mirrors tell you one thing

data can tell you another

jonfroehlich@uw.edu
phd candidate in computer science
university of washington
aug 2, 2010

dub design: use: build:
university of washington

ubicomp lab
university of washington

sustain
sustainability research


seattle, wa
minneapolis, mn
portland, or
ames, ia
orange county, ca
CANADA
MANITOBA
ALBERTA
Edmonton
Calgary
Regina
Winnipeg
Seattle
WASH.
MONTANA
NORTH DAKOTA
MINN.
Minneapolis
Toronto
Detroit
Lake Ontario
Ottawa
Boston
N.Y.
New York
Philadelphia
OREGON
IDAHO
Boise
WYOMING
S. DAK.
IOWA
Chicago
OHIO
PA.
Washington
W. VA.
MD.
Virginia Beach
UNITED STATES
Indianapolis
IND.
ILL.
MO.
KY.
VA.
Denver
NEVADA
UTAH
COLORADO
KANSAS
San Francisco
CALIFORNIA
Las Vegas
Oklahoma City
OKLA.
ARK.
Memphis
Charlotte
N.C.
Atlanta
S.C.
ARIZONA
Los Angeles
Phoenix
NEW MEXICO
TEXAS
Dallas
MISS.
ALA.
GA.
Houston
LA.
FLA.
Miami
Nassau
CHIHUAHUA
SONORA
COAHUILA
Gulf of Mexico
MEXICO
Monterrey
Havana
Santa Clara
Culiacán
Mérida
JALISCO
Mexico City
CAMPECHE
OAXACA
Guatemala City
HONDURAS
NICARAGUA


LEGO


mirrors tell you one thing
data can tell you another

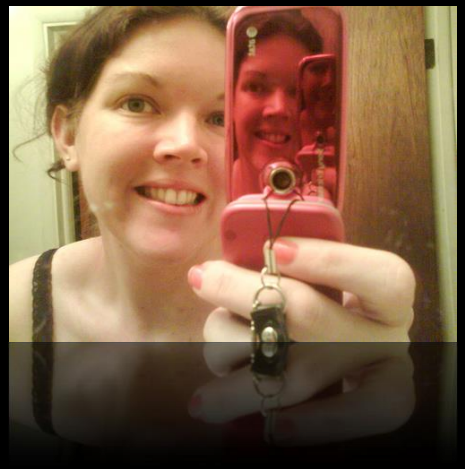
reflections


see the world differently


see things we cannot otherwise see


help us **practice**


see ourselves differently



new reflections of self with

technology

new insights

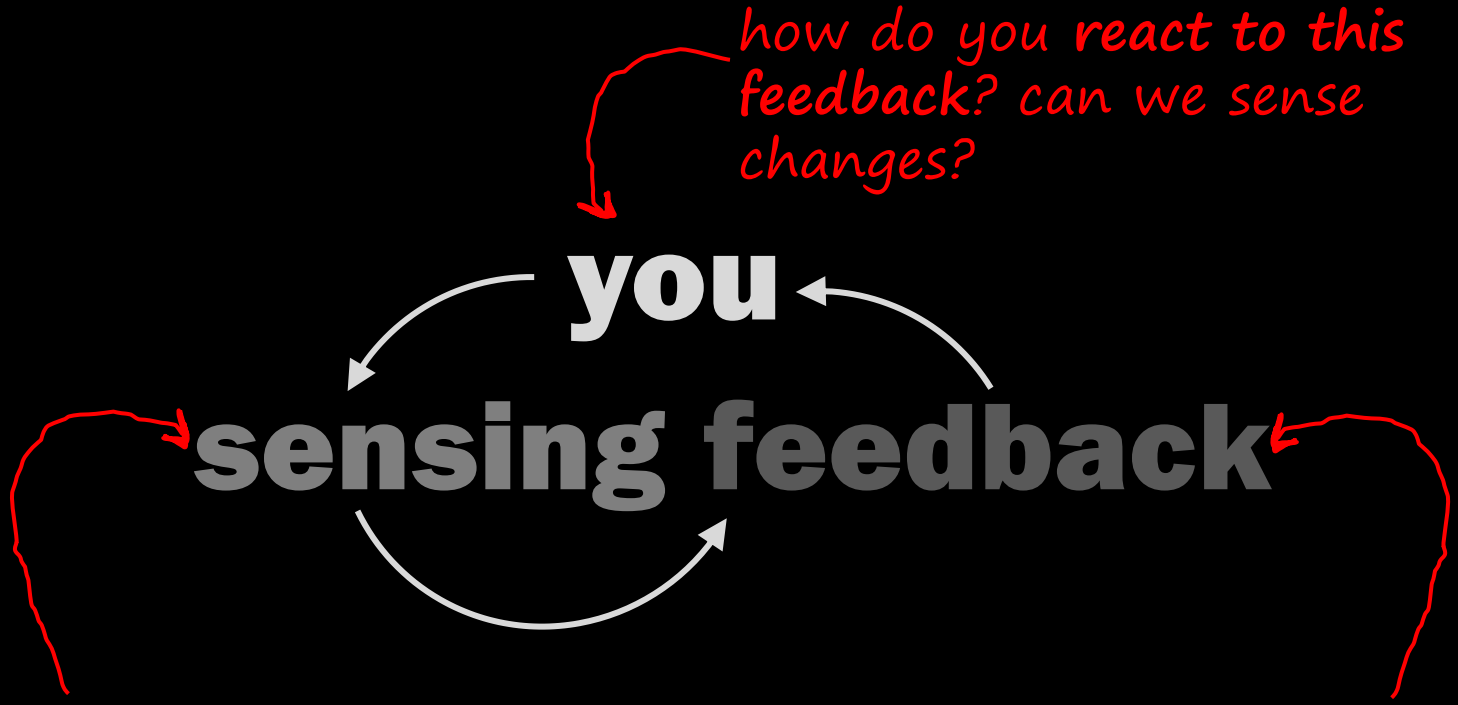
- our behaviors
- our routines
- our past actions
- our social connections

a simple

example

objective vs. subjective self


thanks,
great clips!


how do you react to this feedback? can we sense changes?
you
sensing feedback
how can we create sensors to sense and infer your behaviors?
how do we present this data back to you? what medium and interface is most effective?

human-computer
interaction

computer science

why?

1. i want to make the world better
2. now is the time...


running
Esso
lester et al., ijcai 2005
choudury et al., ieee pervasive 2008

walking

lester et al., ijcai 2005
choudury et al., ieee pervasive 2008

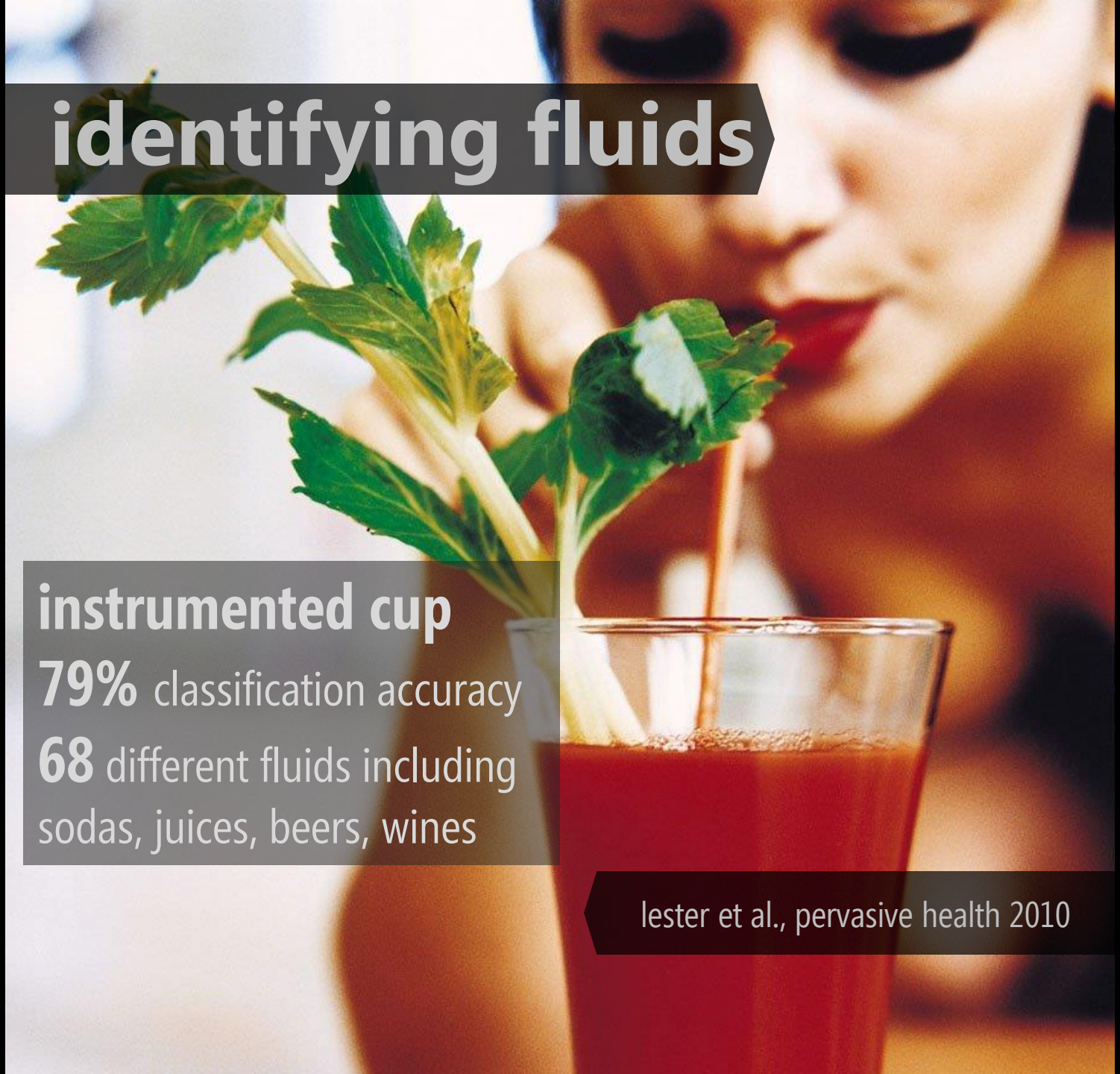

sitting
PUBLIC
PARKING
lester et al., ijcai 2005
choudury et al., ieee pervasive 2008

transit modes

patterson et al., ubicomp 2003
zheng et al., ubicomp 2008
reddy et al., sensor networks2009


eating
microphone in ear detects **when** a person is eating with **99%** accuracy
amft et al., ubicomp 2007
cheng et al., pervasive 2010

identifying fluids



instrumented cup

79% classification accuracy

68 different fluids including sodas, juices, beers, wines

lester et al., pervasive health 2010

coughing

liu et al., *in submission*

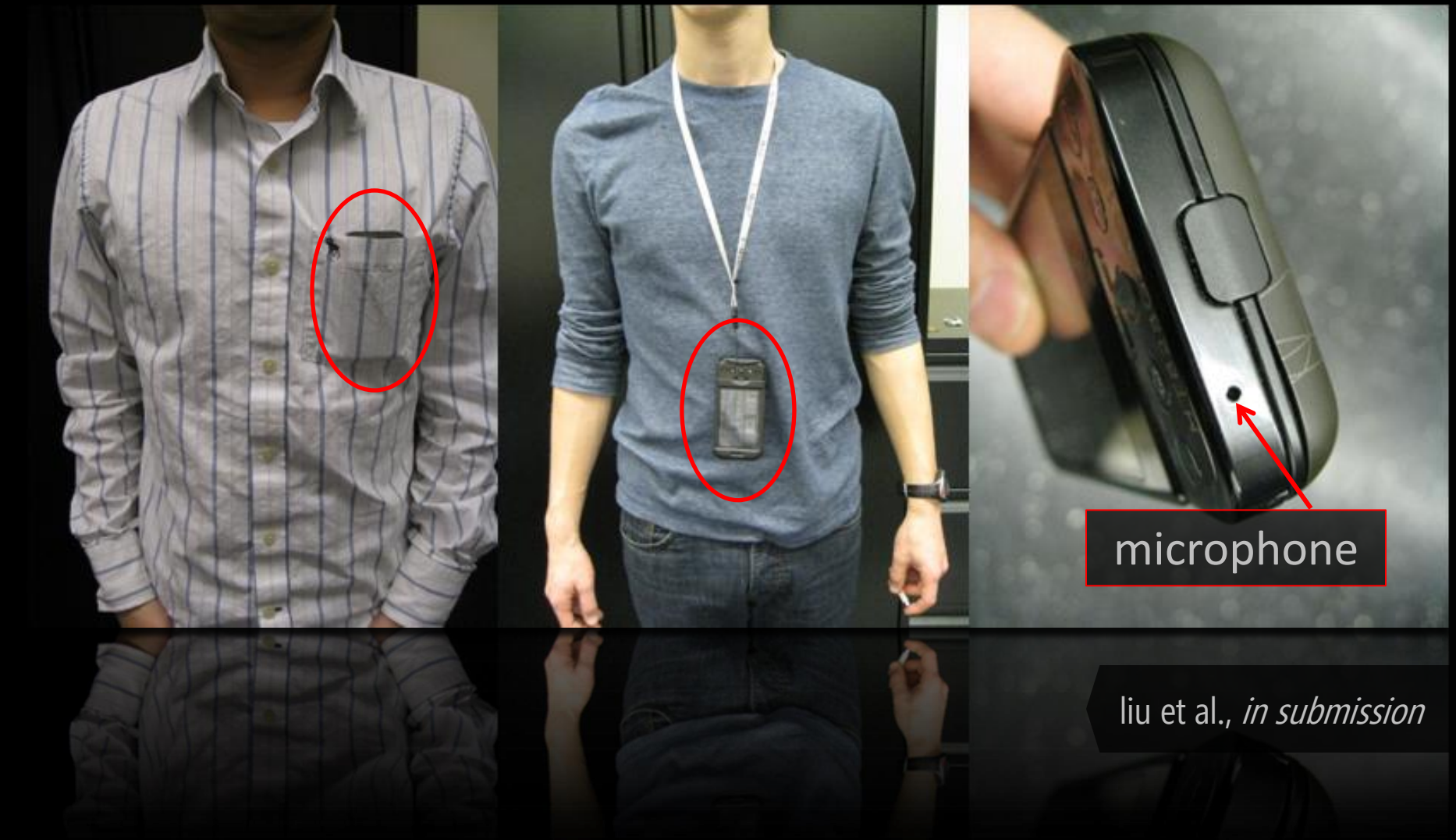
ok, we have all this data…

now what?

coughing

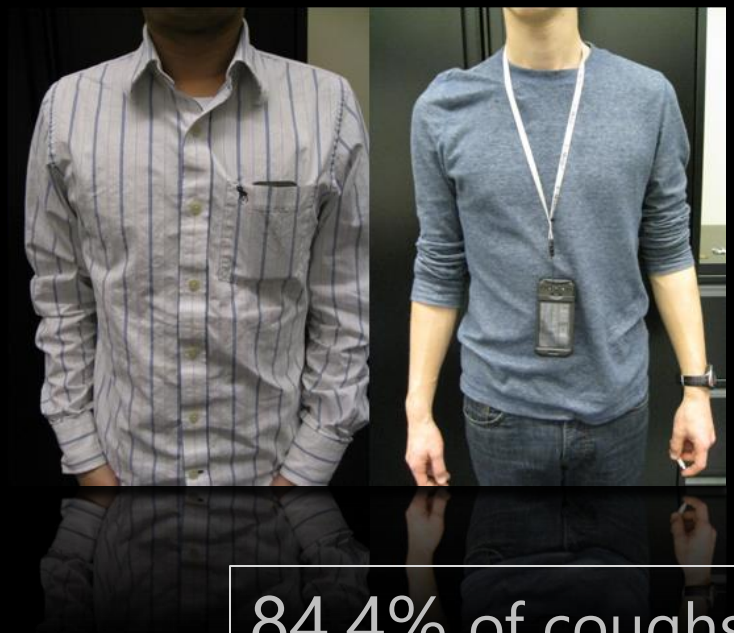
liu et al., *in submission*

automatically detecting coughs with a commodity mobile phone



liu et al., *in submission*

collecting and analyzing the cough dataset



17 participants

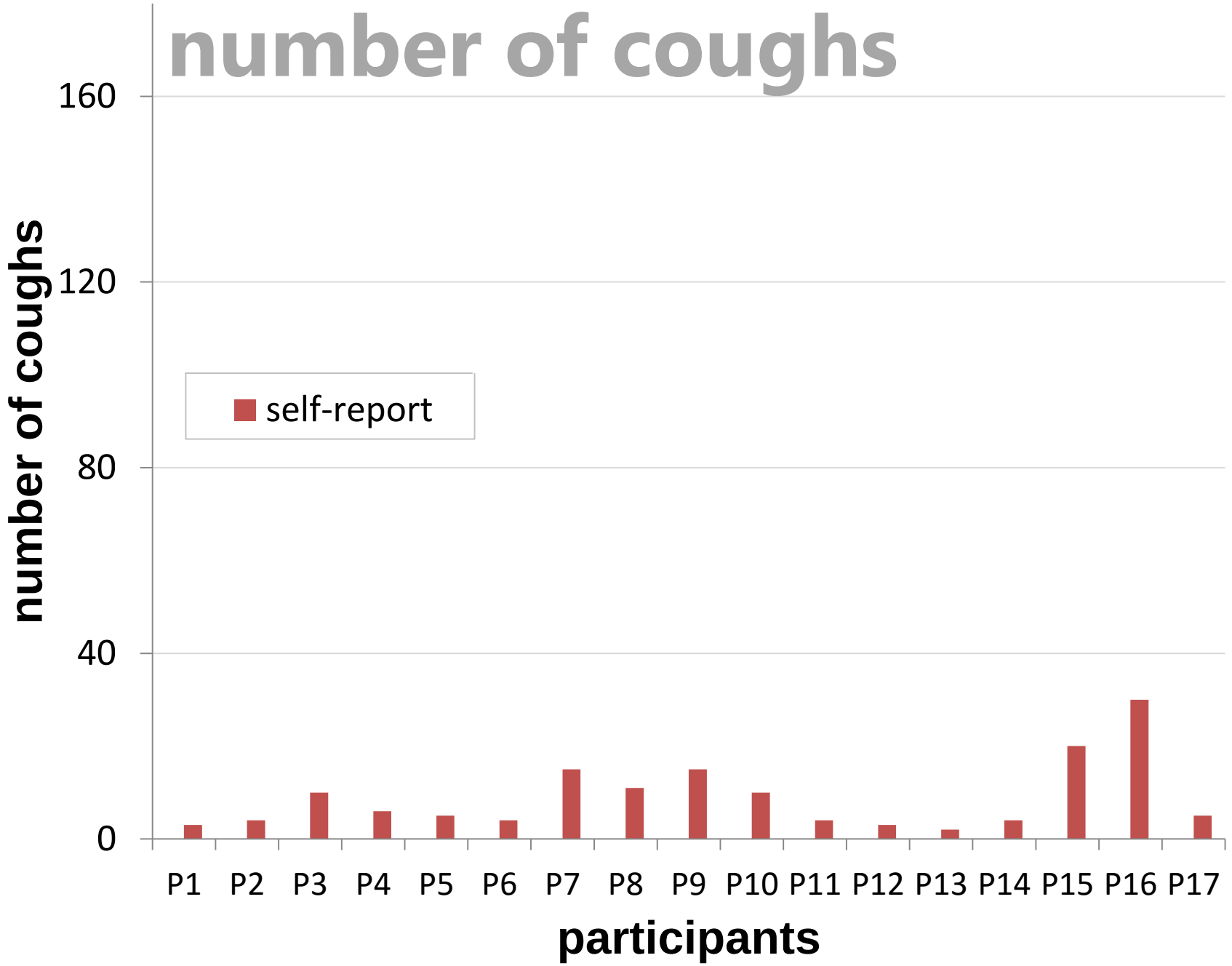
72 hours of naturalistic audio recording

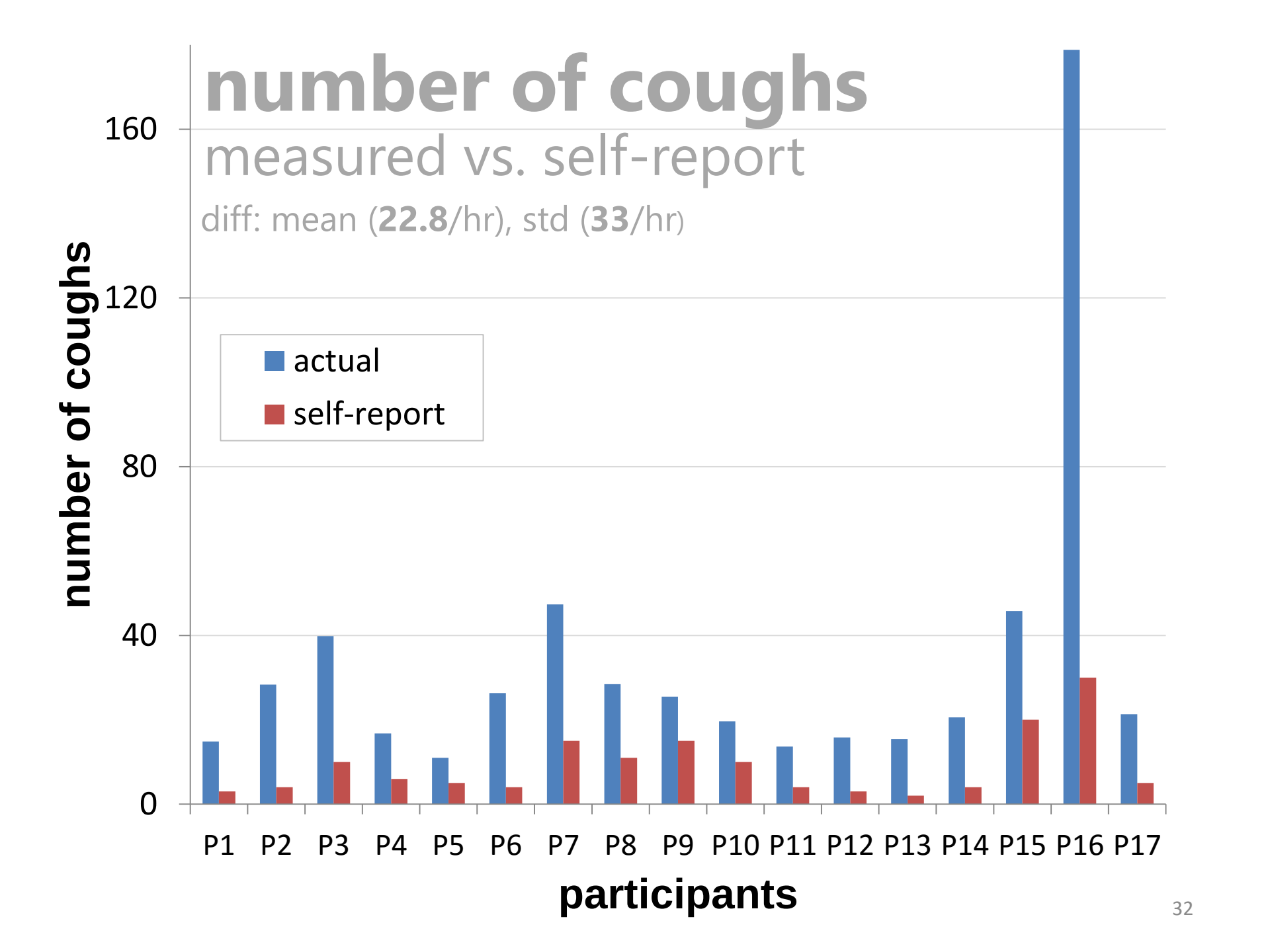
6 graduate students annotated recordings

