



Security and Privacy in the Lifecycle of IoT for Consumer Environments

(SPLICE)

presents

Smart Use of Smart Devices in Your Home

An Hands-On Night of Learning at the Montshire



Who are we?



David Kotz



Tim Pierson



Brigid McCarron



Tushar Jois



Tina Pavlovich

SPLICE
Security and
Privacy in the
Lifecycle of
IoT for
Consumer
Environments



An opportunity for us to gauge how effective today's workshop is



If you have any questions, you can ask any one of us, or send us an email later at splice-outreach-group@dartmouth.edu



Internet of Things

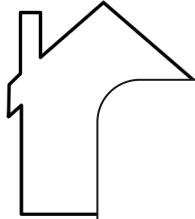




and more...



What constitutes a home? Who are stakeholders?



Homes *can include:*

Townhouse

Apartment

Standalone homes

Assisted living facilities

Dormitories



Stakeholders *can include:*

Landlords

Tenants

Homeowners

Children

Parents

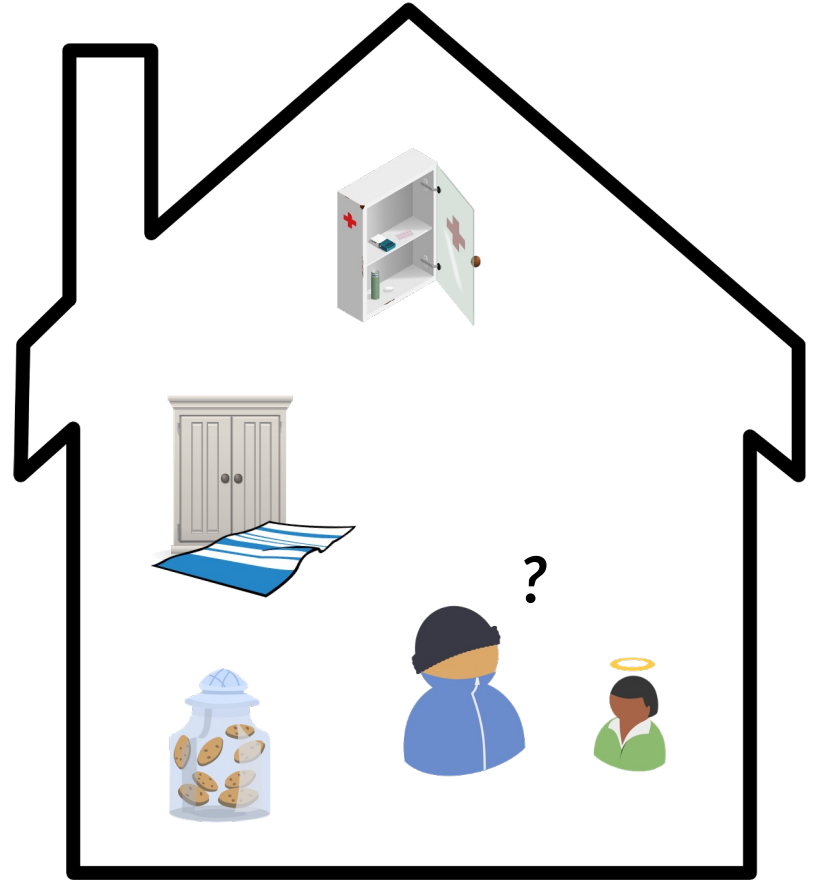
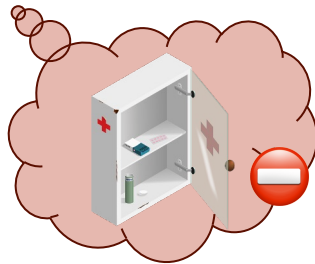
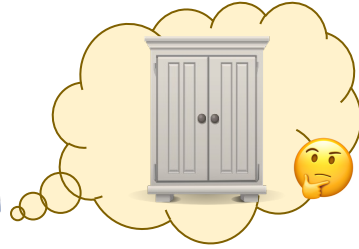
Friends

Caregivers

Technicians

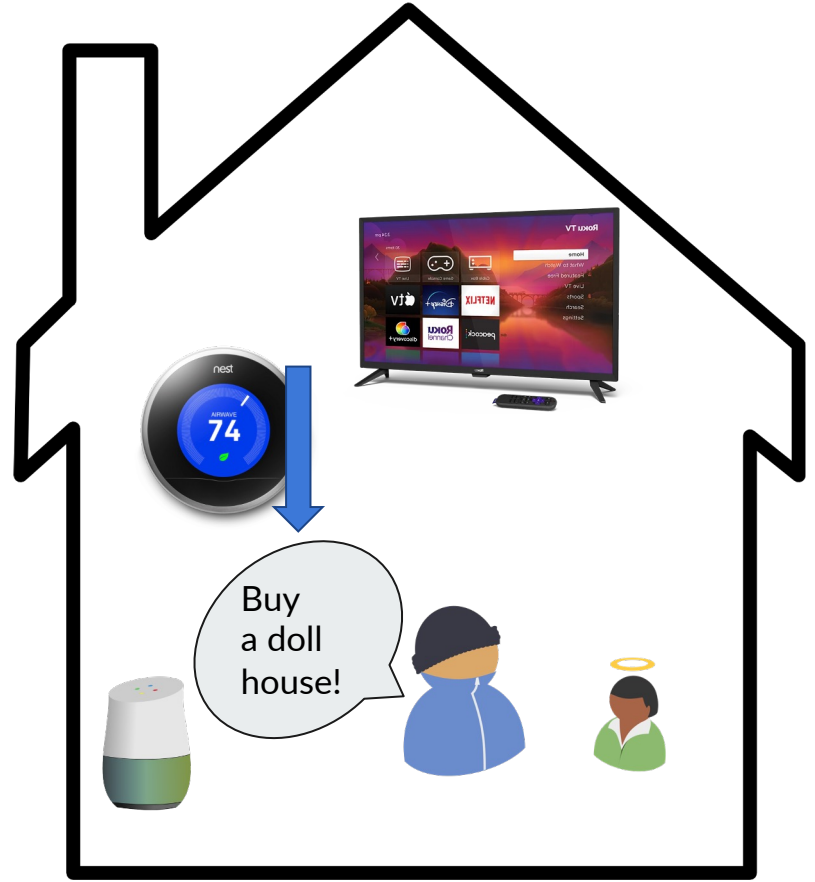
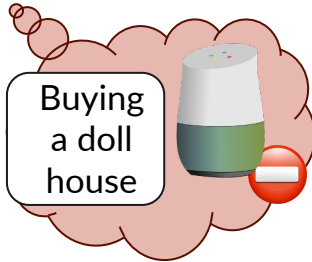
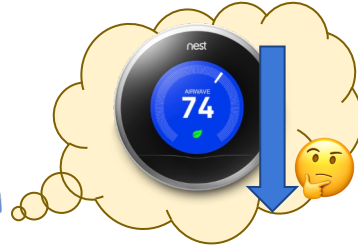


Make yourself
at home!





Make yourself
at home!





