

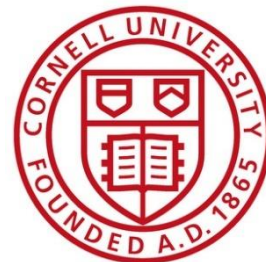
The Spyware Used in Intimate Partner Violence

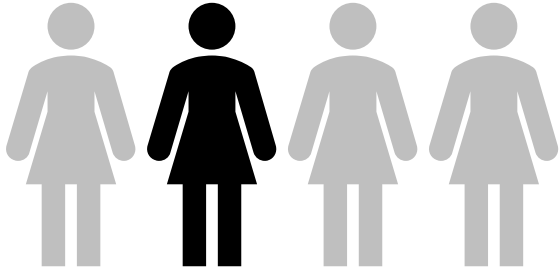
Rahul Chatterjee, Periwinkle Doerfler, Hadas Orgad,
Sam Havron, Jackeline Palmer, Diana Freed,
Karen Levy, Nicola Dell, Damon McCoy, Thomas Ristenpart



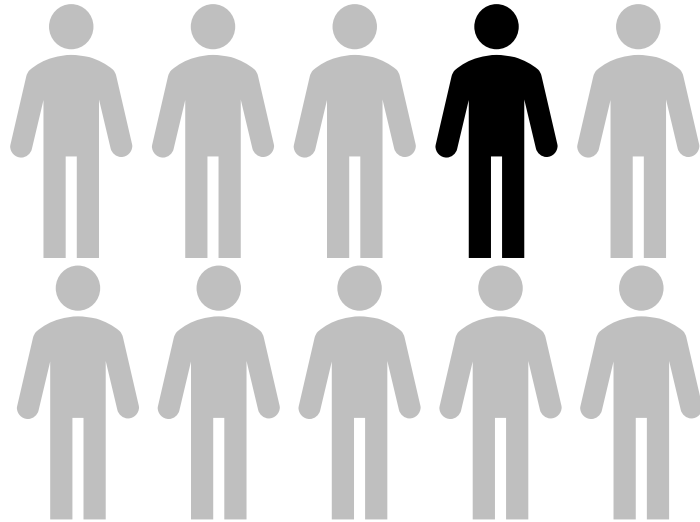
NYU

**TANDON SCHOOL
OF ENGINEERING**





Intimate partner violence (IPV):
sexual violence, physical violence, or
stalking by boyfriend, girlfriend, or spouse



1 in 4 women **1 in 10** men
experienced IPV in their lifetime in US

Source: <https://www.cdc.gov/>, 2015

Technology is abused for IPV

Burke et al. '11

Dimond et al. '11

Citron '15

Woodlock et al. '16

Matthews et al. '17

Freed et al. '17, '18

Abusers exploit technologies to

- send harassing texts
- stalk victim online
- distribute non-consensual pornography
- spy on victims using spyware

Intimate partner surveillance (IPS)



IPS is both a form of violence and facilitates other forms of violence.

*“An abusive partner **kicked in our front door** and wound up in the lobby of our building by tracking her phone . . . it was some **secondary application that the abuser had put on it and knew exactly where she was... it was scary.**”*

– Case manager

[Freed et al. CSCW '18]

Spyware threat model in IPV

Abuser {
has physical access
knows passwords
might own device



Abuser can install
spyware



We did not know ...

1. What spyware tools are available to abusers?
2. How easy it is to find and (ab)use them?
3. Are developers of these tools complicit in IPS?
4. Can anti-spyware apps come to the rescue?

Our work:

First study of the ecosystem of IPS-relevant apps

~4000 IPS-relevant apps:

- Some are overt spyware
- Most are *dual-use*

Abundant resources
(blogs, videos, forums, etc.)
to help abusers with IPS

Current anti-spyware doesn't
flag IPS-relevant apps as threat

Some developers promote
IPS, others condone it

Spyware ecosystem currently empowering abusers and failing victims

How do abusers find IPS-relevant apps?