2542 coughs labeled by annotators

84.4% of coughs were correctly classified
0.7% false positive rate (3.3/hr)

liu et al., *in submission*


number of coughs
160
120
80
40
0
number of coughs
self-report
P1 P2 P3 P4 P5 P6 P7 P8 P9 P10 P11 P12 P13 P14 P15 P16 P17
participants


number of coughs
measured vs. self-report
diff: mean (22.8/hr), std (33/hr)
160
120
80
40
0
number of coughs
actual
self-report
P1 P2 P3 P4 P5 P6 P7 P8 P9 P10 P11 P12 P13 P14 P15 P16 P17
participants

nike+ipod

nike+ interface

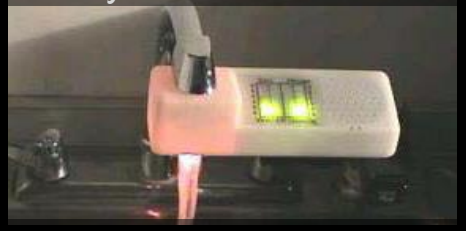
toyota prius

eco-feedback

sensing behavior paired with feedback to reduce environmental impact

eco-feedback
a brief history

Arroyo et al., *CHI2005*



Kuznetsov et al., *CHI2010*

hci/ubicomp

2003 2010

Fogg, B.J., *Persuasive Technology,* 2003

eco-feedback
a brief history

Kohlenberg et al., *J. Applied Behavior Analysis, 1976*

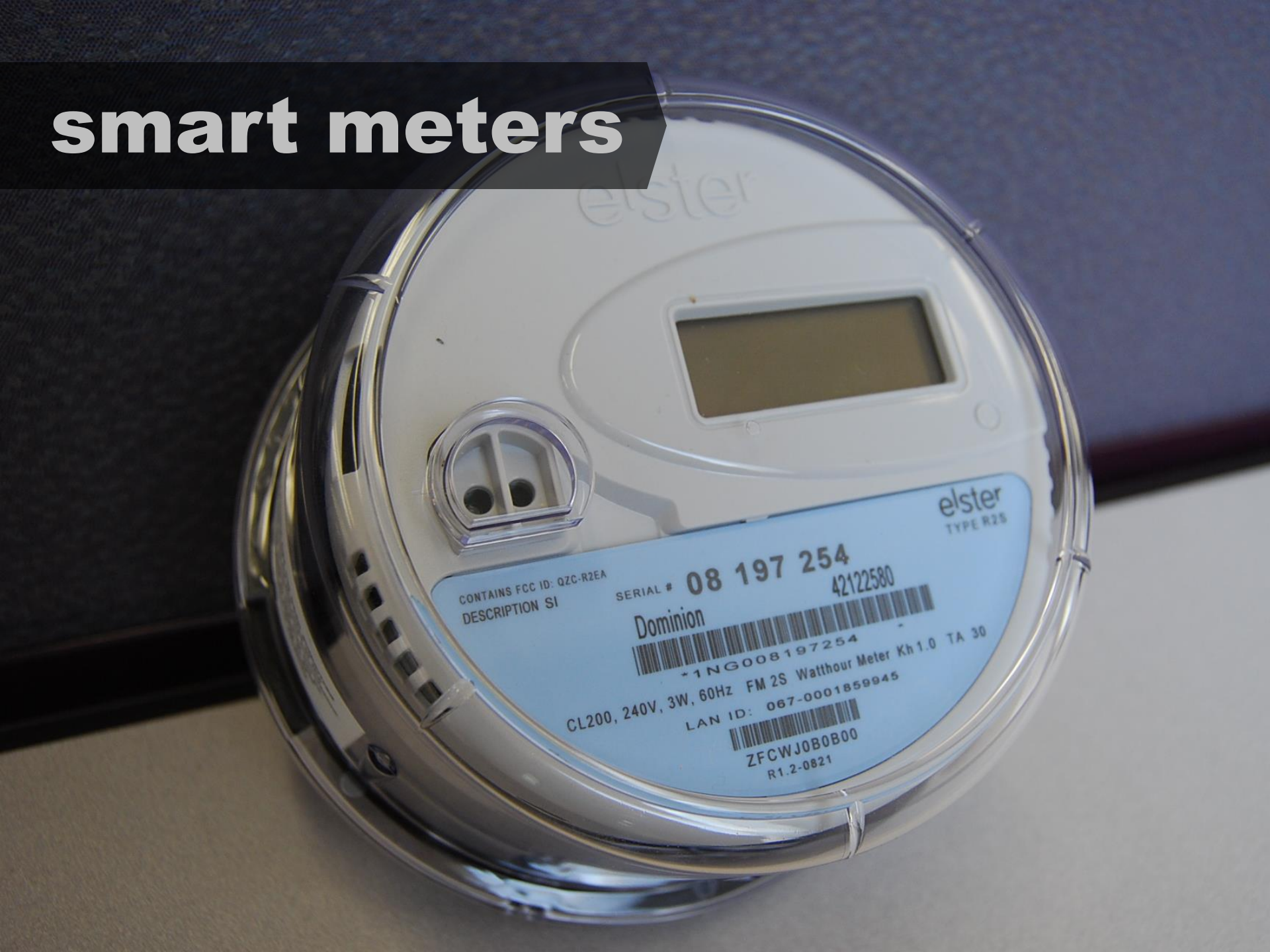
environmental psychology

hci/ubicomp

1970 1976 2003 2010

Fogg, B.J., *Persuasive Technology,* 2003

smart meters




power-aware cord
cord light pulsates &
varies in intensity
based on power draw
Gustafsson and Gyllenswärd, *CHI2005*

jetsam

visualization allows pedestrians to view amount and type of garbage at-a-glance

Paulos and Jenkins, *CHI2005*

toyota prius

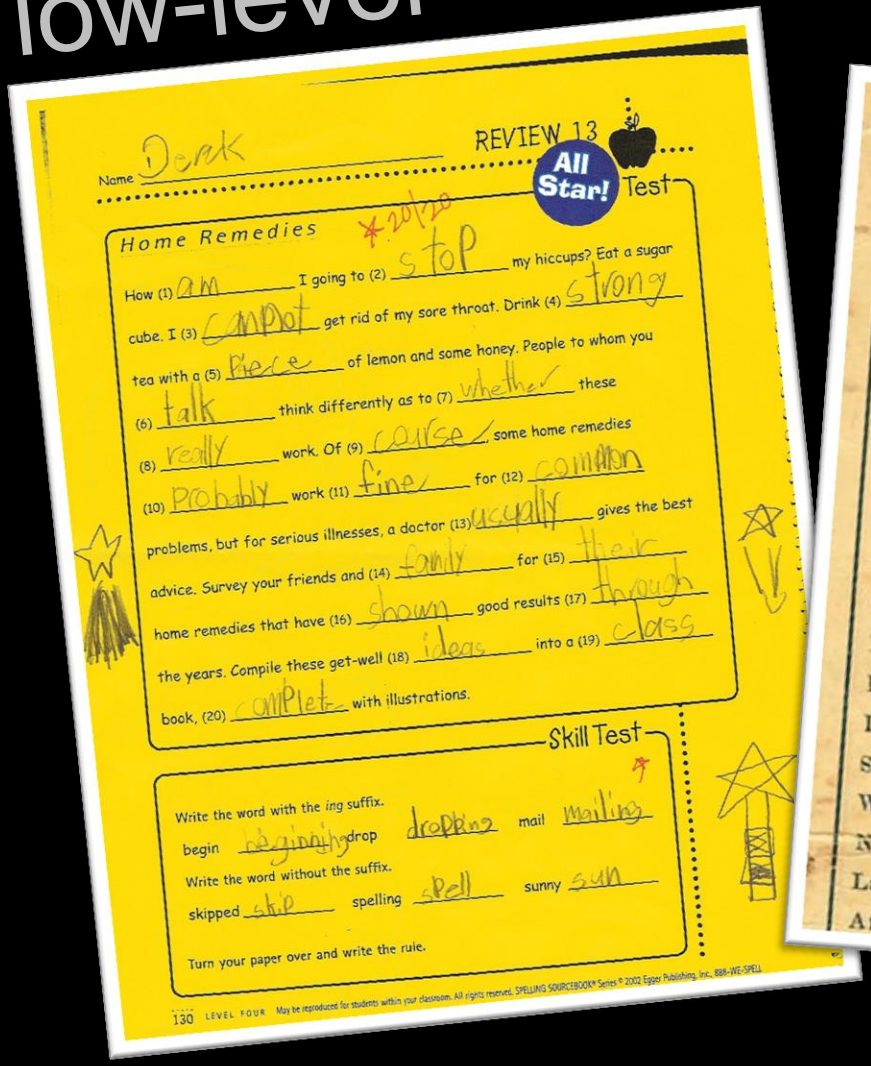
toyota prius

what makes this design effective?

- **immediacy** – relevant information accessible
- **constrained environment** – few distractions
- **reason to care** – gas mileage is important
- **simple** – interface is easy to understand
- **educates** – immediacy combined with history can teach efficient driving practices

feedback improves performance

low-level


Name Derk

REVIEW 13

All Star! Test

Home Remedies

How (1) am I going to (2) stop my hiccups? Eat a sugar cube. I (3) cannot get rid of my sore throat. Drink (4) strong tea with a (5) Piece of lemon and some honey. People to whom you (6) talk think differently as to (7) whether these (8) really work. Of (9) course, some home remedies (10) Probably work (11) fine for (12) common problems, but for serious illnesses, a doctor (13) usually gives the best advice. Survey your friends and (14) family for (15) their home remedies that have (16) shown good results (17) through the years. Compile these get-well (18) ideas into a (19) class book, (20) complet with illustrations.

Skill Test

Write the word with the *ing* suffix.

begin beginning drop dropping mail mailing

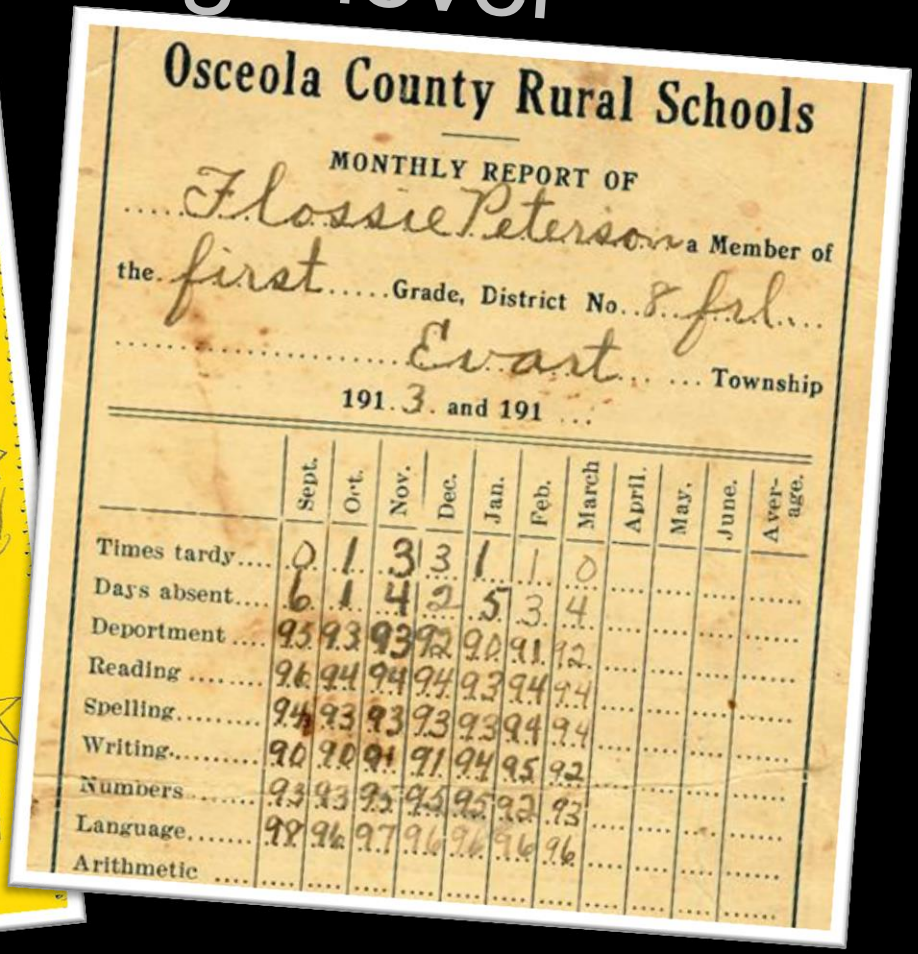
Write the word without the suffix.

skipped skip spelling spell sunny sun

Turn your paper over and write the rule.

130 LEVEL FOUR

high-level


Osceola County Rural Schools

MONTHLY REPORT OF

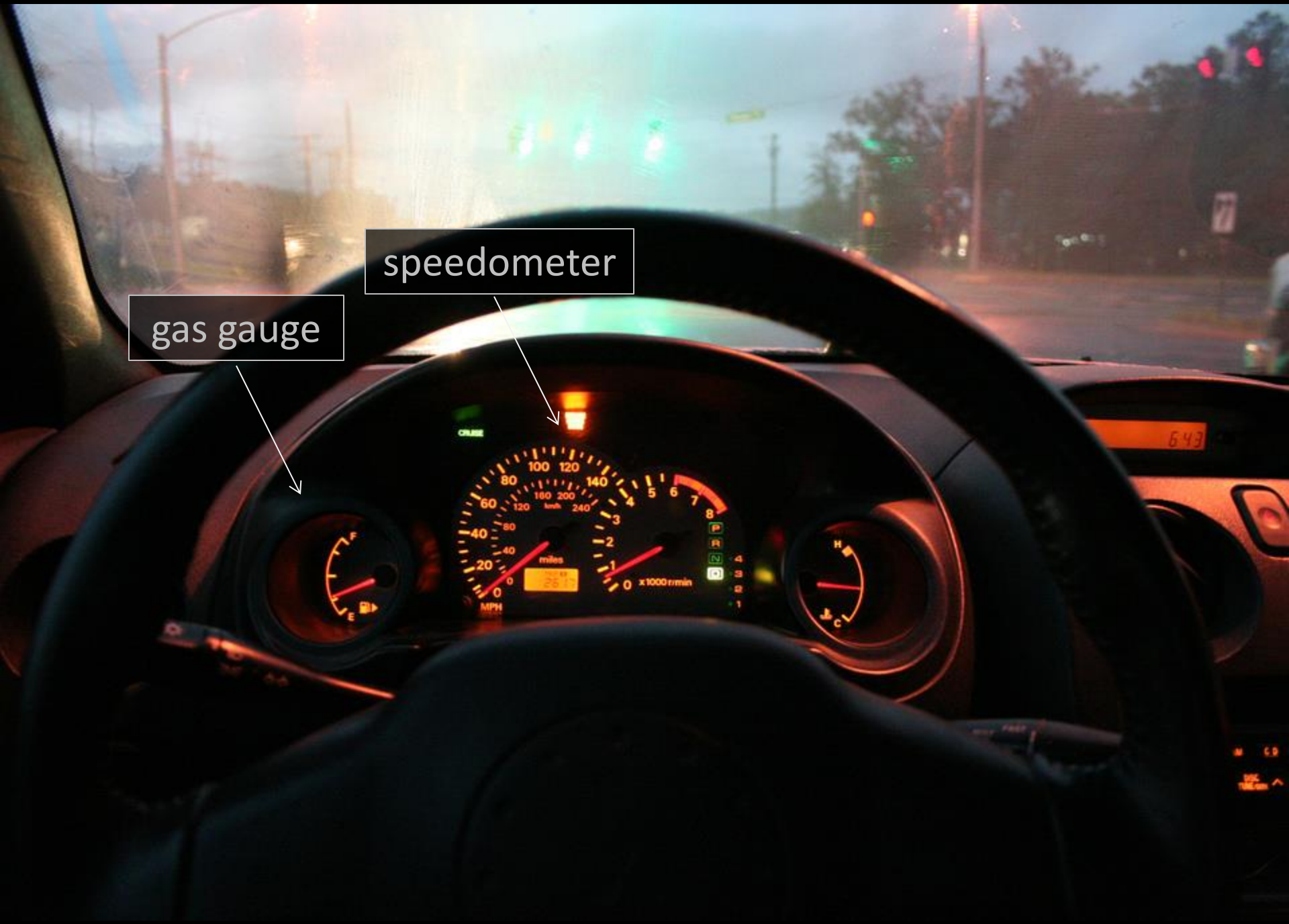
Flossie Peterson a Member of the first Grade, District No. 8 frl.

Evart Township

191 3. and 191 ...

	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April.	May.	June.	Aver-age.
Times tardy	0	1	3	3	1	1	0				
Days absent	6	1	4	2	5	3	4				
Deportment	93	93	93	92	90	91	12				
Reading	96	94	94	94	93	94	94				
Spelling	94	93	93	93	93	94	94				
Writing	90	90	91	91	94	95	92				
Numbers	93	93	95	95	95	92	93				
Language	92	96	97	96	96	96	96				
Arithmetic											

Becker, *J. of Applied Psychology 1978*


speedometer
gas gauge


CRUISE
643
0 1 2 3 4 5 6 7 8
x1000 r/min
P R N D
4 3 2 1
H
C

but if we have speedometers, why do we have...

vehicle activated speed signs

speed cameras

vehicle activated speed signs

the design of vehicle activated speed signs

vas signs

so an interesting research question then is:

how can we design technology to influence behaviors?

behavior change techniques

- information
- prompts
- goal-setting
- comparison
- commitment
- incentives
- feedback

Geller et al., 1990
Health Education Research

behavior change

techniques

- information
- prompts
- goal-setting
- comparison
- commitment
- incentives
- feedback

do you know how much ENERGY is E AY?

LOOK AROUND YOU

prompts

much more effective!

Winett et al., *Journal of Applied Psychology, 1978*

SWITCH OFF

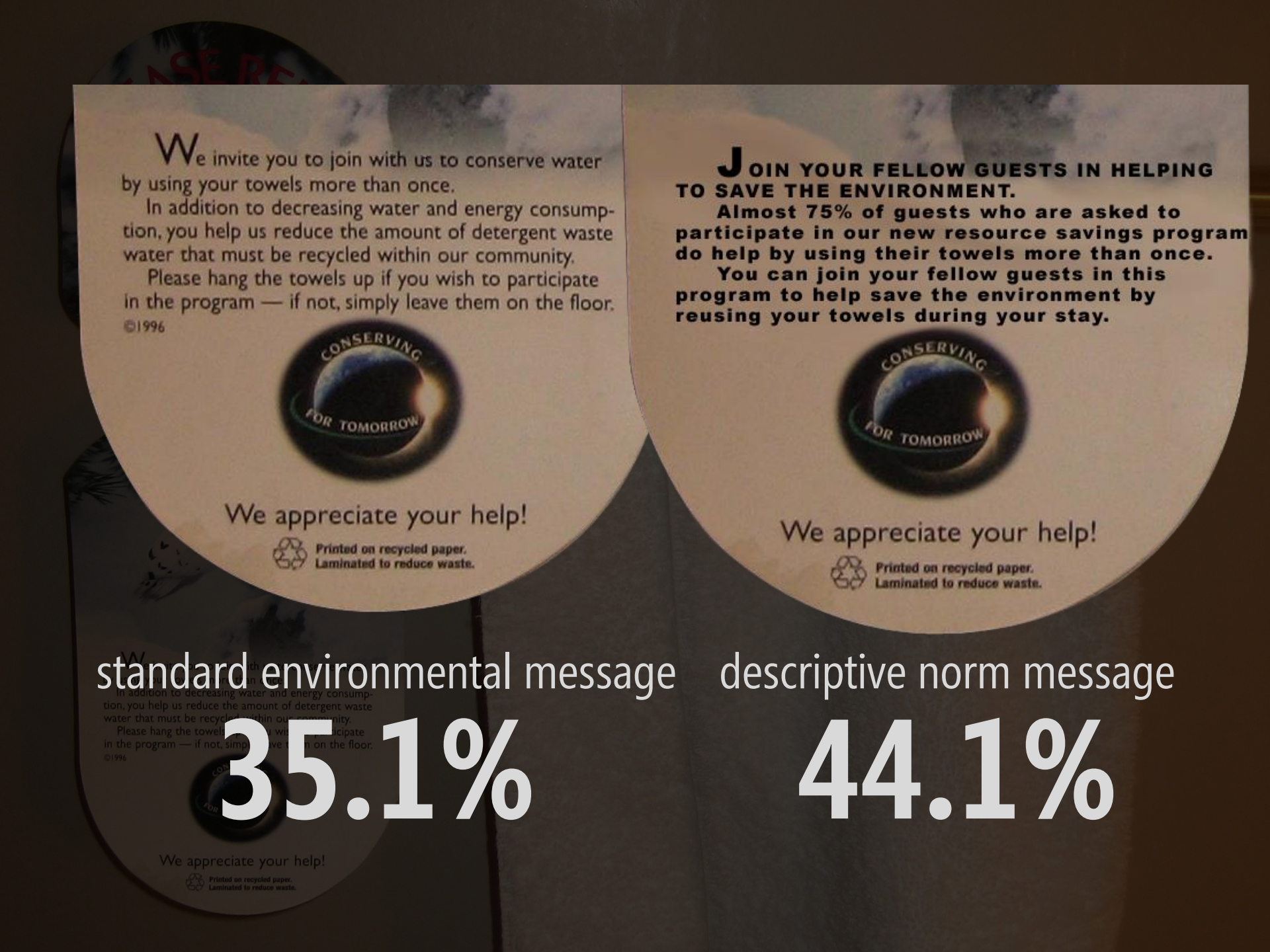
unnecessary bulbs

SAVE THE PLANET.
ONE SWITCH AT A TIME.

comparison


JAKE 2/6/10
JAKE 11/9/09
Jake 7/6/09
JAKE 4-12-09
JAKE 2/20/09
JAKE 9/26/08
JAKE 1-27-08
JAKE 4/07/07
self comparison


PLEASE REUSE
THE TOWELS
We invite you to join with us to conserve water by using your towels more than once.
In addition to decreasing water and energy consumption, you help us reduce the amount of detergent waste water that must be recycled within our community.
Please hang the towels up if you wish to participate in the program — if not, simply leave them on the floor.
©1996
CONSERVING FOR TOMORROW
We appreciate your help!
Printed on recycled paper.
Laminated to reduce waste.



standard environmental message

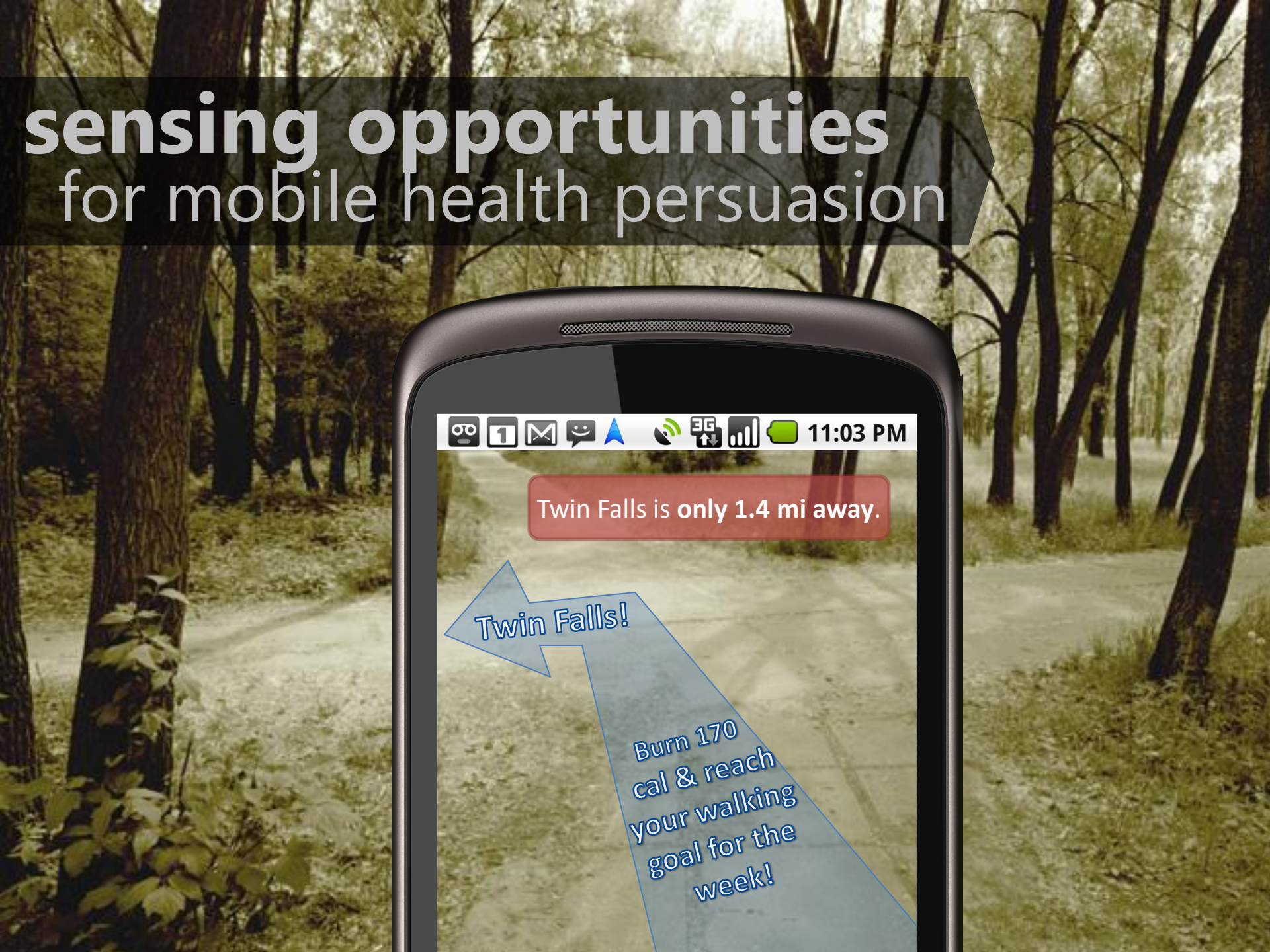
35.1%

descriptive norm message

44.1%

sensing opportunities
for mobile health persuasion

sensing opportunities
for mobile health persuasion



sensing opportunities
for mobile health persuasion

Kairos

technology that suggests a behavior at the most opportune moment

-fogg, 2003

two mobile phone examples:

ubifit

encouraging *fitness* behaviors through passive sensing and feedback

consolvo et al., chi 2008
consolvo et al., ubicomp2008

ubigreen

encouraging *proenvironmental* behaviors through passive sensing and feedback

froehlich et al., chi 2009

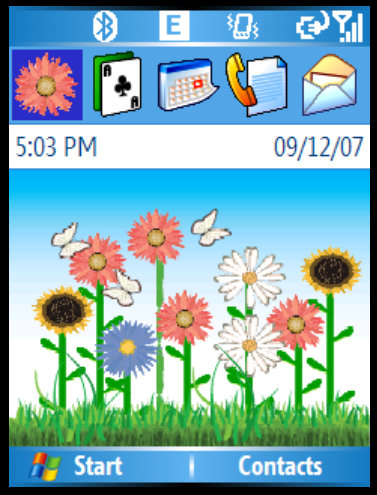
ubisystem components

collects data about physical activities

activity recognition device

+

glanceable display



phone wallpaper!

communicates data about physical activities

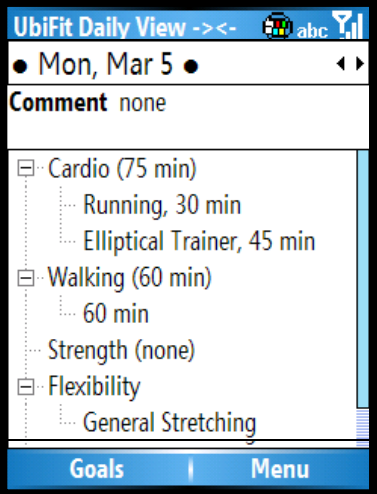
ubisystem components
towards zero effort applications

collects data about physical activities

activity recognition device

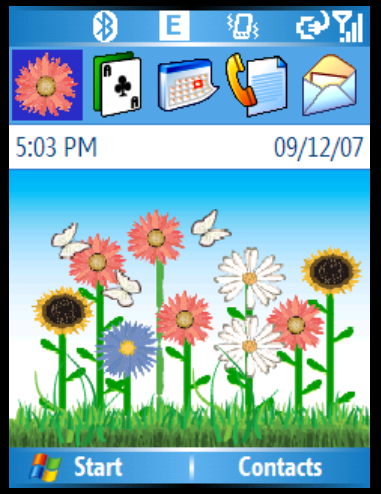
+

interactive application



+

glanceable display



communicates data about physical activities

pedometer cell phone fitness study

Figure 1. a) The Omron HJ-112 pedometer, b) the pedometer in use, and c) the Nokia 6600 mobile phone running Houston.