Unauthorized Local Access to Devices





Little Girl Orders Dollhouse and Cookies From Amazon's Alexa, Racks Up Big Bill

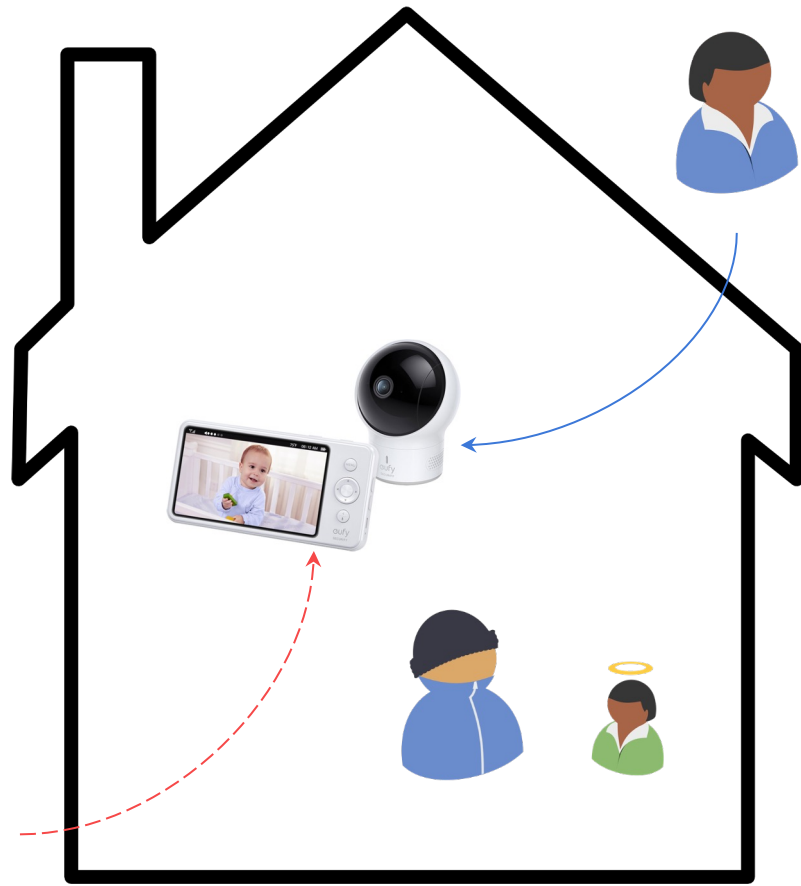
Dallas, TX — A Texas girl ordered a dollhouse and four pounds of cookies during a conversation with Alexa, Amazon's voice-activated device. Brooke N...

"The family kept the four pounds of cookies but will not be keeping the dollhouse, a \$170 Kidcraft Sparkle Mansion."





Unauthorized Remote Access to Devices





'Look behind you'; Va. family says hackers used Ring cameras to taunt their children

“They could be watching and making note of our schedules. If they are hacking our system, it's registered to our home address so they would have our address,” Reed said.”





Table Discussion

3 minute discussion:

How do you or could you use smart devices in your home?

What are your biggest concerns about having smart devices in your home?

03:00



What to do?

Secure the smart home lifecycle

*Getting
the device*

*Installing
the device*

*Using
the device*

*Removing
the device*



What to do?

Secure the smart home lifecycle

*Getting
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*Removing
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doorbell camera



Privacy, simplified. ▾



All Images Videos News Maps Shopping

Settings

Clear all filters

Ads



Brand

Blink

Google

Amocam

Kangaroo

Wyze

Show 10 more

Price

Up to \$30

\$30 - \$50

\$50 - \$100

\$100 - \$220

Over \$220


Connectivity Type

Wireless

Wired

Security System Type


Monitoring System



Free shipping

Wireless Video Doorbell Camera, Smart Home Security...

\$38.98
Temu



Free shipping

Wireless Camera Video Doorbell, Wide Angle...

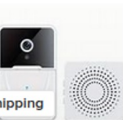
\$16.98
Temu



Free shipping

Doorbell Camera Wireless Wifi With Chime, Smart Security...


\$29.98
Amazon.com



Free shipping

1 Set, Smart Mini HD Wifi Video Doorbell Camera,...


\$11.97
Temu



Free shipping

Kangaroo Smart Photo Doorbell + Indoor Chime I...


\$29.99
Amazon.com



Free shipping

Smart Video Doorbell Camera, Wireless Security Camera...


\$40.98
Temu



Free shipping

1 Set Wireless Doorbell Camera With Chime, AI...

\$36.48
Temu




Free shipping

Wyze 1080P HD Video Doorbell Camera

★★★★☆ (724)

\$35.98 ~~\$49.98~~
Chewy.com




Free shipping

Blink Video Doorbell | Two-Way Audio, HD Video, Motio...

★★★★☆ (1.3K)


\$59.99
Amazon.com



Free shipping

Eufy Security, Wi-Fi Video Doorbell, 2K Resolution, No...

\$99.99
Amazon.com

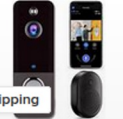


Free shipping

Arlo Essential Wired Video Doorbell - HD Video, 180°...

★★★★★ (2.5K)


\$70.00
Amazon.com



Free shipping

Doorbell Camera Wireless, Video Doorbell With...

\$39.98
Amazon.com



Free shipping

Wifi Wireless Doorbell Camera, Outdoor Video...

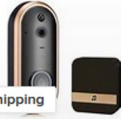
\$38.98
Temu



Free shipping

Ring & Video Doorbell With Camera Wireless Wifi Securit...

\$31.99
Walmart



Free shipping

Wifi Smart Video Doorbell, Goldcherry Wireless Door Be...

\$50.99
Walmart

Share Feedback



When buying devices....

Tip: Research the company's security & privacy history before purchasing!

Prefer
Reputable
Manufacturers

Those with a track record of prioritizing the security of their devices

amazon



nest



tp-link



Avoid

“Off-Brand” Devices
Unknown Manufacturers

Less trustworthy, as their commitment to security techniques are unclear



Where can I find trustworthy information on devices?

 **Wirecutter**

PCMAG.COM



What to do?

Secure the smart home lifecycle

*Getting
the device*

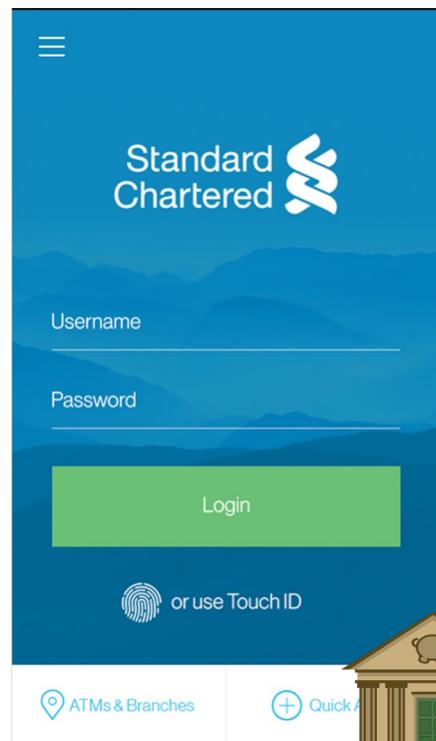
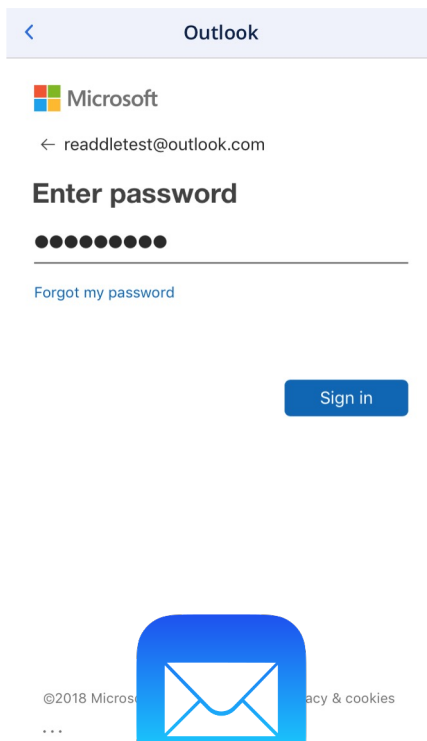
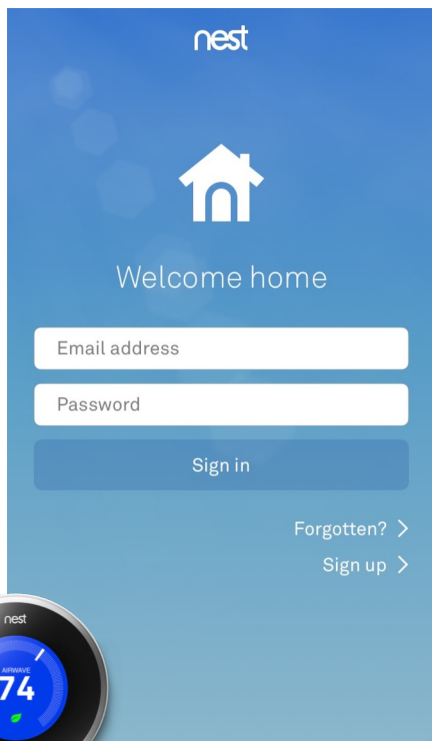
*Installing
the device*

*Using
the device*

*Removing
the device*



Installing a Device: Passwords





What Makes A Password Weak?

