

Our Instrumented Life



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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.

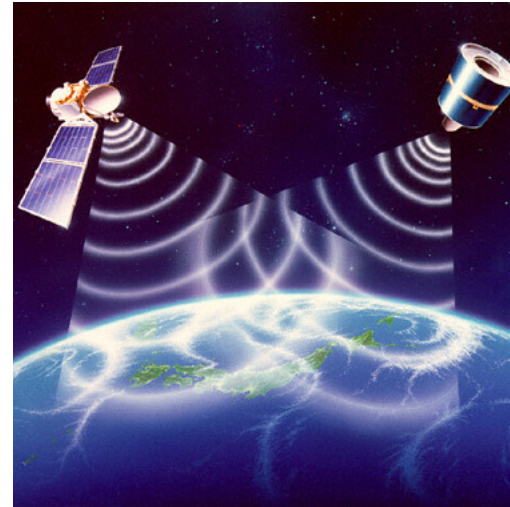
Where are the sensors in your life?



Sometimes They Find You...



Census Taker



Satellite



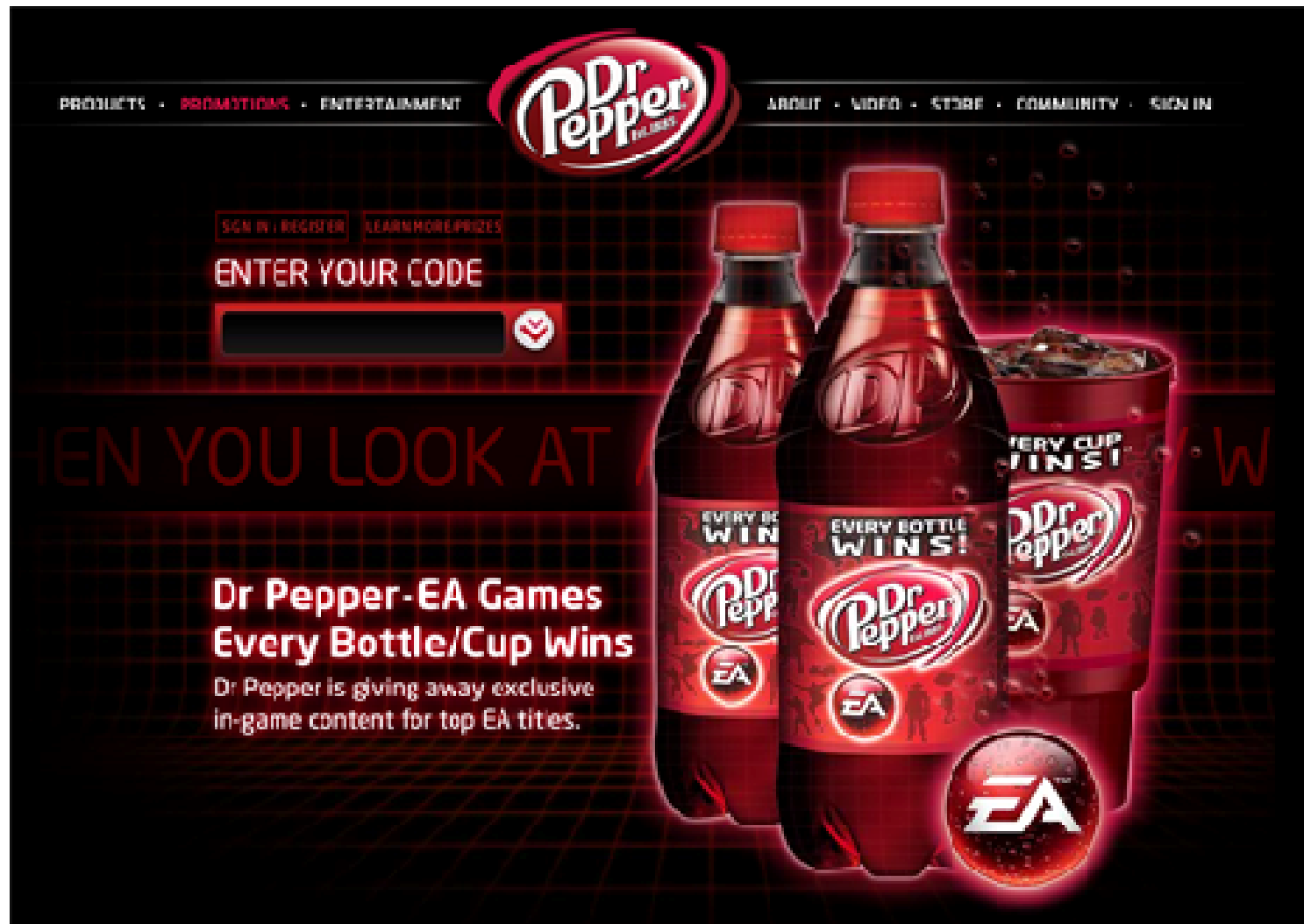
Robocaller



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...



A screenshot of the Dr Pepper-EA Games promotion website. The page has a dark background with a red grid pattern. At the top, there is a navigation bar with links: PRODUCTS, PROMOTIONS, ENTERTAINMENT, ABOUT, VIDEO, STORE, COMMUNITY, and SIGN IN. The Dr Pepper logo is prominently displayed in the upper center. Below the navigation bar, there are buttons for SIGN IN / REGISTER and LEARN MORE / PRIZES. A large text field labeled ENTER YOUR CODE is visible, with a small EA logo icon to its right. The main content area features the text "WHEN YOU LOOK AT" on the left and "EVERY CUP WINS!" on the right. In the center, there is a large image of two Dr Pepper bottles and a cup, all featuring the EA logo. Below this image, the text "Dr Pepper-EA Games Every Bottle/Cup Wins" is displayed, followed by a smaller line of text: "Dr Pepper is giving away exclusive in-game content for top EA titles." The EA logo is also visible in a circular frame at the bottom right of the image area.

PRODUCTS • PROMOTIONS • ENTERTAINMENT

ABOUT • VIDEO • STORE • COMMUNITY • SIGN IN

SIGN IN / REGISTER LEARN MORE / PRIZES

ENTER YOUR CODE

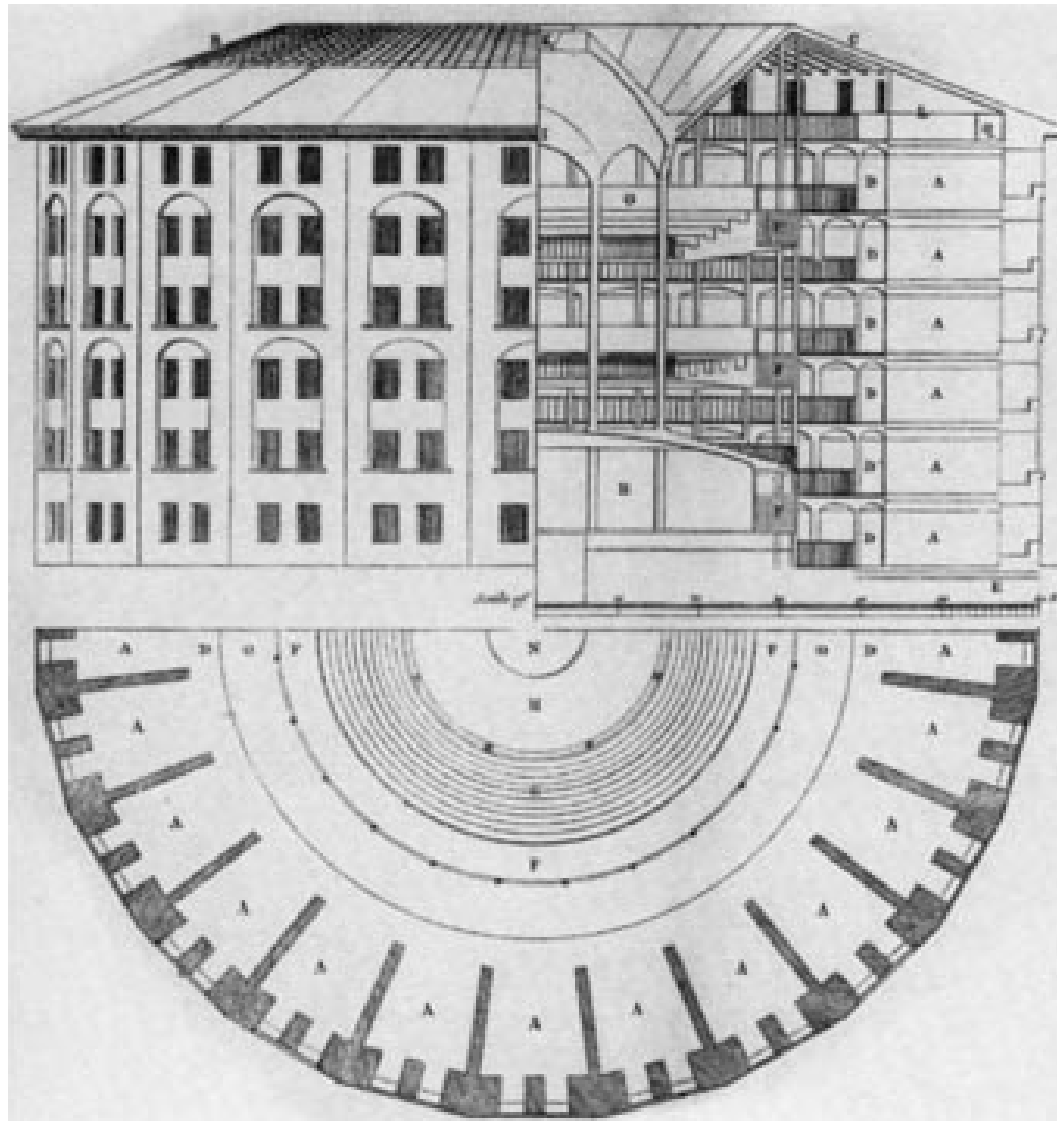
WHEN YOU LOOK AT

EVERY CUP WINS!

Dr Pepper-EA Games Every Bottle/Cup Wins

Dr Pepper is giving away exclusive in-game content for top EA titles.

EA



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

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

The diagram illustrates a 'Model' with three main components. On the left, a dashed box contains two sub-sections: 'Input' and 'Environment'. 'Input' is represented by a solid gray rectangle with the word 'Input' centered inside. 'Environment' is a list of factors below it. To the right of the dashed box is a solid black rectangle labeled 'Sensor', which contains a list of sensor-related factors. The entire diagram is titled 'Model' at the top center.