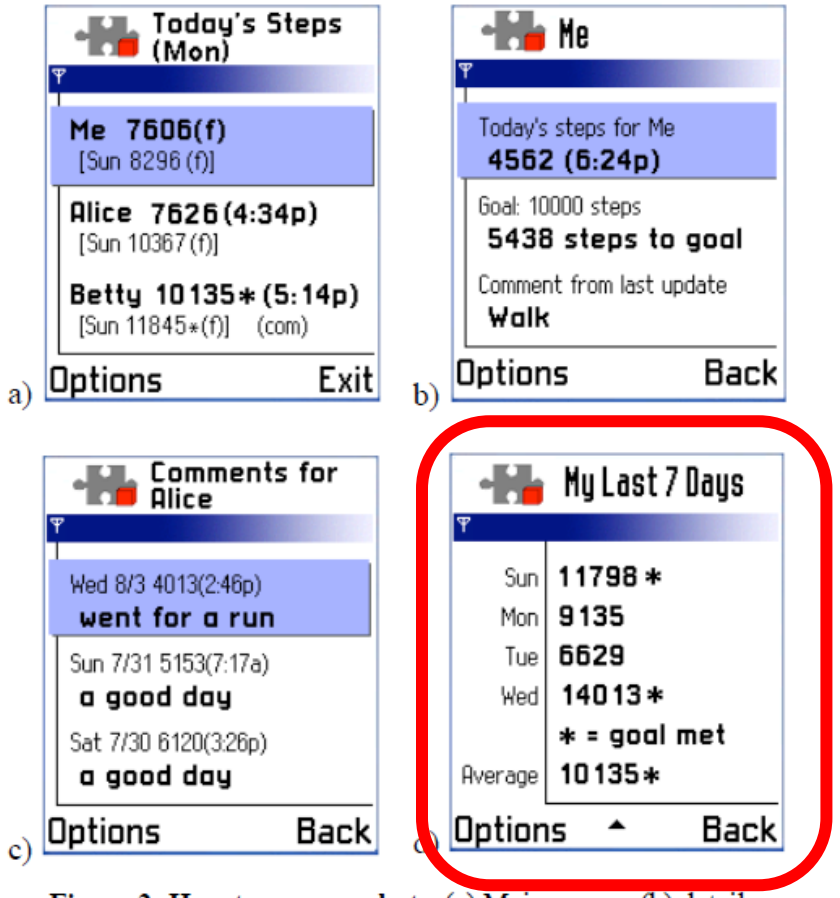


Figure 2: Houston screen shots. (a) Main screen, (b) detail screen, (c) recent comments, and (d) trending information.

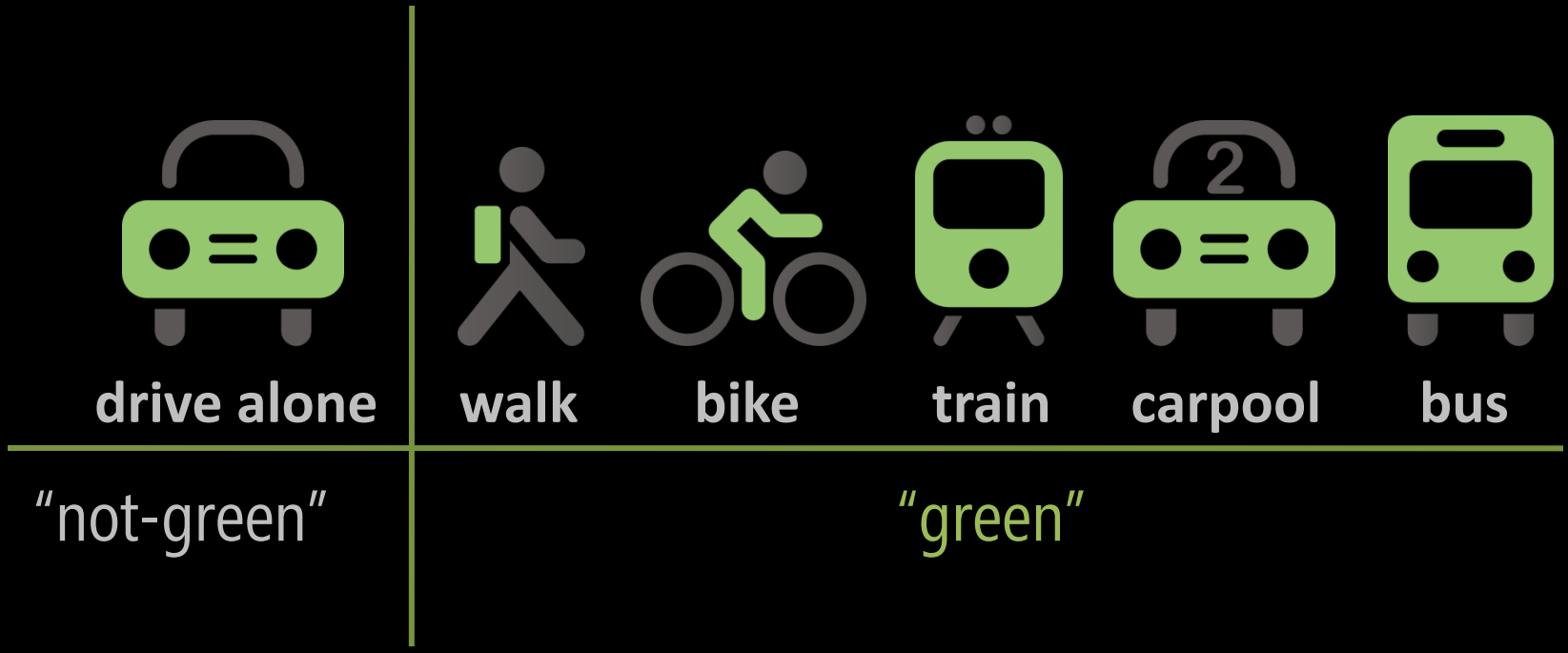
Consolvo, S., et al. Design Requirements for Technologies that Encourage Physical Activity. CHI 2006

ubifit

personal ambient display

ubigreen

tracked 6 transit activities



minimum activity duration: 7 minutes

ubigreen

personal ambient display

current activity

phone background (wallpaper)

value icon bar

evolving image

sense of anticipation for how story would unfold

ubigreen

personal ambient display

tree design:

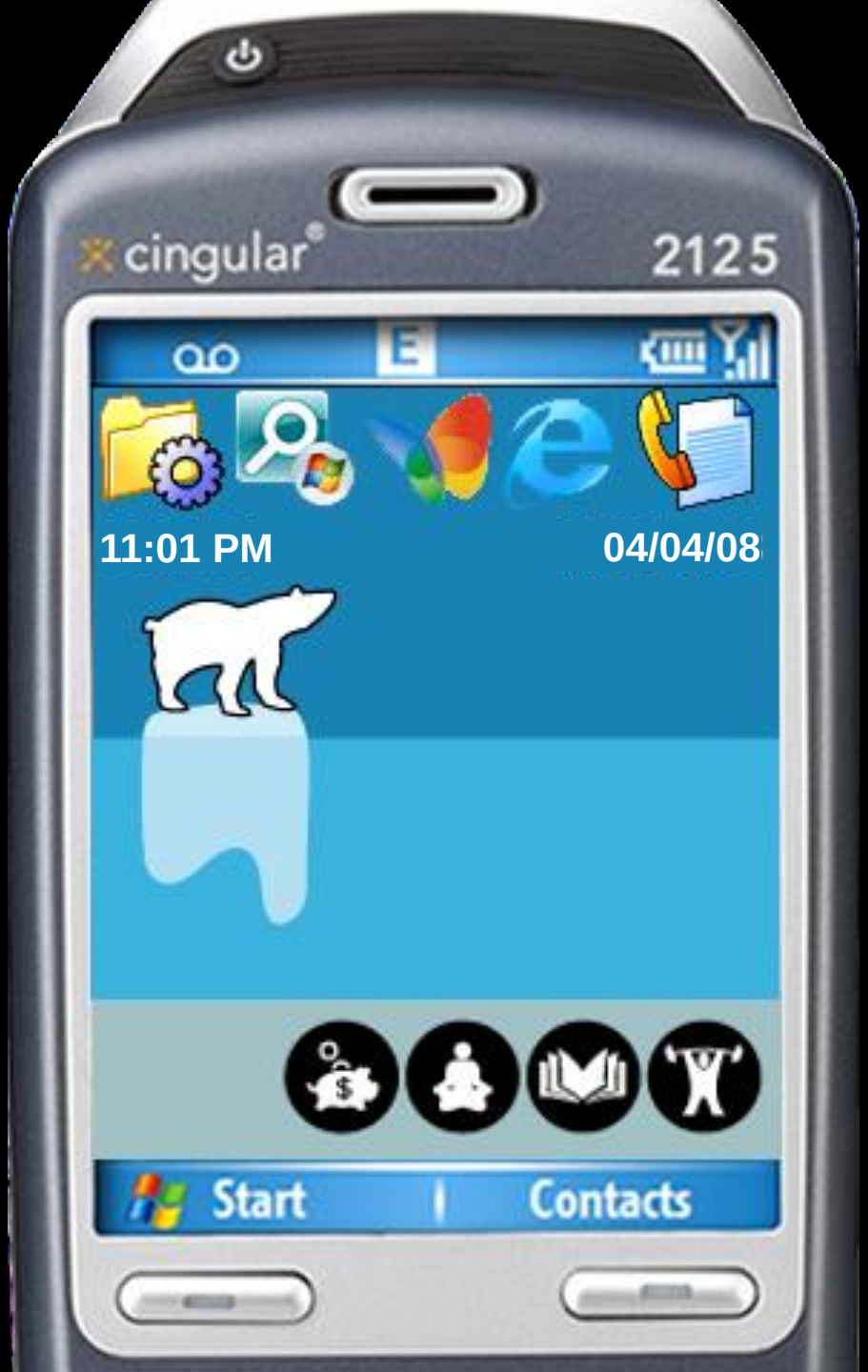
everything resets on sunday

ubigreen

personal ambient display

polar bear

design:

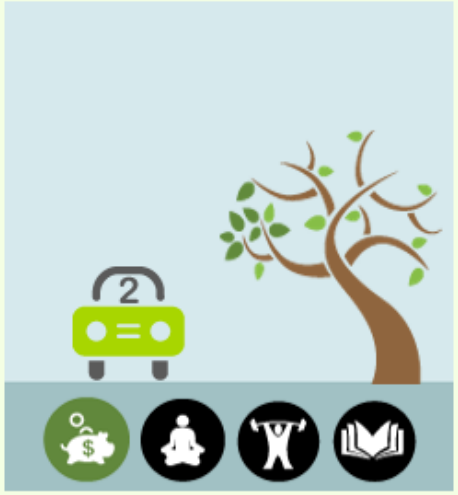


current ubigreen phone images

march 2008 field study

Sunday

RESEARCH PARTICIPANTS

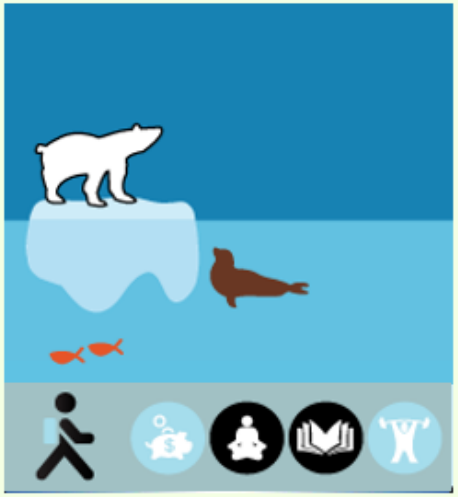


ubiqreen1

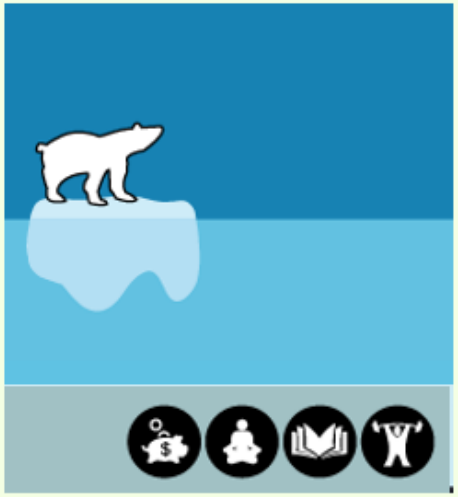
ubiqreen2

ubiqreen3

ubiqreen4

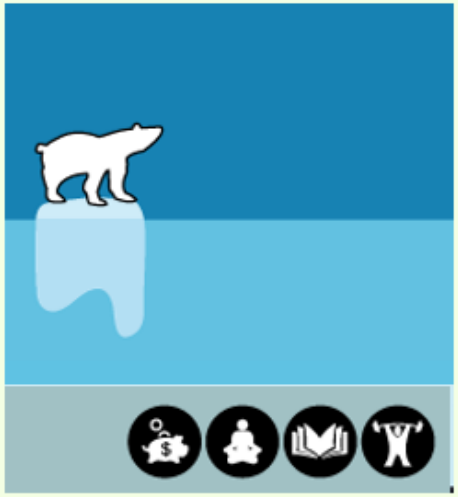


ubiqreen5



ubiqreen6

ubiqreen7



ubiqreen8

personal ambient display
impressions of ubifit

If you didn't have a screen [display], I wouldn't think about it [physical activity] as much… I **think about it** maybe subconsciously **every time I look at my phone.**

- $P5_{UF}$

With **a website, it's so easy to ignore**… it's just out of sight, out of mind. But **on the phone, you can't really ignore it**…

- $P9_{UF}$

MARIO
000000

×00

WORLD
1-1

TIME

SUPER MARIO BROS.

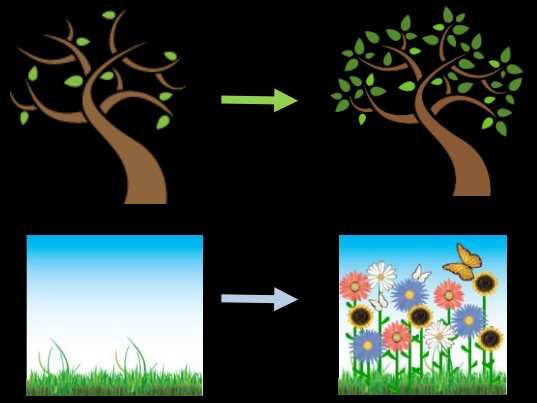
1 PLAYER GAME

2 PLAYER GAME

TOP- 000000

game mechanics

playful



measured progress

virtual achievements

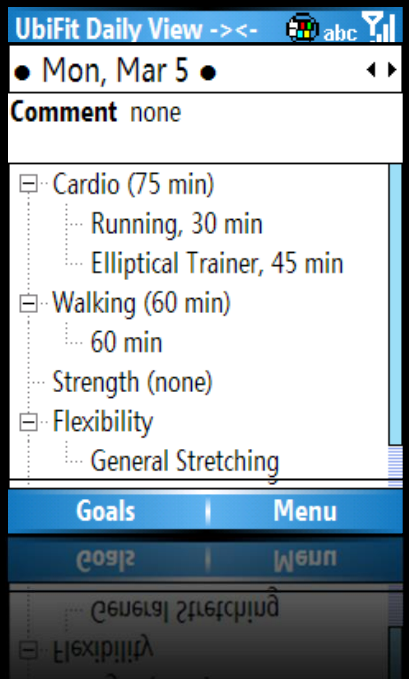
collections


MARIO
002100
×03
WORLD
1-1
TIME
323
loss aversion

need for quantitative data

I would **like to see some graph** or raw data.

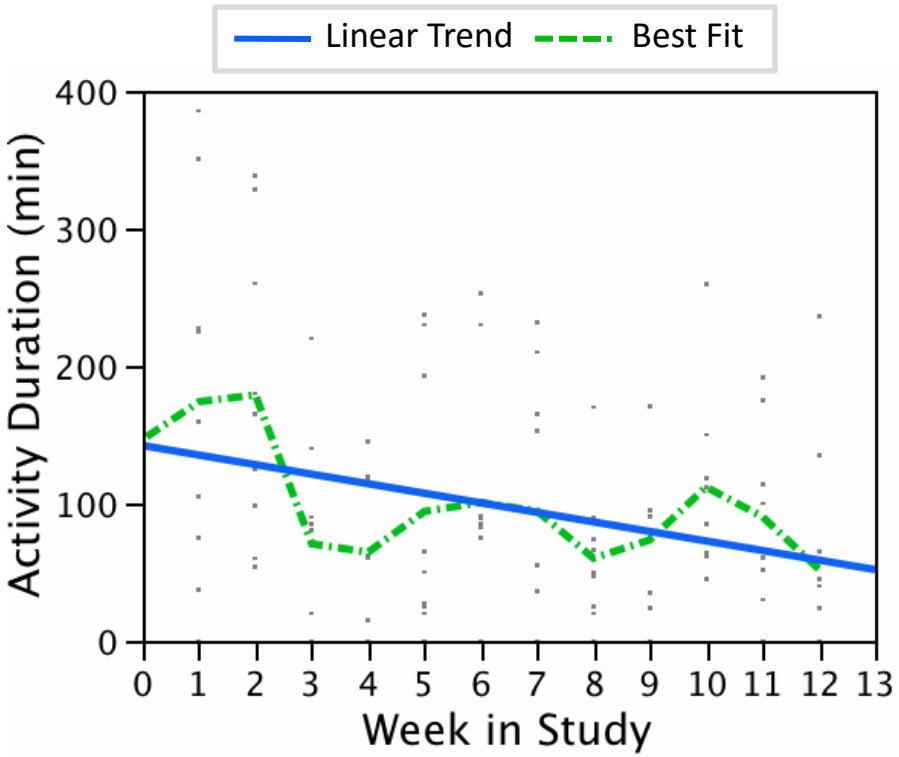
- P13$_{UG}$



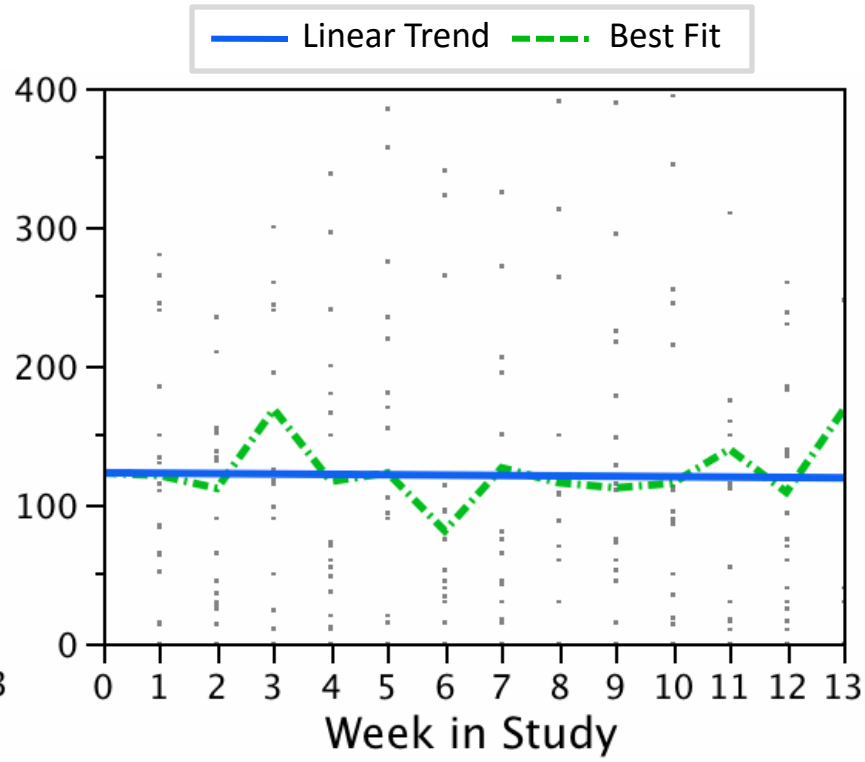
quantitative data

- builds trust system is working
- allows for self-comparison
- some people like it better

effectiveness of the ubifit glanceable display



no glanceable display



glanceable display

study occurred over thanksgiving, christmas, and new years.

mpg?

gpm?

kwh?

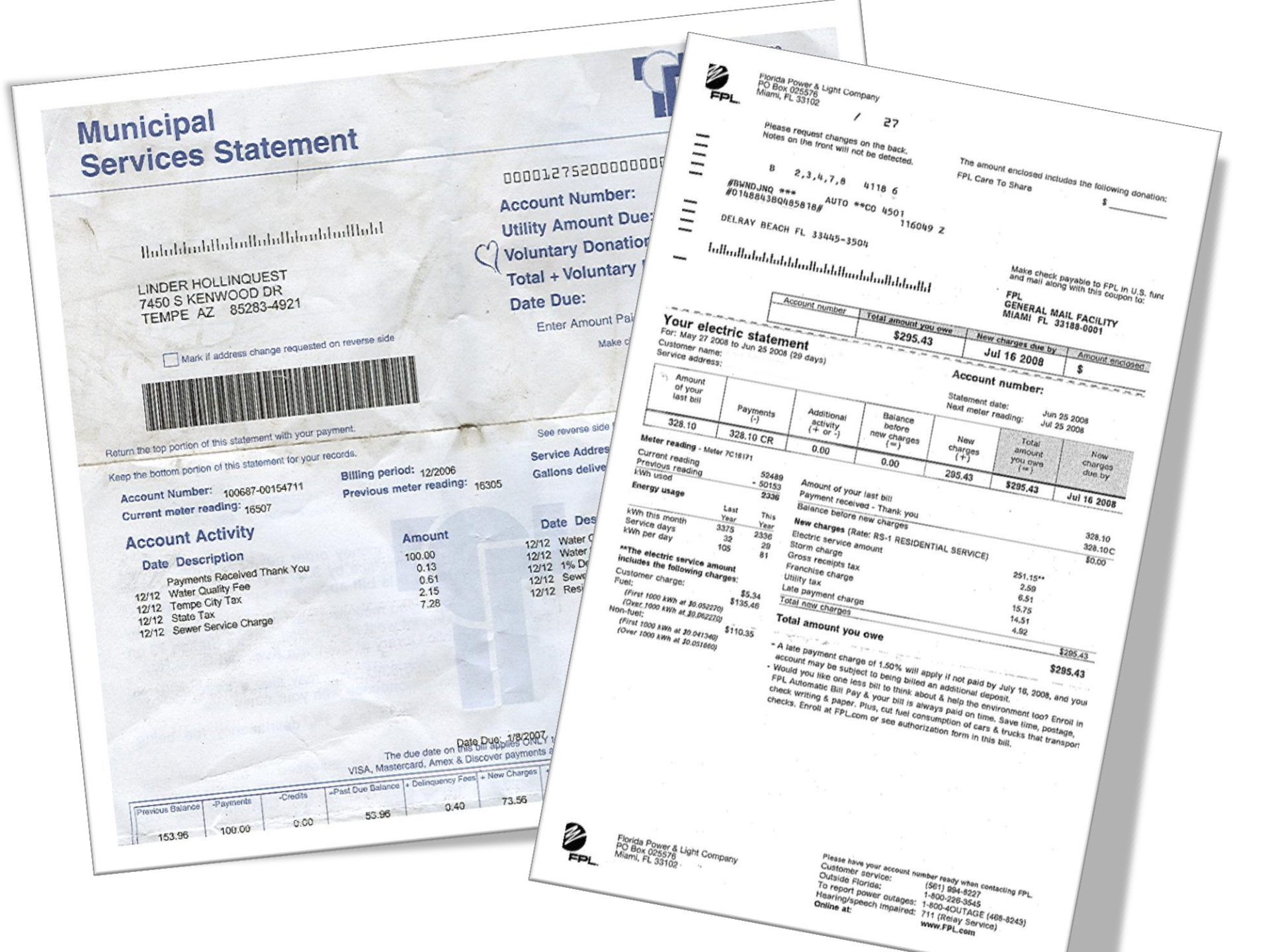
how much water do you use when you shower?

how much energy does your dryer use?

why
the
dis-
connect?


KILOWATTHOURS
240V 3W
DE435


smart meters
ELSTER
00001
kWh
SERIAL # 07 000 683
ELSTER
TYPE R1S
FCC ID: QZC-RX9
27229
BOROUGH OF LANSDALE
*1NG007000683
CL200, 240V, 3W, 60Hz
FM 2S Watthour Meter
R03.6-0711
Kh 1.0 TA 30
LAN ID: 071-0000942546
ZCC39000000



Municipal Services Statement

LINDER HOLLINQUEST
7450 S KENWOOD DR
TEMPE AZ 85283-4921

Mark if address change requested on reverse side

Return the top portion of this statement with your payment.

Keep the bottom portion of this statement for your records.

Account Number: 100687-00154711
Current meter reading: 16507

Billing period: 12/2006
Previous meter reading: 16305

Account Activity

Date	Description	Amount
	Payments Received Thank You	100.00
12/12	Water Quality Fee	0.13
12/12	Tempe City Tax	0.61
12/12	State Tax	2.15
12/12	Sewer Service Charge	7.28

Account Number:
Utility Amount Due:
Voluntary Donation
Total + Voluntary
Date Due:

Enter Amount Pa

Make c

See reverse side

Service Addres
Gallons delive

Date Des
12/12 Water
12/12 Water
12/12 1% D
12/12 Sewe
12/12 Resi

Date Due: 1/8/2007

The due date on this bill applies ONLY
VISA, Mastercard, Amex & Discover payments a

Previous Balance	-Payments	-Credits	=Past Due Balance	+ Delinquency Fees	+ New Charges
153.96	100.00	0.00	53.96	0.40	73.56

Florida Power & Light Company
PO Box 025576
Miami, FL 33102

/ 27

Please request changes on the back.
Notes on the front will not be detected.