Uses easily available information



Social Engineering

Is used on multiple services



Reuse

Is short enough to guess

hunter2

Brute Force



Better Passwords

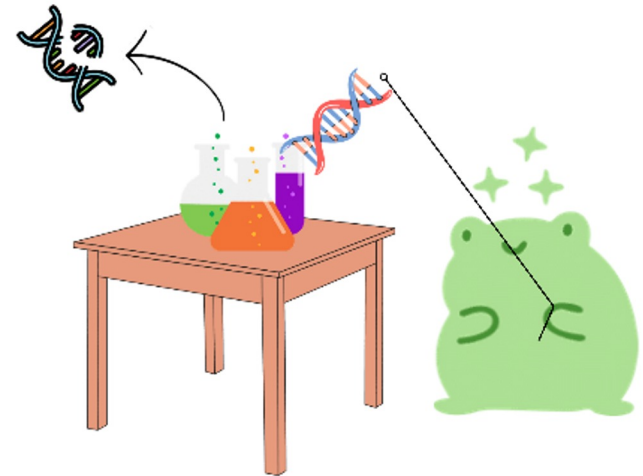
Create *passphrases* using a **unique, long** combination of **random words**

Amphibian-Genetic-Compromise-Run-3

Social Engineering → random words ✓

Reuse → unique ✓

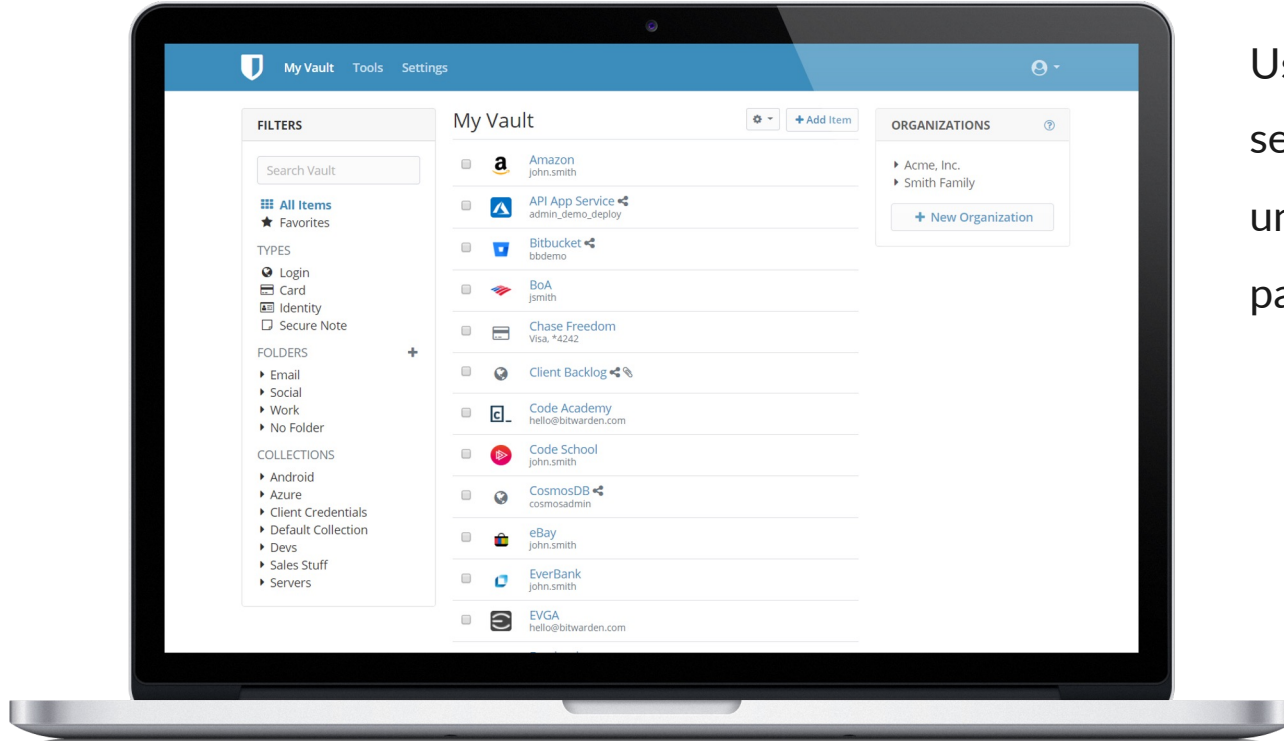
Brute Force → long ✓



Hard to remember several of these!



A Better Way: Password Manager

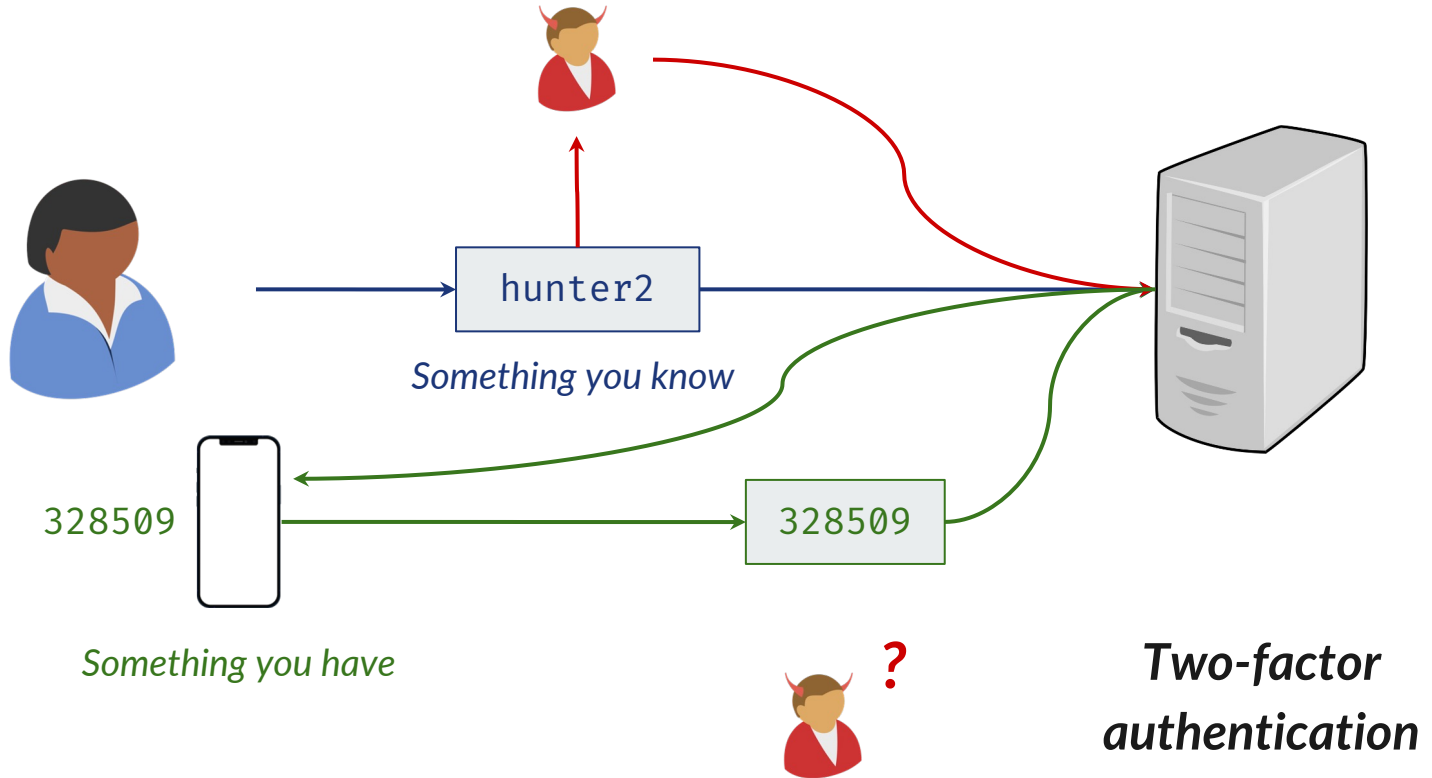


Use a *password manager* to securely generate and store unique, long, and random passphrases and passwords.