Input

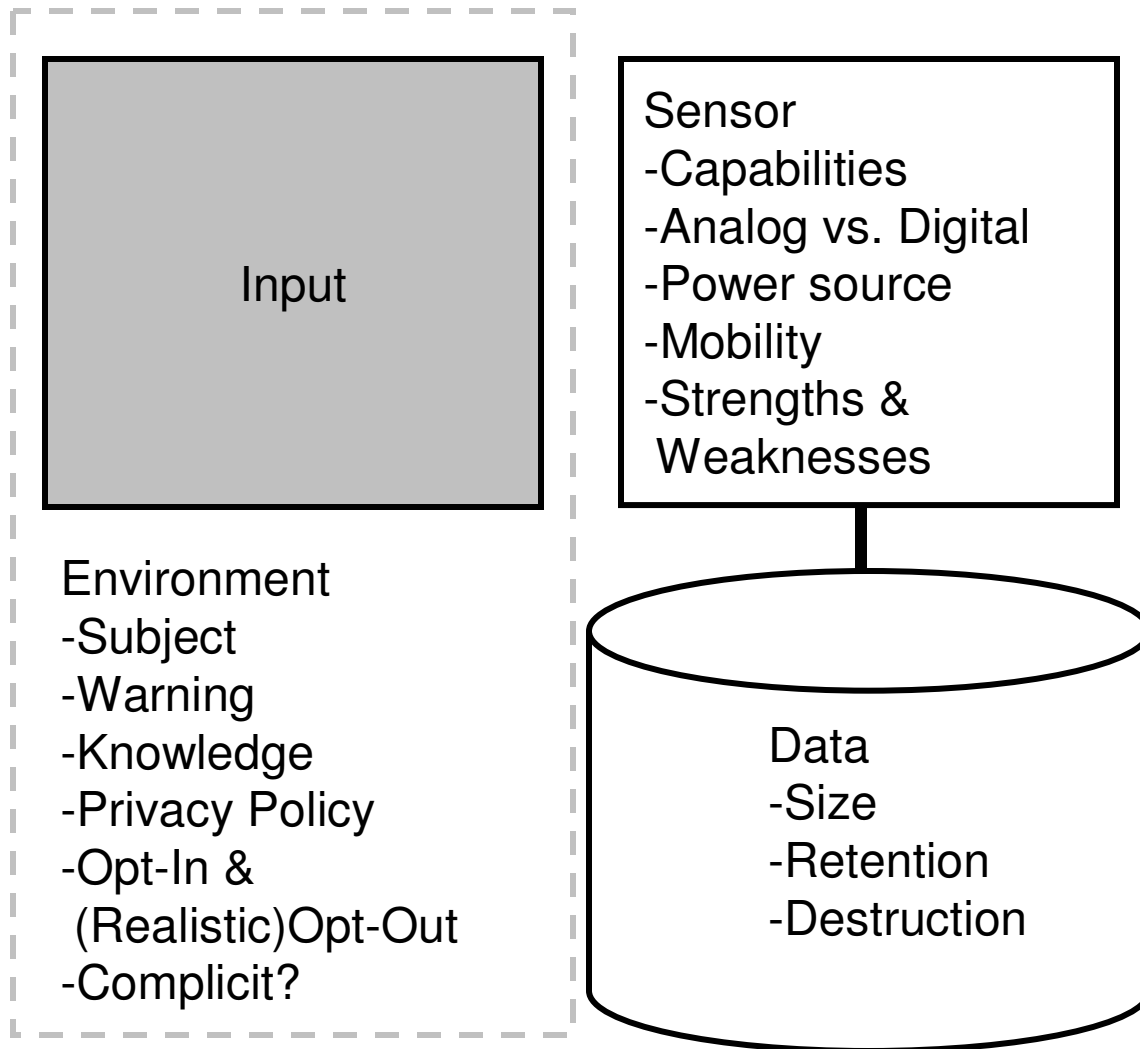
Sensor

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

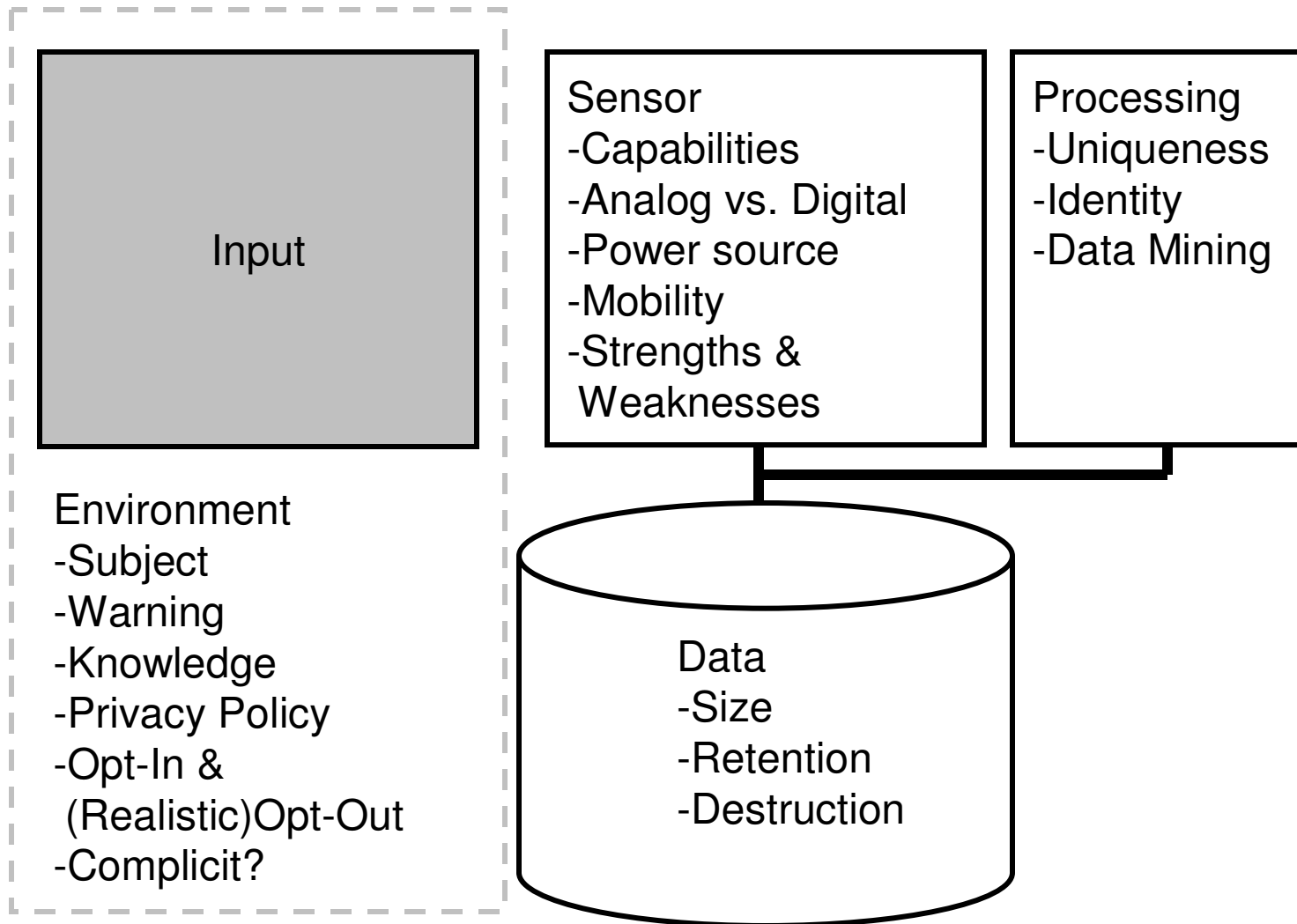
Environment

- Subject
- Warning
- Knowledge
- Privacy Policy
- Opt-In & (Realistic) Opt-Out
- Complicit?