Need large number of query terms that an abuser might use

The image shows a Google search interface for the query "How to spy on my husband". The search bar contains the text "How to spy on my husband" and a microphone icon. Below the search bar are tabs for "All", "Videos", "Shopping", "News", "Images", "More", "Settings", and "Tools". The search results show "About 11,700,000 results (0.44 seconds)". Four search results are highlighted with red boxes and callouts:

- Result 1:** "How to Spy on My Husband's Cell Phone Without Touching It?" from <https://besttrackingapps.com/spy-on-your-spouse/>. The snippet mentions "Hundreds of people wonder 'how to spy on my husbands cell ... How Can I Track My Husbands Cell Phone Without Him Knowing and for Free?'". Callout: "Blogposts comparing spy apps".
- Result 2:** "How to Spy on My Husband's Phone Without Him Knowing! - YouTube" from <https://www.youtube.com/watch?v=LBTf2jEECo>. The snippet says "Aug 18, 2016 - Uploaded by Richard Smith Cell Phone Spying Software - Track Anyone Via Phone With Ease .This is the BEST Monitoring Software and ...". Callout: "Videos how-to guides".
- Result 3:** "How can i spy on my husband cell phone without touching his cell ..." from smstrackers.com > Tracking My Partner. The snippet states "The popularity of mobile spy software is increasing every passing day as worried wives want to confirm that their husbands are absolutely honest with them at all ...". Callout: "Ad funnels for spy apps".
- Result 4:** "How can I spy on my husband cell phone without touching ... - Guestspy" from guestspy.com/can-spy-husband-cell-phone-without-touching-cell/. The snippet says "Jan 10, 2017 - How can I spy on my husband cell phone without touching his cell. GuestSpy is a strong tracking tool with a few attributes that are truly ...". Callout: "Spy app websites".

Blogposts comparing spy apps

Videos how-to guides

Ad funnels for spy apps

Spy app websites

Search engines give query suggestions

how to spy on my

how to spy on my **husband**

how to spy on my **boyfriends phone**

how to spy on my **boyfriends iphone**

how to spy on my **girlfriends iphone**

how to spy on my **husband iphone**

how to spy on my **boyfriends facebook messages**

how to spy on my **husband phone**

how to spy on my **son's iphone**

how to spy on my **bf phone**

how to spy on my **wifi network**

Searches related to how to spy on my husband

track my husbands phone for free

track my husbands phone without him knowing

how **can i find out who** my husband is **texting for free**

cheaters spy app free

how **can i track** my **husbands cell phone without him knowing and for free**

how to **hack** my **husbands whatsapp**

how **can i track** my **husbands phone location**

spy on **cell phone without touching target phone**

“Snowball” searching

how to spy on my girlfriend,
track my girlfriend android,
how to spy on my husband
...

Query set

Regex-based
filter to remove
unrelated terms



how to spy on my

how to spy on my **husband**

how to spy on my **boyfriends phone**

how to spy on my **boyfriends iphone**

how to spy on my **girlfriends iphone**

how to spy on my **husband iphone**

how to spy on my **boyfriends facebook messages**

Searches related to how to spy on my husband

track my husbands phone for free

track my husbands phone without him knowing

how **can i find out who** my husband is **texting for free**

cheaters spy app free

how **can i track** my **husbands cell phone without him knowing**

Stop when no new query found
or # queries more than 10,000

Abundant resources for conducting IPS

- Crawled  and  (and ) using snowball searching
- We found:

23 off-store spyware apps



A collection of six spyware app logos and boxes. At the top left is the 'M.SPY' logo in blue and orange. To its right are two boxes: 'MOBILE SPY' and 'Appmia'. Below these are three more boxes: 'PHONESHERIFF MOBILE PARENTAL CONTROLS', 'FLEXISPY', and 'THE ONE SPY'.

