3 years of **crowdsourcing** smart home network traffic

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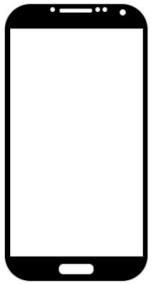
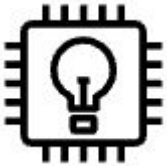
Smart home networks are getting increasingly complex





Security and privacy issues are often opaque to users and researchers

users

What's happening on my home network?

What's WireShark?

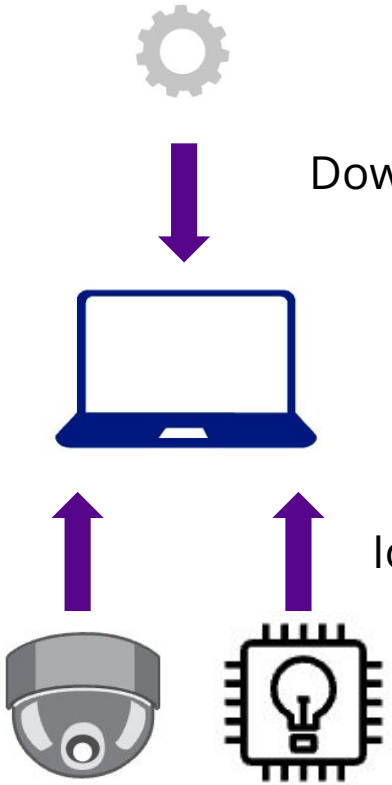
researchers

How to buy 1,000 IoT devices for my lab?

How to ask Company X for their IoT data?

IoT Inspector: an open-source monitoring tool for smart homes

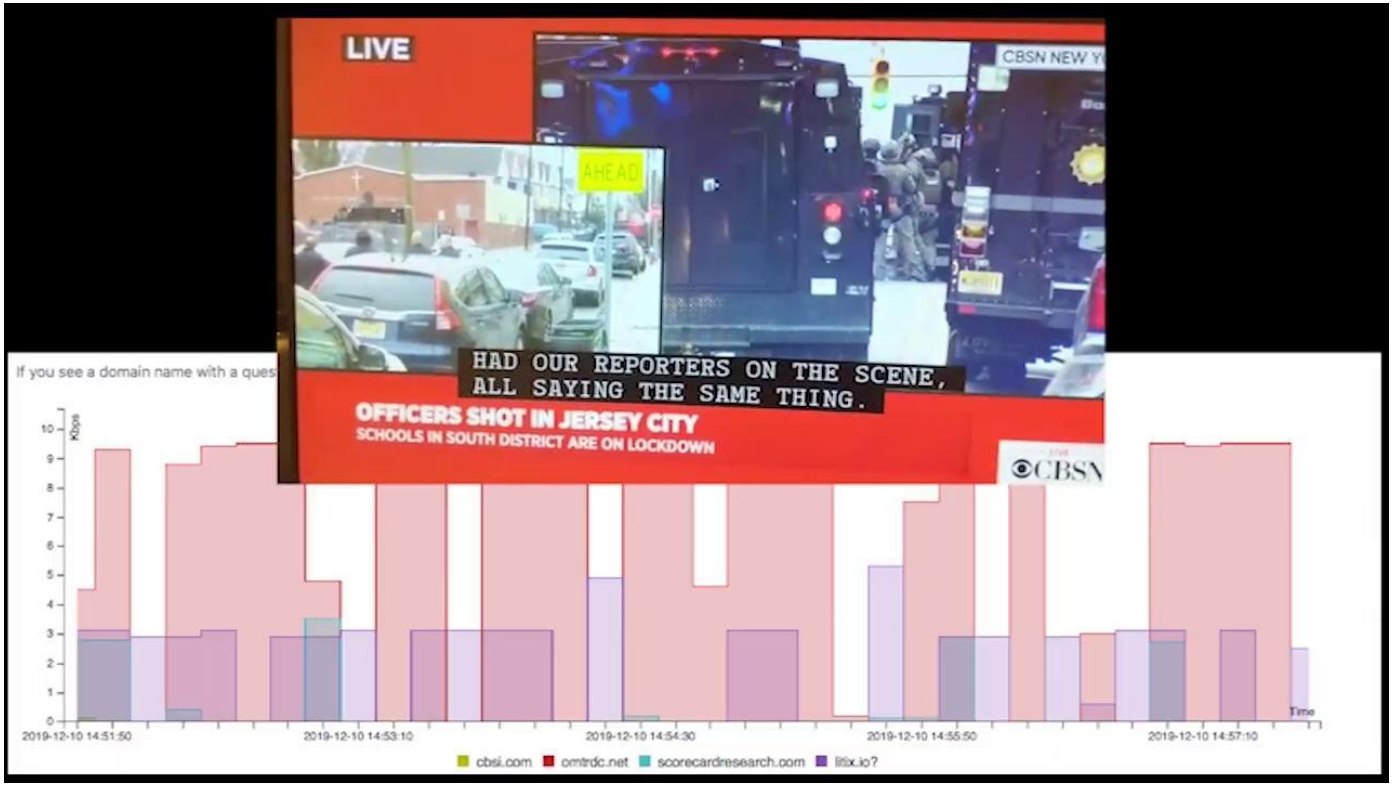
Helping users visualize network activities of smart home devices



