

teens' and parents' perspectives on home-entryway surveillance

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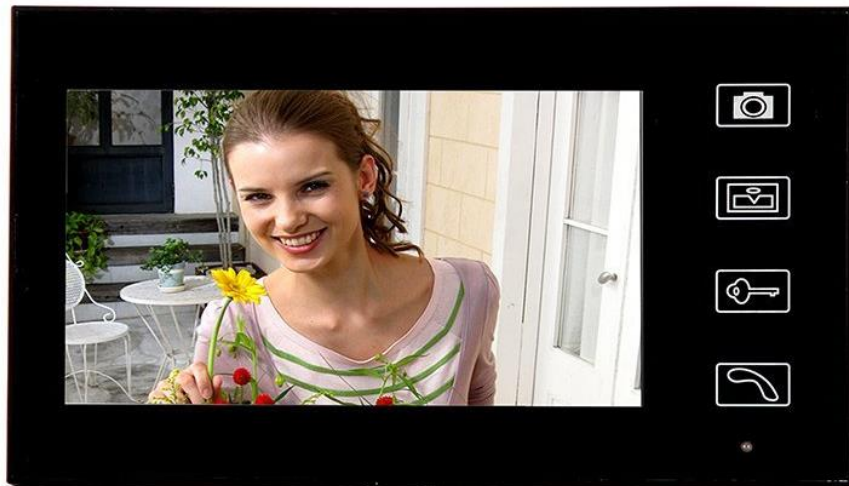


<http://research.microsoft.com/apps/pubs/default.aspx?id=216721>
best paper awarded at UbiComp 2014

smart home of the future



homes are increasingly filled with connected devices



security cameras & connected locks are
beneficial because



detering thieves
reducing lock-outs
enabling remote monitoring

security audit logs

<u>What?</u>	<u>How? / Who?</u>	<u>When?</u>
Rear door 		19 minutes ago
Rear door 	Aurora's Phone	20 minutes ago
Front door 		39 minutes ago
Front door 	Billy's PIN Code	40 minutes ago
Rear door 		4 hours ago
Rear door 	Billy's Phone	4 hours ago



record every access with photo evidence:

- detect unauthorized access
- detect any piggybacking or tailgating
- detect any remote access without physical presence
- verify visits by temporary workers (e.g., cleaning person, pet sitter)

however, audit logs can also reveal ...

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teenagers arriving home after curfew, sneaking in friends, or sneaking out

parents vs. teenagers



worry home security
worry the safety of children



desire freedoms
desire to exert independence



research questions

Q1: what is the impact of in-home monitoring technologies on parent-teen relationships?

Q2: what are technical mechanisms or design features for audit interfaces that can reduce the negative impact?

What?


How? / Who?

Rear door 




Rear door 

Aurora's Phone

Front door 



Front door 

Billy's PIN Code

Rear door 



Rear door 

Billy's Phone



study overview

participants:

we recruited 13 teenagers (entering 9th-12th) and 11 parents of teenagers through UXC

semi-structured interview:

interviews last for at most an hour in a conference room of B99 (in august 2013); we used parallel scripts for teens and parents.

analysis:

each interview was recorded, transcribed, and then analyzed using affinity diagram based on a grounded theory approach.





interview structure

commercially-available door locks:

we instructed participants to review advertising materials from the lock manufactures and asked their opinions

auditing home access:

we instructed participants to review three printed mock-ups of interfaces for auditing the entryway door locks and chose one they would prefer.

existing parental monitoring:

we asked questions about household rules and what strategies and tools parents used to monitor teens.





a few methodology highlights

presented interview as a study into smart homes:
we chose never to use the word "privacy" unless brought up by a participant.

designed the interview with a review of prior literature on parent-teen relationships

protecting teen participants:
we recruited only one participant per household, used a broad consent form, and chose not to attribute quotes to a participant in some cases.





participants demographics

age & gender distribution:

13 teenagers (6 female) in age from 15 to 17

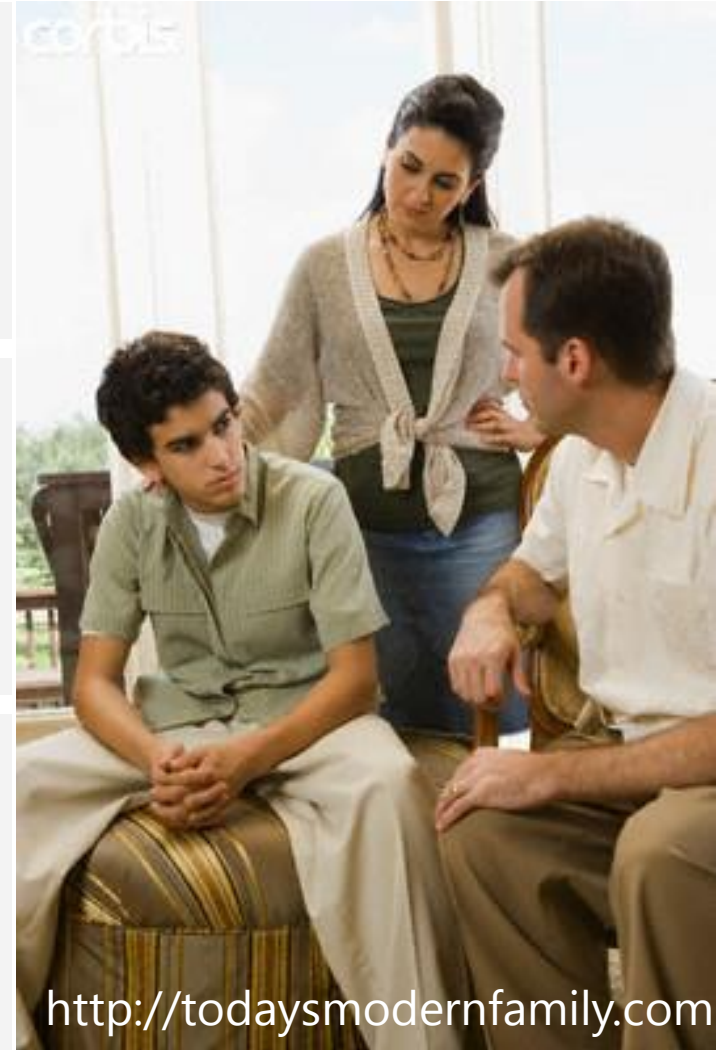
11 parents (7 female) in age from 35 to 69

household composition:

most in dual-parent households. T2 lived with a guardian, P4 & P10 were single parents, and P1 & P11 lived with significant others

technologically savvy:

P4 lives in a house with connected door lock, 5 participants have visited a house with such locks, 4 seen commercials on TV, and 6 encountered smart home devices.





1. perceived benefits & concerns of connected locks

Lock and unlock doors from anywhere

Control your lock from anywhere on your smart phone, tablet, or internet connected device.



Get notified when someone enters your home

Receive notifications when your loved ones arrive home safely.

Monitor people going in and out of your home.



Q: how would you feel about having Internet-connected door locks installed in your home?

- what features would you use?
- anything that concerns you or other members of the household?



connected locks are appealing

convenient, enhancing control, and safe:

“because you can lock doors from somewhere else” {T2}; “because it tells you about people’s comings and goings” {P11}; “feel safe because you can tell if your door is locked” {T9}

automation capabilities are interesting:

“you could save money because then your house wouldn’t have to be heated or the AC wouldn’t have to be on until somebody came into the house” {T11}

not compelling (3):

“I have basically the same schedule as my kids, so they’re not home when no parents home” {P5}, “it’s cooler to be able to carry on your personalized key” {T10}, few benefits for those who live in rurally {P6}

ors from anywhere

on your smart phone, tablet, or ected device.





concerns about connected locks

usability and reliability (7):

forgetting the code, electric outage, lost Wi-Fi connectivity

hacking as a concern (11):

"I really don't know how easy it is to hack in this but I'm afraid that someone could get in the Internet and somehow access our private locking system and then be able to unlock the door, and they get in and take stuff" {T1}

security concerns (6):

PIN code sharing with unauthorized people {T2}{T10}, shoulder-surfing attack {T3}, unauthorized access through a phone {T13}

Control your lock from anywhere

Control your lock from anywhere on your smart phone, tablet, or other connected device.