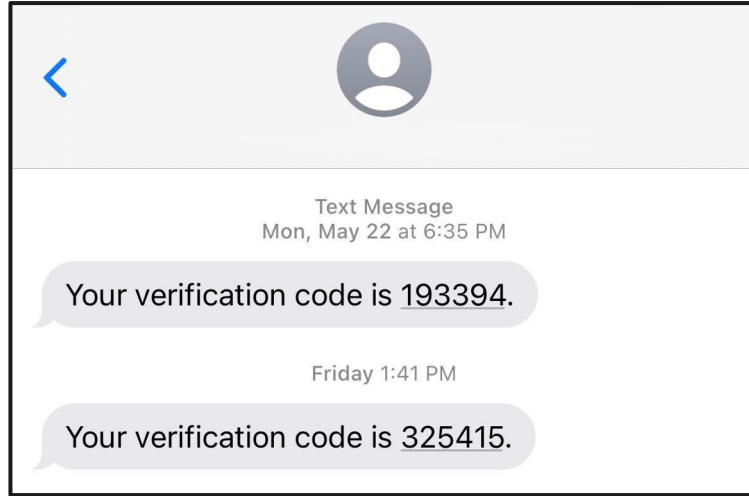


A Step Further

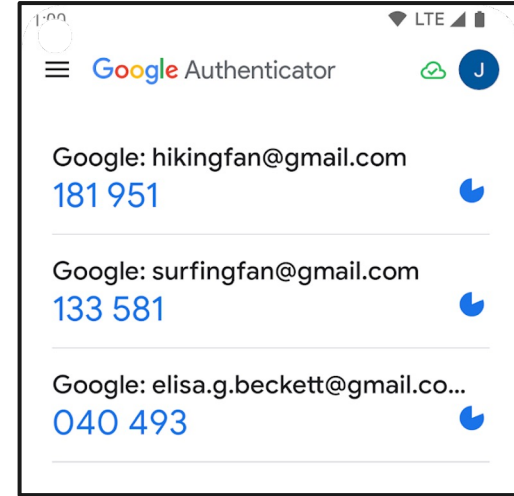




Two-Factor Authentication



Text message/SMS



Google Authenticator App

Only **you** should have access to your second factor



Smart Plug

Tapo Mini Smart Wi-Fi Plug

Voice Control

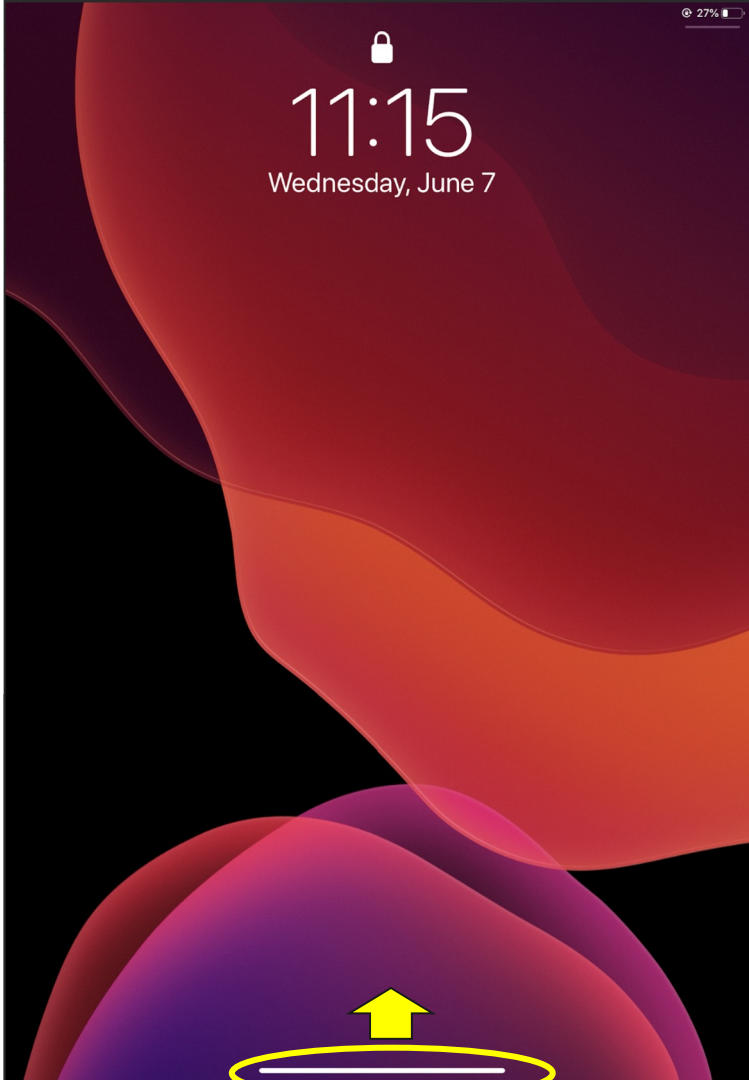
Remote Control

Auto-Off

Away Mode

Scheduling





e go to settings to allow it.
to u
idir

“Tapo” would like to find and connect to devices on your local network

For device setup and local management, Tapo needs the Local Network permission to find and communicate with devices on the networks you use.

Don't Allow

Allow

“Tapo” Would Like to Send You Notifications

Notifications may include alerts, sounds, and icon badges. These can be configured in Settings.

Allow

Don't Allow

I've already given Local Network permission

GO TO SETTINGS

Welcome to Tapo

TP-Link ID (Email)

Password

Remember

Privacy Policy & Terms of Use

I accept the [Terms of Use](#) and confirm that I have fully read and understood the [Privacy Policy](#).

I confirm to join the [User Experience Improvement Program](#). I understand that I can opt out of the program at any time.

CONTINUE

DISAGREE AND QUIT

Welcome to Tapo

 TP-Link ID (Email)



Password



Remember Me

LOG IN

[Sign Up](#)

[Forgot Password?](#)

Create a TP-Link ID

splicemontshire3@gmail.com

(email from back of iPad)@gmail.com

hikeowner2urgentpride

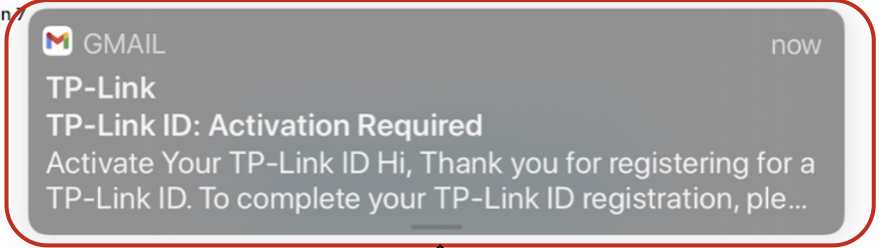
hikeowner2urgentpride

hikeowner2urgentpride

- I accept the [Terms of Use](#) and confirm that I have fully read and understood the [Privacy Policy](#).
- Subscribe to the TP-Link newsletter and be the first to know about amazing deals, VIP giveaways, new products and so much more!

