpg

Toys







http://en.wikipedia.org/wiki/File:Teddy_ruxpinBackpack.pnghttp://en.wikipedia.org/wiki/File:Furby.JPG
http://cache.lego.com/upload/contentTemplating/LEGOAboutUs-PressReleases/images/picE9D9E017265EBC62077D58AB3F164766.jpg

Games



Microsoft Kinect (AKA Project Natal)

- Depth sensing camera
- ID and track body parts
  - $4cm^3$ in space/10ms
- On sale in November

"Kinect-like technology could, for instance, be used in a home-security system that wouldn't confuse the motion of pets or family friends with those of an unfamiliar intruder…

The algorithm is essentially there for doing that kind of application, it's just a question of whether this is a socially acceptable thing: having a camera looking in on people"

-Jamie Shotton

MS Research

http://www.newscientist.com/article/dn19065-innovation-microsofts-kinect-isnt-just-for-games.html

Appliances



http://www.flickr.com/photos/samsungtomorrow/4406179174/

(Geotagging) Cameras



Sony DSC-HX5V

http://www.amazon.com/Sony-DSC-HX5V-Digital-Optical-Stabilization/dp/tech-data/B00328HR76/ref=de_a_smtd6

And More…



Smart Power Meter



Home Automation



Smart Urinals



Alarm Systems



Bathroom Scale

http://www.dnr.state.md.us/ed/waterlessurinal.jpg
http://en.wikipedia.org/wiki/File:X10_1.jpg
http://en.wikipedia.org/wiki/Smart_meter
http://www.gwinnettcounty.com/static/departments/police/images/alarn
http://www.genome.gov/images/feature_images/nr_scale.jpg

Tweeting Houseplants

Thank you for watering me!
10:40 PM Jun 26th, 2008

URGENT! Water me!
1:53 PM Jun 26th, 2008

Water me please.
1:52 PM Jun 26th, 2008

Thank you for watering me!
12:35 PM Jun 26th, 2008

URGENT! Water me!
12:34 PM Jun 26th, 2008

Water me please.
12:34 PM Jun 26th, 2008



http://twitter.com/startrkplant
http://en.wikipedia.org/wiki/File:Tomatplanta.JPG

The Tweeting Honeymoon Bed

They’re off the job! #27 – Action concluded at 16.47GMT. Duration: 12m.19 s. Frenzy Index: 9 (thrash metal). Judge’s Comment: "Hot sauce!" 8:48 AM Feb 22nd via Power Twitter

They’re on the job! #27 - Action commenced at 16.35GMT. Weight: 156KG. 8:35 AM Feb 22nd via Power Twitter

They’re off the job! #26 – Action concluded at 22.44GMT. Duration: 40m.59 s. Frenzy Index: 6 (Snow Patrol). Judge’s Comment: "Shabba." 2:45 PM Feb 18th via Power Twitter

They’re on the job! #26 - Action commenced at 22.04GMT. Weight: 156KG.



http://twitter.com/newlywedsontjob
http://en.wikipedia.org/wiki/File:Warsaw_Royal_Castle_GM_%2814%29.JPG

Pleasure Model Robots...



http://www.honeydolls.jp/img/gallerylmages/kaze_13.jpg

Pleasure Model Robots...



Research Topic

http://www.honeydolls.jp/img/galleryImages/kaze_13.jpg

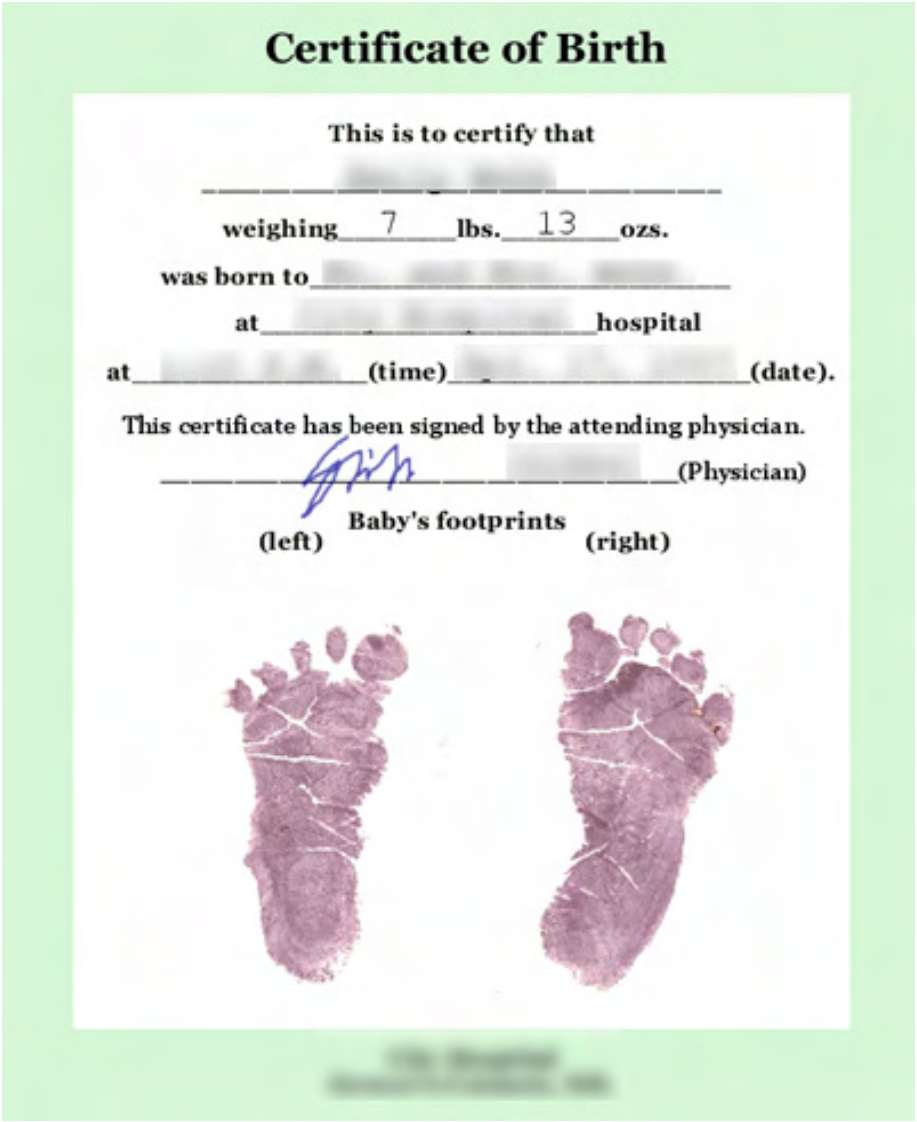
Around Town

Buying Coffee, Food, Beer



http://dps.cobbcountyga.gov/images/2009-12-30-zone1-img-02.jpg

At the Hospital



Certificate of Birth

This is to certify that

_____

weighing 7 lbs. 13 ozs.

was born to _____

at _____ hospital

at _____ (time) _____ (date).