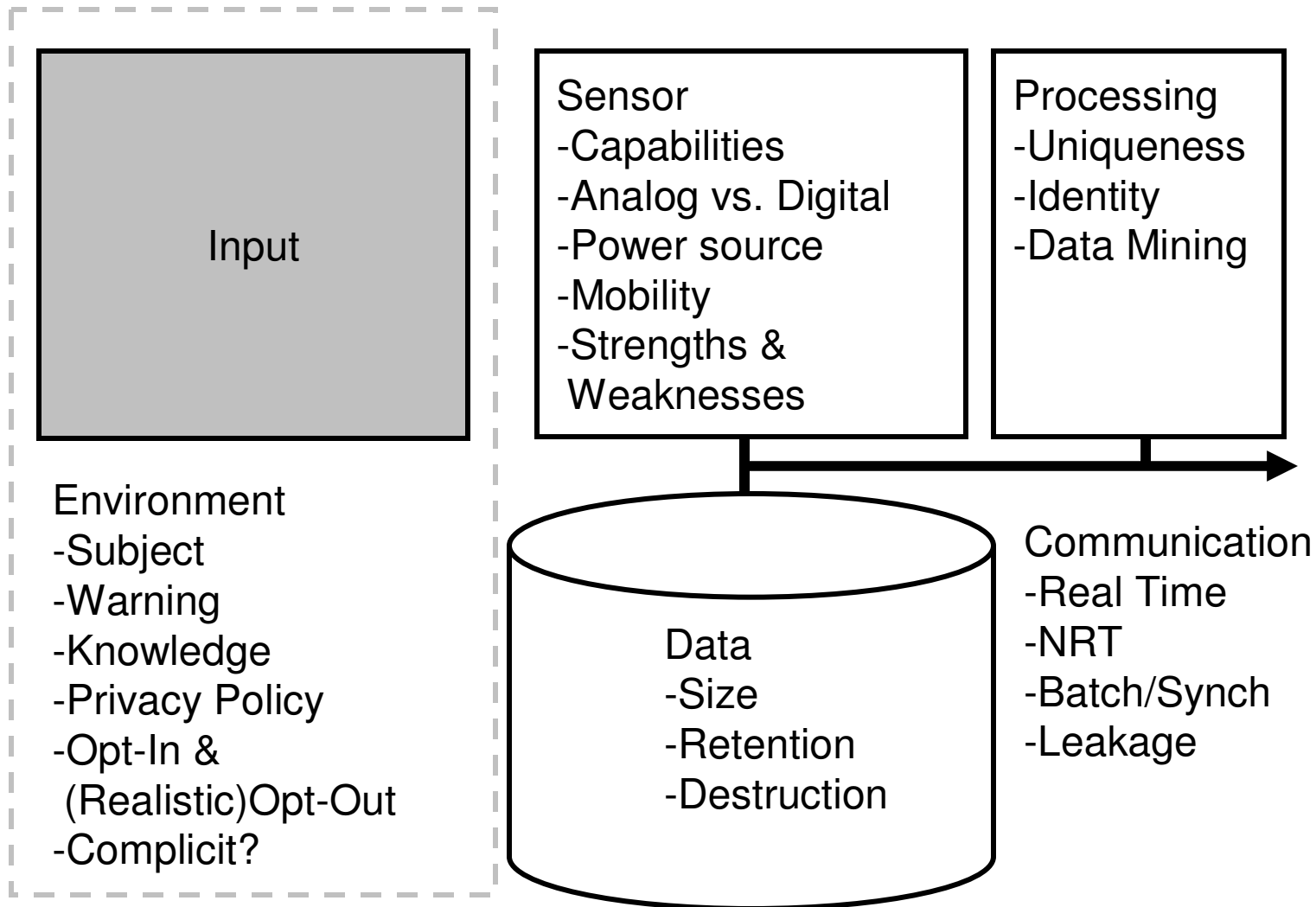
Model



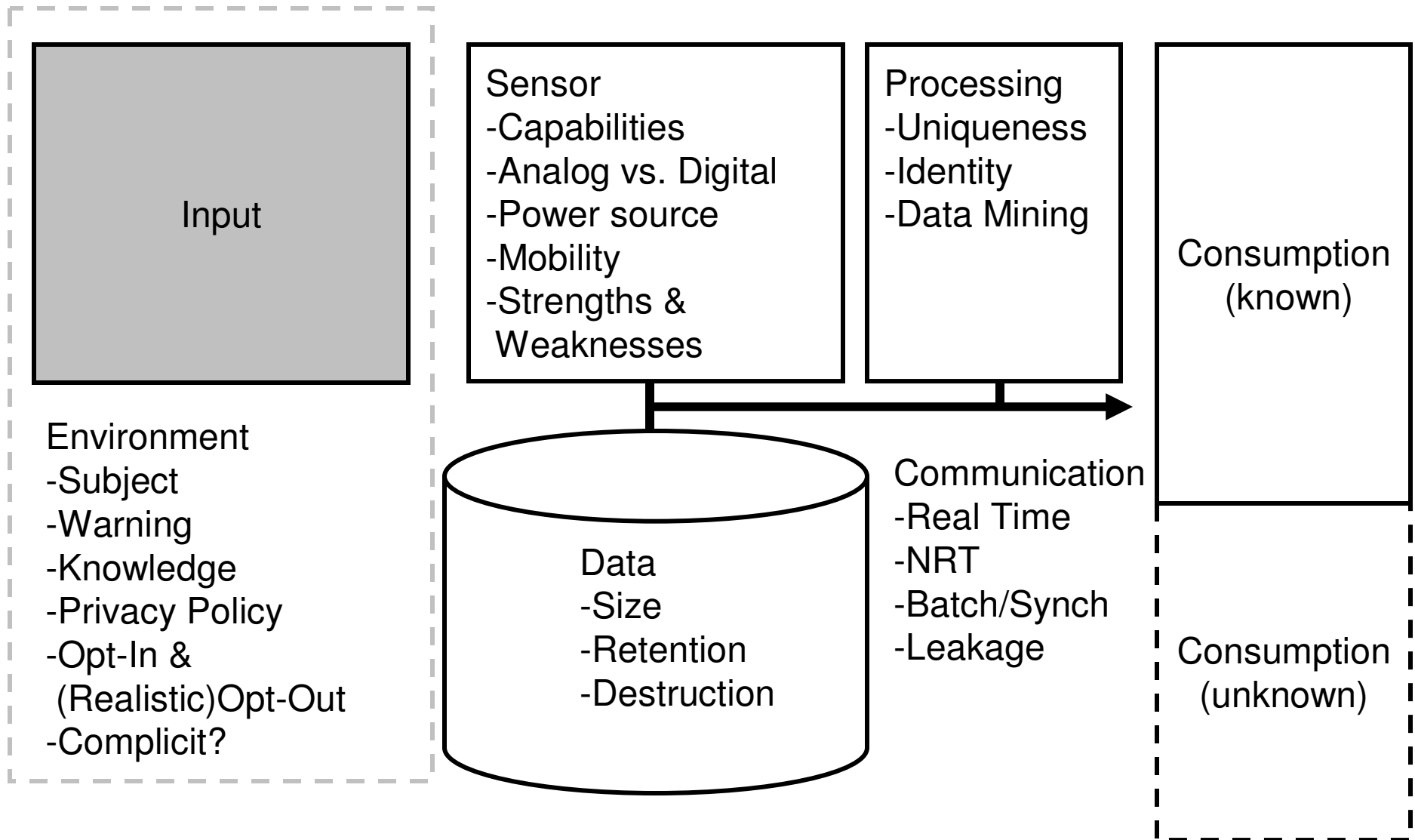
Model



Model



Model



Processing



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



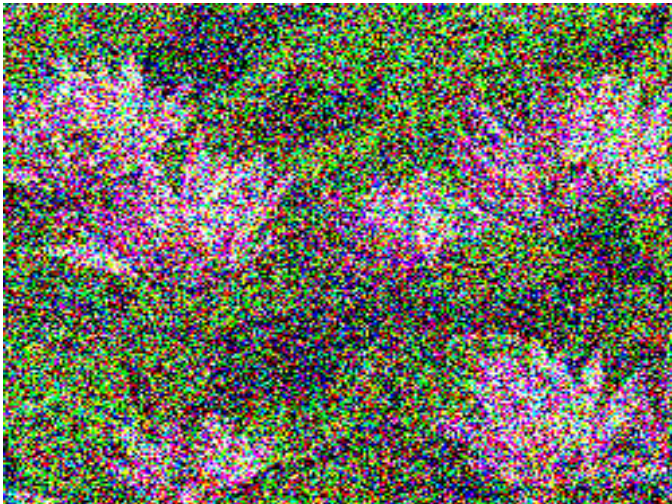
Data Spills



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>

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

Your Person

Your Clothes



RFID Tags
Custom Clothes



Nike + iPod

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

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



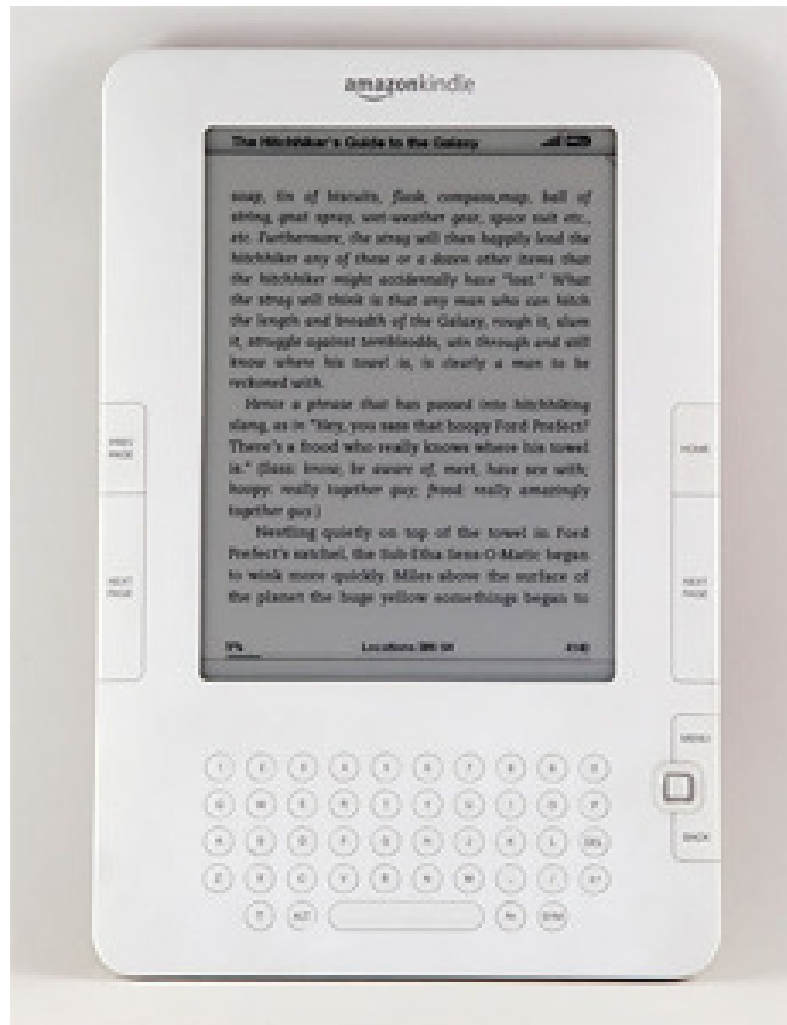
iPhone 4

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.

Books



Online

Online Dating Service



The image displays the eHarmony website interface. On the left is a registration form with the eHarmony logo at the top. Below the logo is a blue banner that says "Get Matched for Free!". The form includes fields for "First Name:", "I'm a:" (with dropdowns for "Woman" and "Men"), "ZIP Code:", "Country:" (with a dropdown for "United States"), "Email:", "Confirm Email:", "Password:" (with a note "Must be at least 5 characters"), and "How did you hear about us?" (with a dropdown for "Please select..."). A green "Find My Matches" button is at the bottom of the form. Below the button are logos for "TRUSTe CERTIFIED PRIVACY", "BBBOnline RELIABILITY PROGRAM", and "VeriSign Secured". On the right is a large photo of a smiling couple, Monica and Josh, with the text "Monica and Josh MATCHED BY EHARMONY" overlaid. A yellow starburst graphic with the text "Bigger Photos" is positioned over the photo. To the right of the photo is a white box with the text "Improved profile features enhance your eHarmony experience". At the bottom right are social media icons for Twitter and Facebook.

eHarmony®

Get Matched for Free!

First Name:

I'm a: seeking

ZIP Code:

Country:

Email:

Note: Your email is used to log back in

Confirm Email:

Password:

Must be at least 5 characters

How did you hear about us?

Find My Matches

TRUSTe CERTIFIED PRIVACY

BBBOnline RELIABILITY PROGRAM

VeriSign Secured

Bigger Photos

Monica and Josh
MATCHED BY EHARMONY

Improved profile features
enhance your eHarmony experience

Twitter Facebook

Social Networking

Basic Account: Upgrade

Welcome, Greg Conti · [Add Connections](#) · [Settings](#) · [Help](#) · [Sign Out](#)

LinkedIn Home Profile Contacts Groups Jobs Inbox (1) More... People Advanced

Inbox (1 unread)

Wayne Schepens curriculum dev May 6 take action ▾

Action items: [Invitations \(3\)](#), [See all messages >](#)

Network Activity



Share an idea, article, question or update...