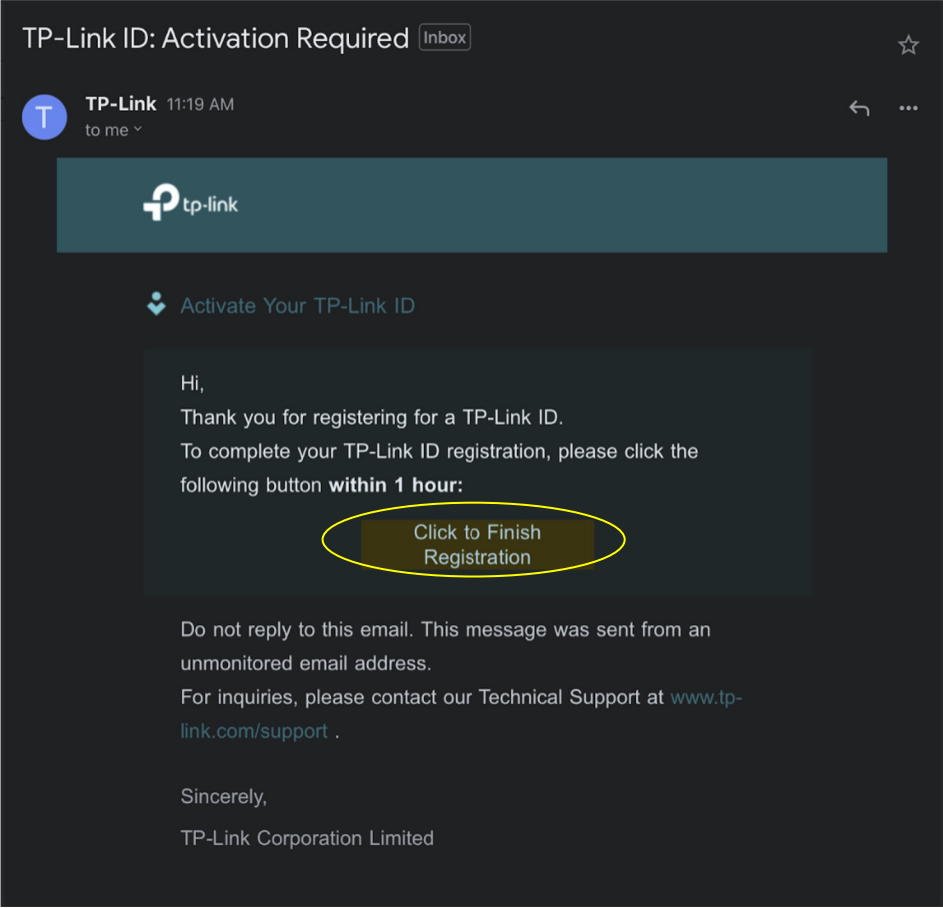
Note: Do not use this password for any of your other accounts

SIGN UP



An email has been sent to:
splicemontshire3@gmail.com

Please follow the instructions in the email to activate your account within 1 hour.





Activation Succeeded

✔ Congratulations!

Your TP-Link ID has been activated.
Go back to the web management page or TP-Link app to start enjoying the TP-Link Cloud services.



Activate Your TP-Link ID



An email has been sent to:
splicemontshire2@gmail.com

Please follow the instructions in the email to activate your account within 1 hour.

(email from back of iPad)@gmail.com
hikeowner2urgentpride



Welcome to Tapo

splicemontshire3@gmail.com

password field with lock icon and clear buttons

Remember Me



[Sign Up](#)

[Forgot Password?](#)



ACTIVATED & LOG IN

No email from TP-Link? [View Details](#)



My home



Tap + to add your devices.

Would you like to save this password in your Keychain to use with apps and websites?

You can view and remove saved passwords in Passwords & Accounts settings.

[Save Password](#)

[Not Now](#)



My home



Tap + to add your devices.

Add Your Device

Cameras

Doorbells

Plugs

Bulbs

Light Strips

Hubs

Sensors

Switches

Robot Vacuums

Plugs

Bulbs

Light Strips

Tapo C100 Tapo C110 Tapo C111 Tapo C200 Tapo C210

Tapo C211 Tapo C225 Tapo C310 Tapo C320WS Tapo C325WB

TC60 TC65 TC70 Tapo TC71 Tapo C400

Tapo C420 Tapo C500 Tapo C510W Tapo C520WS T

Tapo D230

Tapo P100 Tapo P100M Tapo P105 TP10

Tapo P110 Tapo P115 Tapo P125 Tapo P125M Tapo P135

Tapo P300 Tapo P306 Tapo P400M

Tapo L510 Tapo L520 Tapo L530 Tapo L535 Tapo L610

Tapo L630 TL31 TL33 TL135E

Power Up Your Tapo Device

Plug in your Tapo device within your Wi-Fi coverage and check if the LED is blinking orange and blue.

Tip: Keep your phone or tablet close to the Tapo device throughout the setup.

"Tapo" Would Like to Use Bluetooth

We only use Bluetooth to transfer data between this app and the Tapo device during setup.

OK

Don't Allow

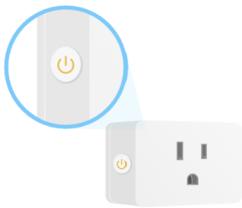
[LED not blinking orange and blue?](#)

ALREADY ORANGE AND BLUE

Power Up Your Tapo Device

Plug in your Tapo device within your Wi-Fi coverage and check if the LED is blinking orange and blue.

Tip: Keep your phone or tablet close to the Tapo device throughout the setup.



**Look for a network named
SPLICE-Montshire
and tap it**



[LED not blinking orange and blue?](#)

ALREADY ORANGE AND BLUE



RESCAN

Choose Your Network

Select a 2.4GHz network for your Tapo device to connect to.

Sonny24



HP-Print-13-ENVY 4500 series



BlueSky6



Layla's



Layla's



ChimePro-7A1FD8



Verizon_TJX7PD



BlueSky6



Layla's



SSID23



Other

[Can't find your Wi-Fi?](#)



Enter Your Network Password

Make sure this password is correct. Your Tapo device will be unable to connect to the network if it's incorrect.

Network Name

SPLICE-Montshire Reselect

← SPLICE-Montshire

Password

montshire

← montshire

Case and space sensitive

Save Password



NEXT

Name Your Device

Device Name

Smart Plug



Type in the name given on back of your iPad

NEXT



Custom Location

Location Name

Living Room Bedroom Hallway Kitchen Main Bedroom Office Study

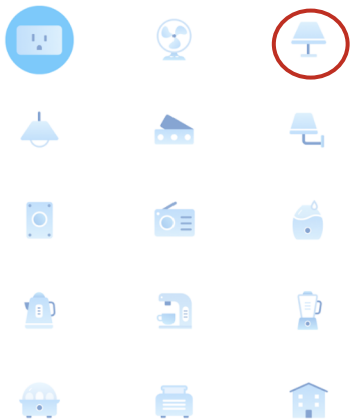


Type in the location given on back of your iPad

NEXT



Choose an icon for your Tapo device.



Choose an icon that represents how you would use the plug

NEXT

Almost Done

You've configured your Tapo device. Make sure you're using the latest firmware for optimum performance.

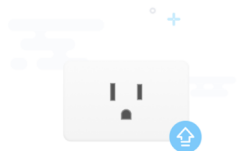


CHECK FIRMWARE

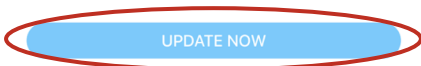
Do NOT power off your Tapo device during the update. It will restart to complete the update.

Firmware Update

New firmware is available for your Tapo device. The update may take a few minutes.



Some may need to update the firmware. This only takes a few seconds. If you do not see this screen your plug is all set!



Congratulations!

Your Tapo device is up-to-date and ready to use. Enjoy!



Firmware Update

Auto Update is enabled to keep your Tapo device up to date for optimal performance. You can turn it off in Device Settings > Firmware Update.

Update Time

3:00 AM - 5:00 AM

Select when you want the Tapo device to be updated.

Note: For Tapo Camera/Doorbell, it will stop working during the update. The update may take 3 to 5 minutes.