B 2,3,4,7,8 4118 6
#BWNDJNQ ***
#0148843BQ485818# AUTO **CO 4501
116049 Z
DELRAY BEACH FL 33445-3504

The amount enclosed includes the following donation:
FPL Care To Share $ _____

Make check payable to FPL in U.S. fund
and mail along with this coupon to:
FPL
GENERAL MAIL FACILITY
MIAMI FL 33188-0001

Account number	Total amount you owe	New charges due by	Amount enclosed
	$295.43	Jul 16 2008	$

Your electric statement

For: May 27 2008 to Jun 25 2008 (29 days)
Customer name:
Service address:

Account number:

Statement date: Jun 25 2008
Next meter reading: Jul 25 2008

Amount of your last bill	Payments (-)	Additional activity (+ or -)	Balance before new charges (=)	New charges (+)	Total amount you owe (=)	New charges due by
328.10	328.10 CR	0.00	0.00	295.43	$295.43	Jul 16 2008

Meter reading - Meter 7C18171

Current reading	52489
Previous reading	- 50153
kWh used	2336

Energy usage

	Last Year	This Year
kWh this month	3375	2336
Service days	33	29
kWh per day	105	81

****The electric service amount includes the following charges:**

Customer charge:		$5.34
Fuel:		
(First 1000 kWh at $0.052270)		
(Over 1000 kWh at $0.062270)		$135.46
Non-fuel:		
(First 1000 kWh at $0.041340)		
(Over 1000 kWh at $0.051660)		$110.35

Amount of your last bill	328.10
Payment received - Thank you	328.10C
Balance before new charges	$0.00
New charges (Rate: RS-1 RESIDENTIAL SERVICE)	
Electric service amount	251.15**
Storm charge	2.59
Gross receipts tax	6.51
Franchise charge	15.75
Utility tax	14.51
Late payment charge	4.92
Total new charges	$295.43
Total amount you owe	**$295.43**

- A late payment charge of 1.50% will apply if not paid by July 16, 2008, and your account may be subject to being billed an additional deposit.
- Would you like one less bill to think about & help the environment too? Enroll in FPL Automatic Bill Pay & your bill is always paid on time. Save time, postage, check writing & paper. Plus, cut fuel consumption of cars & trucks that transport checks. Enroll at FPL.com or see authorization form in this bill.

Florida Power & Light Company
PO Box 025576
Miami, FL 33102

Please have your account number ready when contacting FPL.

Customer service:	(561) 994-8227
Outside Florida:	1-800-226-3545
To report power outages:	1-800-4OUTAGE (468-8243)
Hearing/speech impaired:	711 (Relay Service)
Online at:	www.FPL.com

Kempton and Layne, 1994

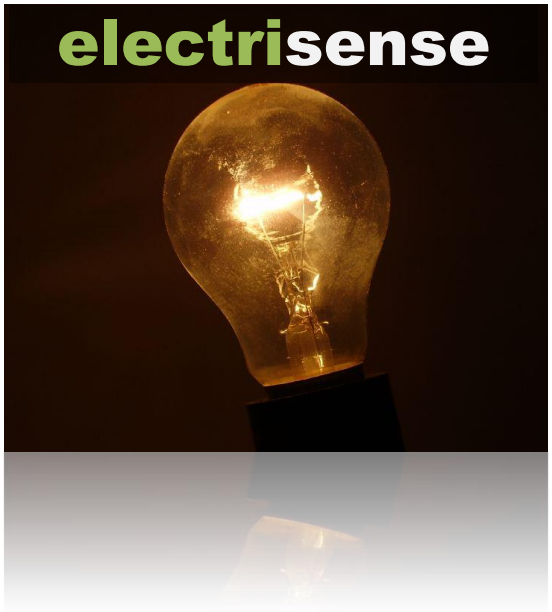
design activity

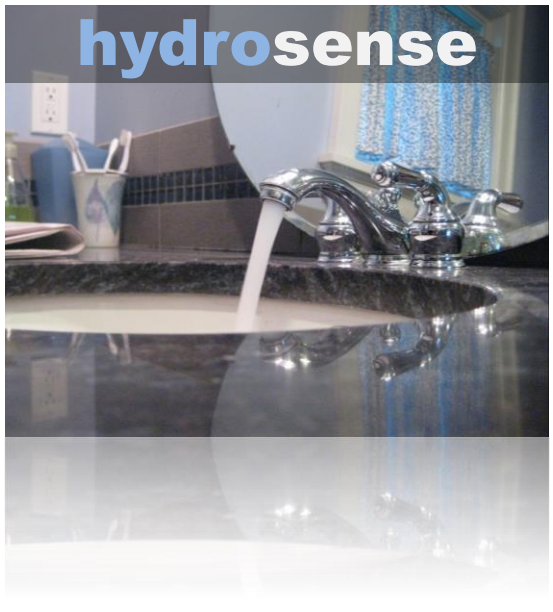
1. split into groups of 3 or 4
2. identify an activity that you want to change via sensing and feedback (energy usage, fitness, sleep, diet, etc.)
3. design an interface to influence that activity.

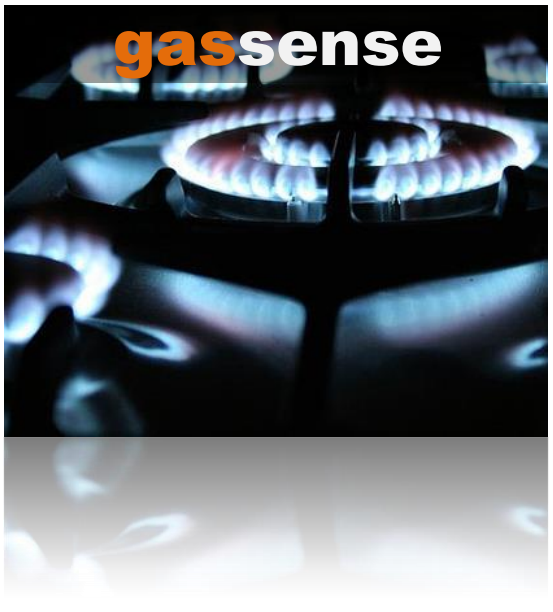
think about

1. what does the interface look like?
2. why would someone want to use it?
3. how does the user see the interface?
4. does the interface use social competition? gaming?

high resolution resource consumption sensing for electricity, water and gas







three design goals

low-cost

easy-to-install

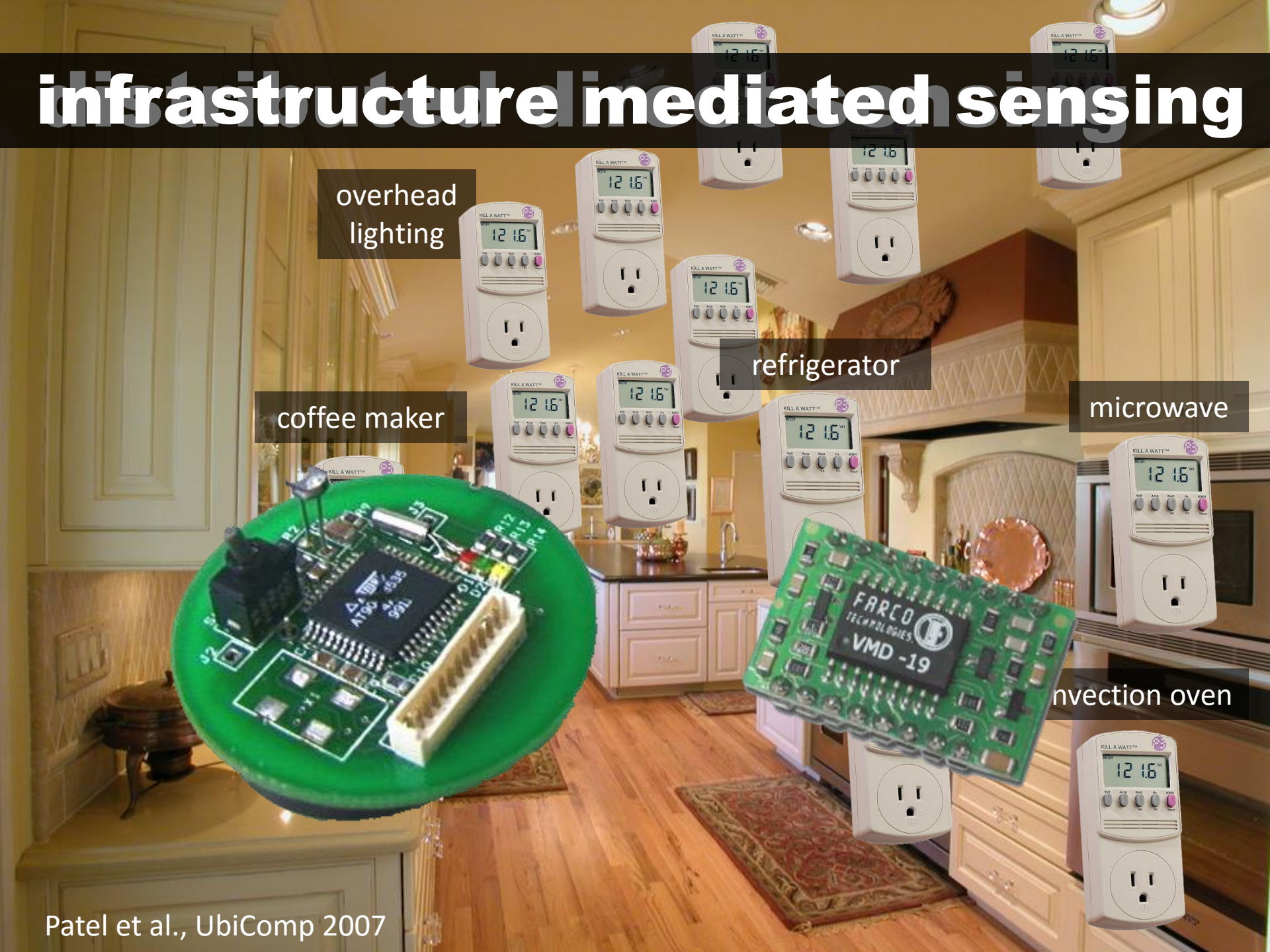
device-level information

how much energy does your dryer use?

appliance + sensor = appliance-level data!

distributed direct sensing

infrastructure mediated sensing



Patel et al., UbiComp 2007

electrisense: appliance level sensing with two sensors

powerline event detection sensor

automatically detects and classifies electrical events on the home powerline

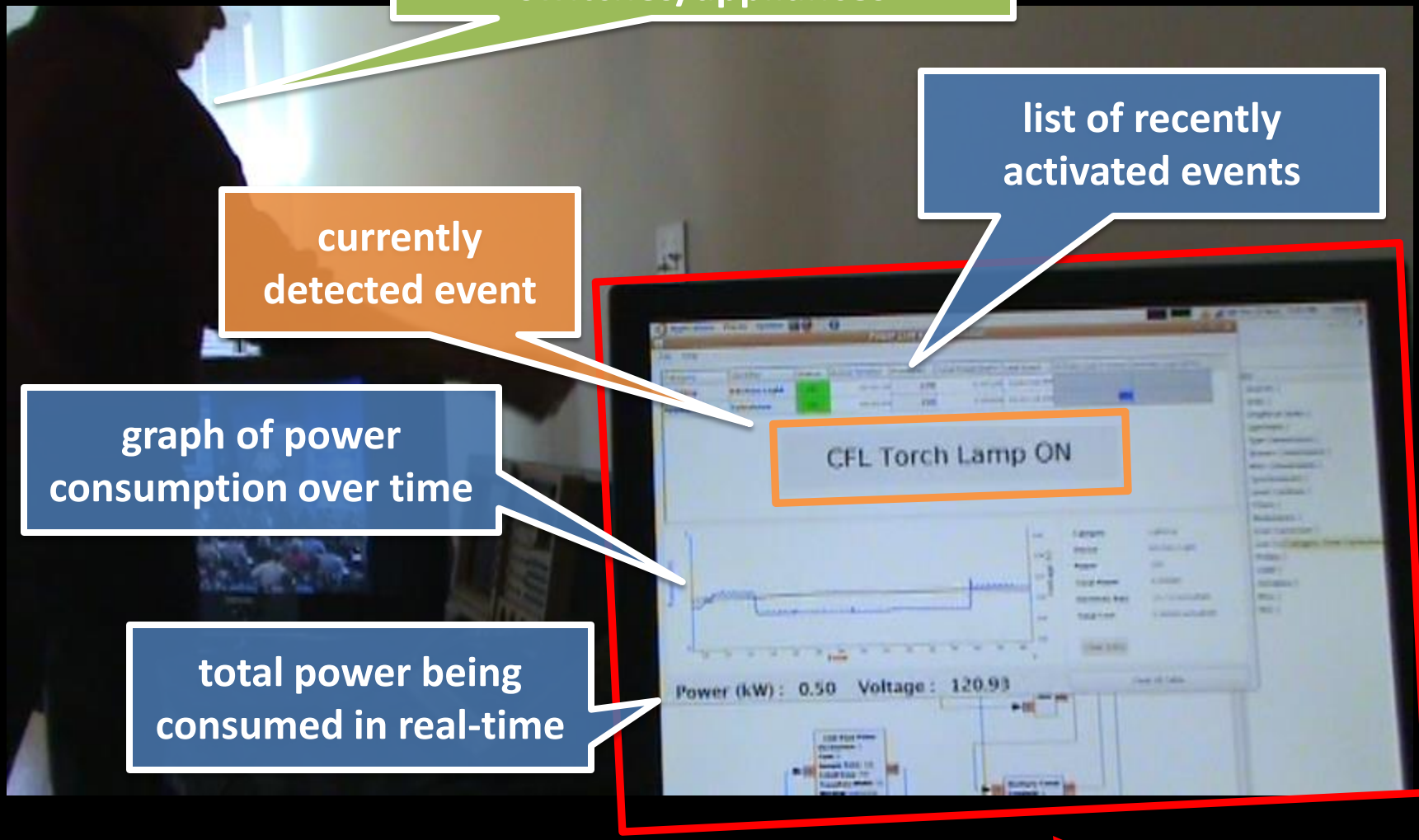
Patel et al., *UbiComp 2007*

contactless power consumption sensor

whole-home power consumption sensing from outside breaker panel

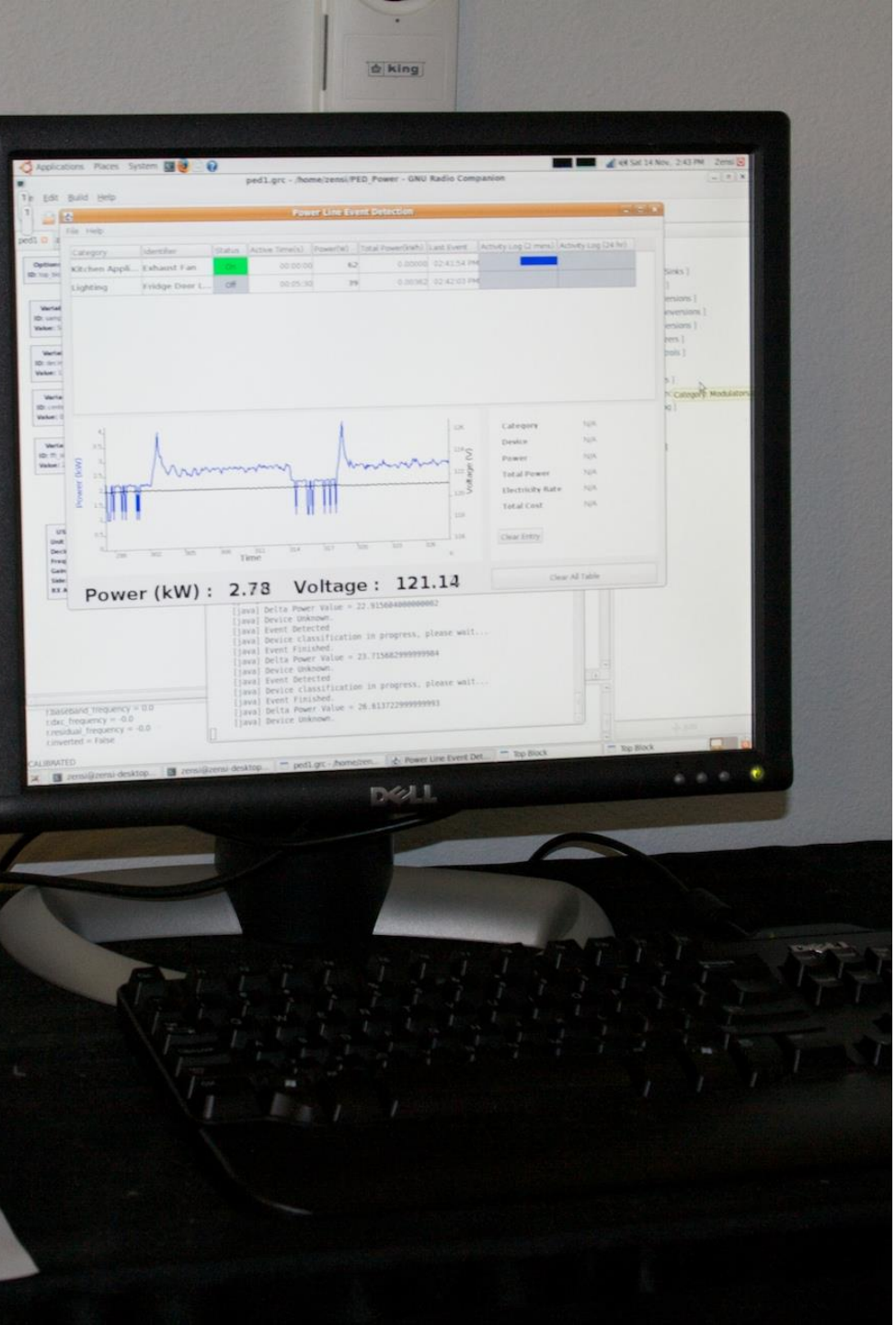
Patel et al., *CHI2010*

demo



not for end users

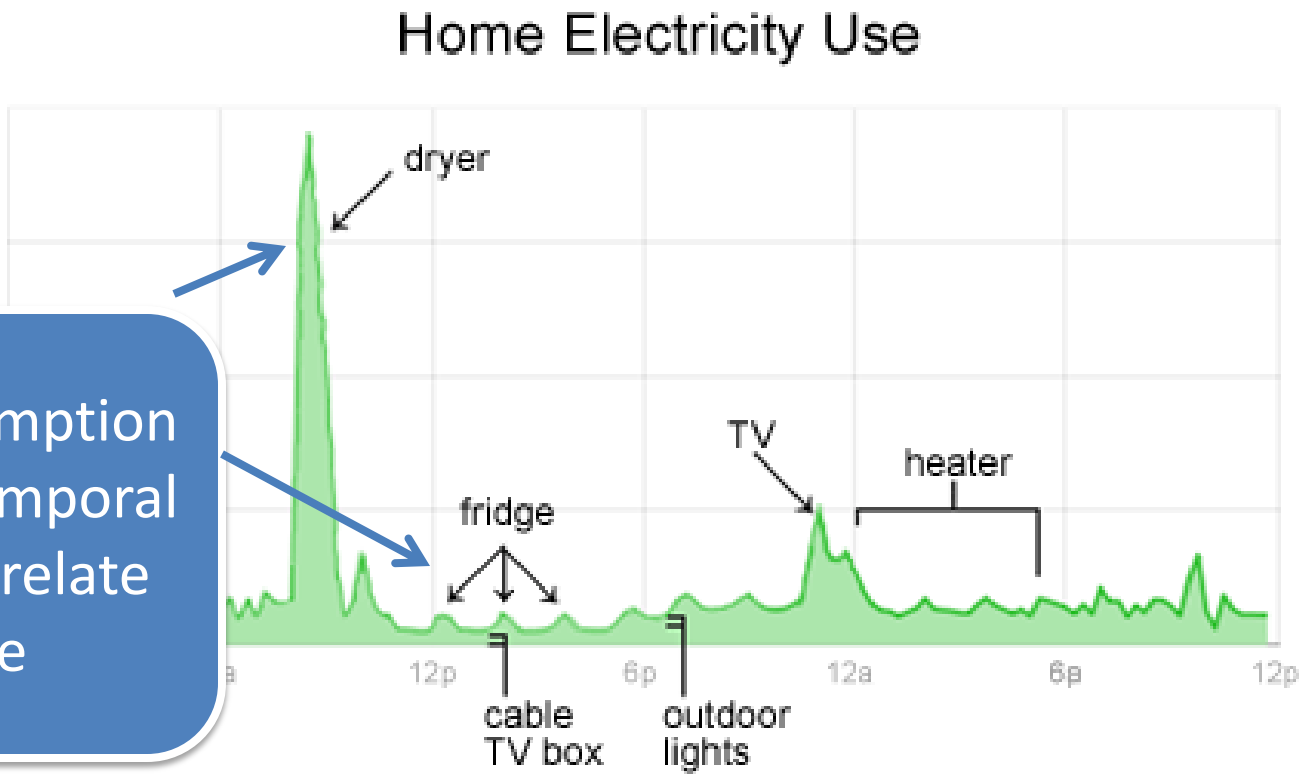
Movie Removed for Public Posting of Slides



how does this work?

Google™ PowerMeter

power consumption spikes and temporal patterns correlate to usage

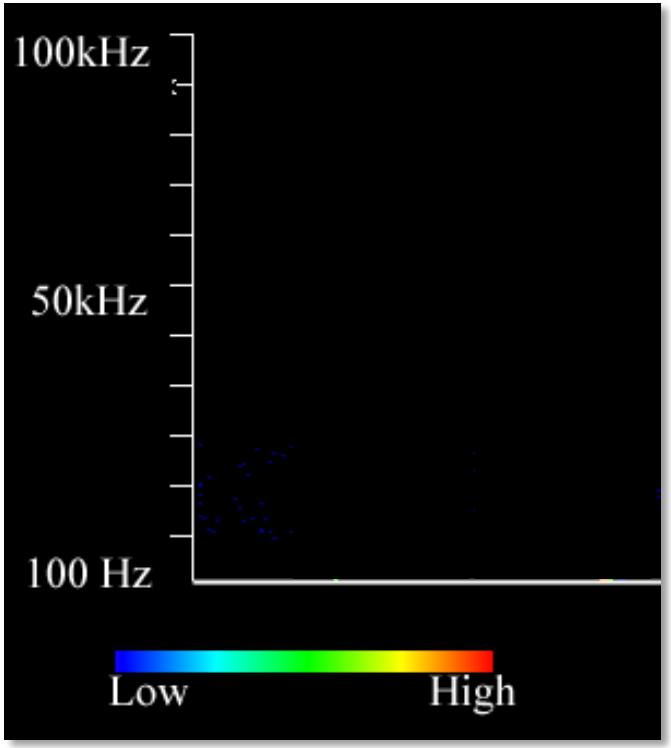


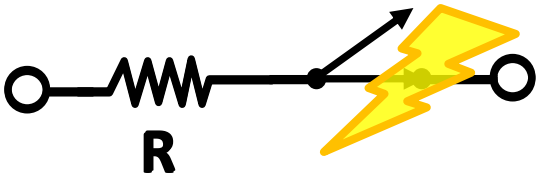
this is only ***one*** input feature into our machine learning algorithm!

your noise is our signal

how ped works

mechanical switches

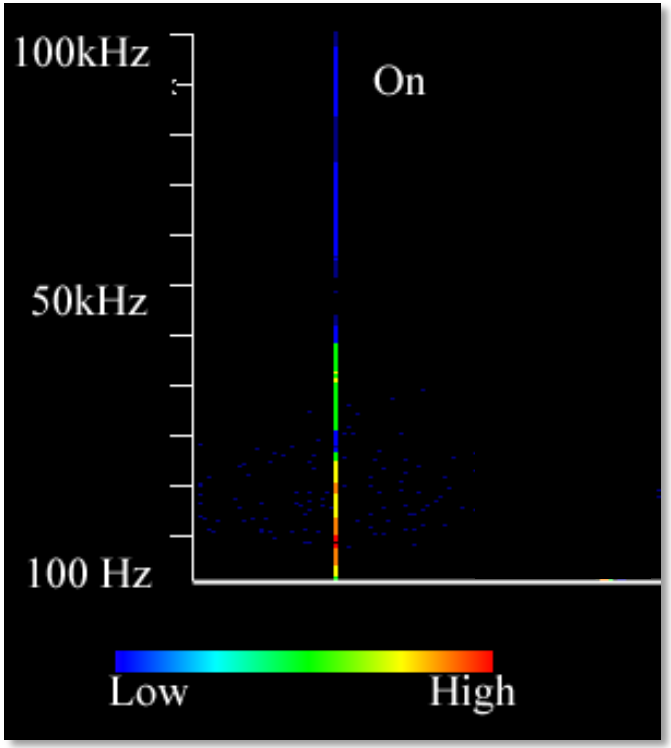


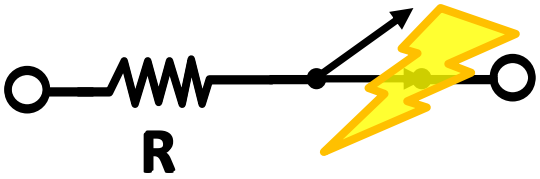


electrical noise transient

how ped works

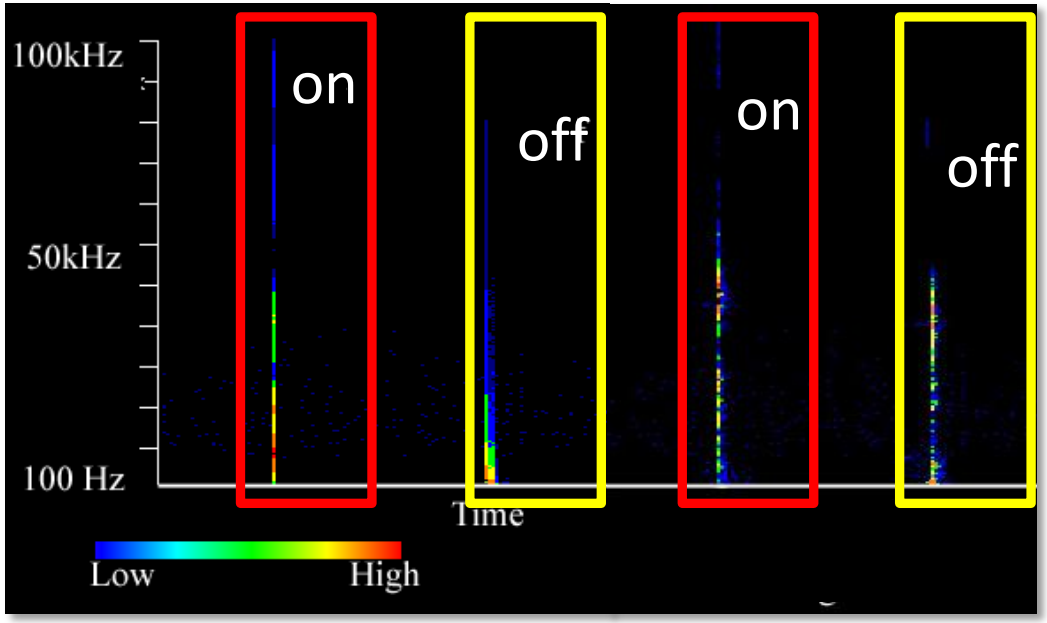
mechanical switches





electrical noise transient

each switch has a unique transient signature



based on:

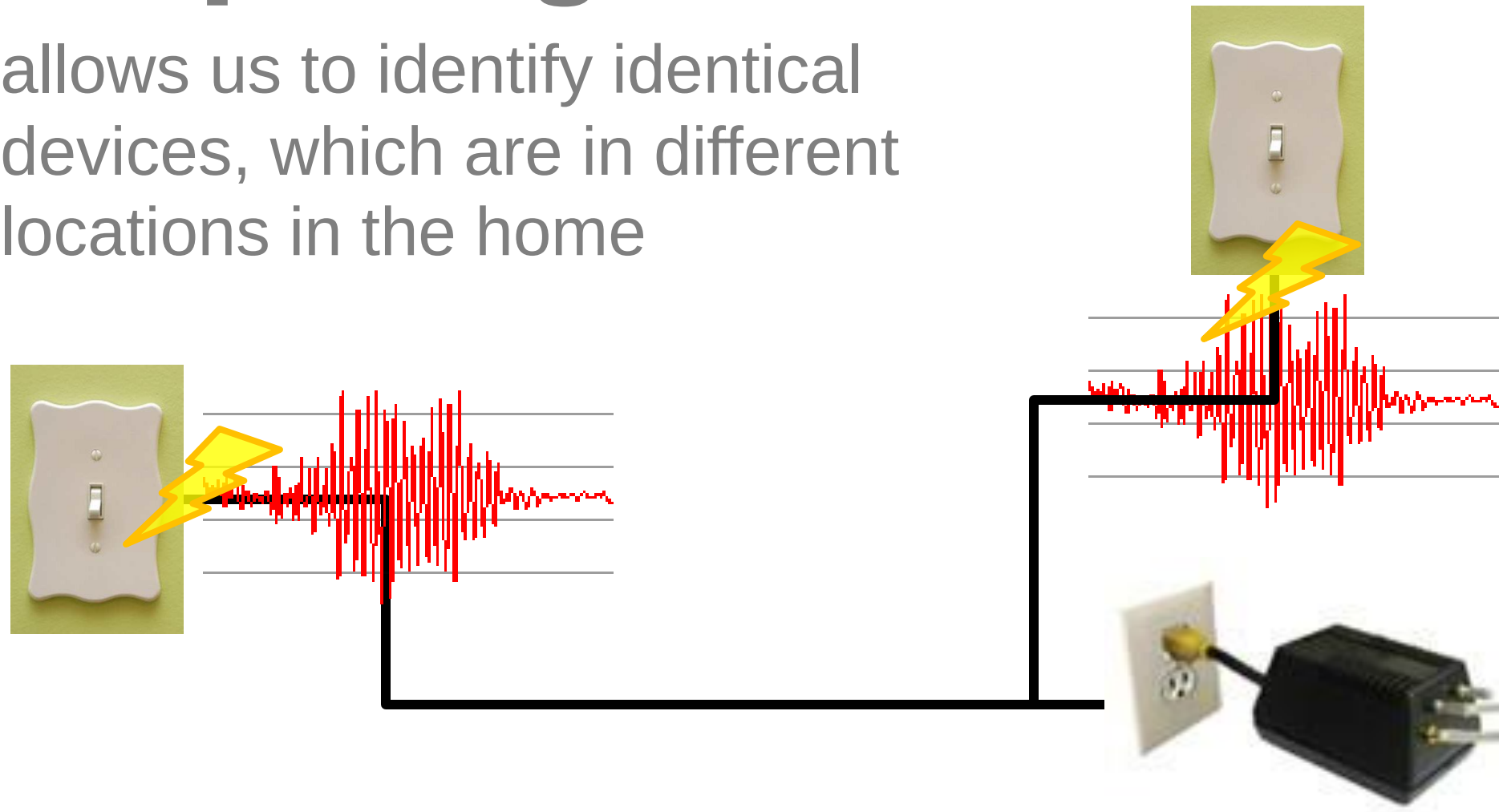
1. switching mechanisms
2. load characteristics
3. position on transmission line

switch 1

switch 2

transmission line shapes signal

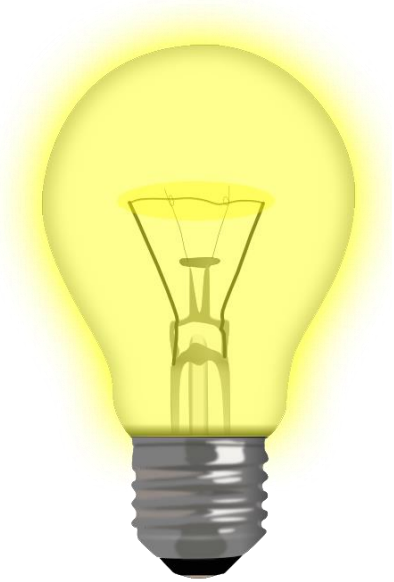
allows us to identify identical devices, which are in different locations in the home



Movie Removed for Public Posting of Slides

how ped works

three classes of noise



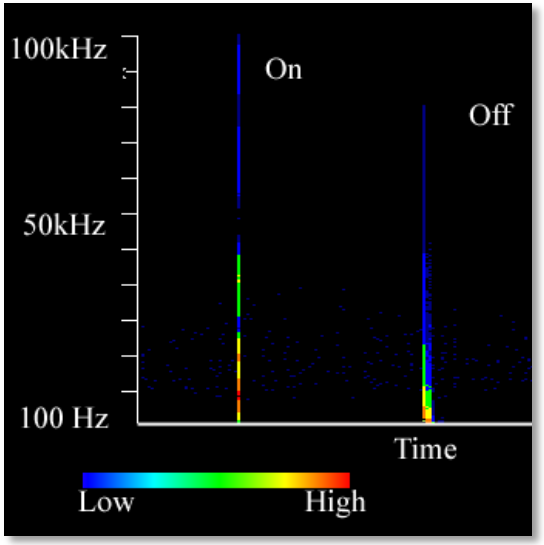
resistive

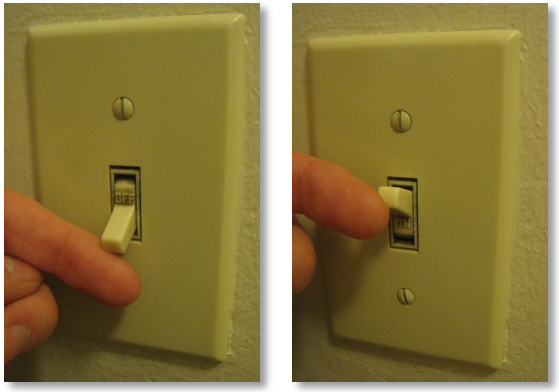
generates continuous noise

inductive loads
(e.g., from motors)

loads with solid state switching
(e.g., tvs, cfls, computers)

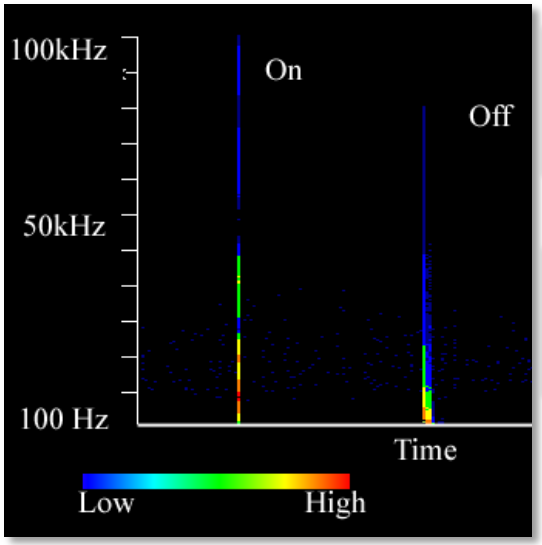
transients





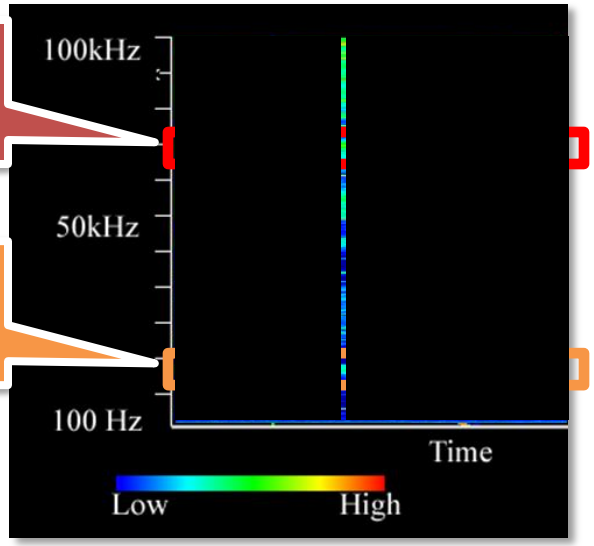
transients

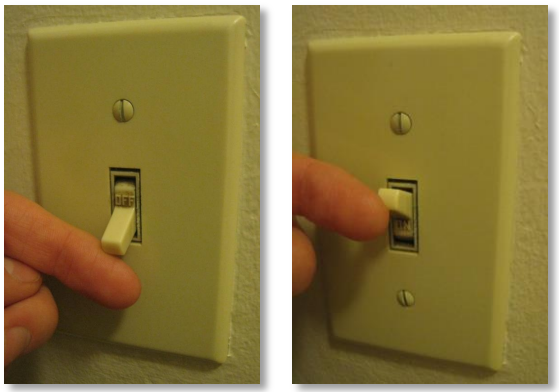
continuous noise

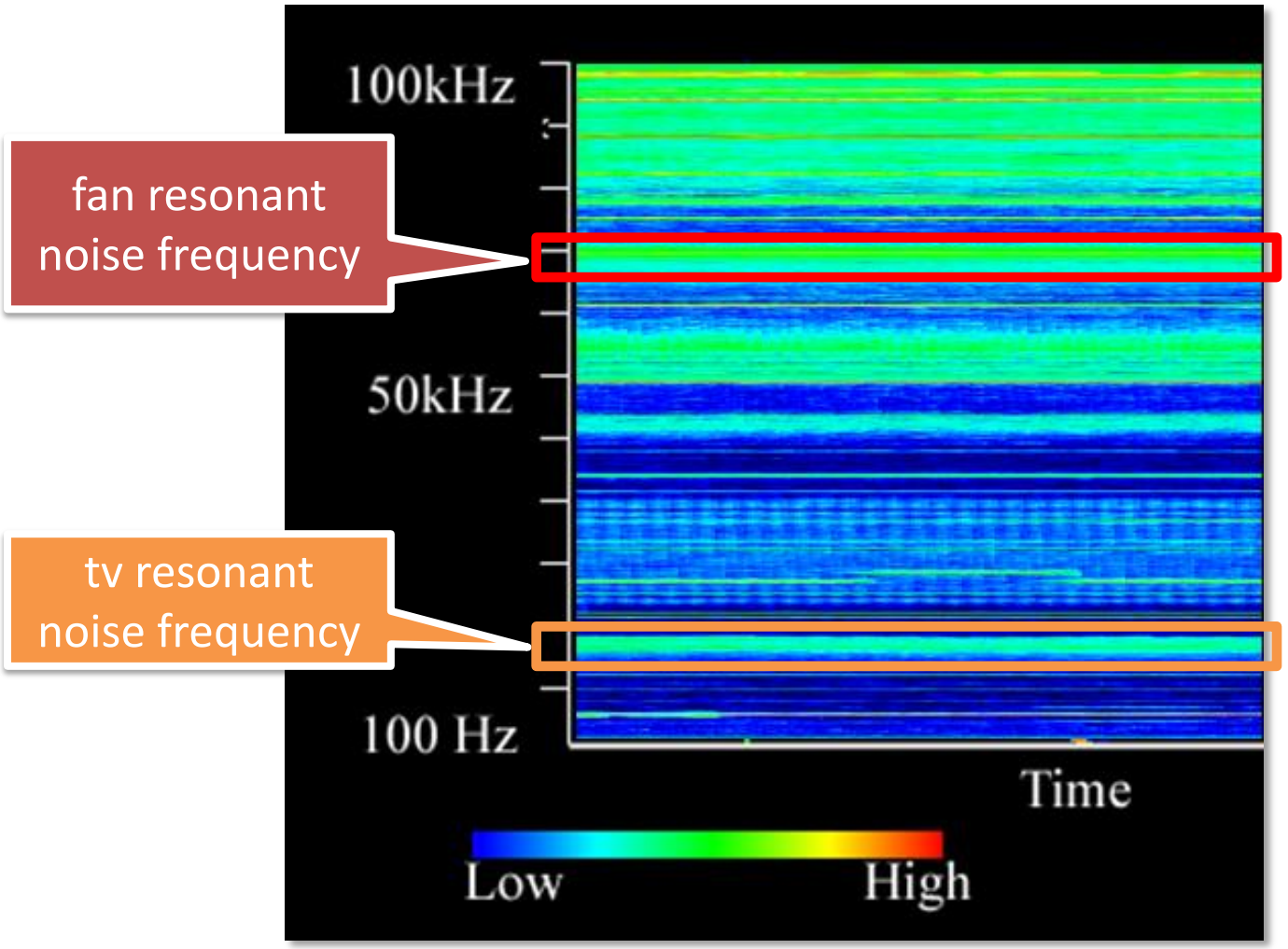


fan resonant noise frequency

tv resonant noise frequency






fan resonant noise frequency
tv resonant noise frequency
100kHz
50kHz
100 Hz
Time
Low
High

Movie Removed for Public Posting of Slides

HYDROSENSE

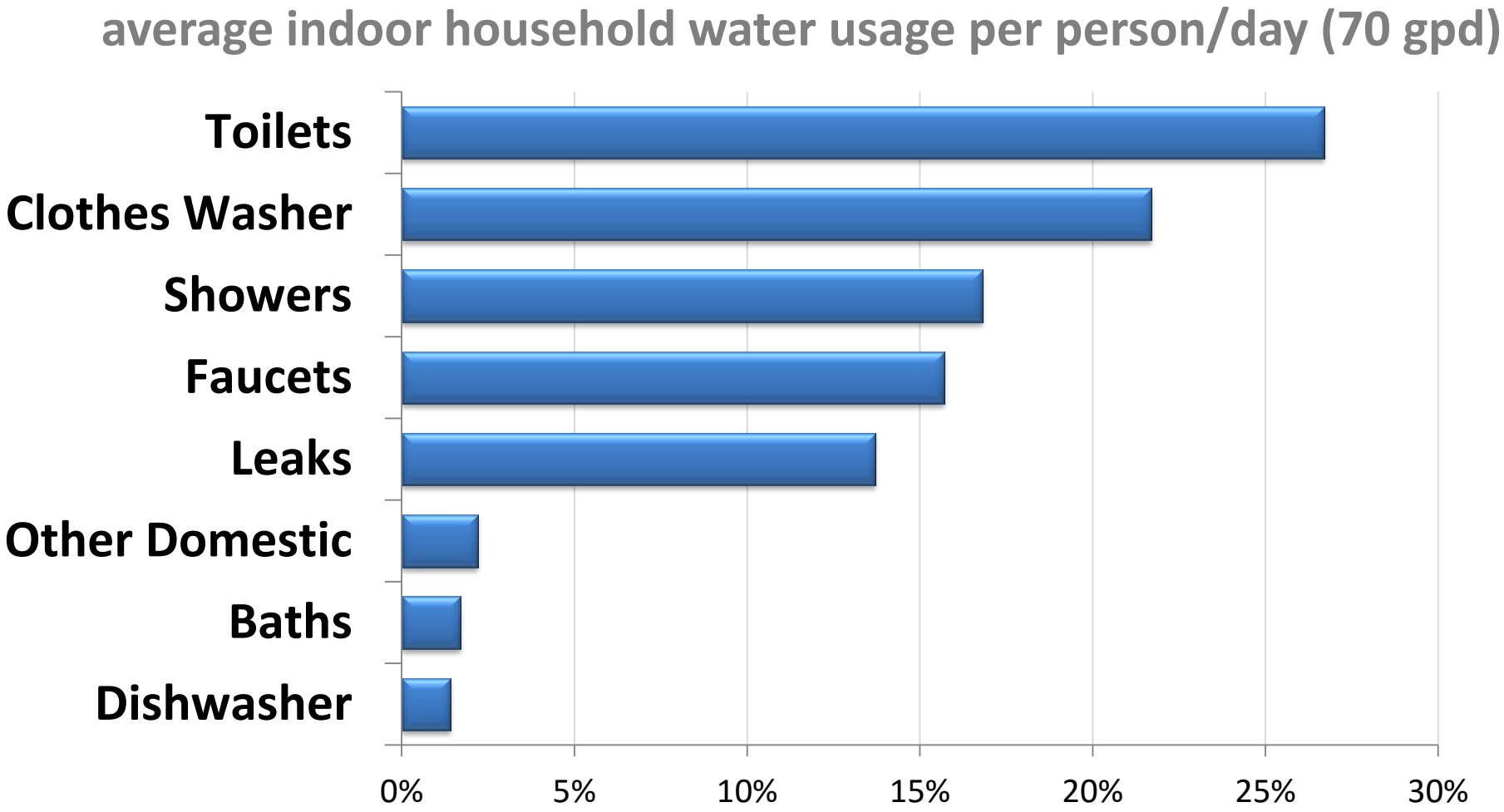
Infrastructure-Mediated Single-Point Sensing of Whole-Home Water Activity

Jon Froehlich[1], Eric Larson[2], Tim Campbell[3], Conor Haggerty[4], James Fogarty[1], Shwetak N. Patel[1,2]

[1]Computer Science & Engineering, [2]Electrical Engineering,
[3]Mechanical Engineering, [4]Community, Environment, and Planning

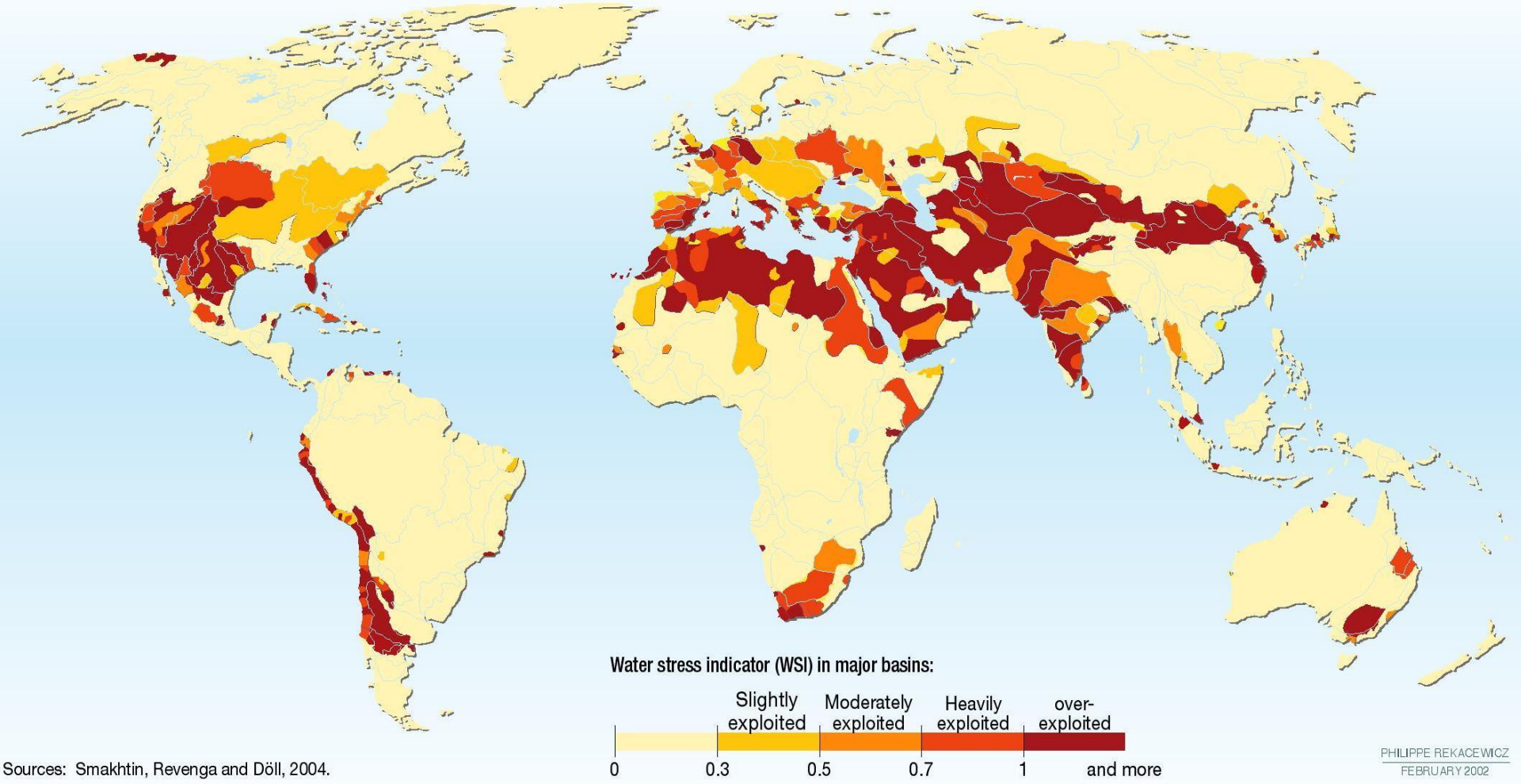
UbiComp 2009

what are the most consuming water activities in your home?



Vickers, 2001

water scarcity



Sources: Smakhtin, Revenga and Döll, 2004.