3,500+ IPS-relevant apps in 

(smaller study)
451 IPS-relevant apps in 





A typical off-store spyware app

All-Inclusive Mobile Phone Spy

- ✓ Spy on all iOS and Android devices
- ✓ Track SMS, Call logs, App chats, GPS etc.
- ✓ No Rooting or Jailbreaking required
- ✓ Invisible mode, monitor the activity remotely

Source: <https://www.spyzie.com/ad/phone-spy.html>



Real-time
+ historical

Remotely record audio,
video, and alter settings

Smooth (ab)user experience with off-store spyware

How-to guides

Installing is easy

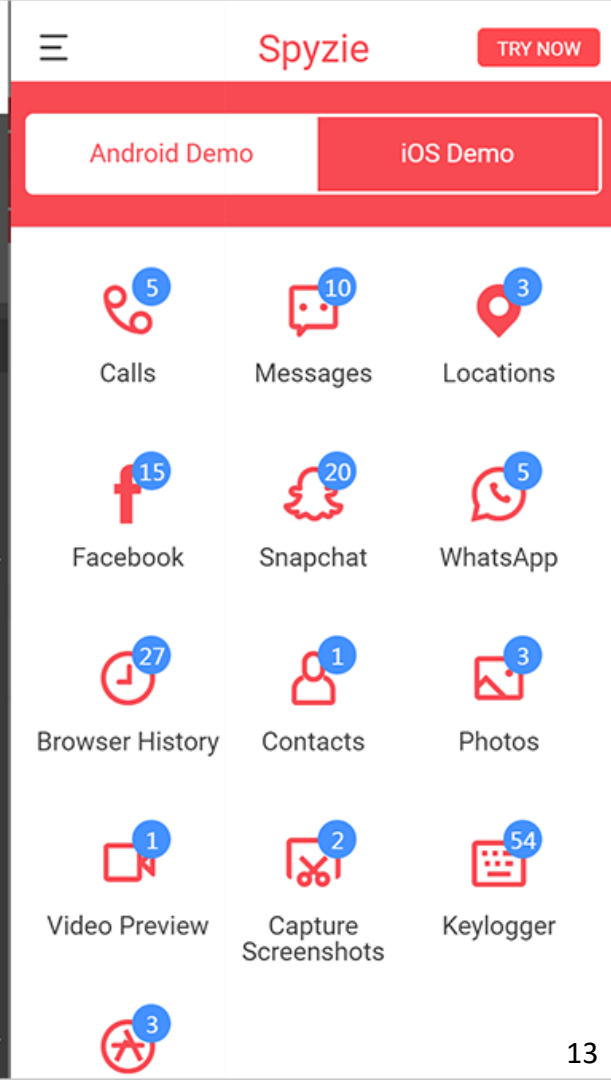
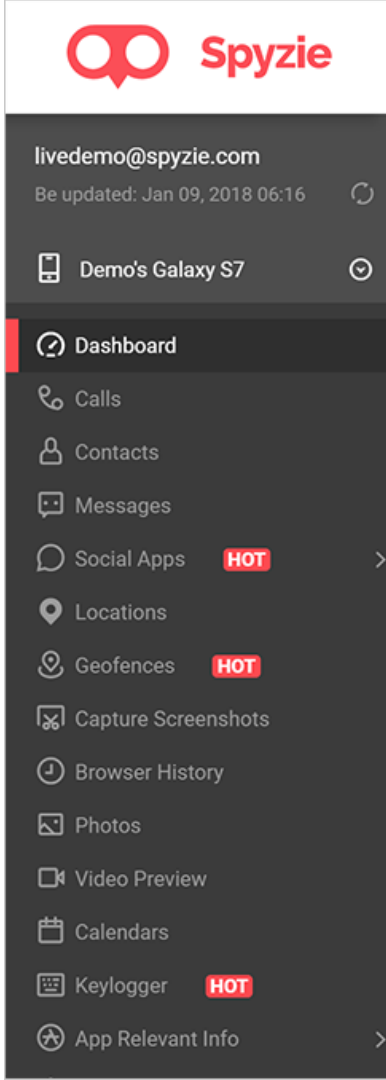
Whole process takes less than 5 min