Set the automatic update time to when you would not need to use it

GOT IT

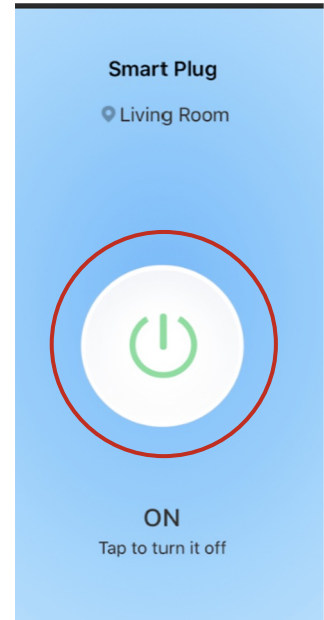
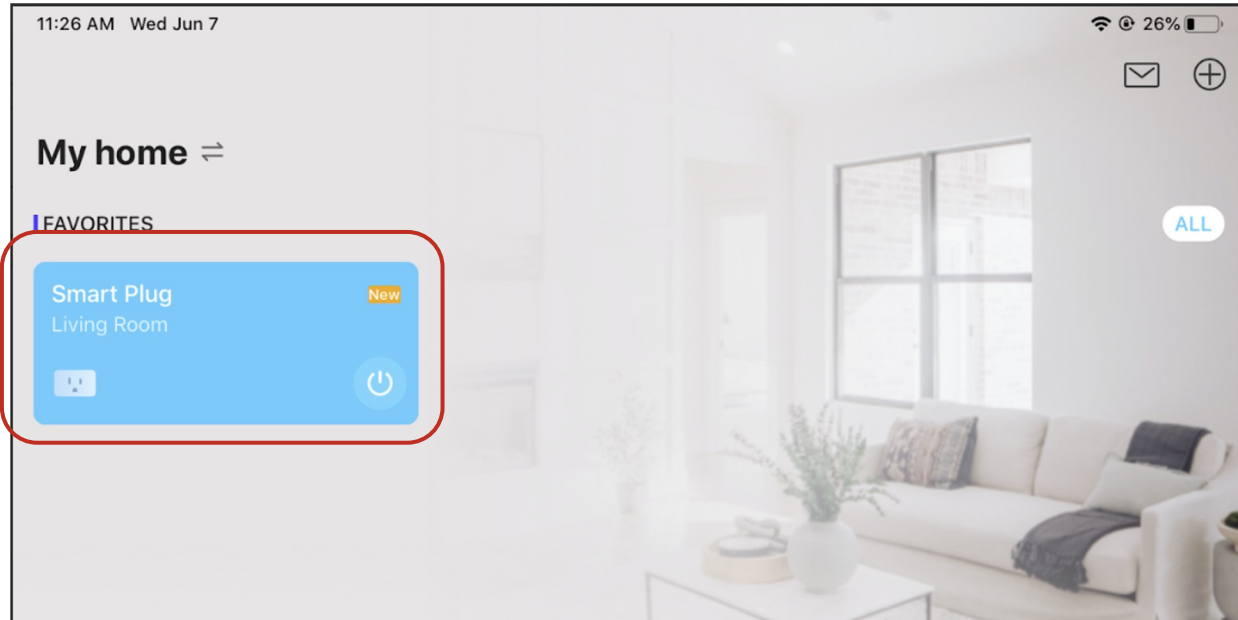


Third-Party Services

Tapo works with the following third-party services to control your Tapo devices by voice. You can always find Third-Party Services in Me > Third-Party Services.

-  Amazon Alexa >
-  Google Assistant >
-  Add to Siri >
-  IFTTT >

Plug in your iPad's charger to the smart outlet! Then...





What to do?

Secure the smart home lifecycle

*Getting
the device*

*Installing
the device*

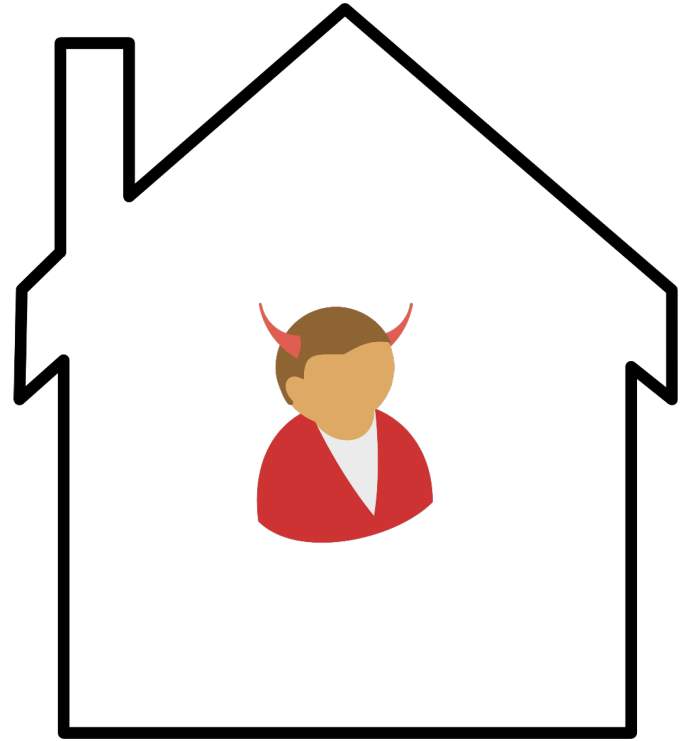
*Using
the device*

*Removing
the device*



Security goal: prevent **unauthorized** use

Preventing Unauthorized Local Access to Devices






Guest Features

Guest features allow temporary access to your smart devices **without granting full control or access to your personal settings.**

Hey Google!
Turn on Guest Mode!

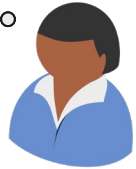



Turn Voice Purchasing off

Give Temporary Access to 



Turn on Guest mode for 



Keeps your settings and personal information safe from visitors!





Guest Features



Unlock the door for me on June 12th? 

Throw a 4th of July party with my friends? 



Buy a doll house! 

What's the weather? 



Can we watch Peppera Pig? 

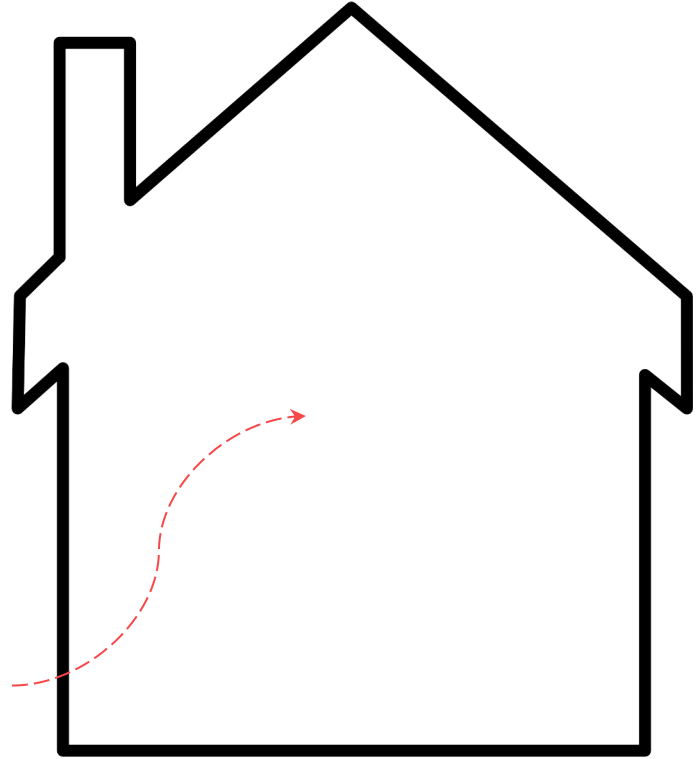
Can I upgrade the subscription? 