This certificate has been signed by the attending physician.

_____ (Physician)

Baby's footprints

(left) (right)

_____

http://www2.hu-berlin.de/sexology/ECE2/birthcert.gif

At the Gym



Photo by Local Fitness - http://en.wikipedia.org/wiki/File:Gym_Cardio_Area_Overlooking_Greenery.JPG

Gunshot Detector



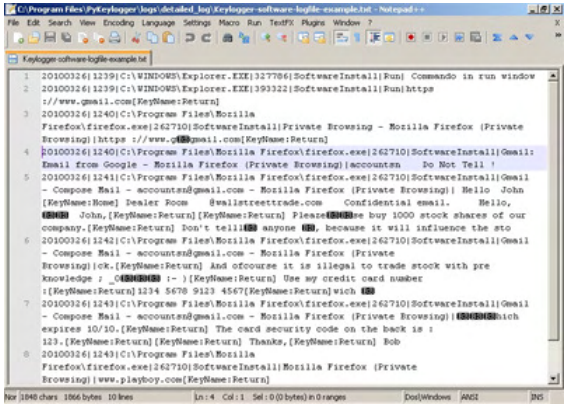
Boomerang III Gunshot Detection System

http://www.defense-update.com/events/2007/summary/mdm07_panoramic.htm

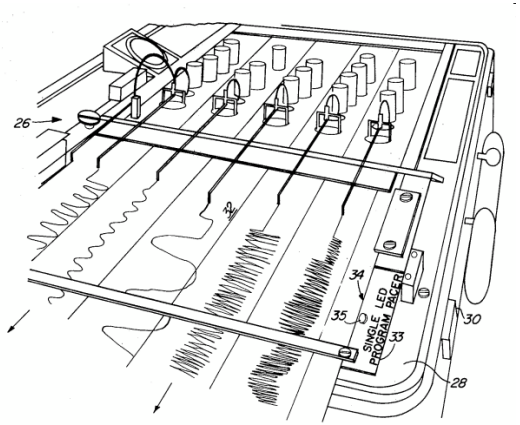
At the Office



Urinalysis



Keystroke Logging



Polygraph

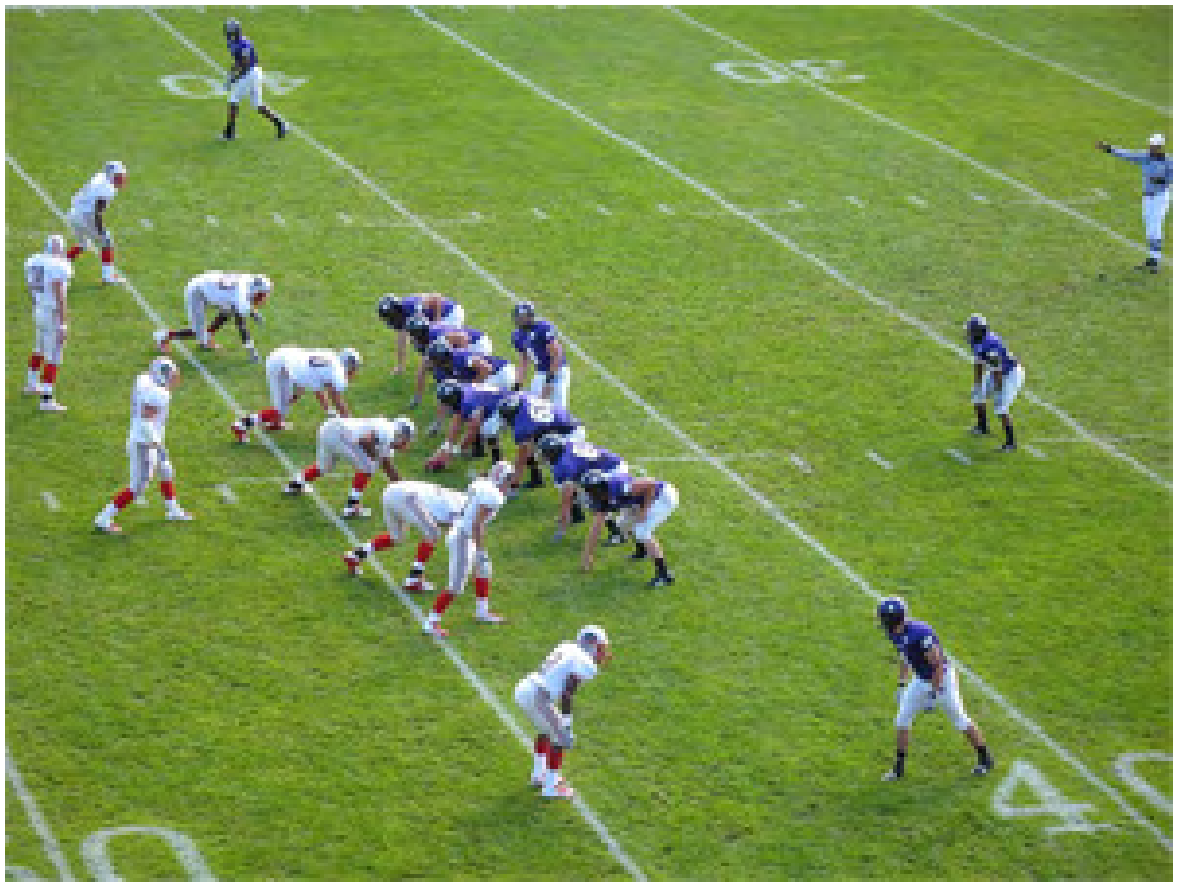
http://en.wikipedia.org/wiki/File:Polygraaf.PNG
http://www.maxwell.af.mil/shared/media/photodb/web/090218-F-2522C-038.jpg
http://en.wikipedia.org/wiki/File:Keylogger-software-logfile-example.jpg

At the Amusement Park



http://en.wikipedia.org/wiki/File:Biometrics.jpg

At the Superbowl



http://en.wikipedia.org/wiki/File:Football_cross.jpg

At the Grocery Store



http://www.shoprite.com/loyalty/images/ppc_wKey.gif

The Cell Phone as Loyalty Card



No one in advertising has ever been able to figure out how to do “one-to-one, real-time marketing. The mobile phone is where that will actually probably happen. It’s the only thing connected and always with you.”