[Link or News](#)



Share



Scott Lathrop is now a connection
34 minutes ago



Dan Evans joined the group [Afribiz Global Business and Investment Professional Community](#)
1 hour ago · [Find a group for you](#)



Daniel Ragsdale is now connected to [Keith Goodson](#), [Jeff Friedel](#), [Bob Karpiak](#), and 7 other people.
2 hours ago



Scott Lathrop has an updated current title: Assistant Professor at [United States Military Academy](#)
4 hours ago · [Send a message](#) · [Comment](#)



Scott Lathrop is now connected to [Alan Vayda](#), [Robert Wray](#) and [Chris Morrell](#)
6 hours ago



Scott Moulton Awesome post! Thanks.. via Twitter
17 hours ago · [Comment](#) · [Reply privately](#)



John "Buck" Surdu was recommended by [Randy Ball](#), "Buck was/is an outstanding Project/Program Manager, combining technical expertise with project manag..."
22 hours ago · [Read more](#)

People You May Know



Jon Giffin (2nd)
Assistant Professor

[Invite](#) | [×](#)



Rusl Flowers (2nd)
Senior Consultant at ProObject

[Invite](#) | [×](#)



Anupama Biswas (2nd)
Performance QA Engineer at NetApp

[Invite](#) | [×](#)

[See more >](#)

Who's viewed my profile?

Your profile has been viewed by **12 people** in the last **30 days**. In the last 30 days, you have appeared in search results **9 times**.

[See more >](#)

Reading List by Amazon

ReadingList by



[Your Reading List](#)



[Network Updates](#)



[Industry Updates](#)



[All Updates](#)

Update Your Reading List

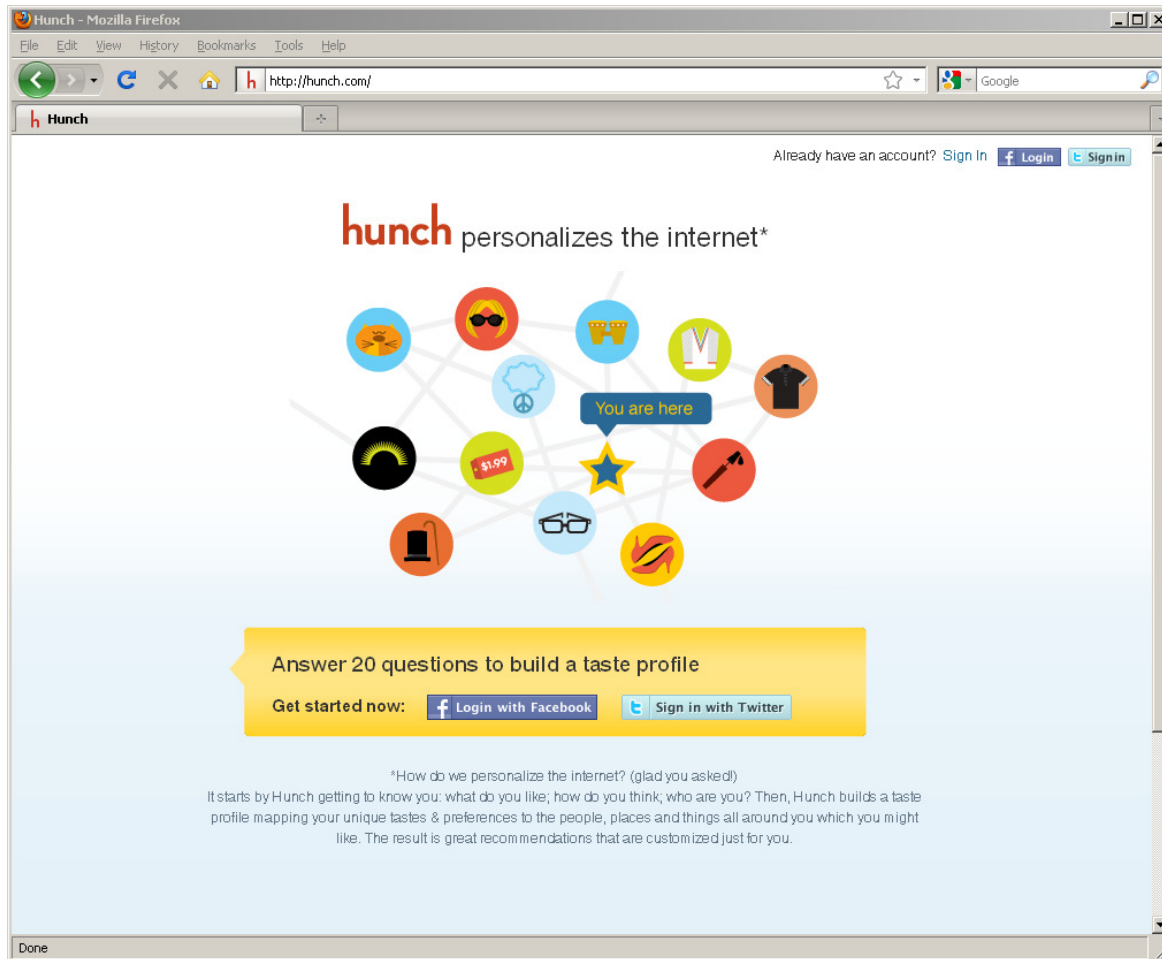
Answers: Information Security

[edit](#) | [×](#)

Q. When you delete a message

Q. What impact has flexible and remote working had on today's organisation?

Social Search



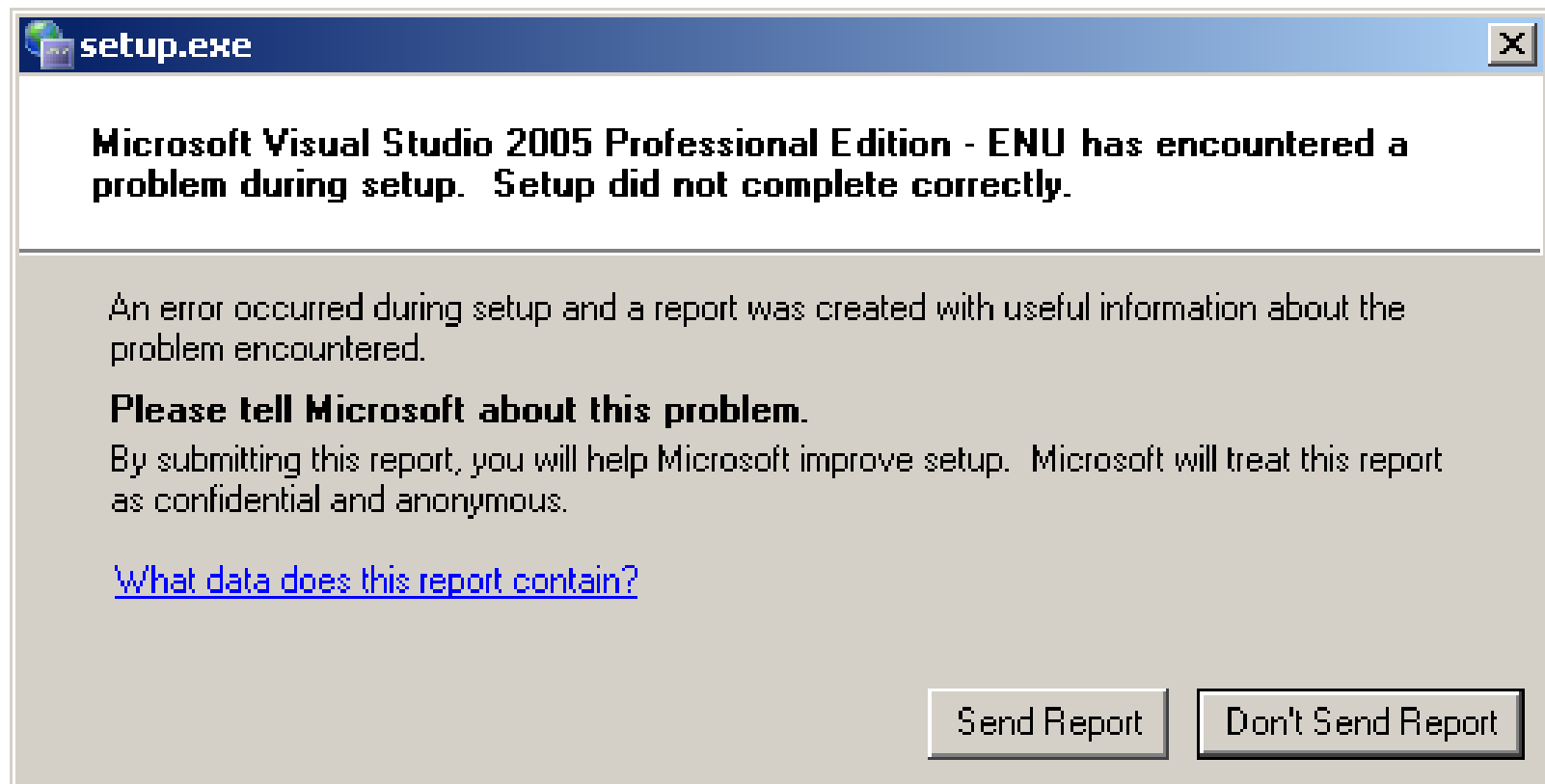
“Hunch is arguably the most ambitious social search service... it is getting users to volunteer a truly impressive amount of unique psychographic data.”