PHILIPPE REKACEWICZ
FEBRUARY 2002


barcelona, spain

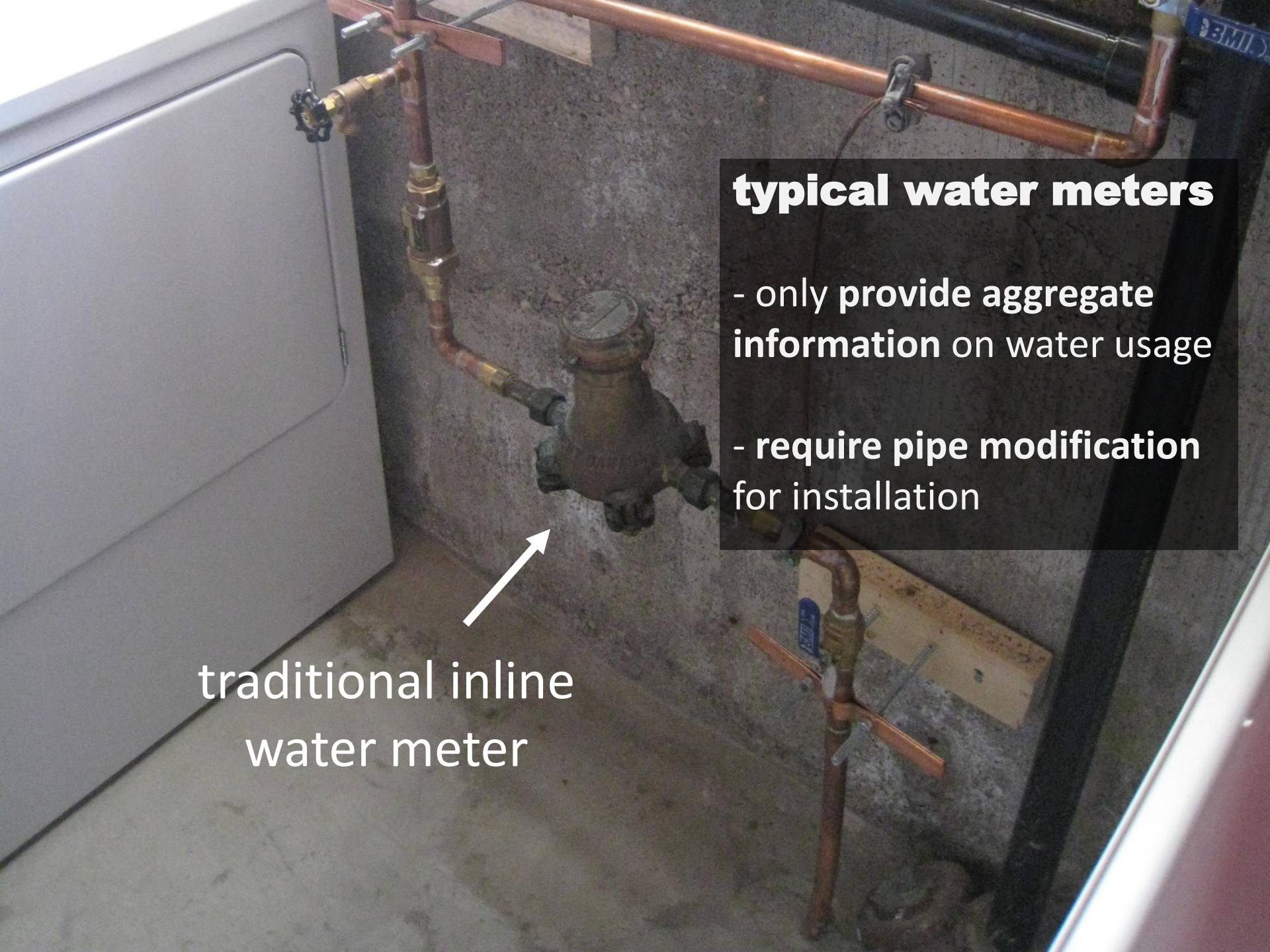

lake mead, nevada

hydrosense

single-point pressure-based sensor of water usage

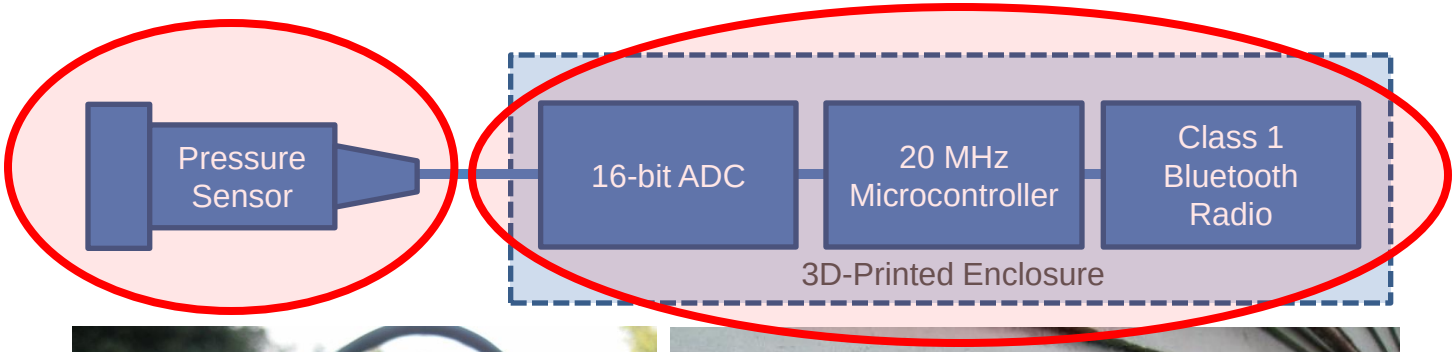
identifies water usage activity down to fixture level (e.g., toilet)

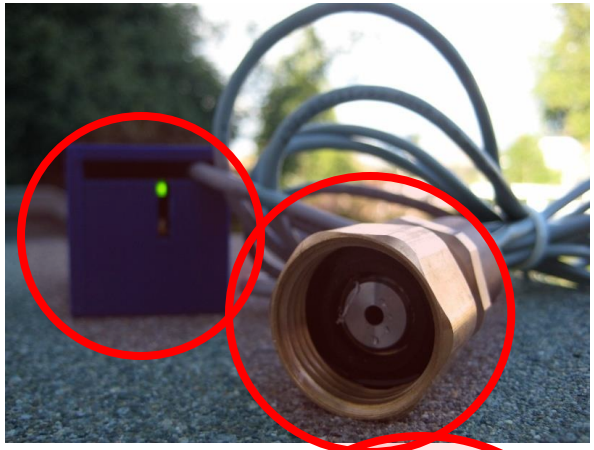
provides estimates of flow at each fixture

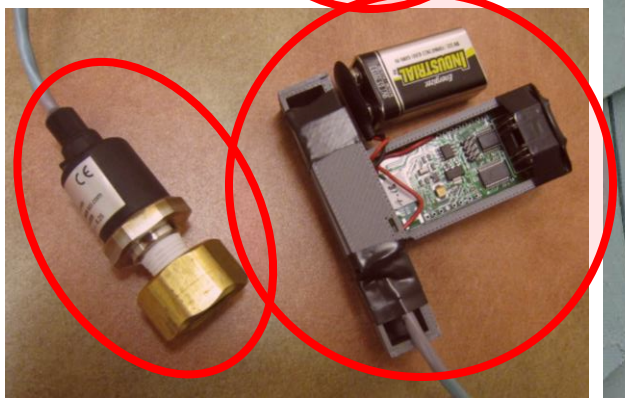

typical water meters
- only **provide aggregate information** on water usage
- **require pipe modification** for installation
traditional inline water meter

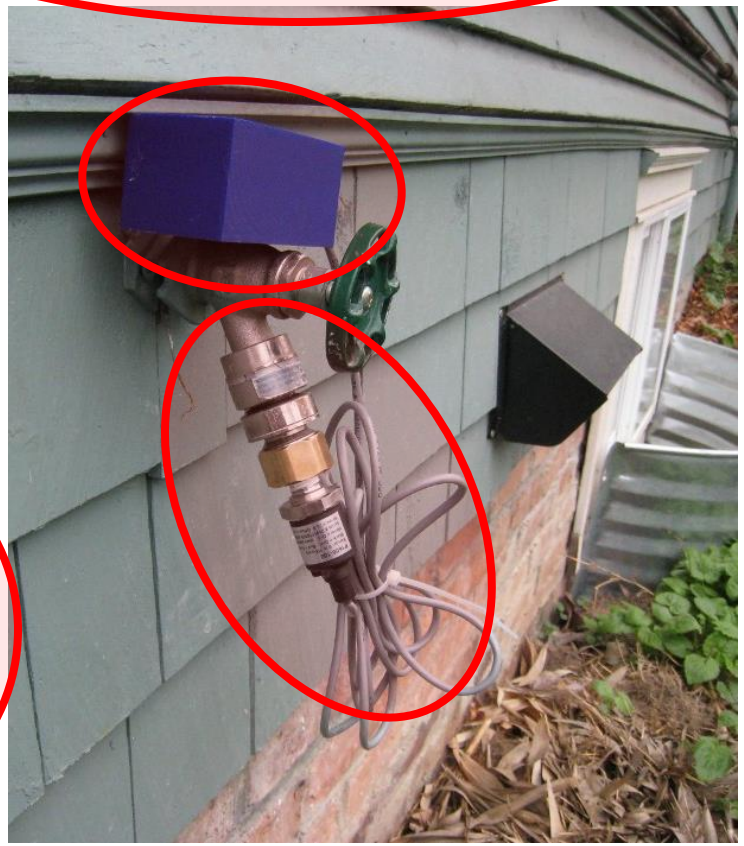
Movie Removed for Public Posting of Slides

the hydrosensor prototype



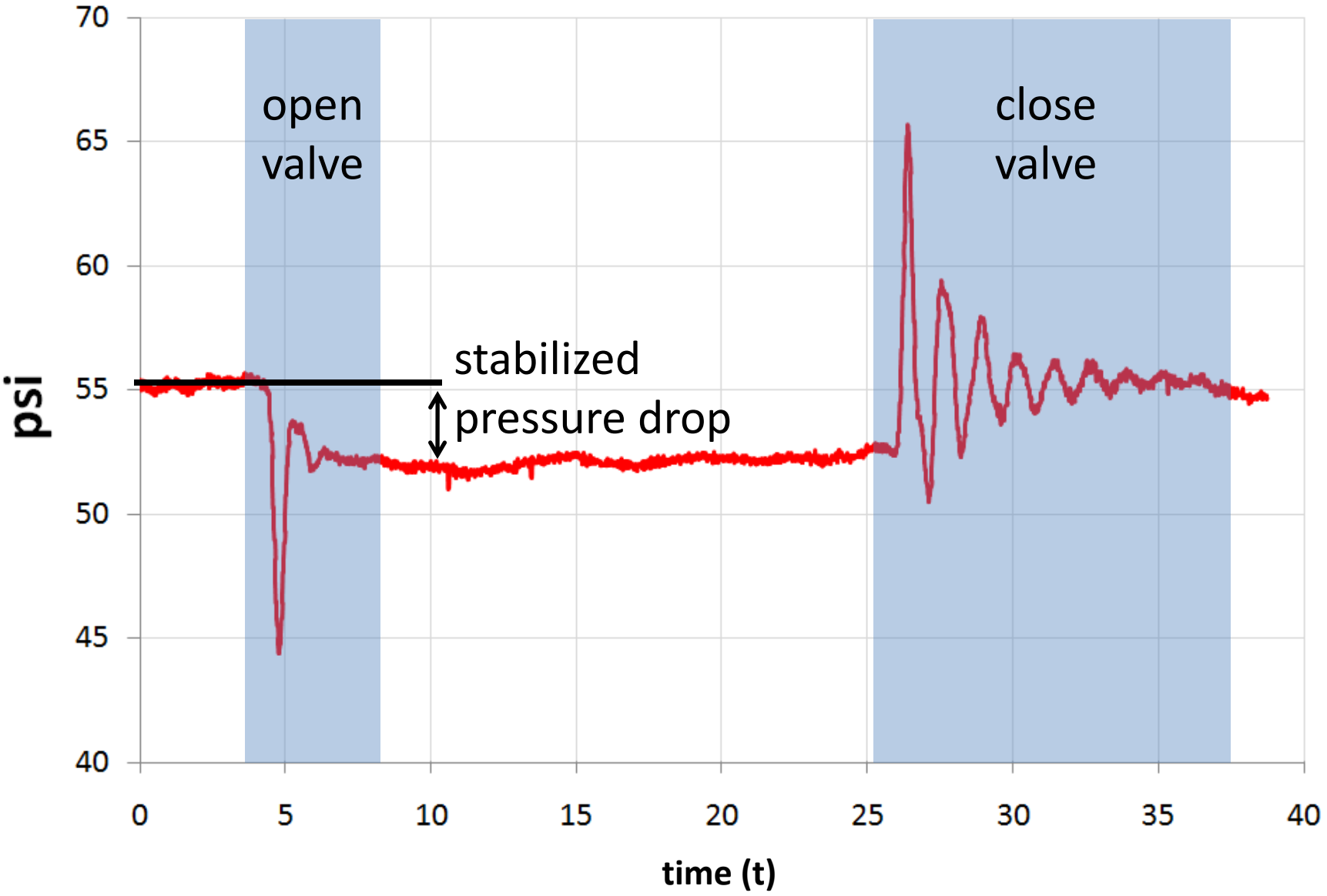






Movie Removed for Public Posting of Slides

raw bathroom sink signal

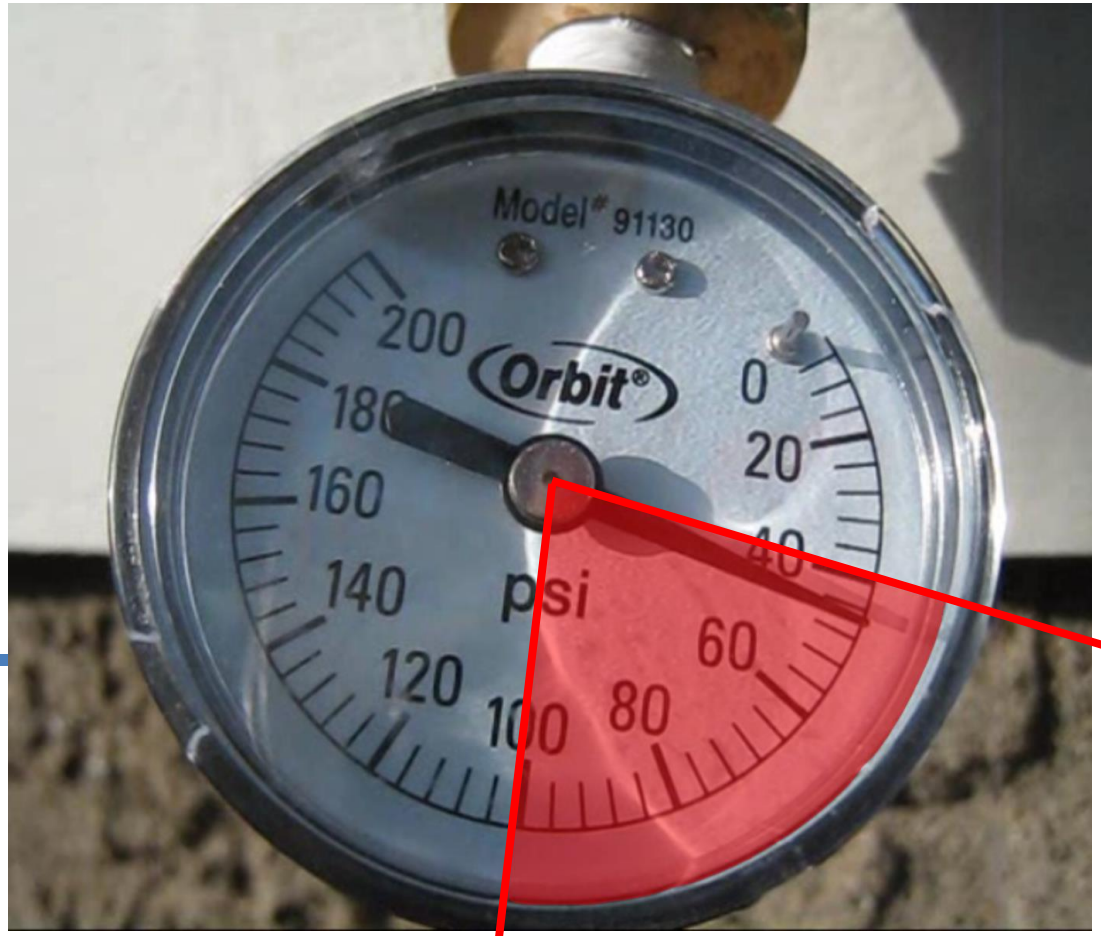


water tower

brief plumbing primer

water tower

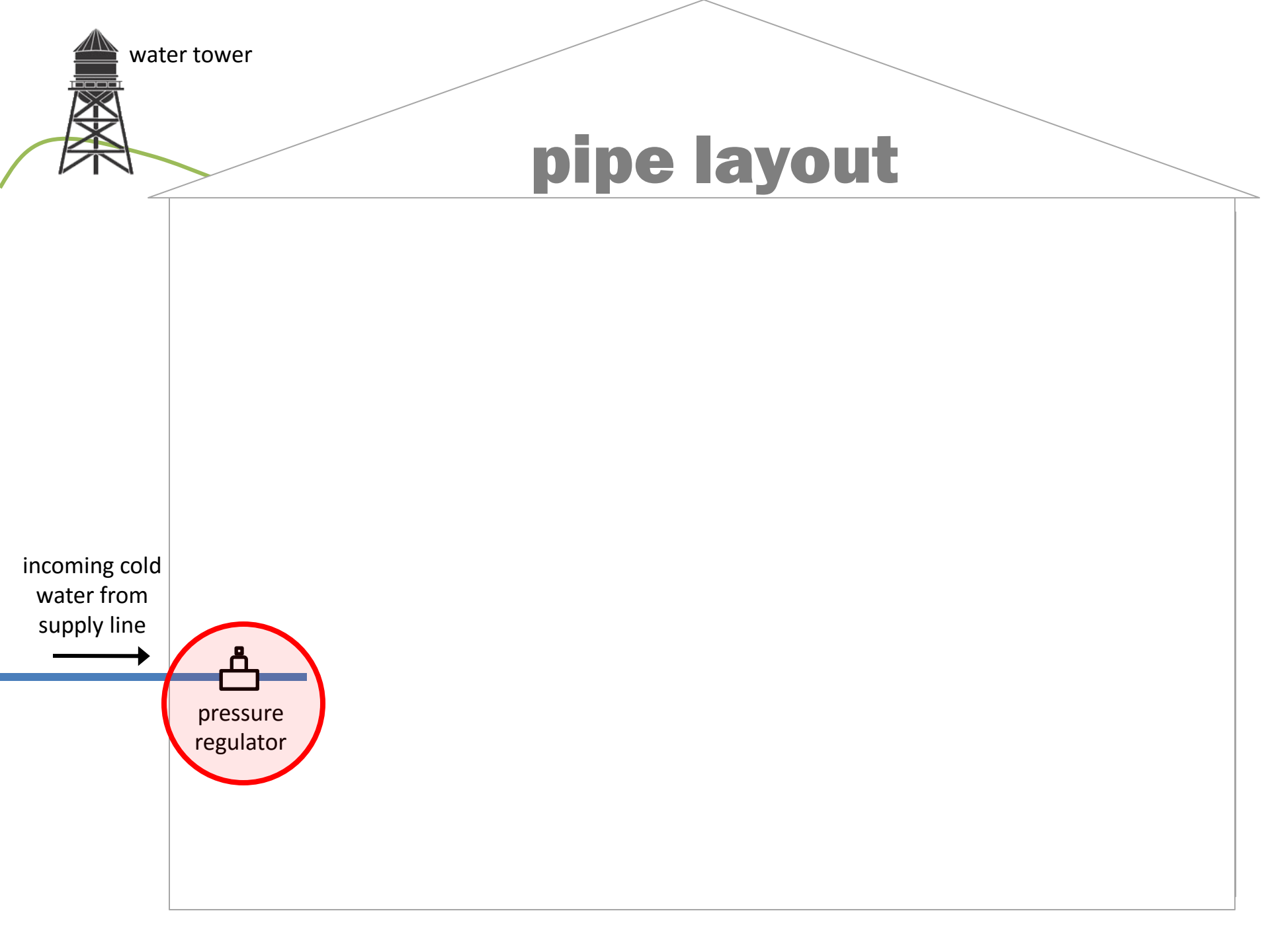
brief plumbing primer

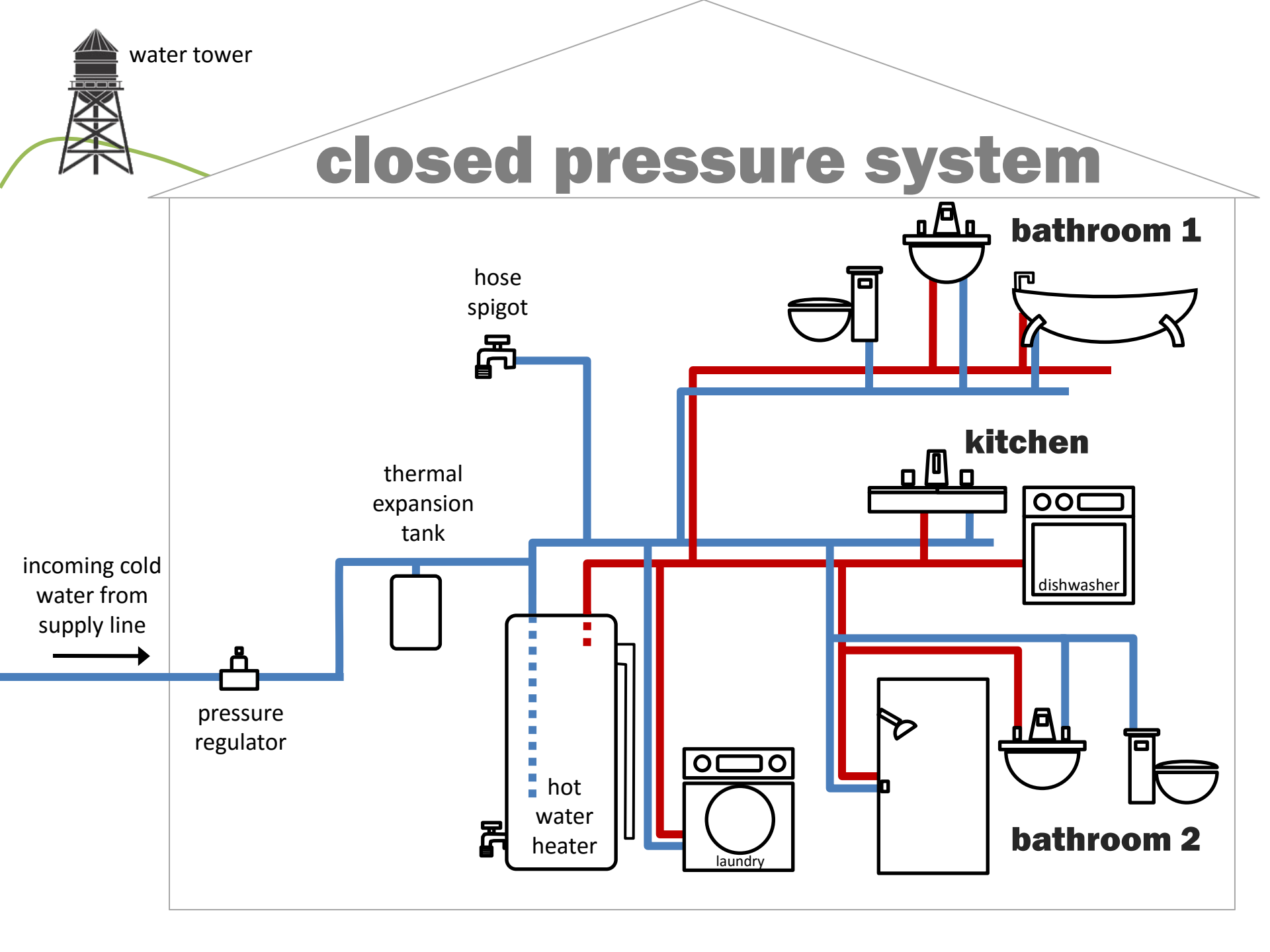


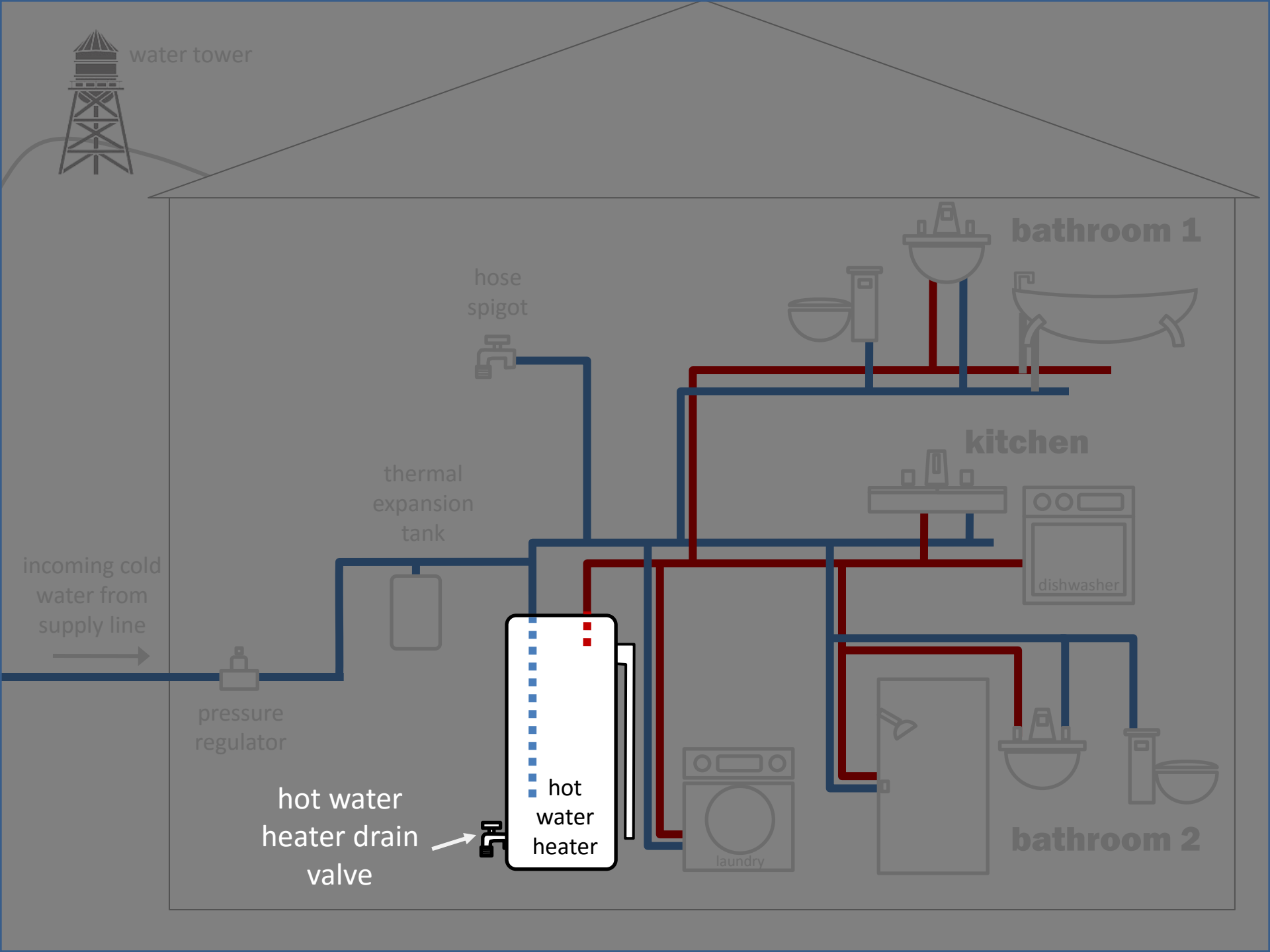
incoming cold water from supply line

40 psi

100 psi


water tower
pipe layout
incoming cold water from supply line
pressure regulator


water tower
closed pressure system
bathroom 1
hose
spigot
kitchen
thermal
expansion
tank
incoming cold
water from
supply line
dishwasher
pressure
regulator
hot
water
heater
laundry
bathroom 2


water tower
bathroom 1
hose spigot
kitchen
thermal expansion tank
incoming cold water from supply line
dishwasher
pressure regulator
hot water heater
hot water heater drain valve
laundry
bathroom 2