- Drew Sievers
  mFoundry

fhttp://www.nytimes.com/2010/06/01/technology/01loopt.html?hpw
http://www.easycashcards.com/images/pizza_shop_customer_card.jpg
http://www.amazon.com/Motorola-CLIQ-Android-Titanium-T-Mobile/dp/B002TX754K/ref=sr_1_8?ie=UTF8&s=wireless&qid=1275847661&sr=1-8

Finance





http://en.wikipedia.org/wiki/File:Smartcard2.png
http://en.wikipedia.org/wiki/File:Fr%C3%BCher_Bankautomat_von_Nixdorf.jpg

Communication



http://transitorienteddevelopment.dot.ca.gov/images/photo/32.jpg

Travel by Car



Electronic Toll Collection



Red Light/Speed Cameras

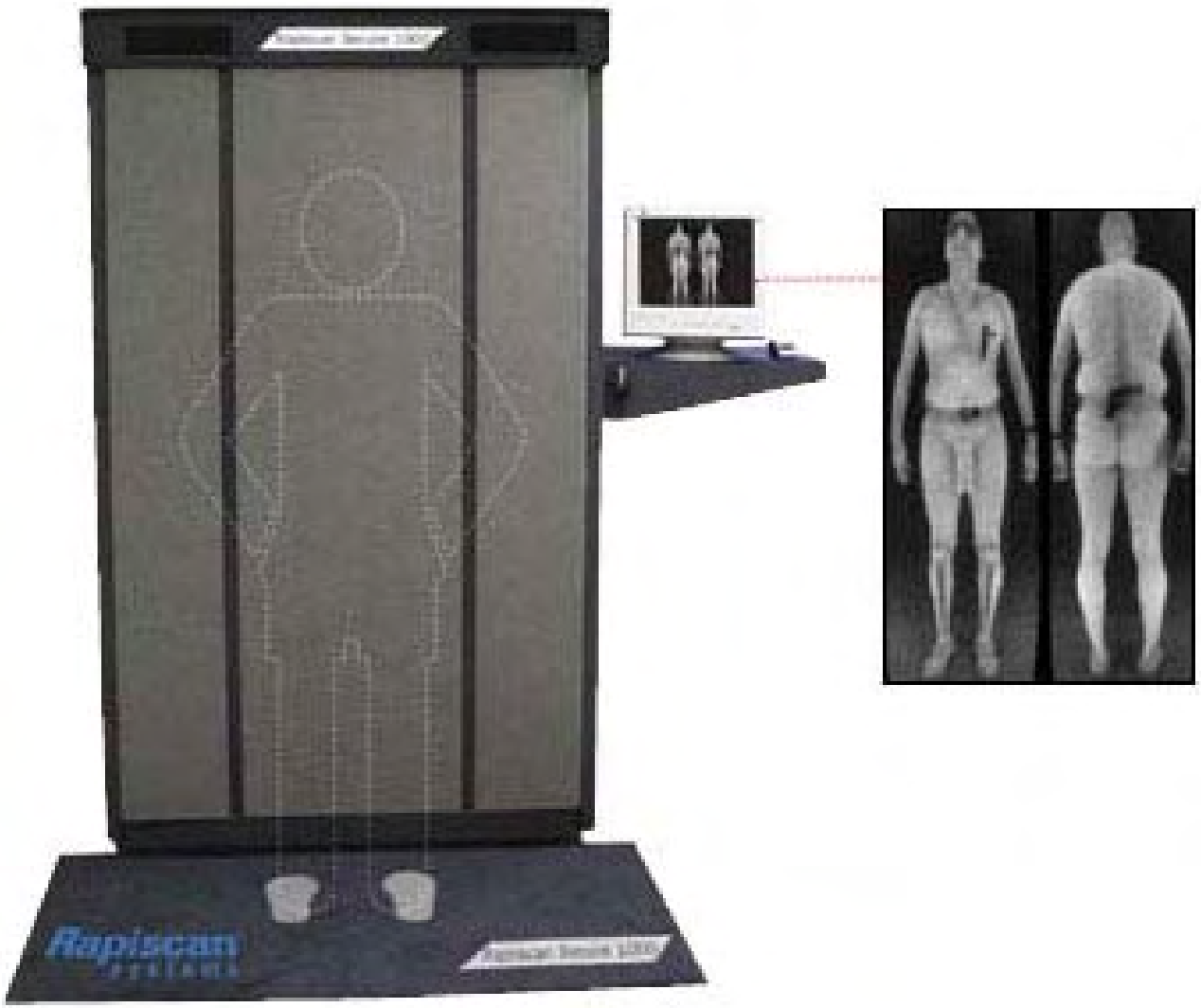


License Plate Readers

Also LoJack, radar/laser detection and the black box

http://en.wikipedia.org/wiki/File:Redlightcamera.jpg
http://en.wikipedia.org/wiki/Radio-frequency_identification
http://www.cctvcamerapros.com/License-Plate-Capture-Cameras-s/283.htm#LPR-Surveillance-Videos

Travel by Air



http://epic.org/privacy/airtravel/backscatter/

Travel by Train



http://www.wmata.com/fares/smartrip/

Countermeasures*

*Some of these are surely illegal, please talk to a lawyer if you are uncertain.
I'm providing these to be comprehensive, not to suggest you do illegal things.

Live in the 19th Century?



http://en.wikipedia.org/

Live in the 20th Century?*





*May be more or less impossible in the near future.