On victim's device:

No app icon, no notification

On abuser end:

Fancy web UI or apps



Abundant resources for conducting IPS

23 off-store
IPS-relevant apps



3,500+ IPS-relevant
apps in 

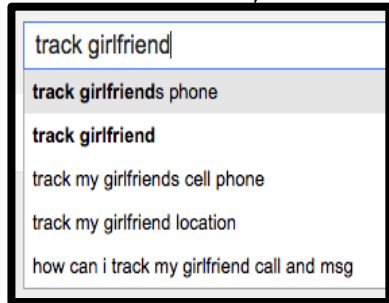
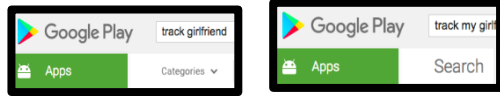
(smaller study)
451 IPS-relevant
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Finding on-store IPS-relevant apps

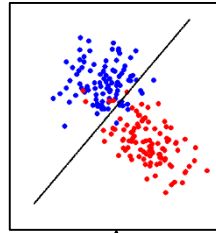
Apps distributed in official application stores

Snowball searching over 3 months on Play Store



15,000+ apps

Prune using ML classifier



~4,500 apps

Filter using human verifier



Found 3,500+ apps usable for IPS

Looks at app title, description, permissions, and genre as reported in Play Store

Smaller study (2 weeks) on iTunes App Store: 451 IPS-relevant apps

Taxonomy of on-store apps

Personal tracking

- Find my phone or Anti-theft
- Automatic call recorder
- Automatic data/SMS syncing
- Phone control
- Personal safety



Mutual tracking

- Find-my-family / friend
- Couple tracking



Subordinate tracking

- Employee tracking
- Parental control

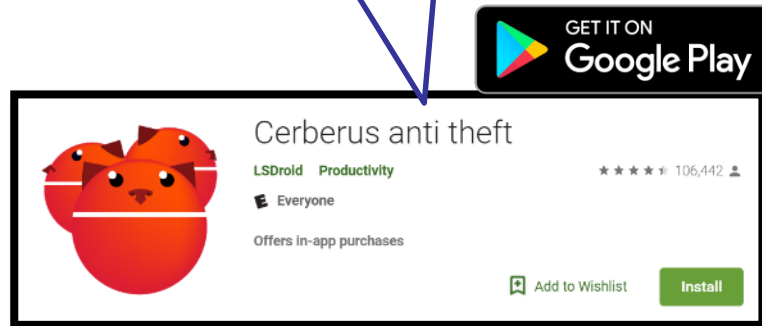


Seemingly innocuous apps are used for IPS

*“I’m looking for an app I can install on my wife’s phone that is **hidden** so that I can see **where she is or has been** via cell towers or gps.”*

*“[Install] **Cerberus** from the market. Once installed and configured, can be set to be invisible in the app drawer. You can also **record audio** and **take pictures remotely** with it! Be sure to **silence the camera** first though!”*

Dual-use app



Types of IPS-relevant apps

Overt spyware apps
(typically off-store)

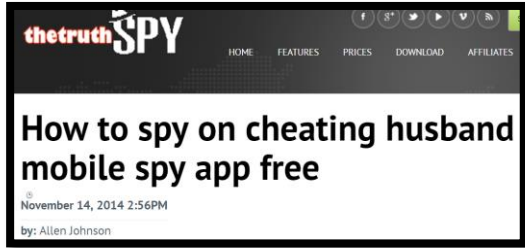


Dual-use apps
(typically on-store)



Are app developers complicit in IPS?

Some developers are promoting IPS



thetruthSPY

HOME FEATURES PRICES DOWNLOAD AFFILIATES

How to spy on cheating husband mobile spy app free

November 14, 2014 2:56PM
by: Allen Johnson



Spyzie

How to Spy on My Cheating Wife

You can find out if your wife is cheating on you. However, hiring a private detective to spy on your wife to find out the truth may cost hundreds or thousands of dollars and may or may not produce results.