- Wired

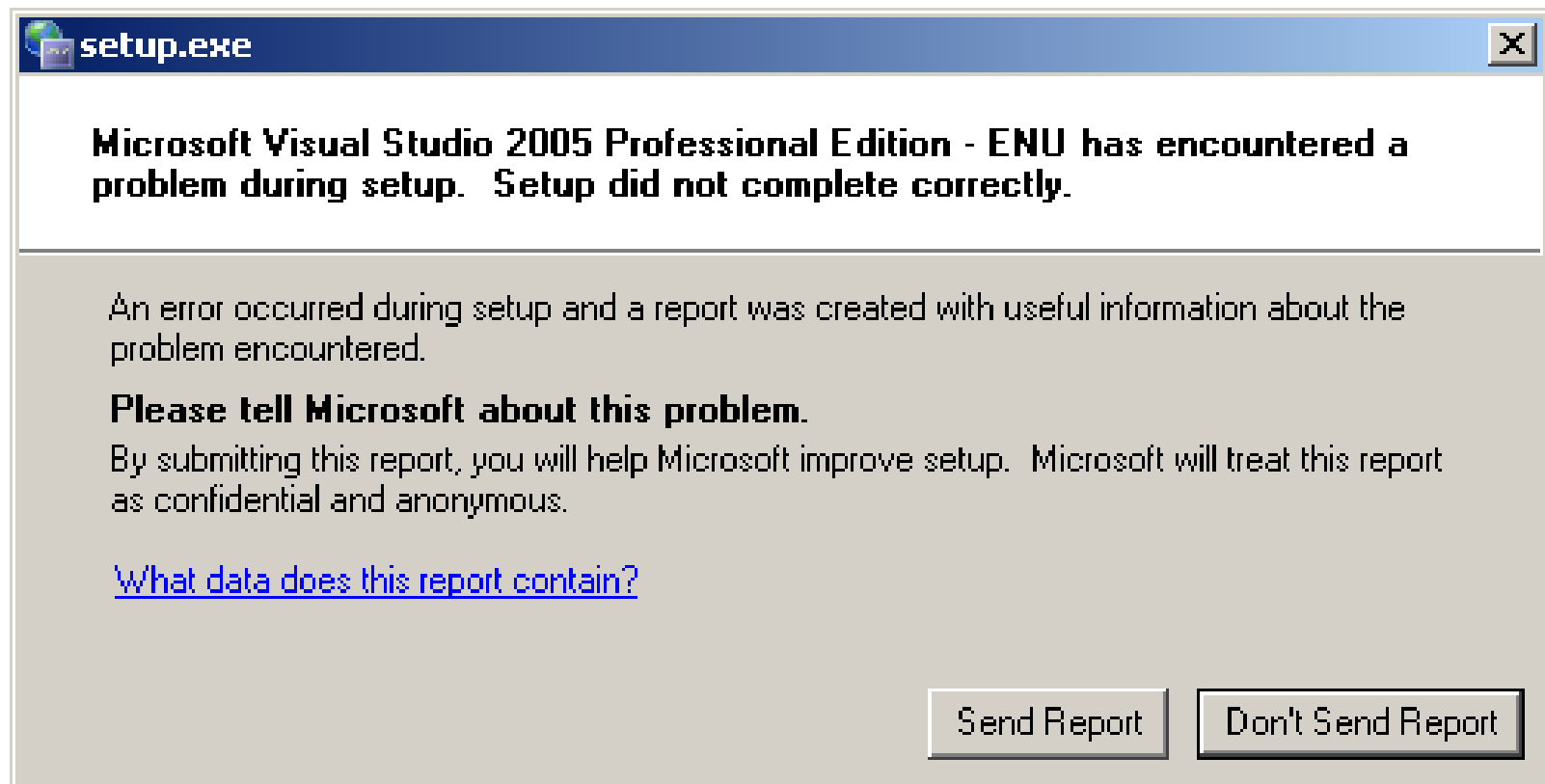
Location Aware



Software



Software



Research Topic

Your Home



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



Computer



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

Toys



http://en.wikipedia.org/wiki/File:Teddy_ruxpinBackpack.png<http://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
 - 4cm³ 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

Appliances



(Geotagging) Cameras



Sony DSC-HX5V

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.gwinnettcountry.com/static/departments/police/images/alarms.jpg>
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



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.



Pleasure Model Robots...



Pleasure Model Robots...



Research Topic

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

Around Town

Buying Coffee, Food, Beer



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)



At the Gym



Gunshot Detector

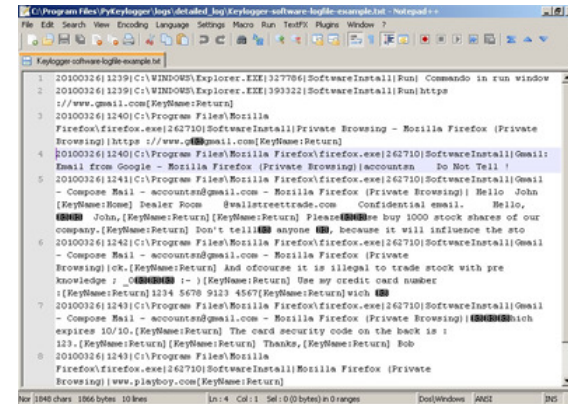


Boomerang III Gunshot Detection System

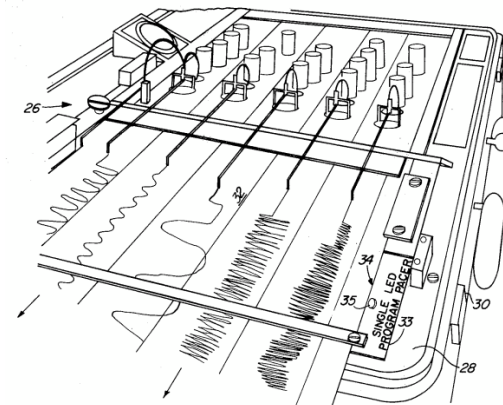
At the Office



Urinalysis



Keystroke Logging

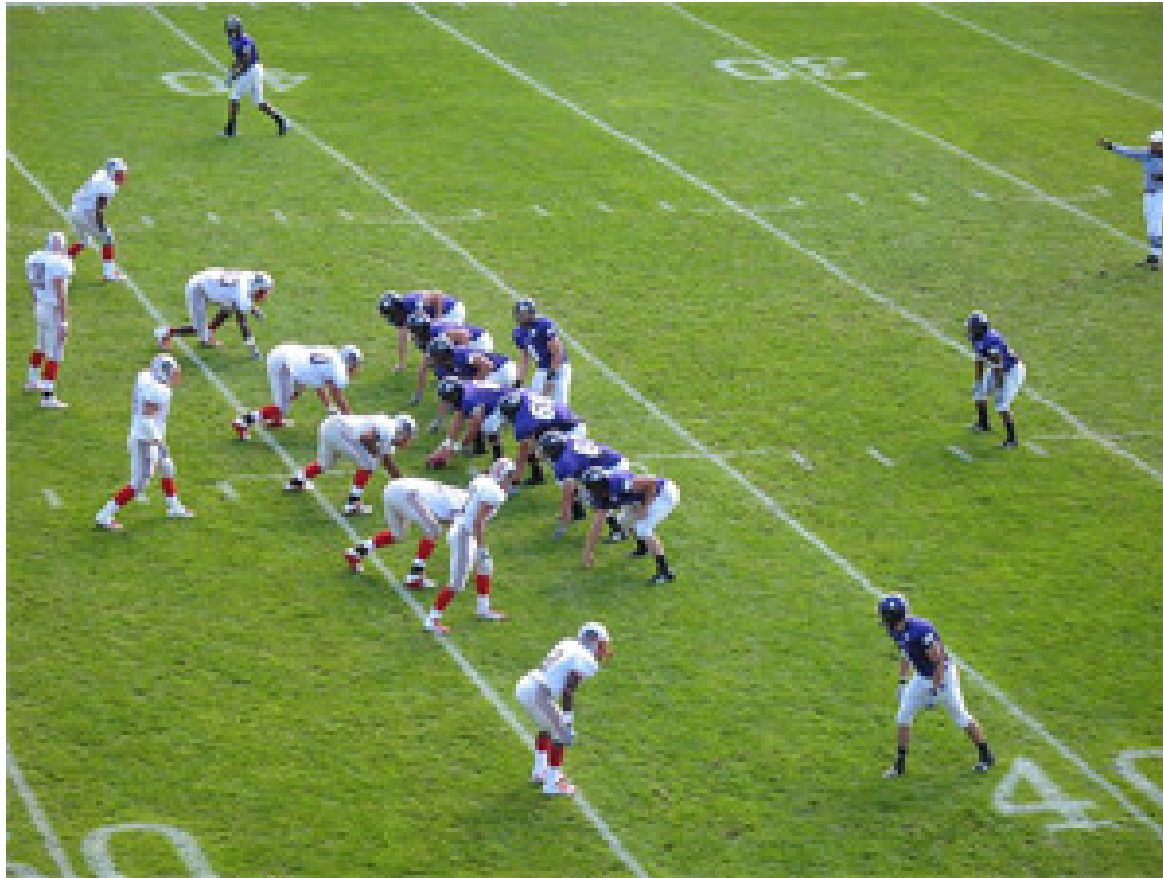


Polygraph

At the Amusement Park



At the Superbowl



At the Grocery Store



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

Finance



Communication



Travel by Car



Electronic Toll Collection



Red Light/Speed Cameras

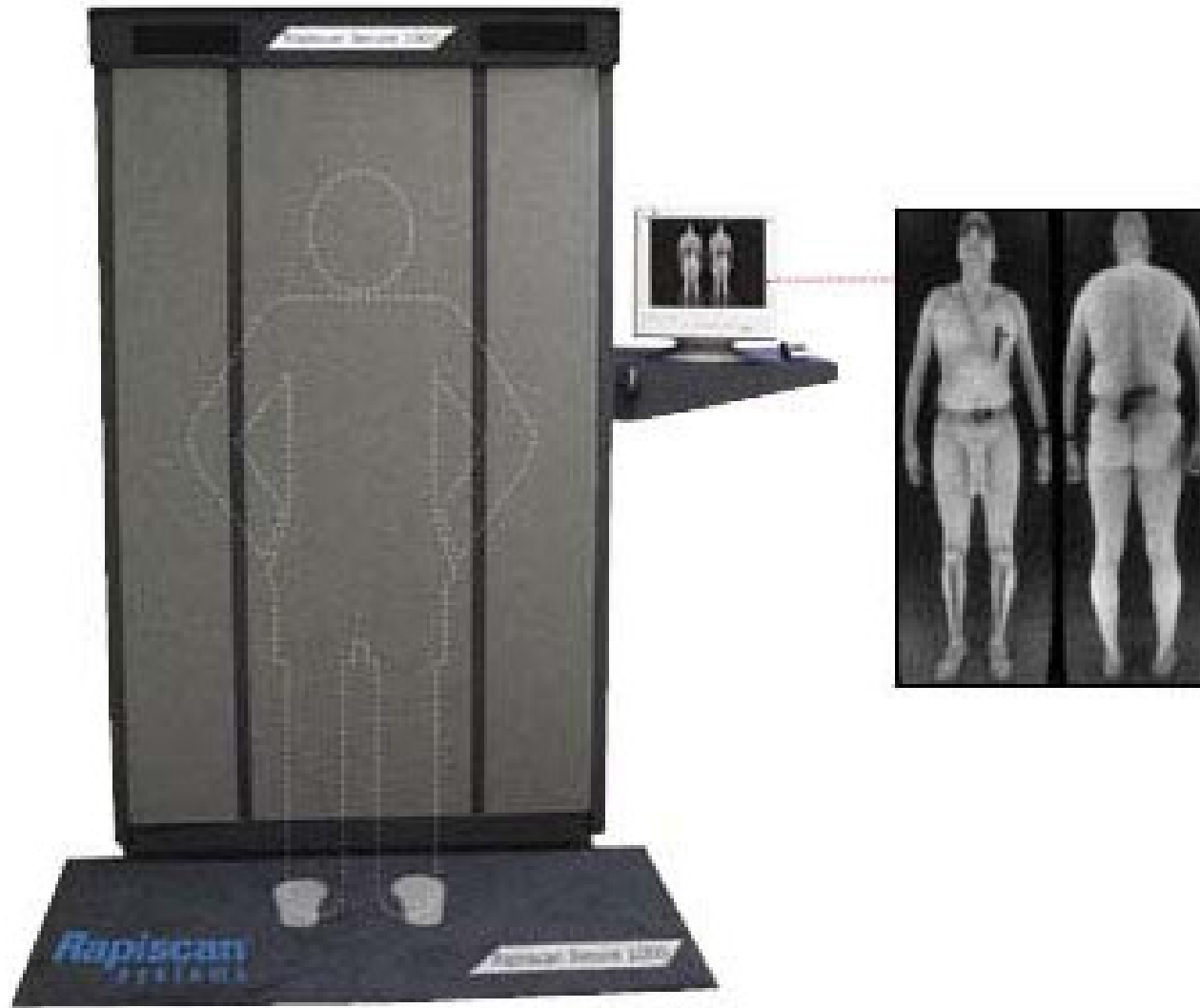


License Plate Readers

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



Travel by Train



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?