http://sanbruno.ca.gov/Library/Newsletter/2008/April%202008/dollar_bill.jpg

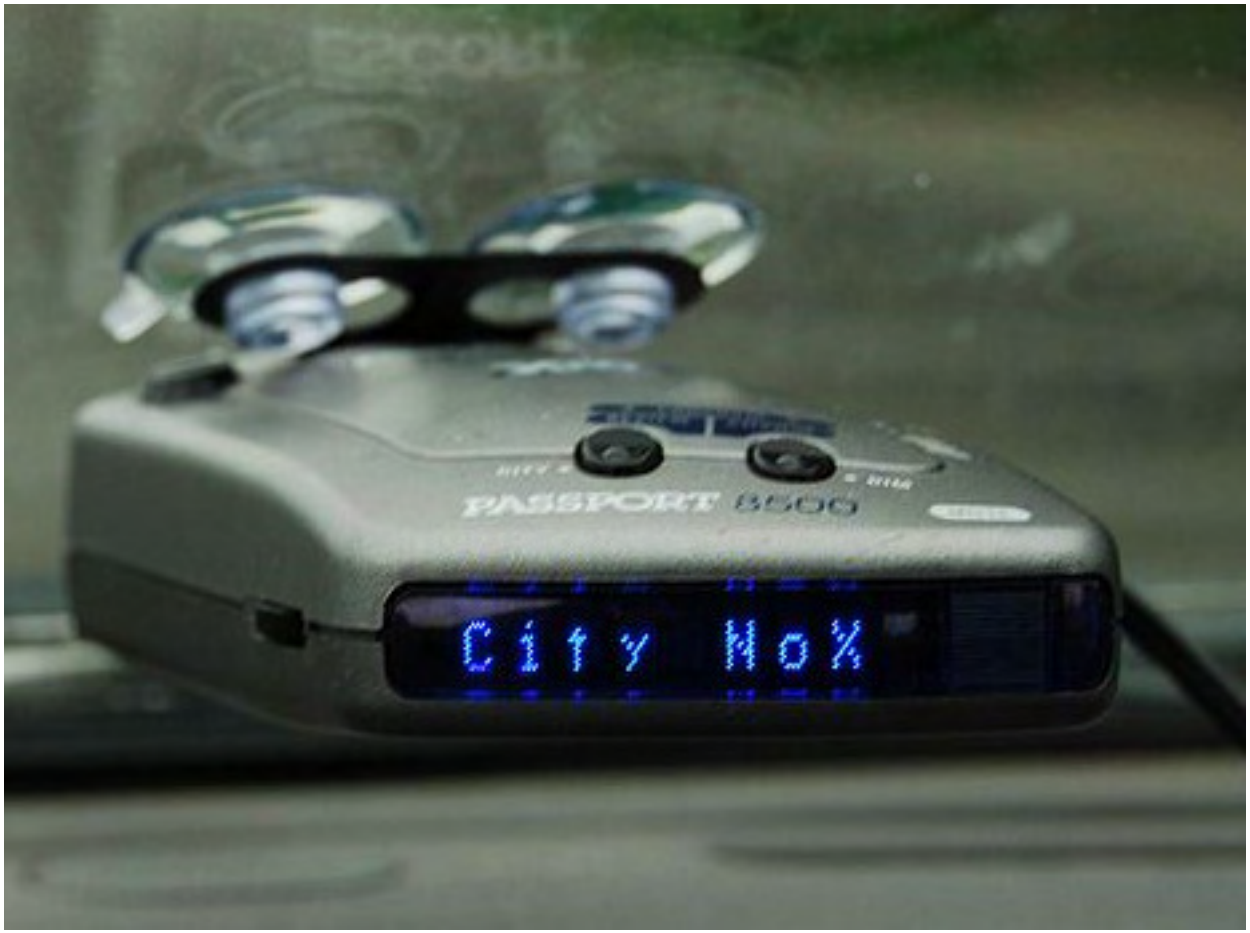
http://www.davie-fl.gov/Gen/DavieFL_Programms/garbage/0046ABD1-000F8513.1/telephone%20books_books.jpg

Disclose



http://www.syns0r.com/site/Cameras_and_Camcorders/Digital_Cameras/Camera_Kits/store_security_camera.html

Detect



See also sweeping rooms by specialists

http://en.wikipedia.org/wiki/File:Radar_Detector._canada._Escort_Passport_8500_x50_blue_3635.jpg

Monitor

NYC Surveillance Camera Project

Breakout lists by community board

Community Board 1
Community Board 2
Community Board 3
Community Board 4
Community Board 5
Community Board 6
Community Board 7
Community Board 8
Community Board 9

Community Board 1

- 364 Total Cameras

Robert F. Wagner, Jr. Park:
4 globe cameras

South Street and FDR:
1 stationary camera, NW corner

State and Bridge Streets:
2 globe cameras, NE corner

Pearl Street between State and Whitehall Streets:
5 stationary cameras on lamposts, south side

Bridge Street between State and Whitehall Streets:
3 globe cameras, 1 stationary camera, north side



http://www.mediaeater.com/cameras/info/cb-01.html

Bypass



Shield



Faraday Room



License Plate Cover

See also RFID blocking wallets, radar camouflaging paint

http://licenseplatecovers.info/
http://en.wikipedia.org/wiki/File:Elektrisch_dode_kamer_%28kooi_van_Faraday%29.JPG

Jam



See also “vibrating windows,” lasers into optical sensors

http://www.maine.gov/dep/rwm/drinkingwater/photos/running%20water%20from%20kitchen%20faucet.jpg

Disable*



*Please don’t do this

See also take out batteries, microwave RFID

http://www.puppetgov.com/wp-content/uploads/2009/08/speed-camera-011-774542.jpg

Express Displeasure





http://www.bluffcitypd.com/
http://www2.tricities.com/tri/news/local/article/anti-speed_camera_activist_nabs_bluff_city_pds_expiring_web_domain/47244/?ik

Art



http://www.stopdigitalstripsearches.org/

Art



Research Topic

http://www.stopdigitalstripsearches.org/

Rally Community Support



See also the English Villagers vs. Street View Cars

http://oldstersview.files.wordpress.com/2006/08/camera.jpg

Embarass

Slashdot POLITICS FOR NERDS. YOUR VOTE MATTERS.

Stories Recent Popular Search

Politics: California Judge Routes Campaign Robocalls Through Colorado

Posted by timothy on Sunday June 06, @02:58PM
from the parsing-the-point-finely dept.

Thomas Hawk writes



> "Victoria Kolakowski, a current sitting law judge at the California PUC, is running for Alameda Superior Court judge in California. As part of her campaign she is robodialing people in California with a pre-recorded message. The only problem is that in Californa robodials are actually *illegal* unless first introduced by a non-recorded natural person who gains consent to play the call. Ironically, the agency set up to protect our privacy and enforce this law, the California PUC, is the very agency where Kolakowski works today. Kolakowski originally apologized for the calls but then later deleted messages on her Facebook account from people objecting to her use of these calls. Now Kolakowski is trying to argue that because 'technically' she is routing her calls through Colorado from outside the state that her robodials are actually legal."