Download IoT Inspector on computer

IoT Inspector intercepts IoT traffic via ARP spoofing

Helping users visualize network activities of smart home devices



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Providing researchers with a realistic large-scale dataset of IoT network traffic

63,000+

devices

with traffic metadata

since April 2019

6,400+

users

npr

The Washington Post

Ongoing research papers

- Smart TV privacy
- IoT firewall
- IoT TLS/PKI
- IoT software supply chain security
- Smart home privacy and usability

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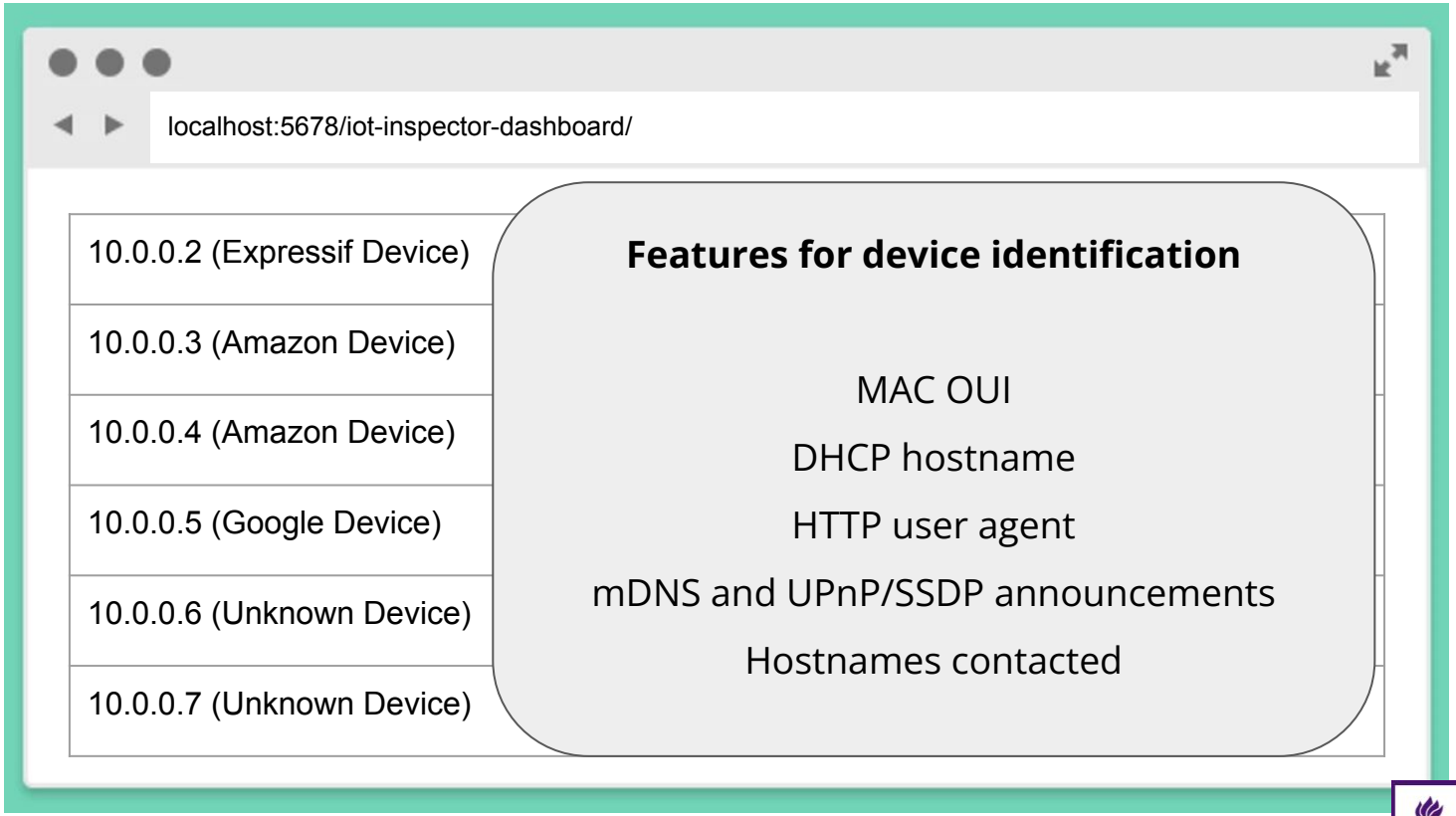
“ *What is this device?*