HelloSpy

Home Features Plans & Pricing Sign Up How To Install Uses

Mobile Spy App for Personal Catch Cheating Spouses

Home Uses HelloSpy for Bussiness

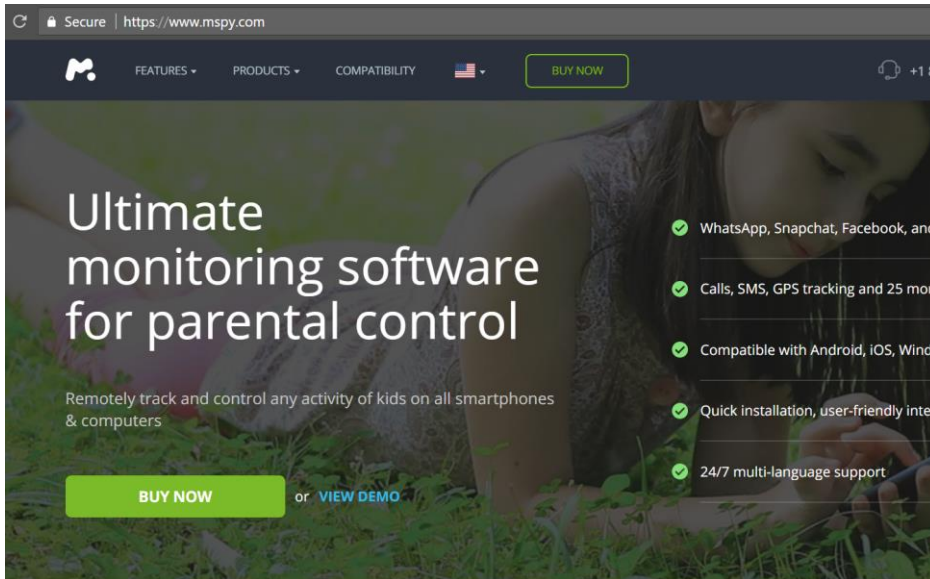
Cheating by the numbers...

One of the unpleasant truths most married individuals are aware of is the surprisingly high occurrence of extramarital affairs. According to a study by Joan D. Atwood & Limor Schwartz, published in 2002, by the Journal of Couple & Relationship Studies, 25-35% of married women and 50-60% of married men have had an extramarital sex at some time or another in their relationship. If that is not alarming enough, a recent study puts the average nonpaternity rate at above 1%, in other words, 33 children in every thousand are not the man everybody thinks they are...





Others are condoning IPS

- Suspicious redirect from IPS-content blogposts to app websites



Secure | https://www.mspy.com

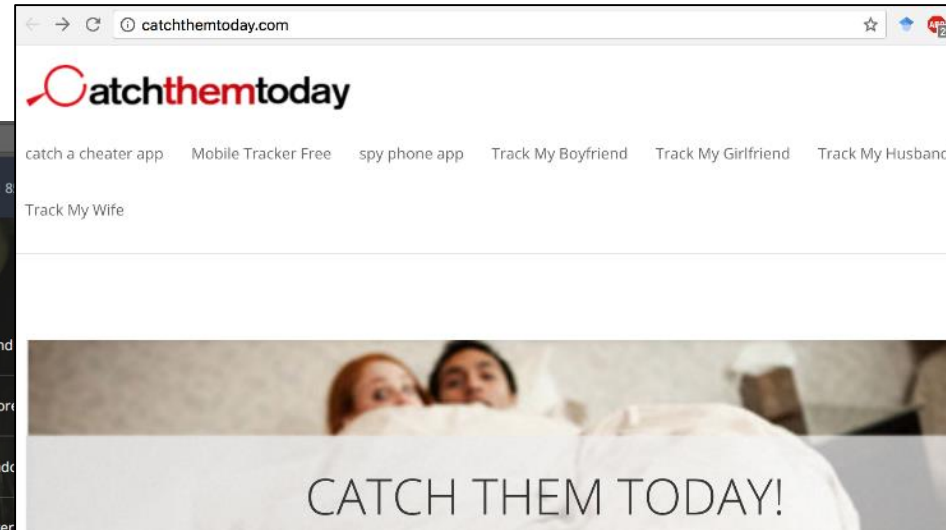
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- ✔ Quick installation, user-friendly interface
- ✔ 24/7 multi-language support