court election ethics politics privacy story

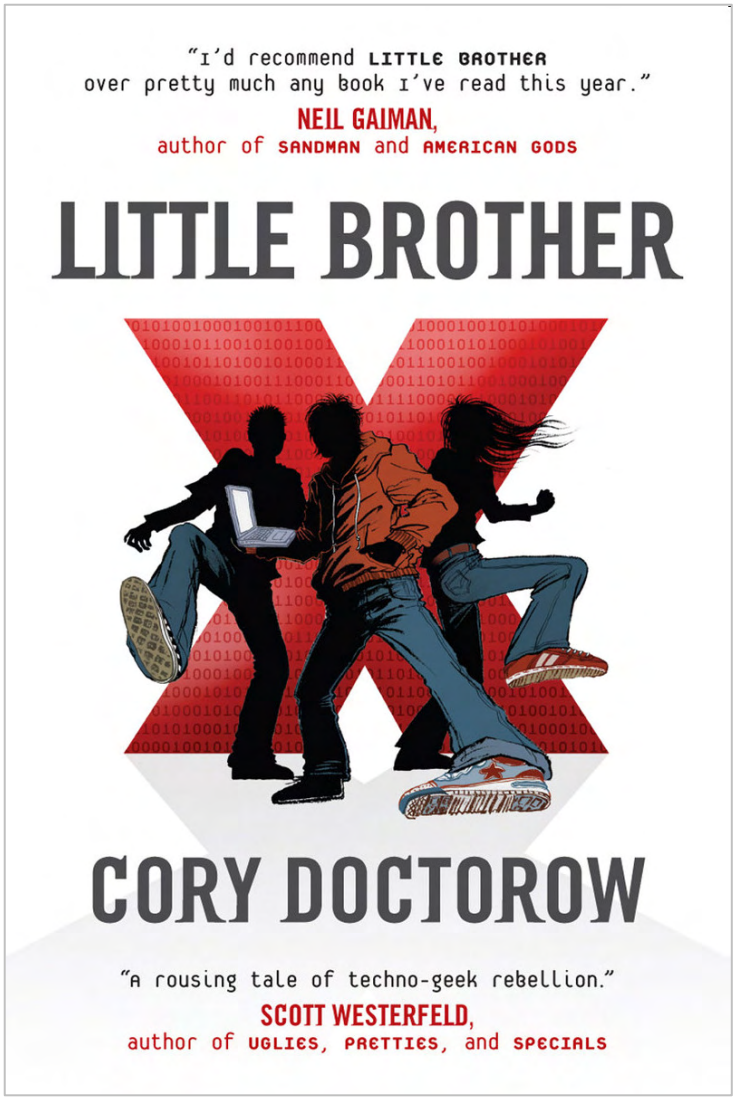
Spoof

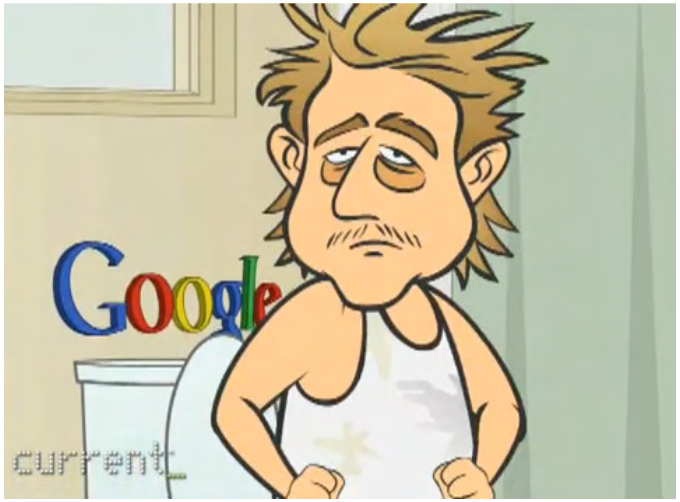


Stephanie Schuckers (Clarkson University)

http://cdn.physorg.com/newman/gfx/news/2005/schuckers2005.jpg

Raise Awareness







http://www.youtube.com/watch?v=hrontojPWEE

Anonymization*

* This slide is deliberately left blank.

Vote With Your Wallet



http://en.wikipedia.org/wiki/File:WalletMpegMan.jpg

Engage Policy Makers and Media





http://www.californiaprogressreport.com/September-10,-2007-125.gif
http://vulcan.wr.usgs.gov/Imgs/Jpg/MSH/MSH05/MSH05_media_interview_USGS_Lockhart_03-10-05_med.jpg

Canadian Standards Association Code for Protecting Personal Information

- Accountability
- Identifying Purposes
- Consent
- Limiting Collection
- Limiting Use, Disclosure, and Retention
- Accuracy
- Safeguards
- Openness
- Individual Access
- Challenging Compliance

Database Nation, p279

Vote With Your Vote



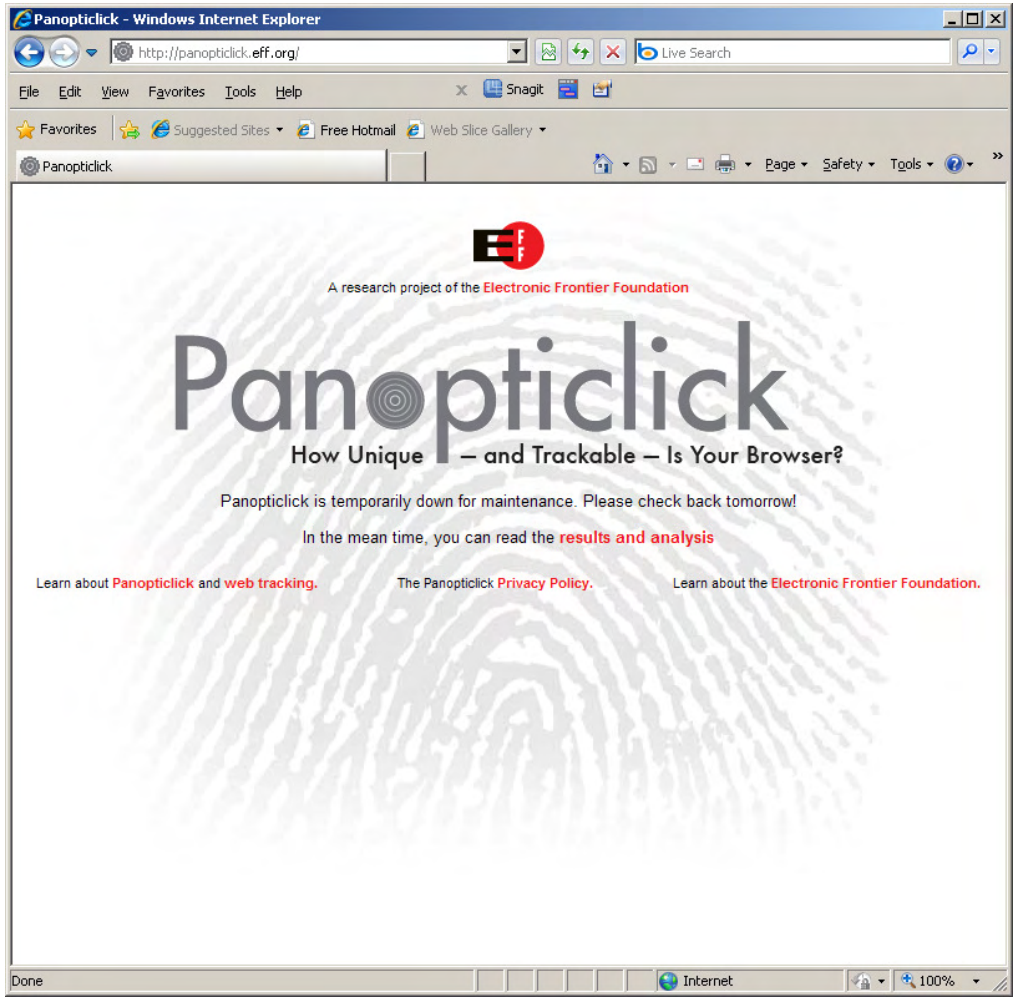
http://www.miamidade.gov/district08/photogallery/Albums/District8/elections_seniors/JMF_3007--Photo%20Gallery%20-%20420%20JPEG%20-%20Large.jpg

Support Opt-in



http://www.thelasthope.org/amd.php

Conduct and Share Research





ELECTRONIC FRONTIER FOUNDATION

How Unique Is Your Web Browser?