Challenge 1: Identifying and labeling devices

Difficult for users to identify devices



Crowdsourced labels can be messy

Missing labels

47% of users labeled at least one device

Users labeled 25% of devices

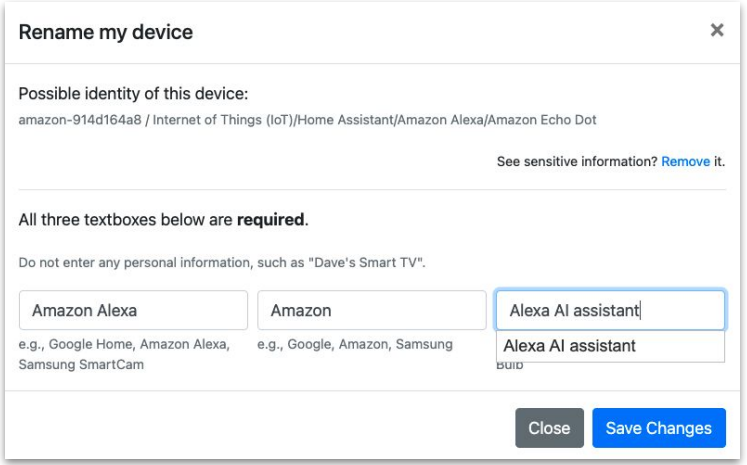
Inconsistent labels

Dropdown list + free text

“Amazon Echo” vs “Amazon Alexa”