[BUY NOW](#) or [VIEW DEMO](#)



catchthemytoday.com

catchthemytoday

catch a cheater app Mobile Tracker Free spy phone app Track My Boyfriend Track My Girlfriend Track My Husband Track My Wife

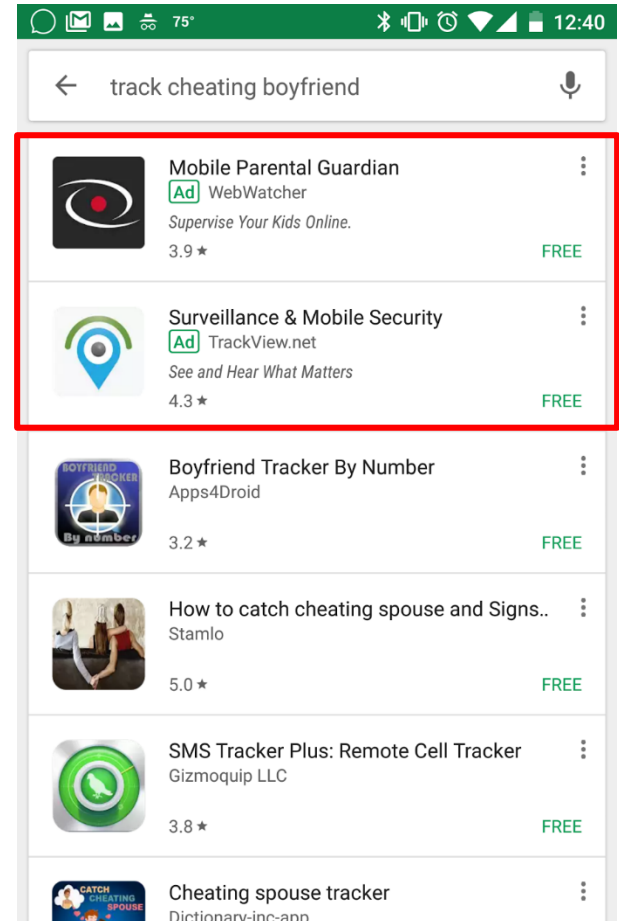


CATCH THEM TODAY!



Others are condoning IPS

- Suspicious redirect from IPS-content blogposts to app websites
- Paid ads coming up on IPS-related search terms



Others are condoning IPS

- Suspicious redirect from IPS-content blogposts to app websites
- Paid ads coming up on IPS-related search terms
- Contacted customer support for 11 apps
 - 6 on-store and 5 off-store
 - posing as an abuser

9 responses:

8 condoned IPS

1 admonished
against IPS use

Jessie:

Hi, If I use this app to track my husband, will he know that I am tracking him?

WebWatcher:


For Android monitoring the app can be hidden from the home screen ...

So far,

1. Thousands of IPS-relevant apps are available
2. Plenty of how-to blogs, videos, and online forums for abusers
3. Some developers promote IPS

