Intruders Versus Intrusiveness: Teens’ and Parents’ Perspectives on Home-Entryway Surveillance

Blase Ur
Jaeyeon Jung
Stuart Schechter
Photo taken by the authors.
Internet-Connected Security Devices

• Advantages include:
  - Convenience
  - Remote operation
  - Transparency
  - Auditability
<table>
<thead>
<tr>
<th>Time</th>
<th>Description</th>
<th>Device</th>
<th>Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>15:27:38</td>
<td>_Kwikset Door Lock</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>15:24:02</td>
<td>_Kwikset Door Lock</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>15:23:47</td>
<td>_Kwikset Door Lock</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>15:22:32</td>
<td>_Kwikset Door Lock</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>10:24:19</td>
<td>_Kwikset Door Lock</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
Home security

Teen monitoring
Home security and teen monitoring

Images Fair Use from mtp-usa.com and safetyzonegps.com
Understand teenagers' and parents' perspectives on auditable locks and cameras in the home
Methodology

• Two studies:
  – Interviews of parents and teenagers
  – Online configuration study
Interview Study Methodology

• Interviewed 13 teenagers and 11 parents
  – Recruited from Microsoft's participant pool
  – All from different households
  – Limitation: Not a representative sample
  – Limitation: Hypothetical deployment

• Interviews lasted ~1 hour
  – Compensation: $50 gift card or equivalent
Interview Structure

- Parenting-style survey
- Familiarity with, and use of, home technology

- General reactions to Internet-connected locks
- Use of traditional keys and home security
- Reactions to potential interfaces for audit logs
- Current monitoring practices and attitudes

Images Fair Use from Kwikset and Schlage promotional materials
Analysis

• Transcribed all interviews
  – Two researchers tagged 1,852 quotes as explanatory
• Collaboratively performed affinity diagramming
  – Identified 28 primary themes representing attitudes and influences
Participants

• 13 teenagers (7 male, 6 female)
  – Age 15 – 17
  – Range of family circumstances
• 11 parents (4 male, 7 female)
  – Age 35 – 59
  – Two single parents
  – One parent uses an Internet-connected lock
Participants Liked Connected Locks

• Benefits include:
  – Convenience
  – Added control
  – Safety from burglars

• Drawbacks are:
  – High cost
  – Fear of hackers
Auditing Interfaces
# Auditing Interfaces

## Photo log

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rear door</td>
<td></td>
<td>19 minutes ago</td>
</tr>
<tr>
<td>Rear door</td>
<td>Aurora’s Phone</td>
<td>20 minutes ago</td>
</tr>
<tr>
<td>Front door</td>
<td></td>
<td>39 minutes ago</td>
</tr>
<tr>
<td>Front door</td>
<td>Billy’s PIN Code</td>
<td>40 minutes ago</td>
</tr>
<tr>
<td>Rear door</td>
<td></td>
<td>4 hours ago</td>
</tr>
<tr>
<td>Rear door</td>
<td>Billy’s Phone</td>
<td>4 hours ago</td>
</tr>
</tbody>
</table>
## Auditing Interfaces

### Text log

<table>
<thead>
<tr>
<th>What?</th>
<th>How?</th>
<th>When?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rear door</td>
<td>Aurora's Phone</td>
<td>20 minutes ago</td>
</tr>
<tr>
<td>Front door</td>
<td>Billy's PIN Code</td>
<td>40 minutes ago</td>
</tr>
<tr>
<td>Rear door</td>
<td>Billy's Phone</td>
<td>4 hours ago</td>
</tr>
</tbody>
</table>
Auditing Interfaces

No log
Parents' and Teens' Preferences Differed

• All 11 parents preferred photo log
  – “For safety purposes” (P7)
  – “If there was a break-in or a theft” (P10)
• 3 specified monitoring teens as a goal
  – “As my son gets older, I’m going to need to verify if he’s coming home alone” (P4)
Monitoring Teens

• Some parents wanted to monitor teens
• Others chose photo log in spite of monitoring
  - “It’s just a human nature thing that nobody likes when people keep tabs on anybody” (P2)
  - “I think [my children] would be paranoid or intimidated by the photos” (P6)
Parents' and Teens' Preferences Differed