Live in the 20th Century?*



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

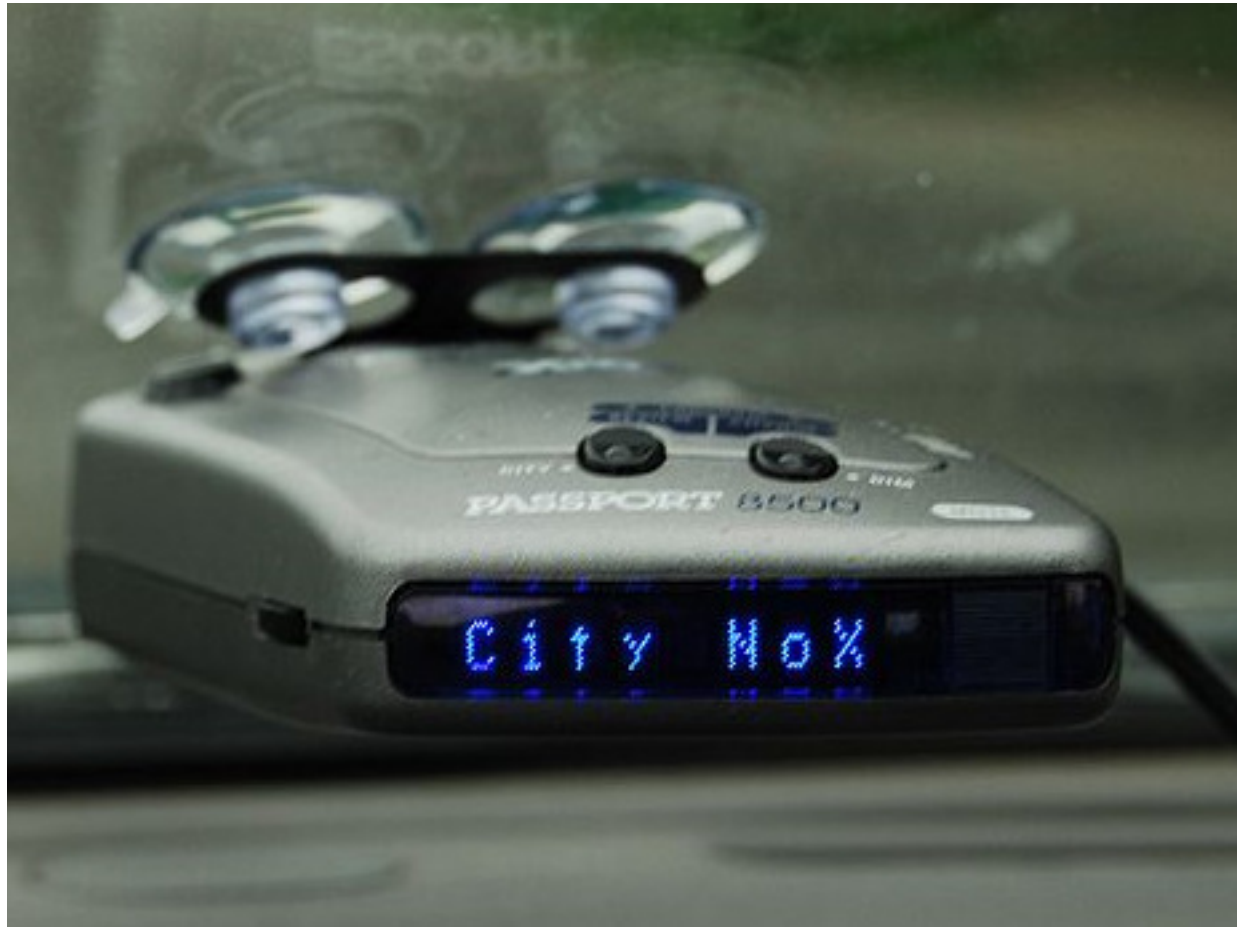
http://sanbruno.ca.gov/Library/Newsletter/2008/April%202008/dollar_bill.jpg

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

Disclose



Detect



See also sweeping rooms by specialists

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

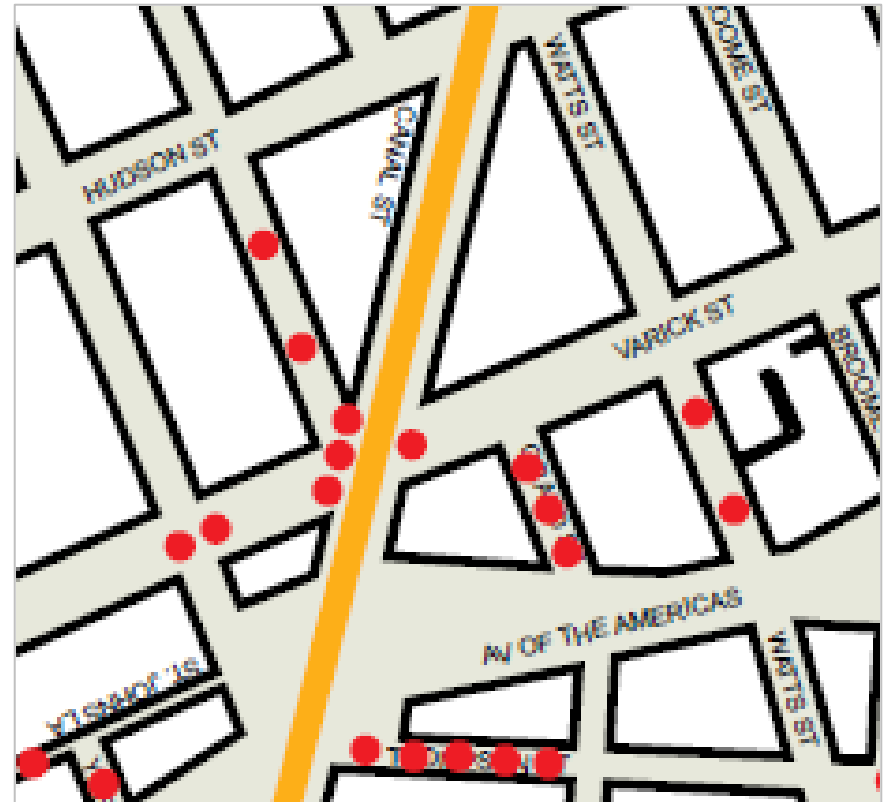
Robert F. Wagner, Jr. Park:
4 globe cameras

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 lampposts, south side

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



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

Express Displeasure



Art



Art



Rally Community Support



See also the English Villagers vs. Street View Cars

Embarrass

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 California 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."



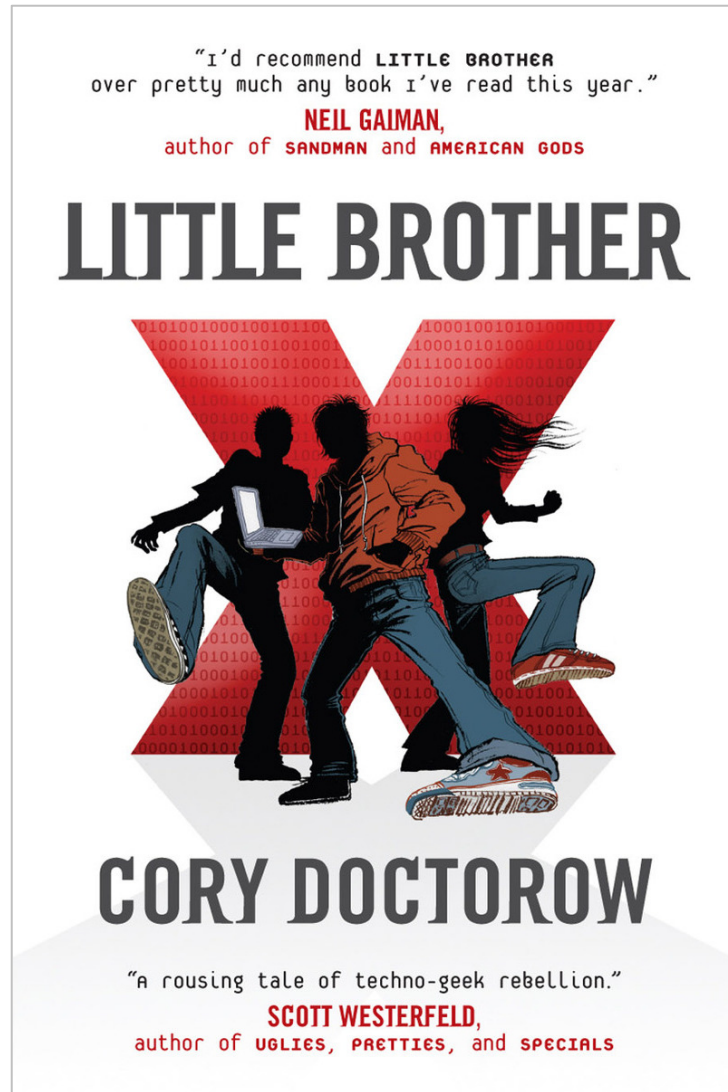
► court election ethics politics privacy story

Spoof



Stephanie Schuckers (Clarkson University)

Raise Awareness



Anonymization*

* This slide is deliberately left blank.