2. reactions to audit logs

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(a) photo log



Q: if your family were to install Internet-connected door locks in your home, which of these three interfaces would you personally prefer your house had, and why?



2. reactions to audit logs

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Q: if your family were to install Internet-connected door locks in your home, which of these three interfaces would you personally prefer your house had, and why?

(b) text log



2. reactions to audit logs



Q: if your family were to install Internet-connected door locks in your home, which of these three interfaces would you personally prefer your house had, and why?

(c) no log



all 11 parents prefer photo log

safety reasons:

"you could see who would actually was in most of the time" {P7} "as my son gets older, I'm going to need to verify if he's coming home alone" {P4}

concern about surveillance in home (3):

"it's just a human nature thing that nobody likes when people keep tabs on anybody" {P2}

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teens showed mixed reactions

photo log (6):

"It is easy to see if anyone is trying to get into my house". However, four teens did not want parents/sibling to access the logs all the time (sister being judgmental, kind of weird)

text log (3):

camera is "not quite necessary"; "with photos, ..., that seems like invasion of privacy, well big brother kind of thing really"

no log (4):

concerns about the adverse effect on their social lives; "infringes on your freedom"; "this is parents going psycho"

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notifying children on data collection

all but P1 & P4 responded positively:

“that would help them feel safer” {P9}, “they would behave a little better” {P10}, “we are really honest with our kids” {P2}

situational {P1}:

“that would all depend on if I felt my kids are being sneaky”

trust but verify {P4}:

“... don't try to go hide in my room or in the garage. I can see everything.' So, that's good to keep up the whole mom omnipotent thing”

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3. monitoring and limiting teens' activities

<http://policestateusa.com>



Q: do your children have a curfew or a daily time limit for using the computer? for using their phone? for playing video games?

- know their passwords?
- monitor online activities?
- are you a Facebook friend with your child?



current monitoring practices

computer, game consoles, and TV:

no monitoring (9), going through a web browser history or other logs (5), limiting Xbox screen time (1), blocking HBO on TV (1), or over the shoulder monitoring (7)

texting:

7 teens and 6 parents that they never monitor texting: "I don't think that's right to touch their phones" {P3}. 4 teens expected their parents could access their messages if wanted to.



<http://policestateusa.com>



circumventing rules & restrictions

safety issues:

sneaking in or out: "I would have to yell like, 'Oh Rapunzel', and have to climb the wall" (5) or rather going over to a friend's (2)

home security issues:

Disabling a window contact sensor (1): "if you put it on like another metal thing, it doesn't actually detect anything" or tampering security cameras (4).





lessons

#1. (bad) default configurations of audit-logs may create parent-teen conflicts where none previously existed

#2. (inappropriately designed) in-home monitoring system can lead to reduced security as a result of circumvention
- teens are not your typical adversary

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a few ideas

monitoring the monitor:

9 teens found it useful or neutral: "prepare myself, buy ear plugs, and mental preparation"; two parents strongly object: "I would rather gather my evidence and pop out"

annotating log entries:

positive (7 teens) vs. negative (6 teens): "over complicated"

selective logging, coarse-grained logging:

using facial recognition to filter out authorized users or using an approximate (e.g., around 11 instead of 11:15PM)

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future work

a survey to quantify how parents' attitudes and monitoring strategies change over time

a field study to understand how audit logs are used, abused, or circumvented in practice

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