Peter Eckersley*

Electronic Frontier Foundation,
pde@eff.org

Abstract. We investigate the degree to which modern web browsers are subject to "device fingerprinting" via the version and configuration information that they will transmit to websites upon request. We implemented one possible fingerprinting algorithm, and collected these fingerprints from a large sample of browsers that visited our test site, panopticlick.eff.org. We observe that the distribution of our fingerprint contains at least 18.1 bits of entropy, meaning that if we pick a browser at random, at best we expect that only one in 286,777 other browsers will share its fingerprint. Among browsers that support Flash or Java, the situation is worse, with the average browser carrying at least 18.8 bits of identifying information. 94.2% of browsers with Flash or Java were unique in our sample.

By observing returning visitors, we estimate how rapidly browser fingerprints might change over time. In our sample, fingerprints changed quite rapidly, but even a simple heuristic was usually able to guess when a fingerprint was an "upgraded" version of a previously observed browser's fingerprint, with 99.1% of guesses correct and a false positive rate of only 0.86%.

We discuss what privacy threat browser fingerprinting poses in practice, and what countermeasures may be appropriate to prevent it. There is a tradeoff between protection against fingerprintability and certain kinds of debuggability, which in current browsers is weighted heavily against privacy. Paradoxically, anti-fingerprinting privacy technologies can be self-defeating if they are not used by a sufficient number of people; we show that some privacy measures currently fall victim to this paradox, but others do not.

1 Introduction

It has long been known that many kinds of technological devices possess subtle but measurable variations which allow them to be "fingerprinted". Cameras [1, 2], typewriters [3], and quartz crystal clocks [4, 5] are among the devices that can be

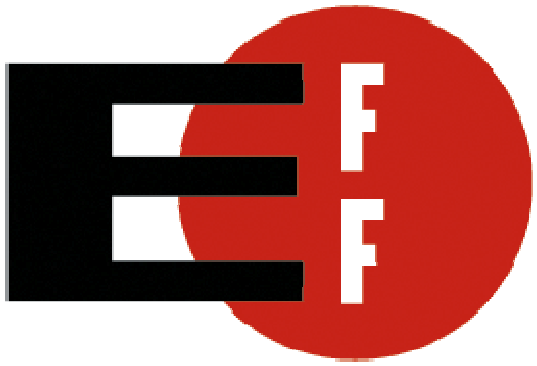
* Thanks to my colleagues at EFF for their help with many aspects of this project, especially Seth Schoen, Tim Jones, Hugh D'Andrade, Chris Controlli, Stu Matthews, Rebecca Jeschke and Cindy Cohn; to Jared Wierzbicki, John Buckman and Igor Serebryany for MySQL advice; and to Andrew Clausen, Arvind Narayanan and Jonathan Mayer for helpful discussions about the data. Thanks to Chris Soghoian for suggesting backoff as a defense to font enumeration.

Find Like Minded Individuals

- ACM Computers Freedom and Privacy Conference
  - http://www.cfp2010.org
- Workshop on Privacy in the Electronic Society (WPES)
  - http://wpes10.csi.muohio.edu/
- Privacy Enhancing Technologies Symposium (PETS)
  - http://petsymposium.org/
- … and many more



Support Your Privacy Champions of Choice





Privacy by Design



http://www.designspongeonline.com/2010/06/thanks-for-shredding-my-paper-coffee-table.html

COMMON SENSE;

ADDRESSED TO THE

INHABITANTS

OF

AMERICA,

On the following interesting

SUBJECTS.

I. Of the Origin and Design of Government in general, with concise Remarks on the English Constitution.

II. Of Monarchy and Hereditary Succession.

III. Thoughts on the present State of American Affairs.

IV. Of the present Ability of America, with some miscellaneous Reflections.

Man knows no Master save creating HEAVEN,
Or those whom choice and common good ordain.

THOMSON.

PHILADELPHIA;
Printed, and Sold, by R. BELL, in Third-Street.

MDCCLXXVI.

http://www.nps.gov/history/history/online_books/declaration/images/fig8.jpg

A Look to the Future…

Through Wall Radar



Cambridge Consultants
Prism 200

- Handheld through-wall radar, which has been designed to be used by police, special forces or the emergency services.
- It provides quick and covert intelligence on the movement and location of people in a room or building - without the need for invasive sensors.
- Highlights moving people and objects in cluttered environments, through doors or brick, block and concrete walls.
- Easy to use
- Can be tripod-mounted for long-term surveillance
- Remote monitoring and data recording using a laptop computer

http://www.cambridgeconsultants.com/prism_200.html

Internet Scale Experimentation



pic src:www.sriraj.org modified by Gaea Times

http://blog.taragana.com/index.php/archive/google-background-experiment-withdrawn/