Vote With Your Wallet



Engage Policy Makers and Media



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

Vote With Your Vote

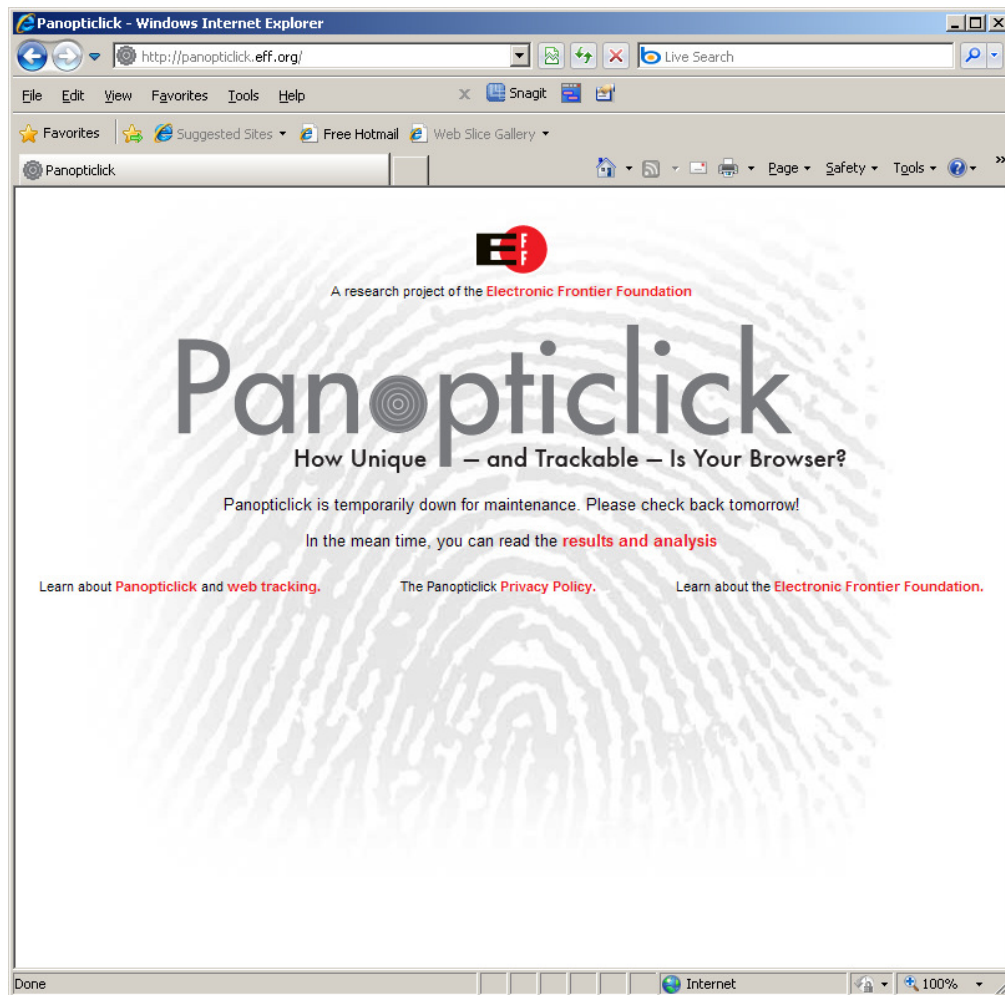


Support Opt-in



<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 those fingerprints from a large sample of browsers that visited our test site, panoptick.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 0.80%.

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 Jasso, Hugh D’Andrade, Chris Controllini, Stu Matthews, Rebecca Jochke and Cindy Cohn; to Jerod Wierzbicki, John Buckman and Igor Serobrynsky 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



epic

Privacy by Design



COMMON SENSE;

ADDRESSED TO THE

INHABITANTS

O F

A M E R I C A,

On the following interesting

S U B J E C T S.

- 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 Matter save crea ing HEAVEN,
Or those whom choice and common good ordain.

THOMSON.

PHILADELPHIA;

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

MDCC LXX VI.

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

Internet Scale Experimentation

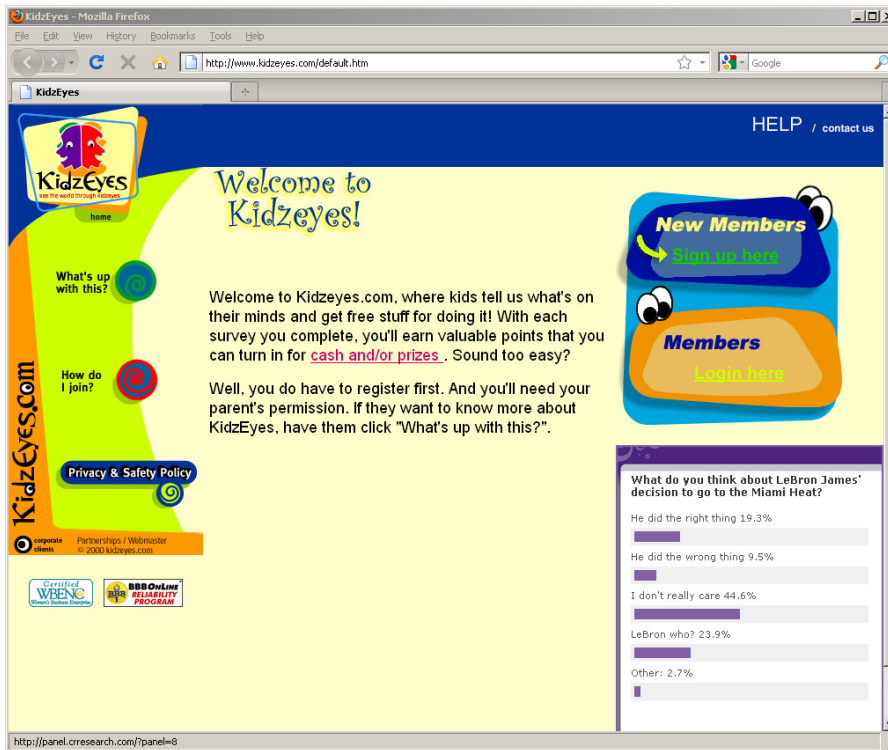


pic src:www.sriraj.org modified by Gaea Times

Electronic License Plates



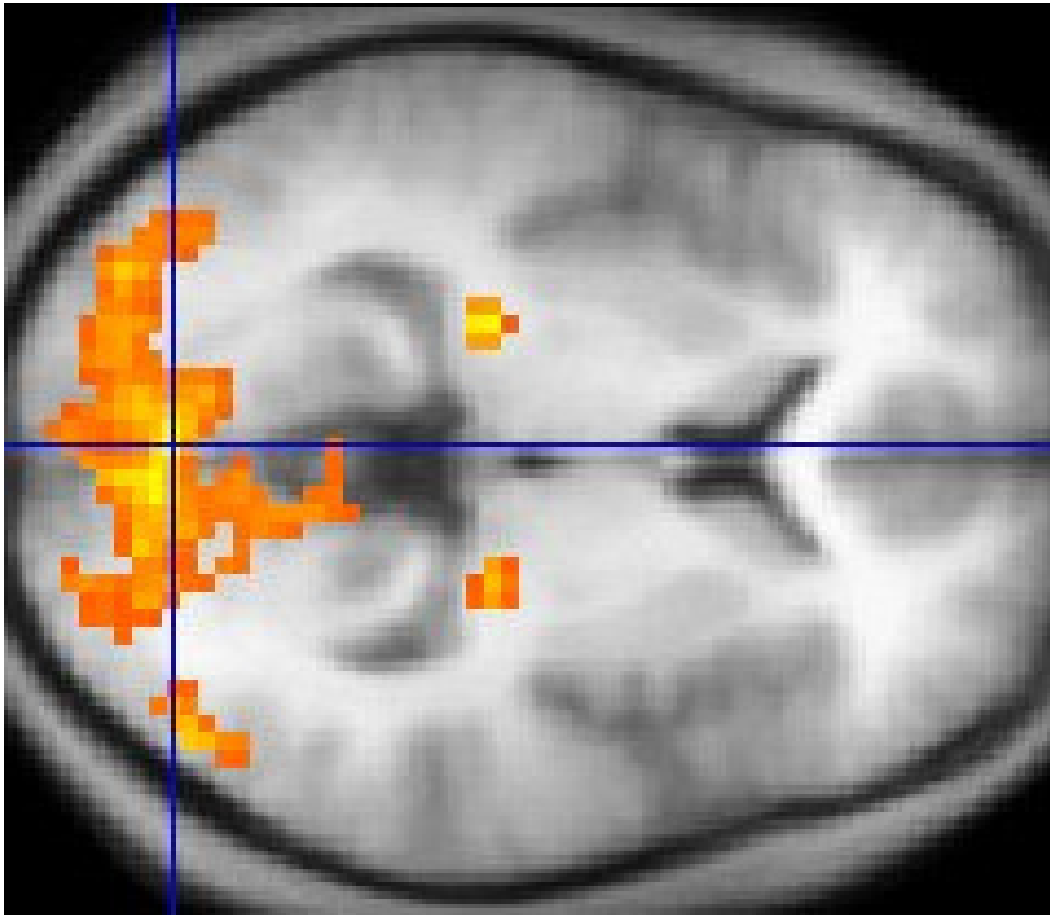
Instrumented Kids



Wearable Computing



Reading the Brain



functional Magnetic Resonance Imaging (fMRI)

“Now scientists can read your mind better than you can”

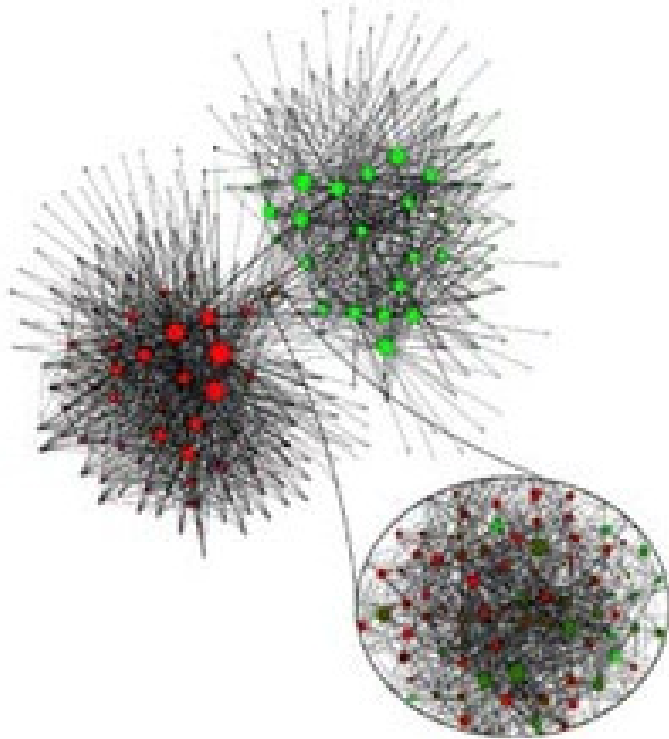
Recent Experiment

- 50% of humans accurately predicted own future behavior
- Activity in medial prefrontal 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