Wrong labels

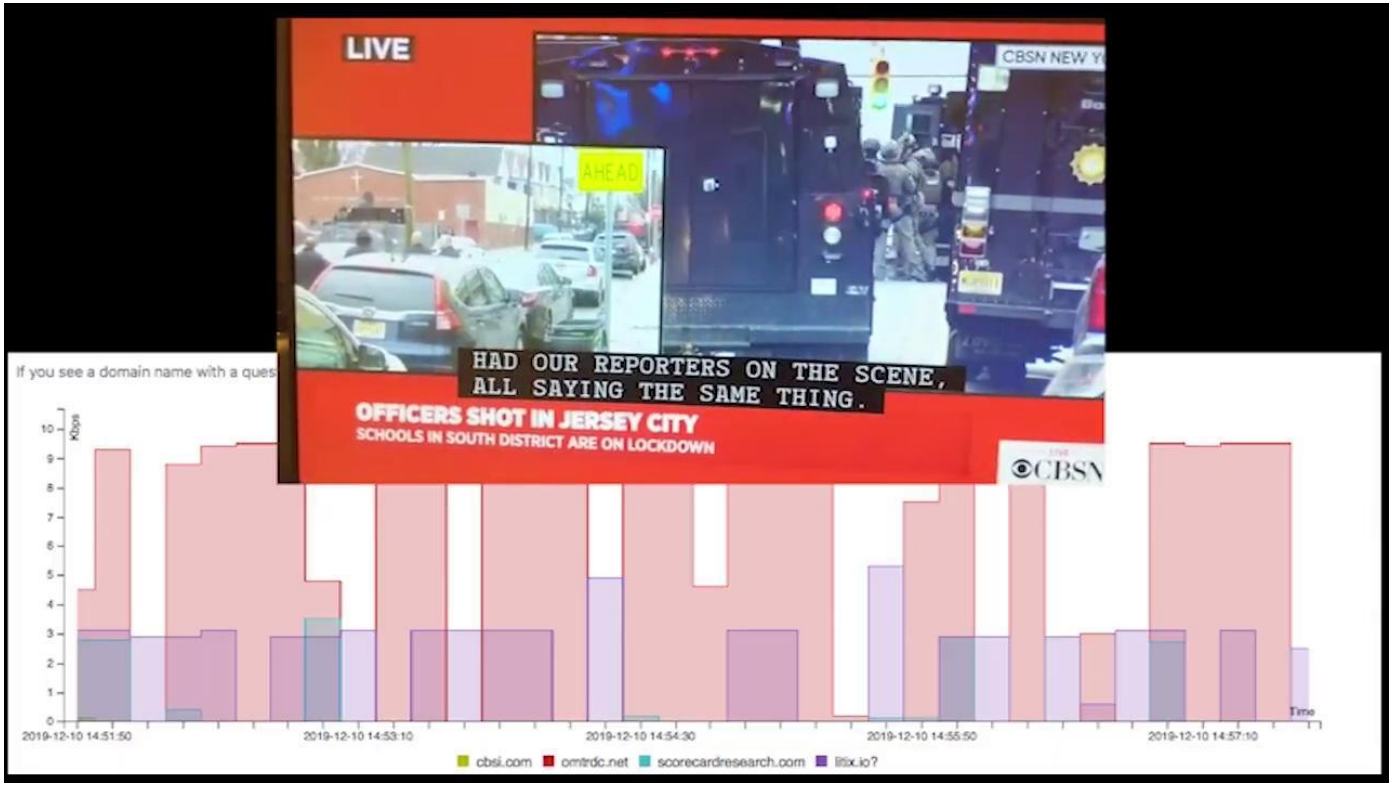
A smart fan that communicated with hundreds of advertising services?



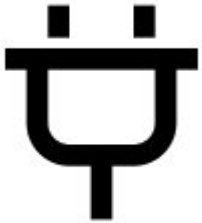
“ *What is this device doing?*

Challenge 2: Communicating risks vs. spooking users

Difficult to infer remote hostnames due to missing DNS packets



Some hostnames could cause confusion

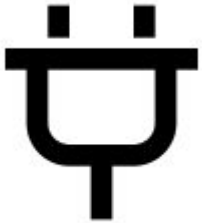


Belkin

Smart Plug

`api.xbcs.net`

Hostnames could also be spooky to some users



another

smart device

`tock.usno.navy.mil`

> *Why should I use and keep using IoT Inspector?*

Challenge 3: Incentivizing users

User engagement can be improved

15,000+ devices labeled

2,900+ users labeled at least one device

63,000+ devices inspected

6,400+ users inspected at least one device

Median inspection time: 40+ minutes

209,000+ devices scanned

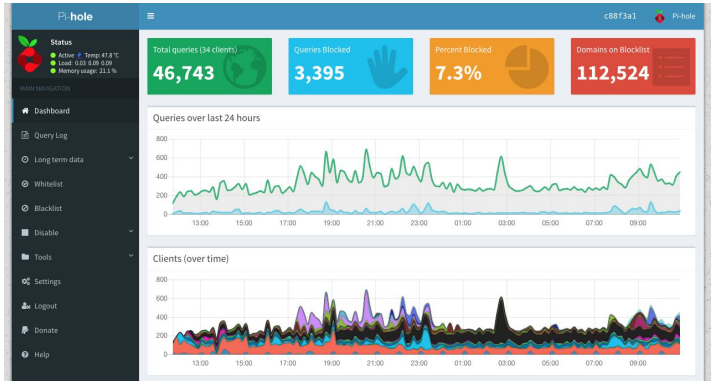
Improving user experience

UI/UX

Provide more usable information

Platform

Raspberry Pi



Analogue: Pi Hole

Need actionable use cases

Blocking

Blocking devices

Blocking connections

Hidden devices

airbnb

Source: https://twitter.com/foxytaughtyou/status/1536128978792198145/

Challenges of 3 years of operating IoT Inspector

Identifying and labeling devices

Communicating risks

Letting users take actions

Incentivizing users

63,000+

devices

6,400+

users

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