• 6 teens preferred photo log
  – 4 nonetheless expressed privacy concerns
  – “Kind of weird that they could just always look and see exactly who's over” (T6)
• 3 teens preferred text log
  – Photo “invasion of privacy, `big brother'...thing” (T11)
• 4 teens preferred no log
  – Photo log “would pretty much ruin a strict parent’s kid’s social life...This is like parents going psycho” (T8)
Current Monitoring Practices

• Unconstrained monitoring (2 parents)
  
• No monitoring (3 parents)
  
  “I'm just waiting to see if she gives me a reason not to let her just be free” (P1)

• Intentionally limited monitoring (6 parents)
  
  “I feel like that's a violation of their privacy if I were to [log onto their Facebook]. I know that I have their permission. I know that I have the access. But that's going further than I want to.” (P5)
Potential Unintended Consequences

• Reduced parent-teen trust
  – Spend time at friends' houses instead

• Circumvention reducing security
  – Leaving doors unlocked and windows open
  – Removing window sensors
  – Disabling camera
What decisions would parents actually make when configuring an auditable security system?
Methodology

- Online configuration study
  - Access & audit settings for entryway security system
- 19 parents recruited from classified ad sites
  - Compensated with $15 gift card
## Configuration Task

### Users

<table>
<thead>
<tr>
<th>First name or nickname</th>
<th>Email address or mobile phone #</th>
<th>Age</th>
<th>Lock PIN</th>
<th>Role</th>
<th>Lock and unlock records can be audited</th>
</tr>
</thead>
<tbody>
<tr>
<td>You, age 30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alice</td>
<td><a href="mailto:alice@foo.com">alice@foo.com</a></td>
<td>50</td>
<td>******</td>
<td>administrator</td>
<td>only with permission</td>
</tr>
<tr>
<td>Husband, age 53</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bob</td>
<td><a href="mailto:bob@foo.com">bob@foo.com</a></td>
<td>53</td>
<td>******</td>
<td>administrator</td>
<td>anytime with notice</td>
</tr>
<tr>
<td>Daughter, age 16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Charlie</td>
<td>202-555-9873</td>
<td>16</td>
<td>******</td>
<td>user</td>
<td>anytime with notice</td>
</tr>
<tr>
<td>Uncle Joe</td>
<td><a href="mailto:joe@foo.com">joe@foo.com</a></td>
<td>40</td>
<td></td>
<td>user</td>
<td>anytime w/o notice</td>
</tr>
</tbody>
</table>

### Notifications

Send a notification to alice@foo.com whenever Charlie unlocks the door(s)
Configuration Task

- **Only with permission from Alice**
  Alice will be sent a text or email asking him/her to approve the release of these records.

- **Anytime, but a notification will be sent to Alice**
  Alice will receive a text or email indicating who accessed his/her records.

- **Anytime & without notice**
  Alice will not be notified when his/her records are accessed, but will know who can access them.

Alice will be able to see which policy has been assigned to him/her and which users can read his/her lock and unlock records.

Records of lock and unlock events are protected by the policy in place at the time of the event. Changing this policy will only change access to future lock and unlock events.
Results

• 4 / 19 participants would allow themselves to be audited without permission or notice

• 8 / 14 participants configured settings to audit spouse/partner without permission or notice

• 19 / 19 participants configured settings to monitor teens without permission or notice
  – “She doesn’t have anything to hide, so it shouldn’t be a problem”
How can we disentangle decisions about home security and teen monitoring?
Possible Directions

• “Outsource” auditing...
  - ...to a security company
  - ...to each individual
Possible Directions

• Technology-assisted auditing
  - Face detection
  - Context-sensitive auditing

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Possible Directions

- Change the interaction with logs
  - Pull instead of push notifications
  - Show less granular logs
Conclusions

• New technologies can alter dynamics in the home
• Parents and teens had differing perspectives on audit
• Privacy and security consequences of conflating decisions about home security and teen monitoring
  – Potential interfaces and interactions that disentangle these decisions
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Blase Ur
(blase@blaseur.com)
Jaeyeon Jung
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