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

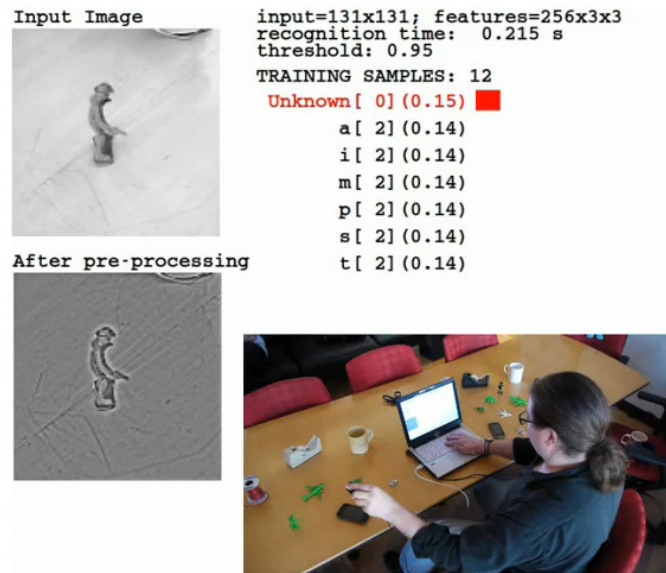


MIT Media Lab
Reality Mining Group
PI: Nathan Eagle

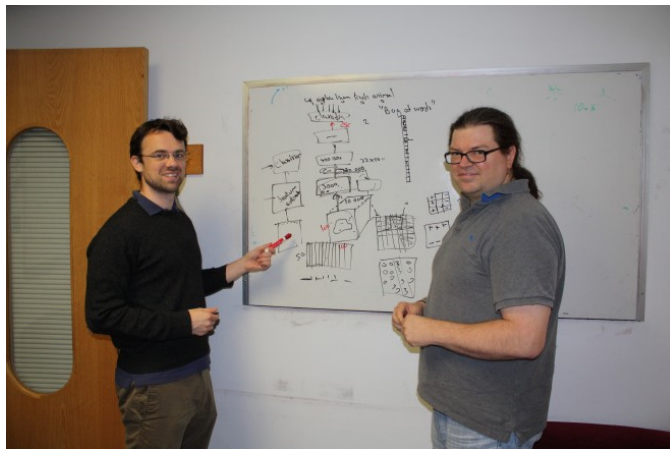
- The Reality Mining research project aims:
 - developing technology and algorithms for sensing
 - Modeling
 - Changing human behavior.
- Some themes...
 - Sociology in the 21st Century
 - User Behavior Modeling and Prediction
 - Relationship Inference
 - Social Serendipity
 - Organizational Dynamics
 - 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



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

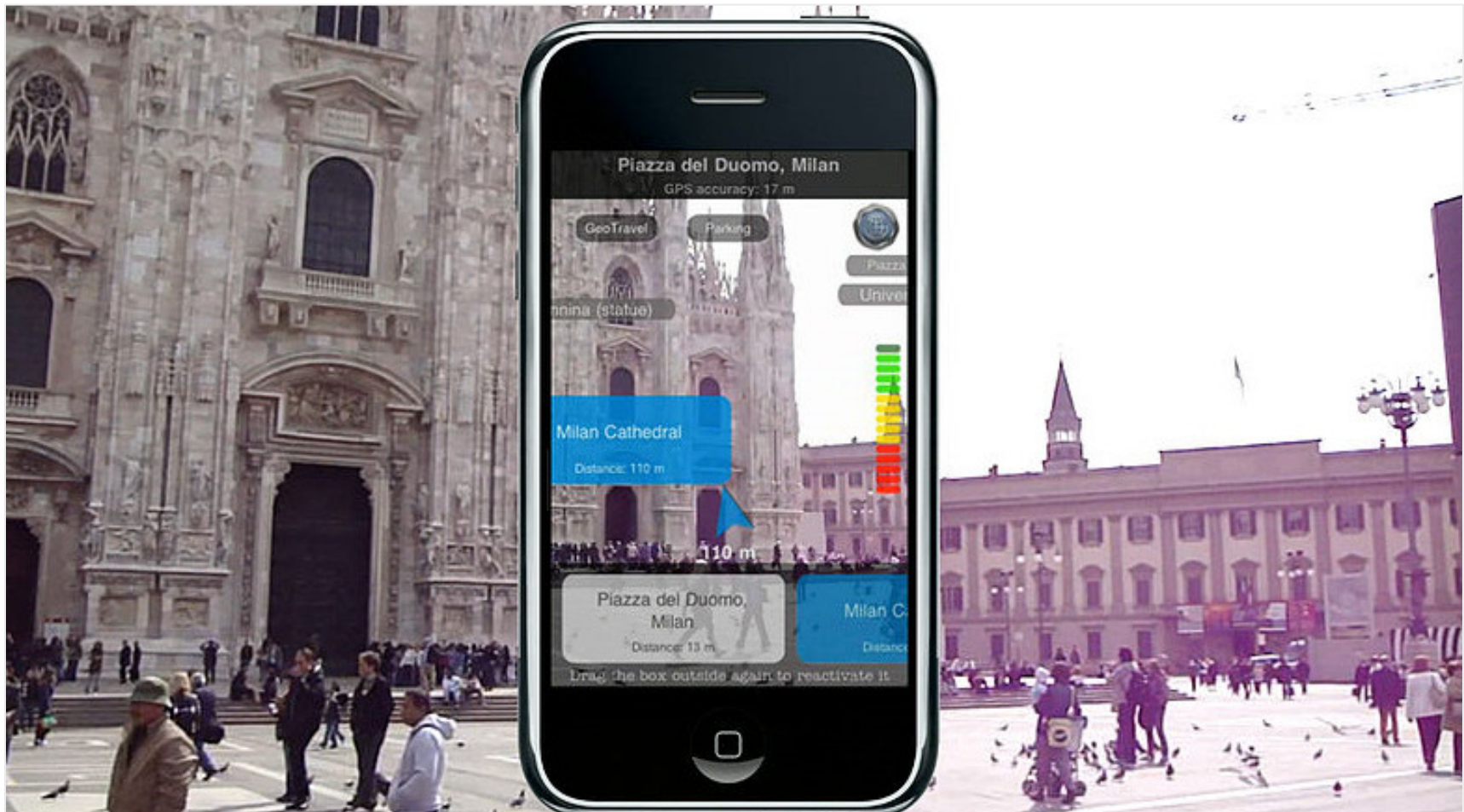


Yann LeCun and Rob Fergus
New York University

“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



The Internet of Things

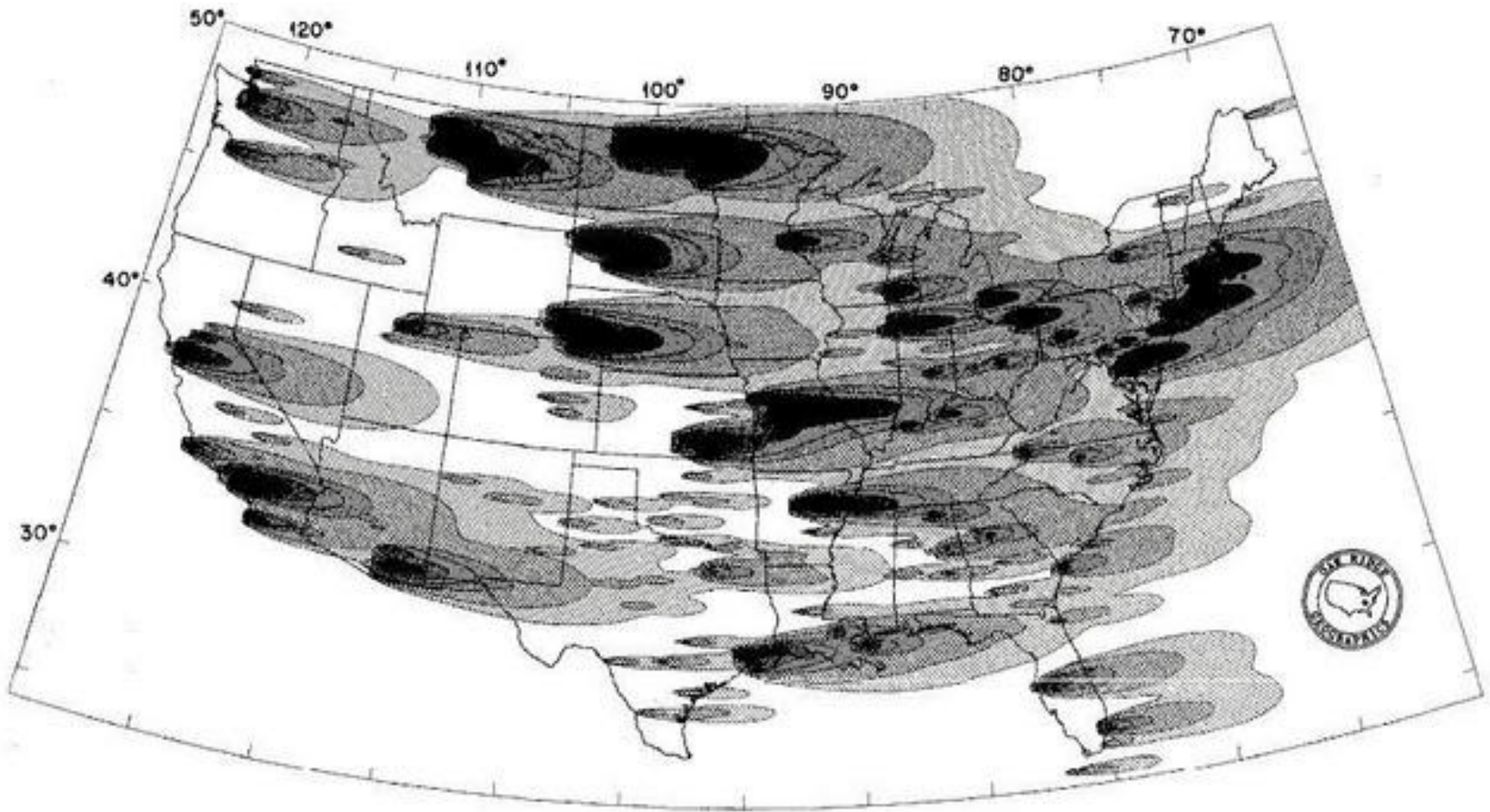
- Self-configuring wireless network of sensors
- RFID will play a big role
- Purpose to interconnect many (all) things
- Ability to encode 50 to 100 trillion objects
- Follow the movement of those objects.
- Every human being is surrounded by 1,000 to 5,000 objects
- IPv6 Addressing 2^{128}



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

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

Conclusions



Questions?