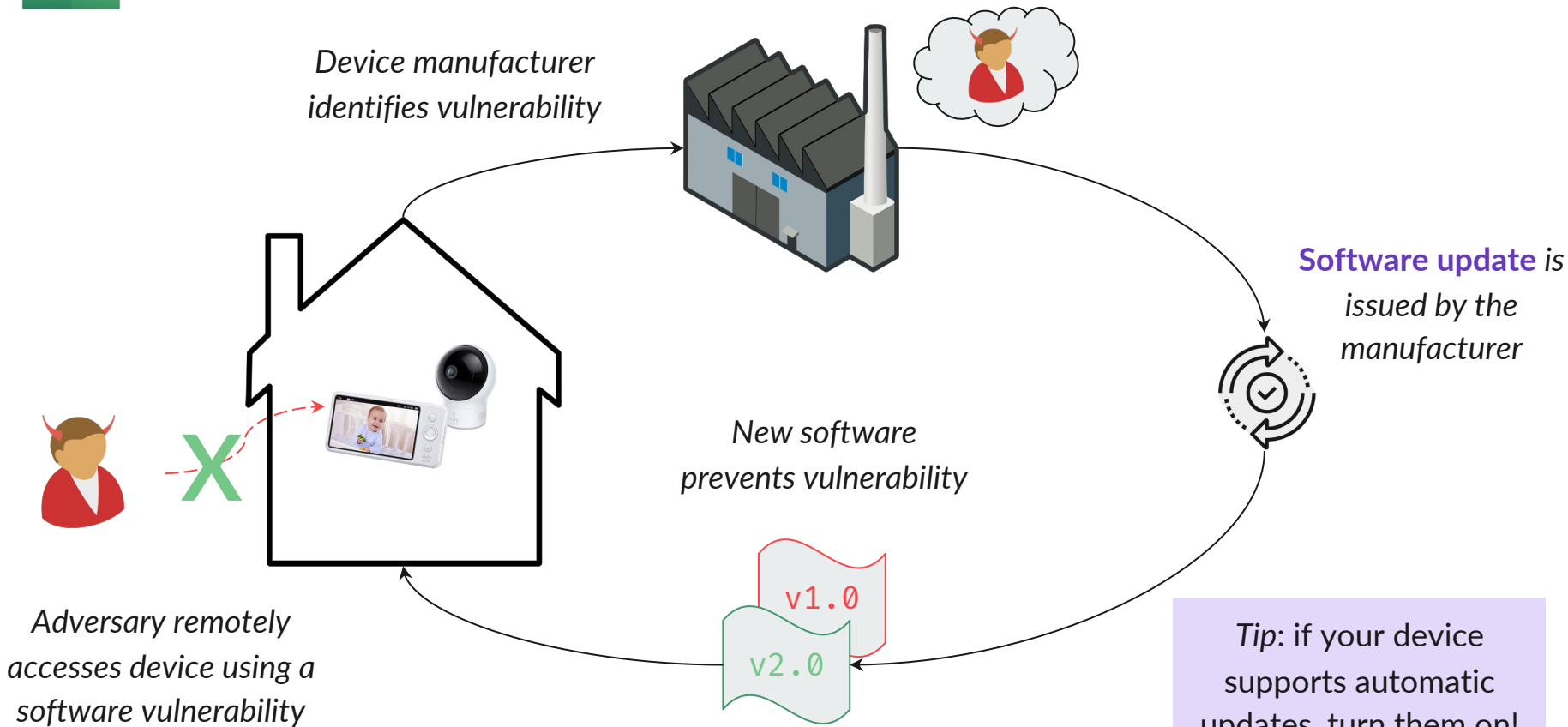
Security goal: prevent **unauthorized** use

Preventing Unauthorized Remote Access to Devices





Software Updates



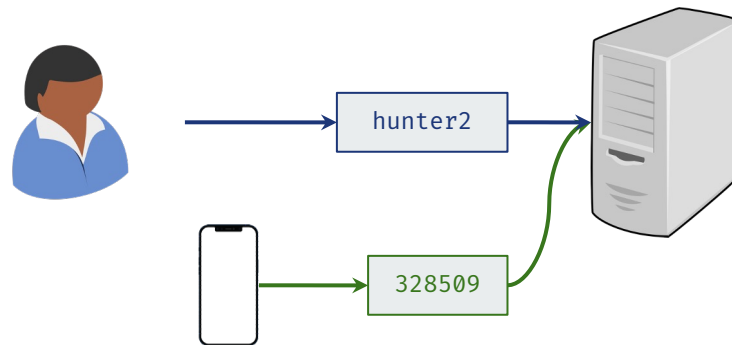


Extra Security Measures on the Tapo Plug

Automatic Software Updates



Two-Factor Authentication



Home

Cameras

Vacuums

Smart

Me

11:26 AM Wed Jun 7

26%



splicemontshire3

splicemontshire3@gmail.com



Camera Memory



Third-Party Services



Device Sharing



Firmware Update



Notifications



Widgets



Tapo Care

Subscribe now to enjoy unlimited cloud storage



Help & Feedback



About



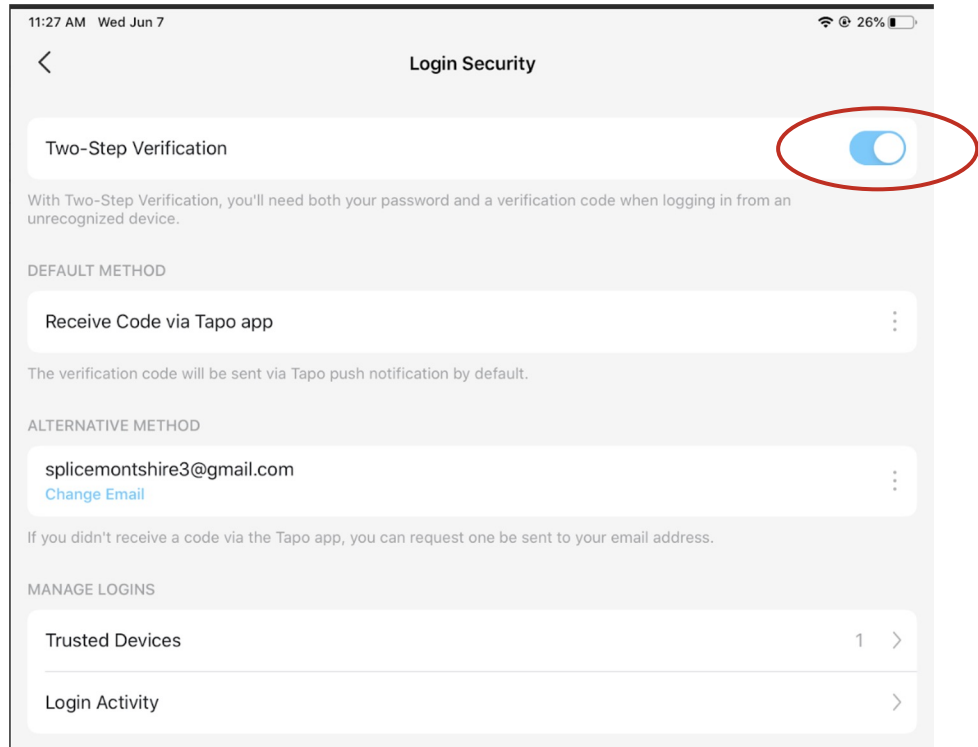
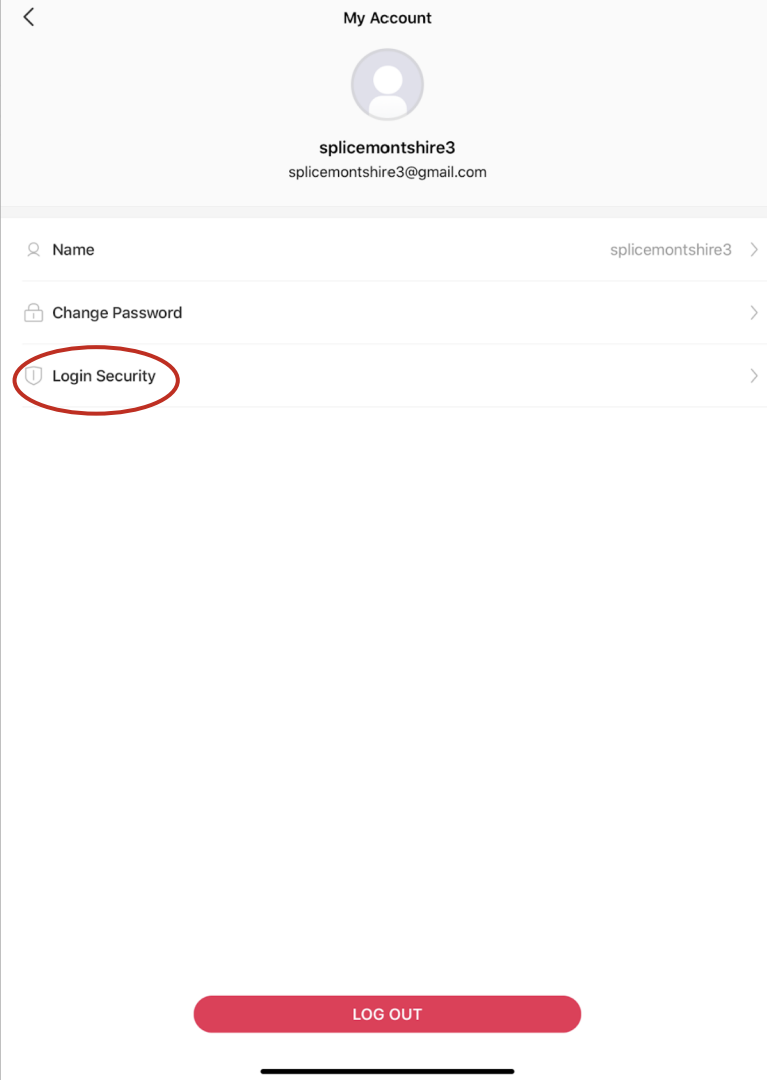
Firmware Update