Electronic License Plates



http://en.wikipedia.org/wiki/File:MI_2008.jpg

Instrumented Kids



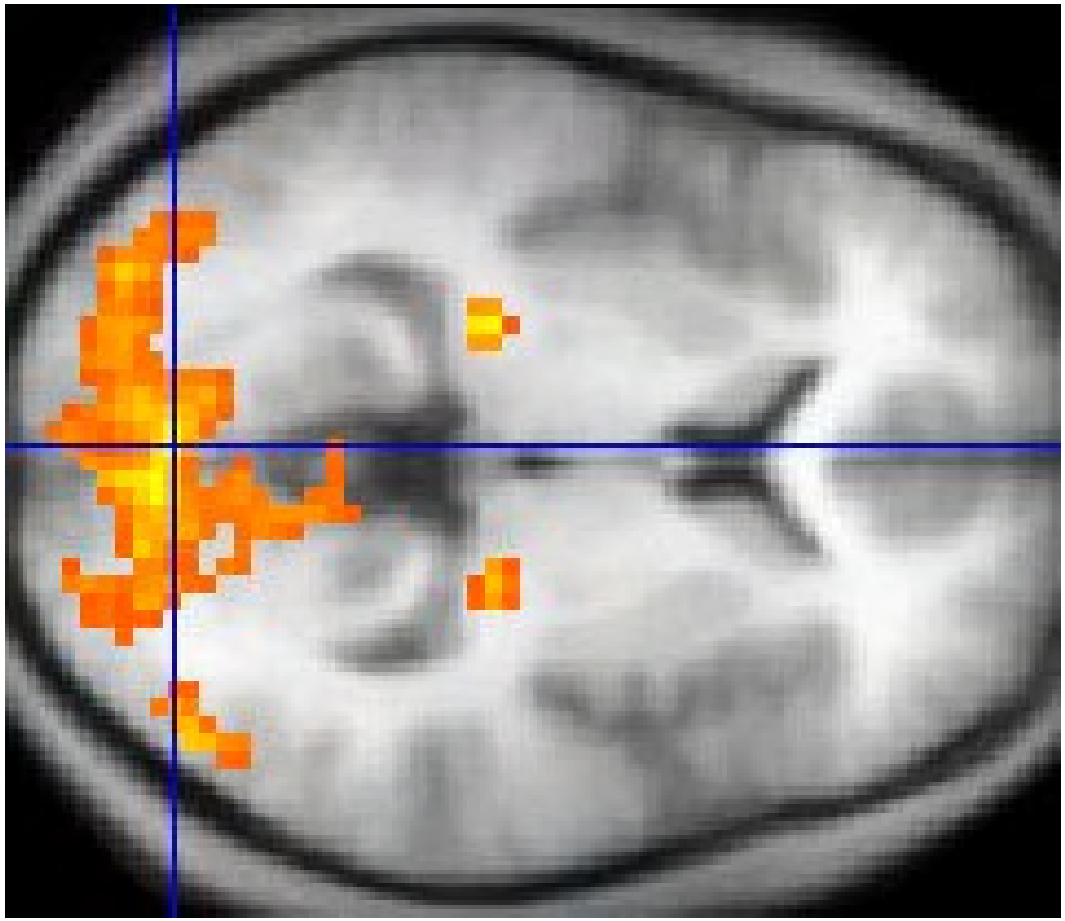


Wearable Computing



http://www.cc.gatech.edu/~thad/

Reading the Brain



functional Magnetic Resonance Imaging (fMRI)

"Now scientists can read your mind better than you can"

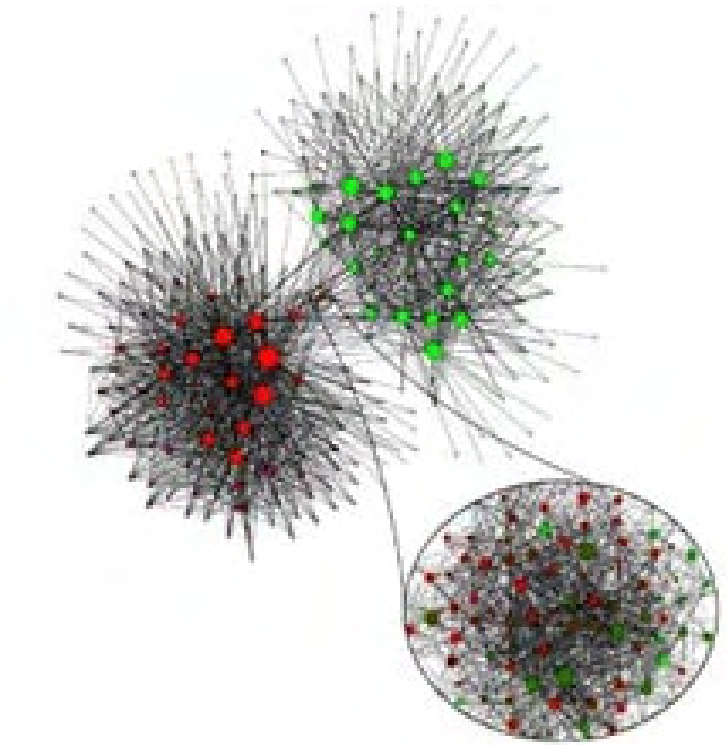
Recent Experiment
-50% of humans accurately predicted own future behavior
-Activity in medial prefontal cortex, 75% accuracy

"While the findings can be important for advertisers seeking to hone a motivational message, they can be equally important for public health experts trying to persuade people to make healthier choices"

- Emily Falk, UCLA

http://en.wikipedia.org/wiki/File:FMRI.jpg
http://www.reuters.com/article/idUSN2214937420100622

Mobile User Data Mining



2M Cell Phone Users in Belgium
6 Months
Dutch-speaking (green)
French-speaking (red)
By Vincent Blondel

- Example: A Recent ATT Project
  - LA and NYC
  - March 15 – 15 May 2009
  - Millions of SMS and Voice records
    - Source / Destination Number
    - Type and Duration of contact
    - Cell phone tower ID
  - Location accuracy w/i 1 Mile
  - Studied travel habits
  - New Yorkers travel 2.5 miles on weekdays and ~70 miles on weekends.