Disclosure with Google

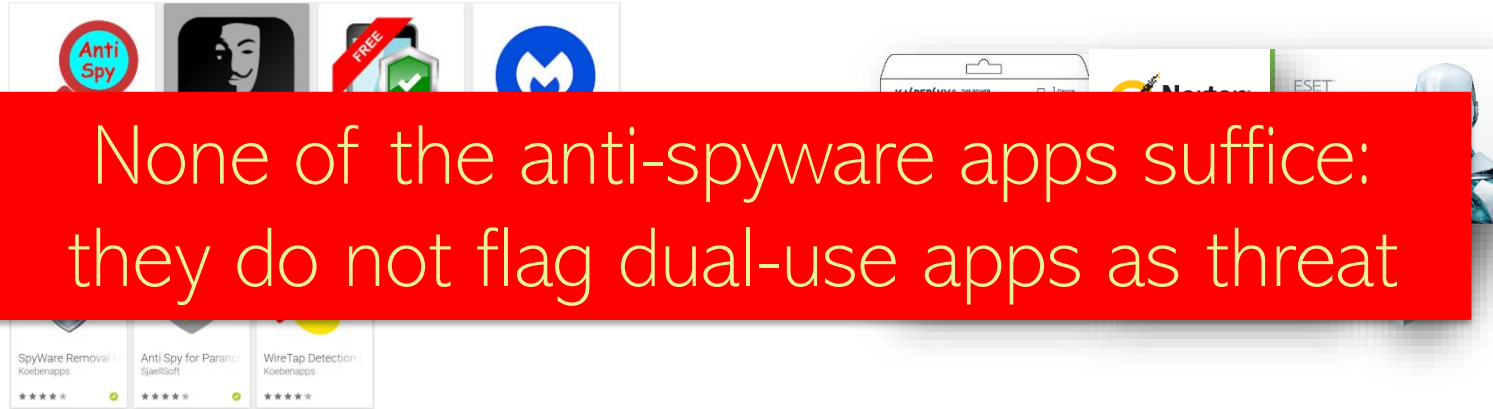
We communicated our findings to Google. Google has

- tightened enforcement to disallow any couple tracking apps and taken action against the ones violate  policies
- taken action against **You Tube** videos that violate their policies
- extended restrictions on ad-serving and Play Store search

Dual-use apps will/should remain on stores:
We need detection tools to help (potential) victims

Are anti-spyware tools effective?

- Snowball searched for anti-spyware apps in Play Store
- Found 40 apps that claim to have anti-spyware capabilities



- **Methodology:** Installed IPS-relevant apps in a phone along with one anti-spyware app
 - record the apps flagged by the anti-spyware

“State-of-the-art” spyware detection remains:

Battery Draining Fast



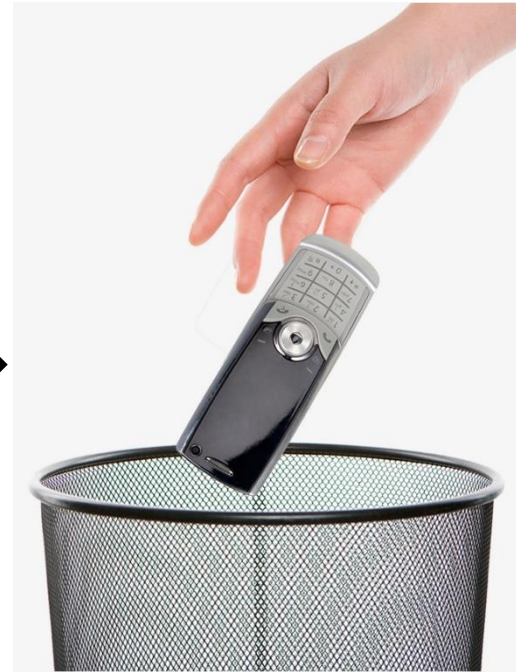
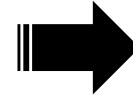
or

+

Feel being spied on



Getting hot



The Spyware Used in IPV

First in-depth study of IPS app ecosystem

Abundant resources
for abusers to do IPS

Some developers
are complicit in IPS

Current anti-spyware
doesn't flag IPS apps

Moving forward:

Working with Google and
Symantec on IPS detection

Guidelines for honest developers
to prevent IPS use-case?

<https://ipvtechresearch.org>

Thanks!

 @rhlchatterjee



rahul@cs.cornell.edu