some possible installation points

hose spigot

bathroom 1

kitchen

thermal expansion tank

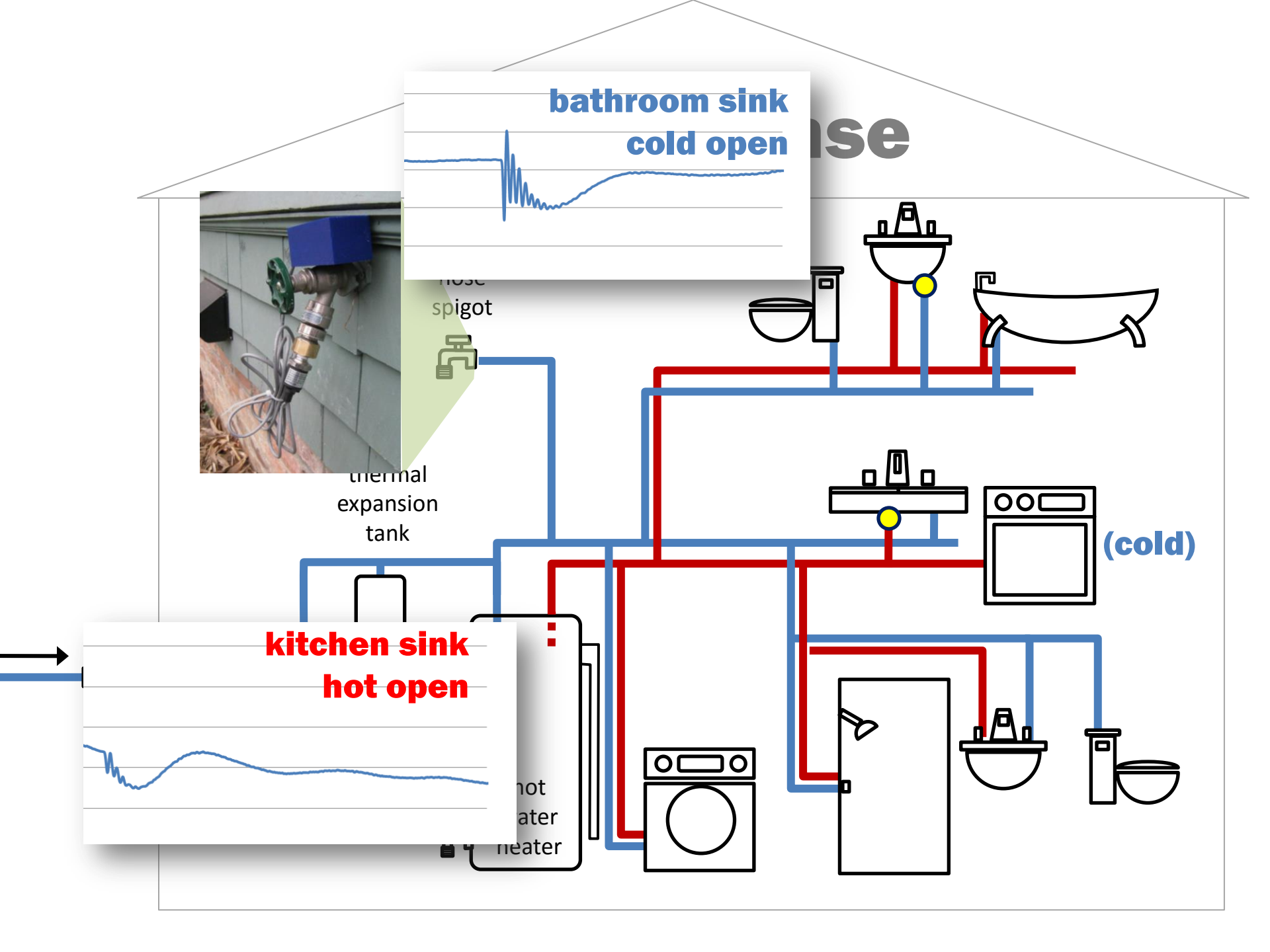
incoming cold water from supply line

hot water heater

dishwasher

laundry

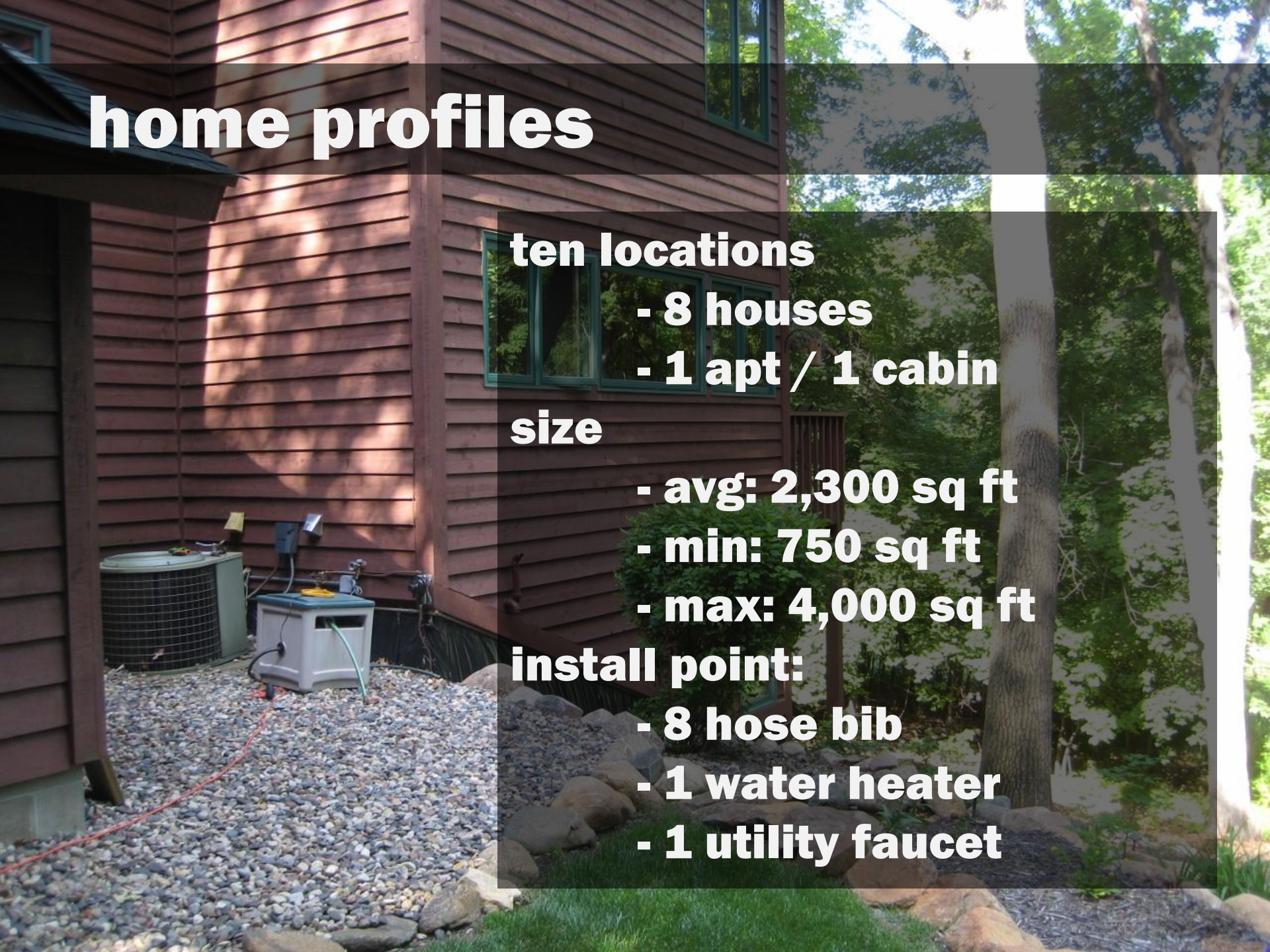
bathroom 2


bathroom sink
cold open
spigot
thermal
expansion
tank
(cold)
kitchen sink
hot open

Movie Removed for Public Posting of Slides

in-home data collection

home profiles



ten locations

- 8 houses
- 1 apt / 1 cabin

size

- avg: 2,300 sq ft
- min: 750 sq ft
- max: 4,000 sq ft

install point:

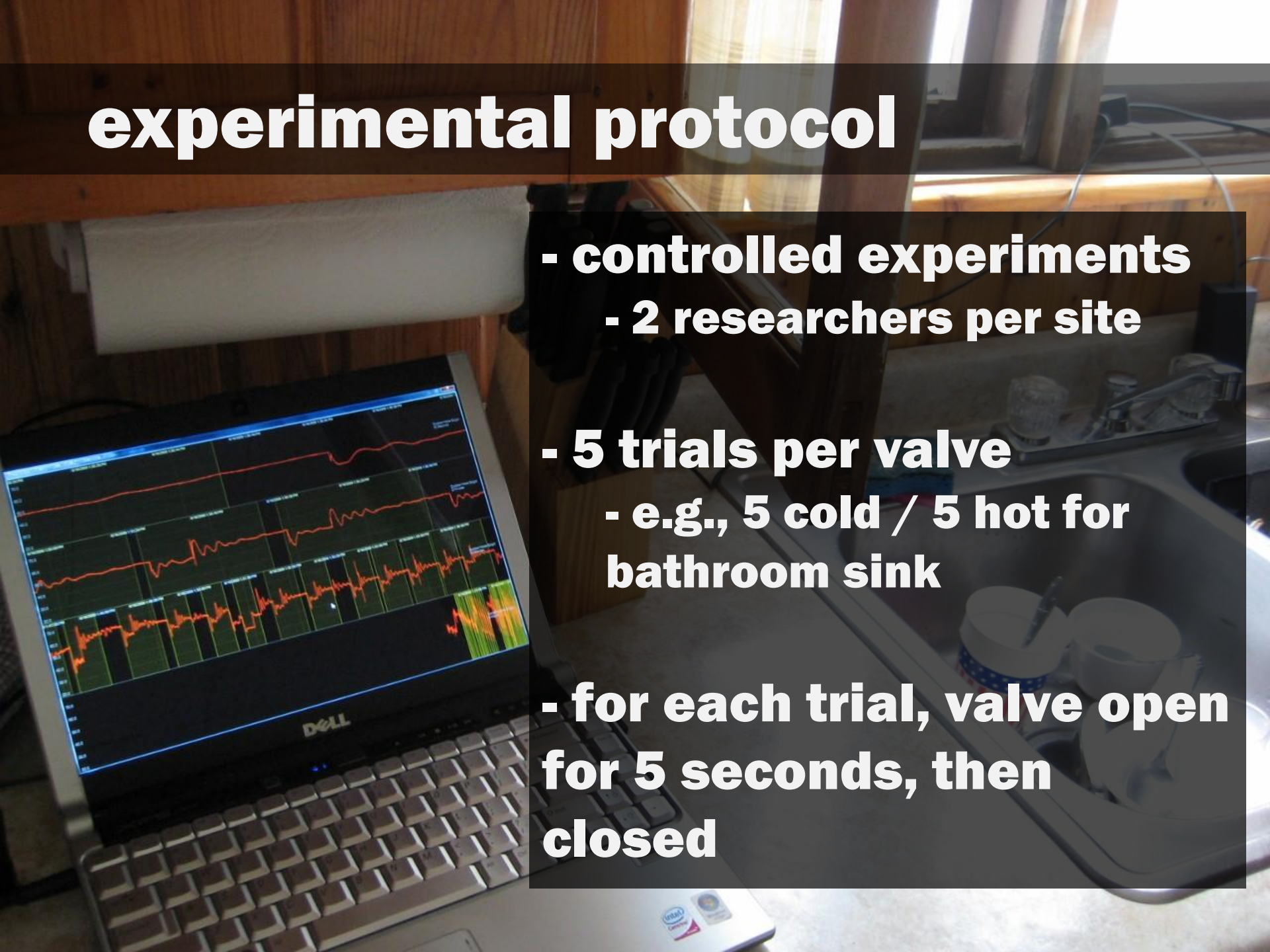
- 8 hose bib
- 1 water heater
- 1 utility faucet

experimental protocol

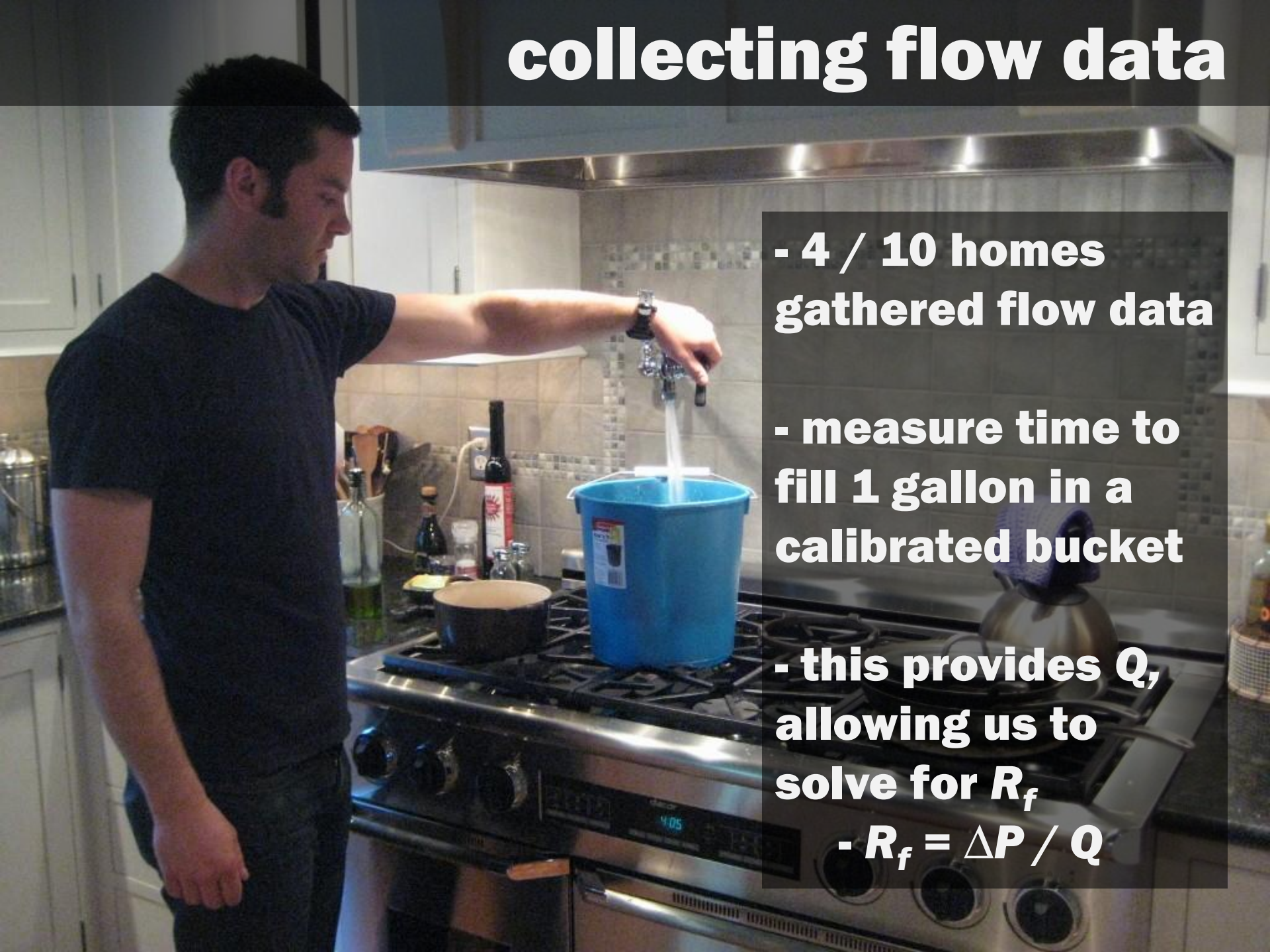
- controlled experiments
  - 2 researchers per site

- 5 trials per valve
  - e.g., 5 cold / 5 hot for bathroom sink

- for each trial, valve open for 5 seconds, then closed



collecting flow data



- 4 / 10 homes gathered flow data

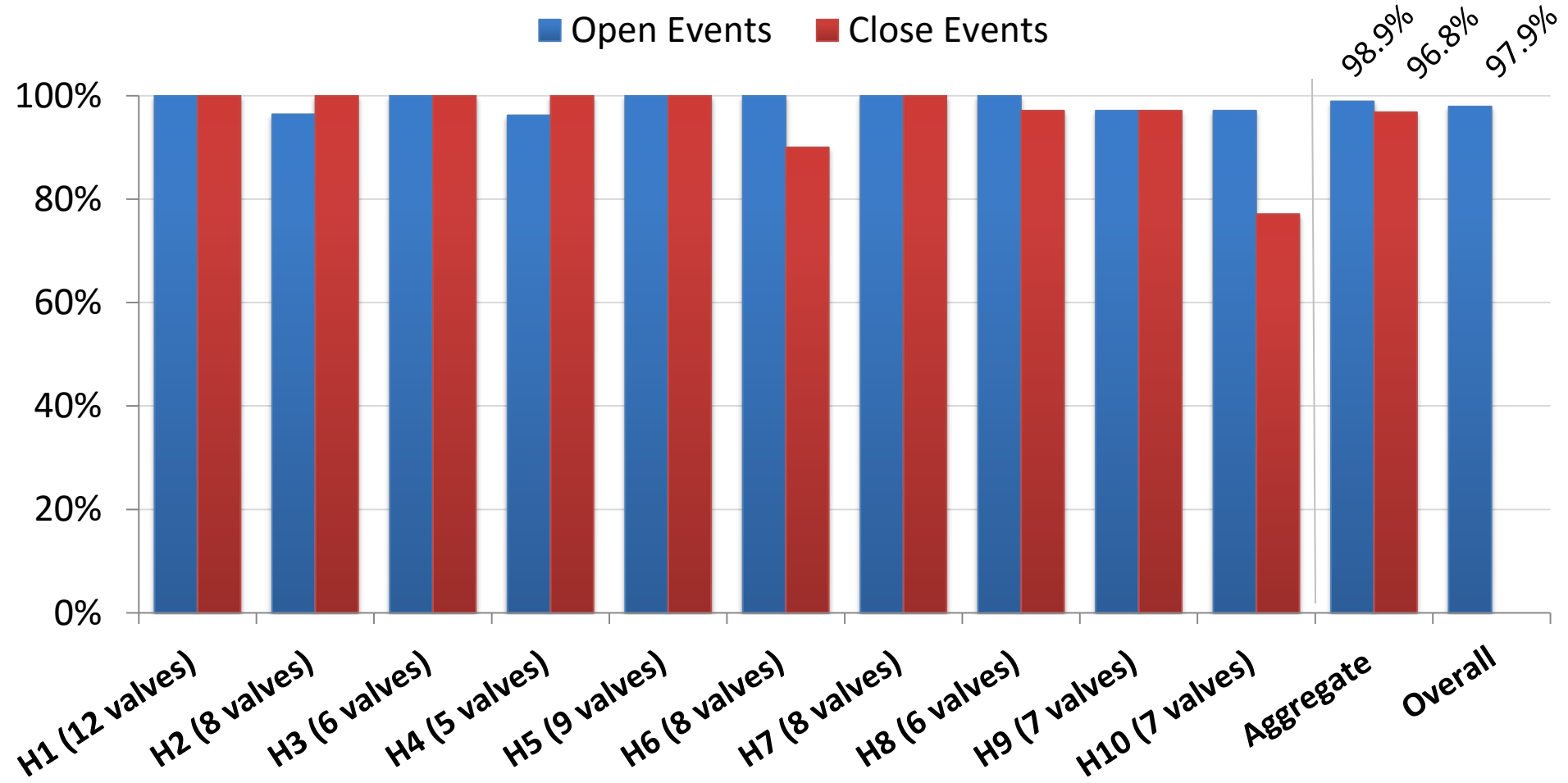
- measure time to fill 1 gallon in a calibrated bucket

- this provides Q, allowing us to solve for R_f
  - $R_f = \Delta P / Q$

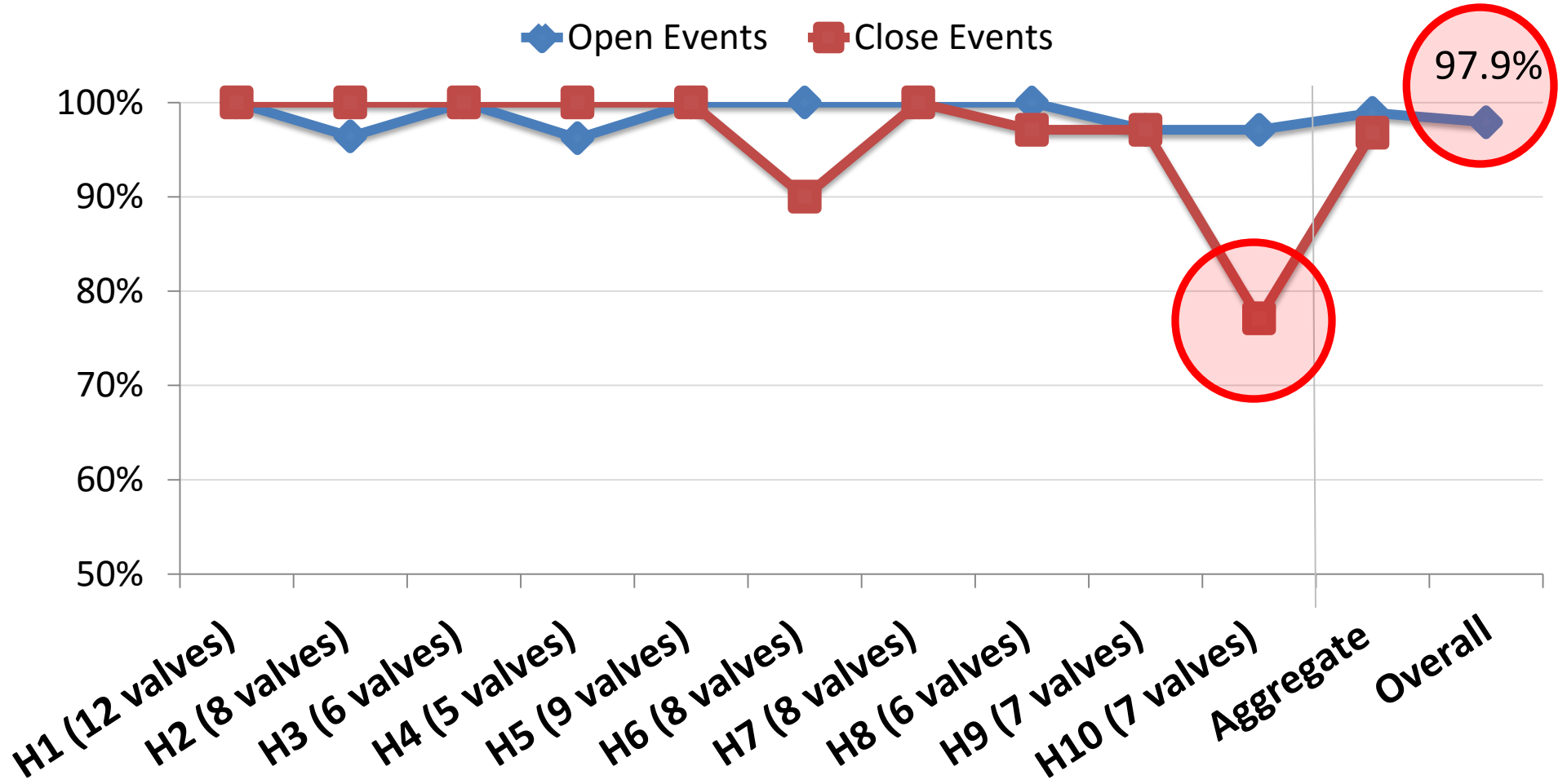
data collection stats

- ten locations
- 706 trials
- 155 flow rate trials
- 84 total fixtures tested

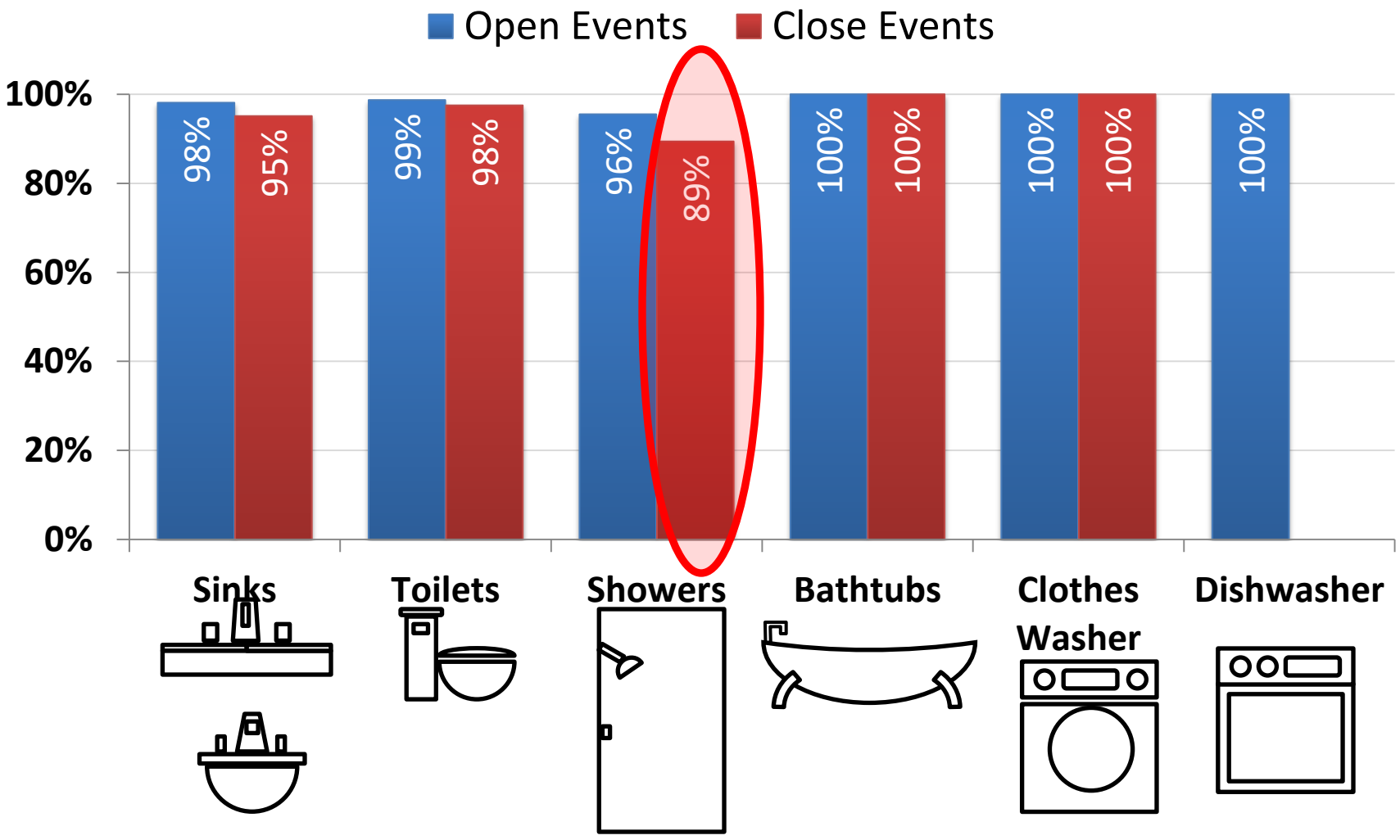
fixture classification results across homes



fixture classification results across homes



fixture classification results across fixtures



what i'm currently working on:

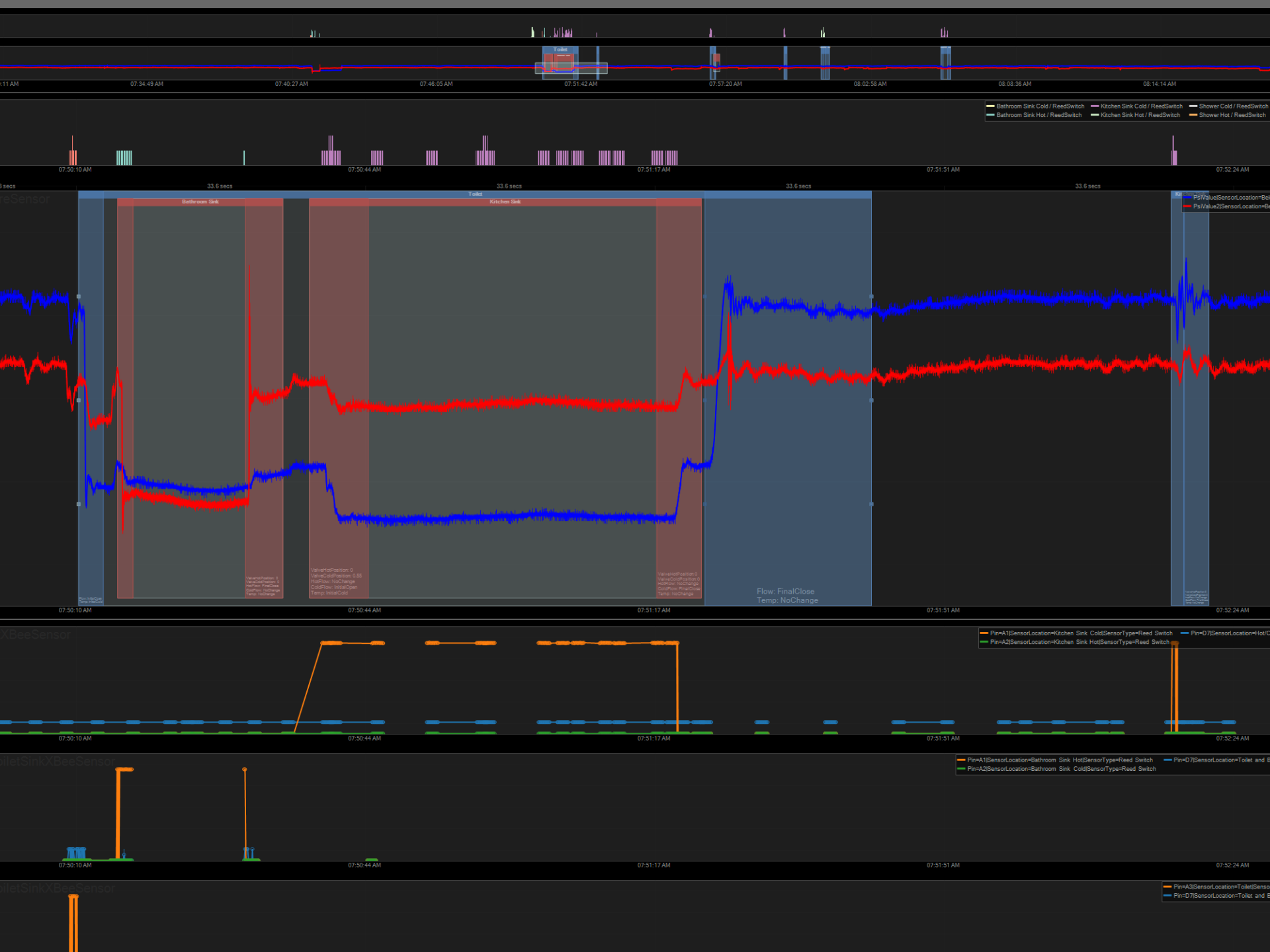
1. studying hydrosense performance in field deployments

2. building water feedback interfaces

Movie Removed for Public Posting of Slides

Movie Removed for Public Posting of Slides

Movie Removed for Public Posting of Slides


Toilet
07:34:49 AM
07:40:27 AM
07:46:05 AM
07:51:42 AM
07:57:20 AM
08:02:58 AM
08:08:36 AM
08:14:14 AM
Bathroom Sink Cold / ReedSwitch
Kitchen Sink Cold / ReedSwitch
Shower Cold / ReedSwitch
Bathroom Sink Hot / ReedSwitch
Kitchen Sink Hot / ReedSwitch
Shower Hot / ReedSwitch
07:50:10 AM
07:50:44 AM
07:51:17 AM
07:51:51 AM
07:52:24 AM
33.6 secs
Bathroom Sink
Kitchen Sink
Flow: FinalClose
Temp: NoChange
Pin=A1|SensorLocation=Kitchen Sink Cold|SensorType=Reed Switch
Pin=A2|SensorLocation=Kitchen Sink Hot|SensorType=Reed Switch
Pin=A1|SensorLocation=Bathroom Sink Hot|SensorType=Reed Switch
Pin=A2|SensorLocation=Bathroom Sink Cold|SensorType=Reed Switch

DEPARTMENT OF WATER
PO BOX 1234
Water City, WA 98112

Seattle Public Utilities -- Billing Options - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.ci.seattle.wa.us/util/Services/Billing/Payment_Options/BillingOptions/inde

SEATTLE.GOV | City Services | Departments | Staff Directory

SEATTLE.GOV
Greg Nickels, Mayor

About Seattle.gov | City Contacts

SEARCH: Go
Seattle.gov | This Department

Home | Contact Us

Seattle Public Utilities
Ray Hoffman, Acting Director

Reliable water, sewer, drainage & solid-waste services

Services | About SPU | Engineering | Directory

Billing | Garbage | Recycling | Yard | Water | Drainage & Sewer

toilet
17 flushes
60.2 gallons

washing machine
4 loads
47.4 gallons

faucets
23 events
29.4 gallons

1 sh
28.8 gallons

continuous
20.8 gallons

bathtub
1/4th bath
11.8 gallons

dishwasher
1/4 load
4.5 gallons

Save 5,300 gallons of water ($21) per year

learn about water-saving toilets

WaterSense
Certified by IAPMO R&T

THE BOLD LOOK OF KOHLER.

$1,289.45

Buy now

Average Water Use per day for May, 2009

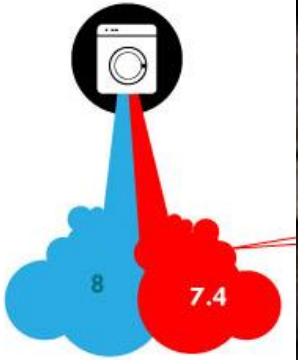
John Doe
123 Department Lane
Water City, WA 98112

Seattle Public Utilities • 700 Fifth Avenue, Suite 4900 • PO Box 34018 Seattle, WA 98124-4018 • (206) 684-3000 • Contact Us

Seattle.gov: Services | Departments | Staff Directory | Mayor | City Council

Questions/Complaints | Privacy & Security Policy

Done




ur water consumption, May, 2009

Thank You!

jonfroehlich@gmail.com
twitter @jonfroehlich

http://ubicomplab.cs.washington.edu
http://dub.washington.edu/

students


Jon Froehlich


Gabe Cohn


Sidhant Gupta


Eric Larson


Tim Campbell


Kate Everitt

faculty


Marilyn Ostergren


Shwetak Patel


James Fogarty


James Landay

dub
design:
use:
build:
university of washington

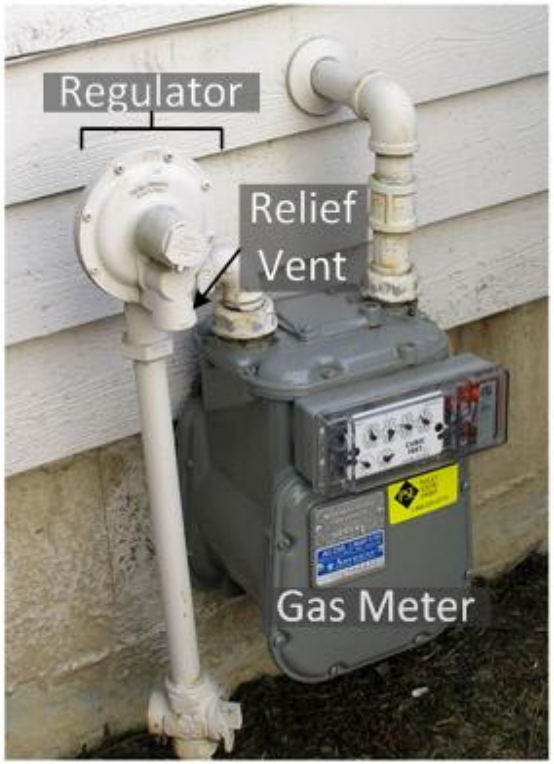
ubicomp lab
university of washington

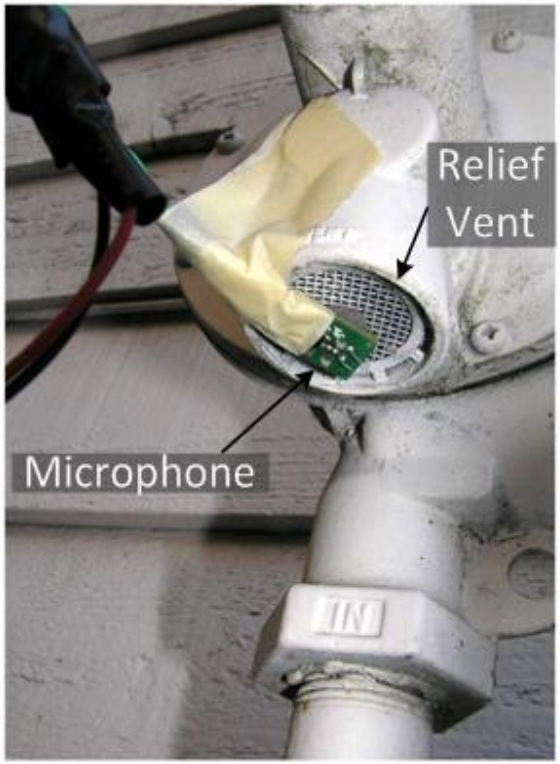
sustain
sustainability research

GasSense: Appliance-Level, Single-Point Sensing of Gas Activity in the Home

Gabe Cohn[1], Sidhant Gupta[2], Jon Froehlich[2], Eric Larson[1], Shwetak Patel[1,2]
[1]Electrical Engineering, [2]Computer Science and Engineering

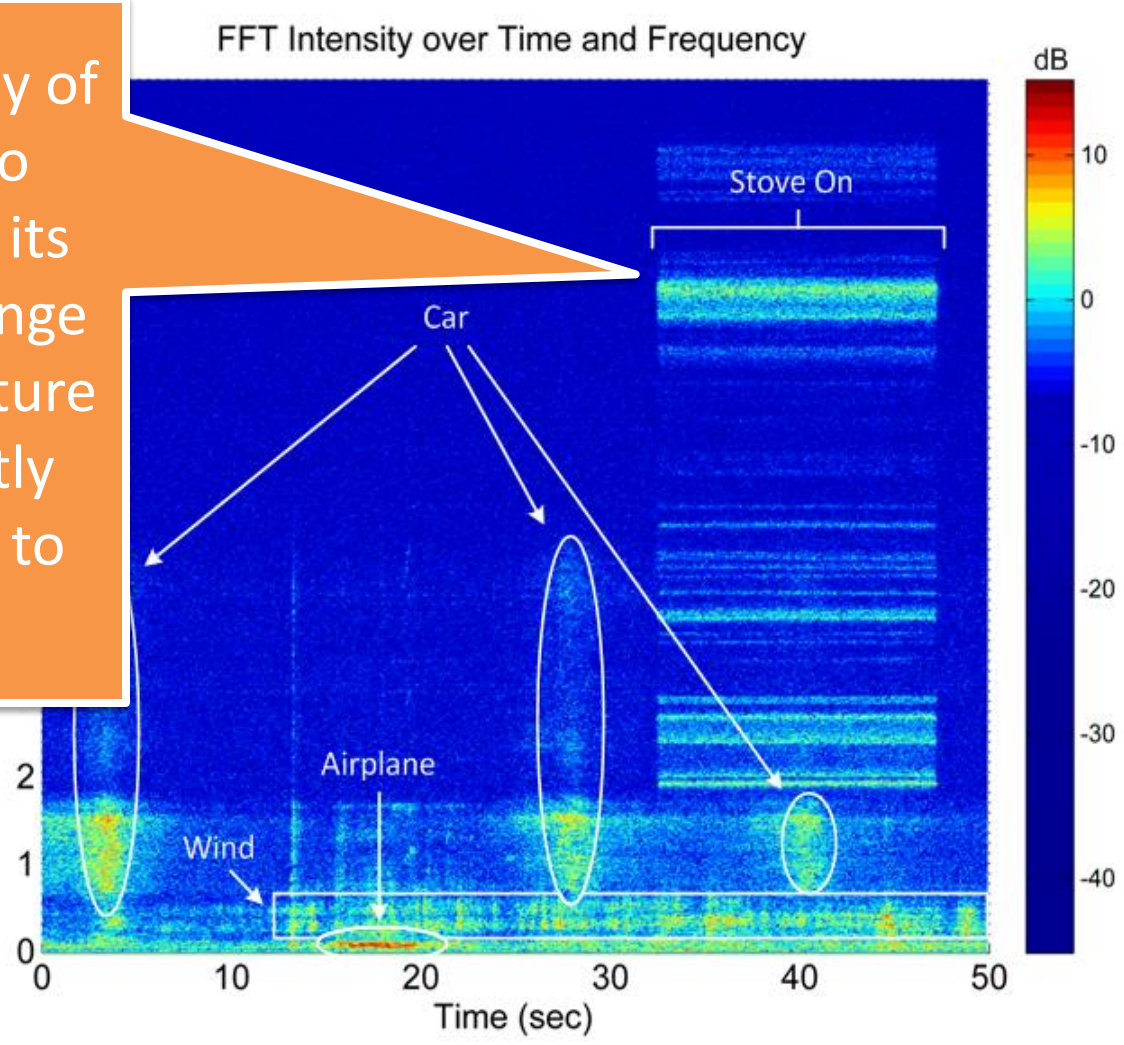
gassense installs on outside of gas regulator



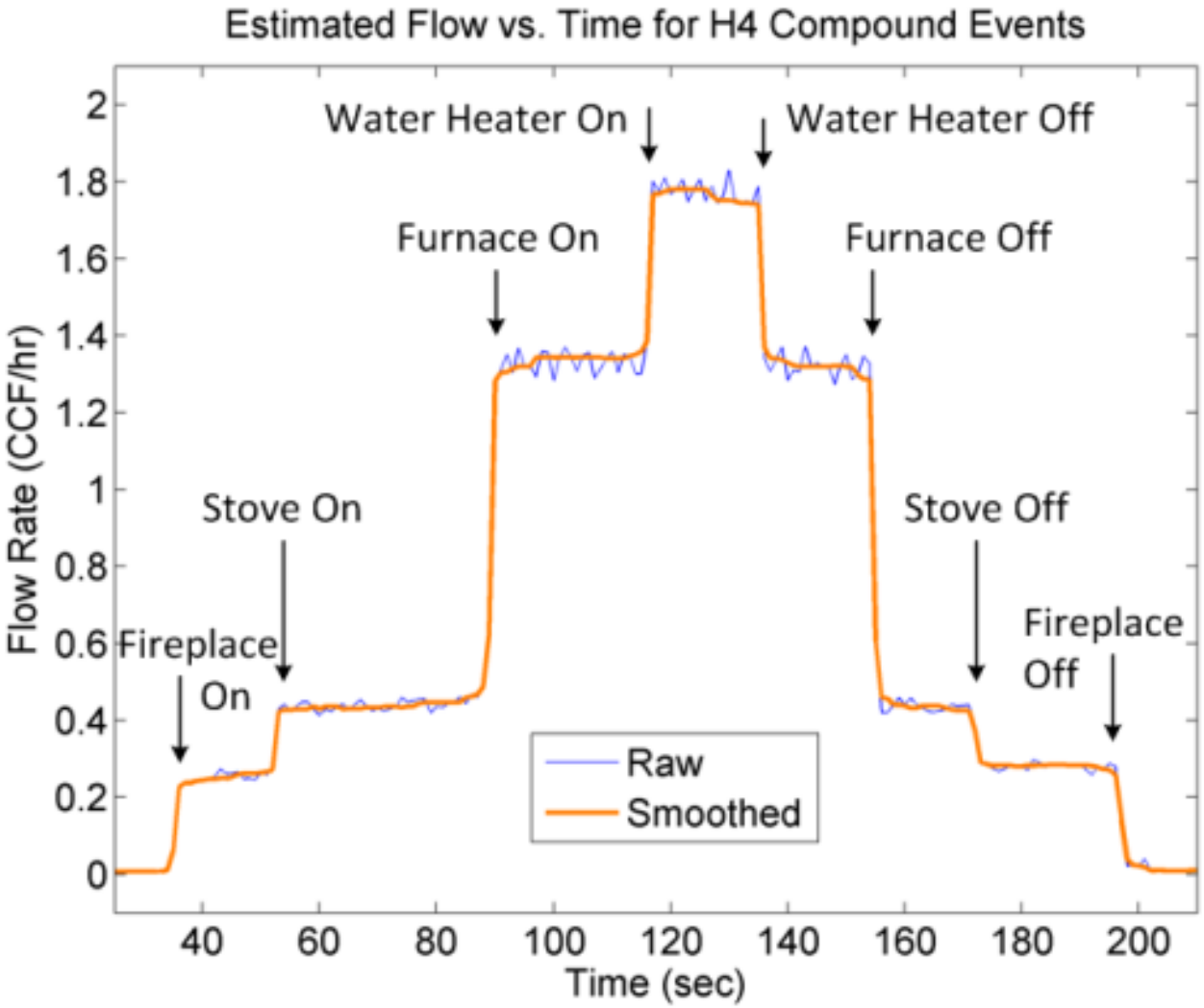


the gassense signal

the intensity of this audio signal and its rate of change indicate fixture and directly correlates to flow



example data



dub design: use: build:
university of washington

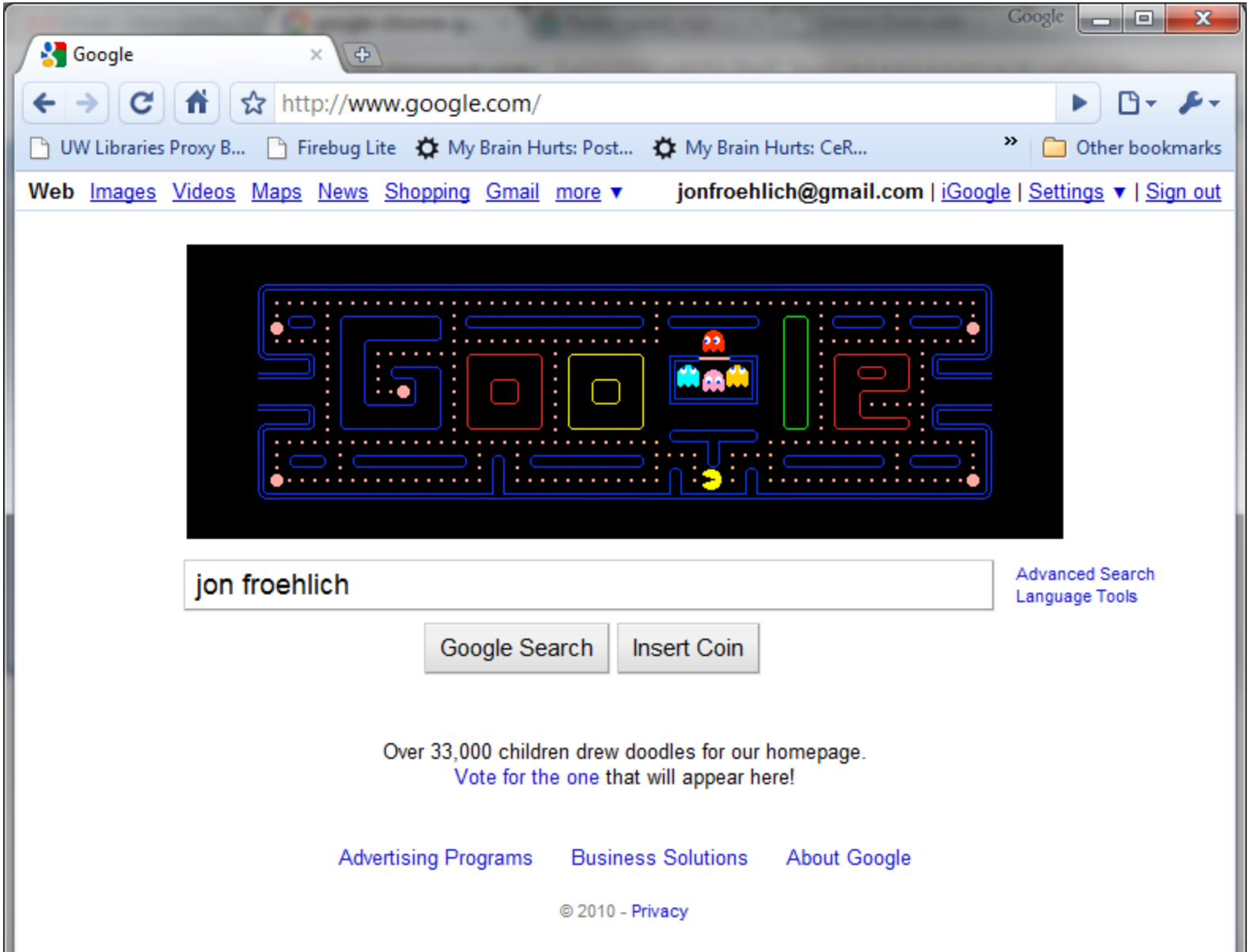
ubicomp lab
university of washington

sustain
sustainability research


you
sensing feedback


sensing feedback you

thanks!


Google
http://www.google.com/
UW Libraries Proxy B...
Firebug Lite
My Brain Hurts: Post...
My Brain Hurts: CeR...
Other bookmarks
Web Images Videos Maps News Shopping Gmail more ▼
jonfroehlich@gmail.com | iGoogle | Settings ▼ | Sign out
jon froehlich
Advanced Search
Language Tools
Google Search
Insert Coin
Over 33,000 children drew doodles for our homepage.
Vote for the one that will appear here!
Advertising Programs
Business Solutions
About Google
© 2010 - Privacy

Amazon.com: Recomme...

https://www.amazon.com/gp/yourstore?ie=UTF8&ref_=pd_irl_gw

UW Libraries Proxy B... | Firebug Lite | My Brain Hurts: Post... | My Brain Hurts: CeR... | 42 Top Social Media... | Other bookmarks

hide | Link to this page | Add to Widget | Add to aStore | Share on Twitter | Your Earnings Summary | What's New | amazonassociates

Discussion Boards | Settings

amazon.com Prime

Hello, Jon E. Froehlich. We have recommendations for you. (Not Jon?)

Kindle: Now Just $189

Jon's Amazon.com | Today's Deals | Gifts & Wish Lists | Gift Cards | Your Account | Help

Shop All Departments | Search | All Departments | GO | Cart | Wish List

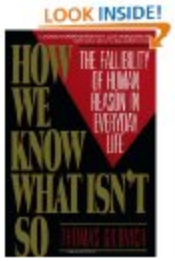
Your Amazon.com | Your Browsing History | Recommended For You | Rate These Items | Improve Your Recommendations | Your Profile | Your Communities | Learn More

Jon, Welcome to Your Amazon.com (If you're not Jon E. Froehlich, click here.)

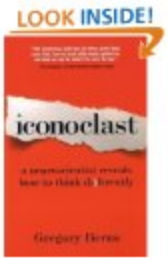
Today's Recommendations For You

Here's a daily sample of items recommended for you. Click here to see all recommendations. Page 3 of 59 (Start over)

Intuition: Its Powers a... (Paperback) by Professor David G....
(17) $19.60
Fix this recommendation



How We Know What Isn't So: Th... (Paperback) by Thomas Gilovich
(38) $17.05
Fix this recommendation



Iconoclast: A Neuroscient... (Paperback) by Gregory Berns Ph.D.
(68) $10.17
Fix this recommendation

Coming Soon for You

Page 1 of 7

Improve Your Recommendations

Hey There Delilah

Rate this item

sensors

nike+ipod

fitbit

mobile phone