See… http://www.technologyreview.com/communications/25396/

Reality Mining

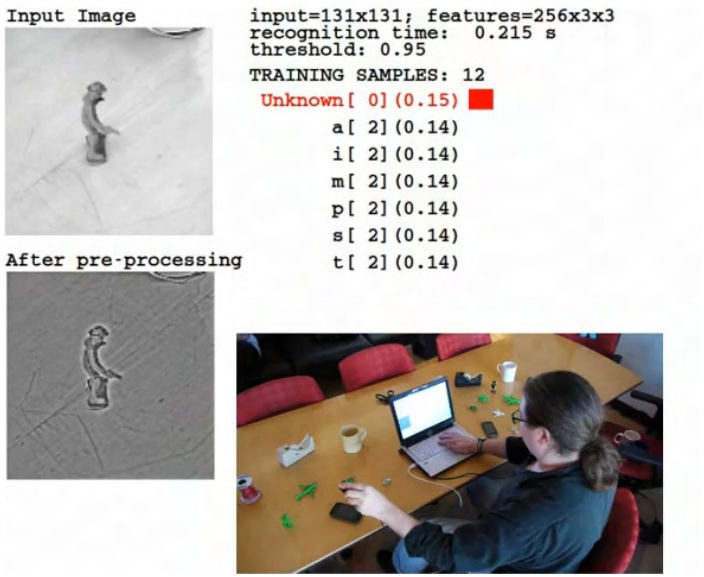


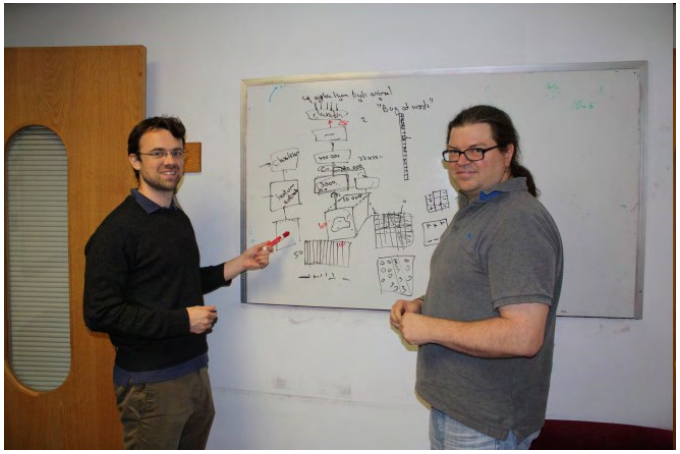
MIT Media Lab
Reality Mining Group
PI: Nathan Eagle

- The Reality Mining research project aims:
  - developing technology and algorithms for sensing
  - Modeling
  - Changing human behavior.
- Some themes…
  - Sociology in the 21st Century
  - User Behavior Modeling and Prediction
  - Relationship Inference
  - Social Serendipity
  - Organizational Dynamics
  - Epidemiology and Information Dissemination
  - Eigenbehavior
- Complex Social Systems: “By continually logging and time-stamping information about a user's activity, location, and *proximity to other users*, the dynamics of large-scale human behavior can be measured. ”

See… http://reality.media.mit.edu/viz.php

Deep Learning





Yann LeCun and Rob Fergus
New York University

- $2M Four year DARPA project
- Identify objects, actions, and voices
- Spot activities like running, jumping, getting out of car
- Uses unsupervised learning

"Ideally, what we'll come away with is a 'generic learning box' that can identify every data cue"

See… http://www.wired.com/dangerroom/2010/05/darpa-code-teaching-itself-what-the-world-looks-like/

Augmented Reality



http://en.wikipedia.org/wiki/File:Augmented_GeoTravel.jpg

The Internet of Things

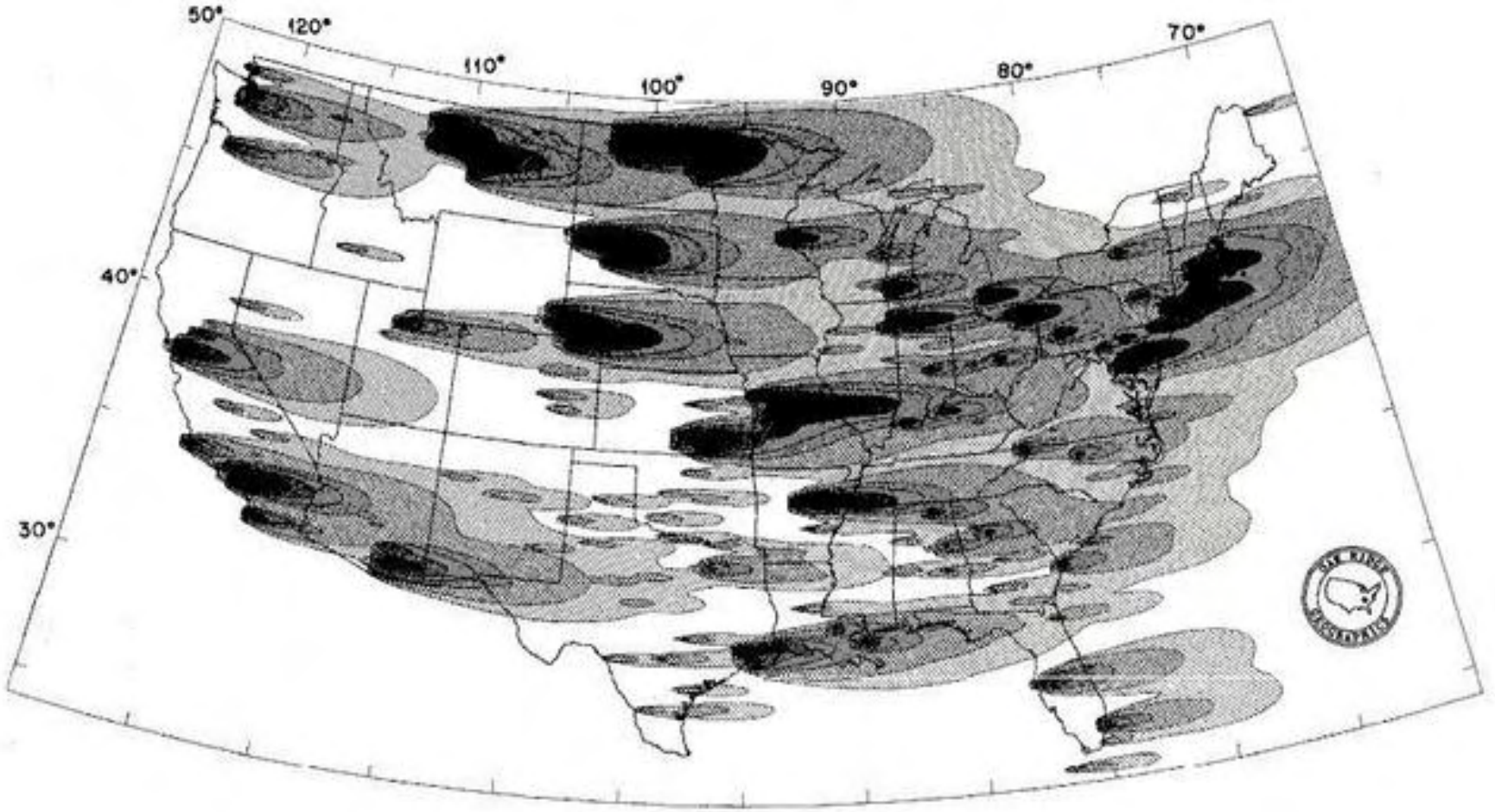
- Self-configuring wireless network of sensors
- RFID will play a big role
- Purpose to interconnect many (all) things
- Ability to encode 50 to 100 trillion objects
- Follow the movement of those objects.
- Every human being is surrounded by 1,000 to 5,000 objects
- IPv6 Addressing 2^128



See… http://en.wikipedia.org/wiki/Internet_of_Things

http://www.campbellsoup.com/images/condensed/photos/2292.png

Conclusions



http://media.photobucket.com/image/nuclear%20fallout%20poster%20map%20targets/newbie_bucket/Fig004-0120Simplified20Fallout20Pat.jpg

Questions?



http://www.state.gov/cms_images/MG6414.jpg