The firmware of all connected devices is up to date.



- Camera Memory
- Third-Party Services
- Device Sharing
- Firmware Update
- Notifications
- Widgets
- Tapo Care
Subscribe now to enjoy unlimited cloud storage
- Help & Feedback
- About





What to do?

Secure the smart home lifecycle

*Getting
the device*

*Installing
the device*

*Using
the device*

*Removing
the device*



Device Transfer

delete data before getting rid of a device

Consider the data on the device

Old images



Passwords

Credit card information



Voice recordings

Email addresses

Information about the home

Phone contacts

Calendar information

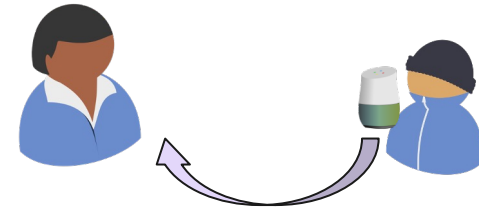


Device Transfer



Giving

1. Delete any personal pictures or information off of its storage
2. Sign out of all accounts
3. Follow manufacturer's instructions for factory reset



Receiving

1. Sign out of any accounts present on the device
2. Follow manufacturer's instructions for factory reset
3. Update the device to the latest software

11:26 AM Wed Jun 7

My home ⇌

FAVORITES

Smart Plug
Living Room

New



11:27 AM Wed Jun 7

26%



Smart Plug

Living Room



ON

Tap to turn it off



Device Settings

Device Icon



Device Name

Smart Plug



Location

Living Room



LED Control

Auto



Default State

Last "On" State



Auto-Off Timer

Off



Device Info



Firmware Update

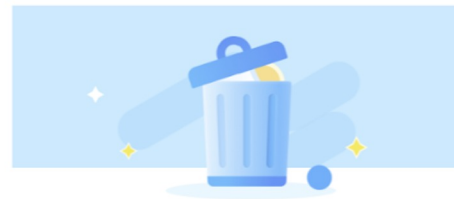
1.0.4 Build 230309 Rel.145855



REMOVE



Remove Device



The following actions will be performed upon removing your device:

- This device will be removed from your Tapo account and deleted from the Device List.
- You will no longer be able to control this device using the connected third-party services (if supported), such as HomeKit, Google Assistant, and Amazon Alexa.
- All configured Smart Actions, Widgets, and related features may no longer operate.

REMOVE



Hold for 10 seconds

Blinks orange and green



What to do?

Secure the smart home lifecycle

*Getting
the device*

*Installing
the device*

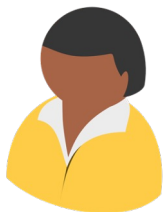
*Using
the device*

*Removing
the device*



Setting expectations

Make yourself at home!

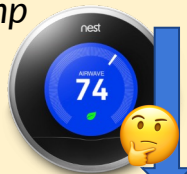


but...

You can use the TV



You can lower the A/C temp if you really need to



You can't use the Google Home





Setting expectations

3 minute discussion:

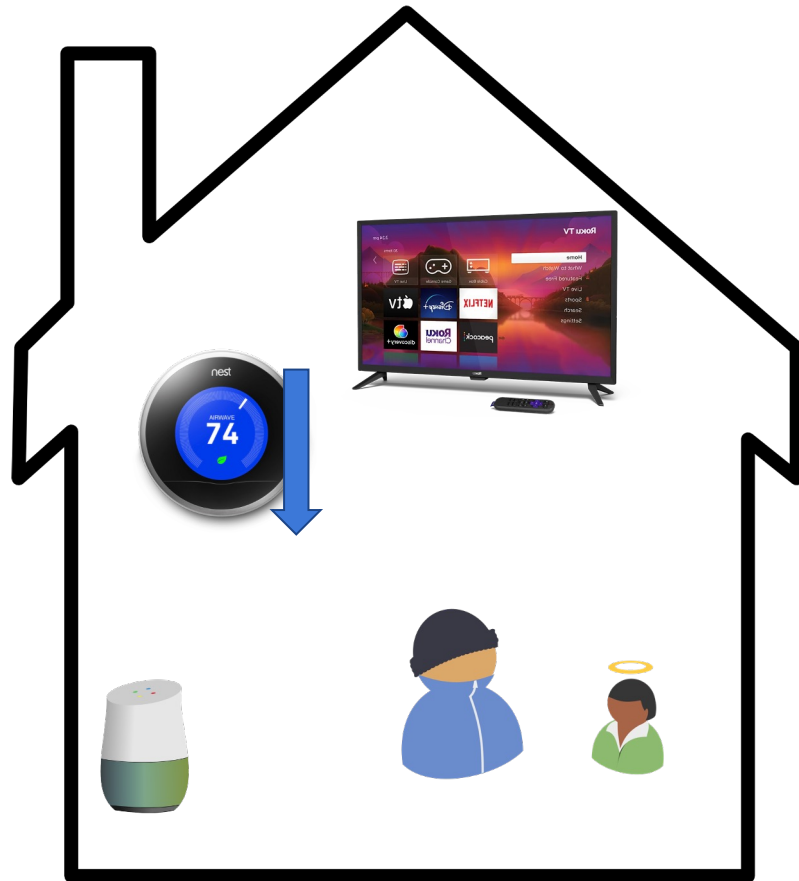
What are some expectations *you* would have in this smart home?

What are some ways you can set these expectations with in-home guests and visitors?

Would you be comfortable doing this?

Why or why not?

03:00





Questionnaire round 2!



If you have any questions, you can ask any one of us, or send us an email later at splice-outreach-group@dartmouth.edu



Closing thoughts

Take a pamphlet home!



Acknowledgements

- SPLICE research is supported primarily by the National Science Foundation under
 - NSF award numbers CNS-1955805, -1955172, -1955228, -1955231.
- Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.
- We thank the Geisel School of Medicine for loaning us the tablets used in today's demo.

splice-project.org

