

Smartphone Access and AT apps for EADL's

Seong-Hee Westlake, ATP, RET

Senior Rehabilitation Engineer, Michigan Medicine



Objectives

1. How can a smart phone be mounted and controlled by a person with a disability?
2. What apps are available to help a person with a vision or hearing impairment?
3. How can a smart phone be used to control a person's environment?



Objectives

- Mounting
- Alternative Access for Smartphones
- Smart Devices for Agriculture



Seong-Hee Westlake, ATP, RET



University of North Carolina at Chapel Hill

- Biomedical Engineering



braillebot, LLC

- President/Founder
- Inclusive play & education company
- Manufacturer of Braille educational toy



RESNA

- Rehabilitation Engineering & Assistive Technology Society of North America
- Governing body for all Assistive Technology Professionals
- Director, Board of Directors
- Chair, Student Design Competition
- Chair, Engineers & Technologists Professional Speciality Group



Michigan Medicine

- Senior Rehab Engineer, Physical Medicine & Rehabilitation
- US D908215 patent, Cardiology Stethoscope Handle
- REP Lead, Comprehensive Stroke Rehabilitation Program
- Inpatient Rehabilitation Lead, paediatrics & adult



UMAISE

- University of Michigan Adaptive & Inclusive Sports Experience
- Director of Technology & Innovation
- Lead, Walker Soccer & Wheelchair Tennis
- QA & QI Co-lead



IMPART

- IMProving Access to Rehab Technologies at Michigan Medicine
- First adaptive gaming program at UM



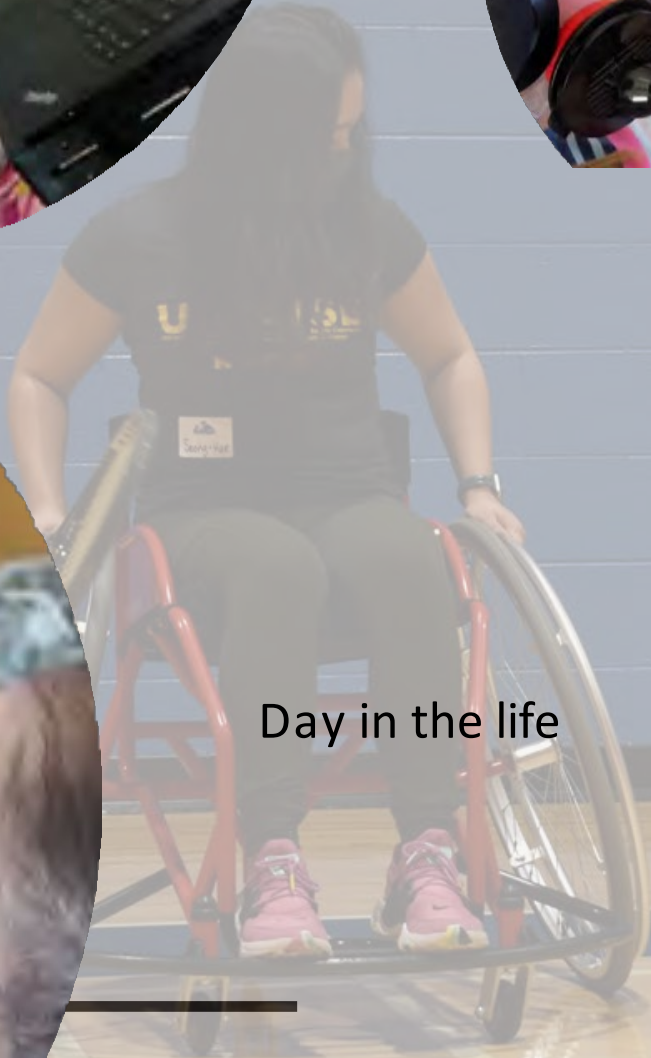
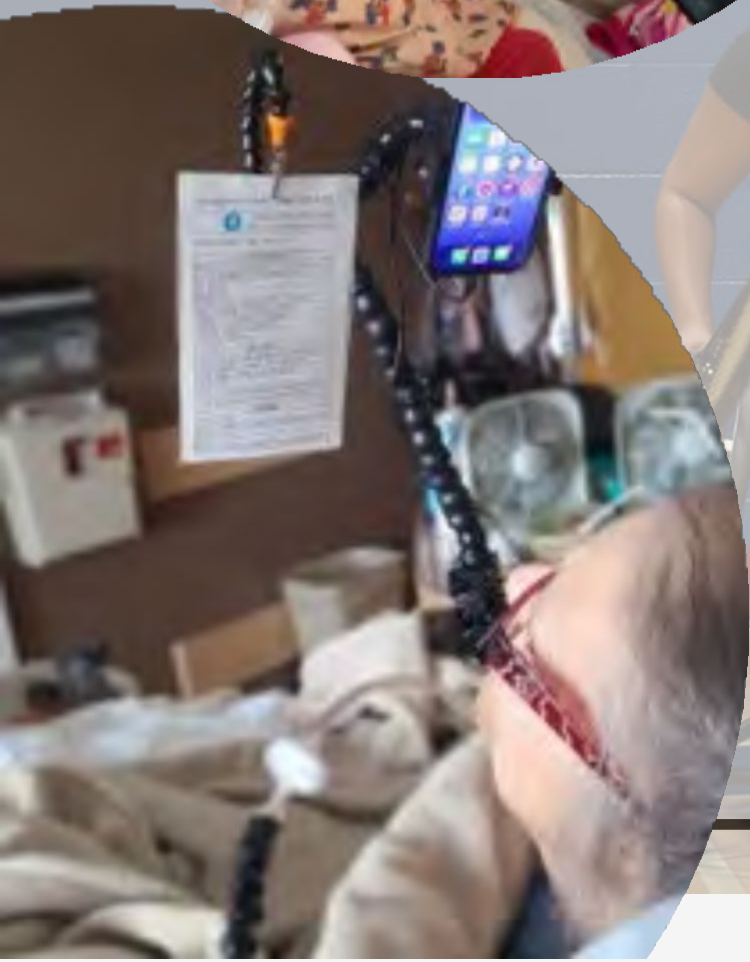
Tinkered Toy Box

- Adaptive toys program
- Design & switch modify standard toys
- Provide inclusive play opportunities for local community



Day in the life





Day in the life

Mounting for AT

Mounting

Modularhose

Manfrotto

RAM

B&H

(sturdy enough for a camera, sturdy enough for a cellphone)

ModularHose™



TABLET + MOBILE DEVICE SOLUTIONS



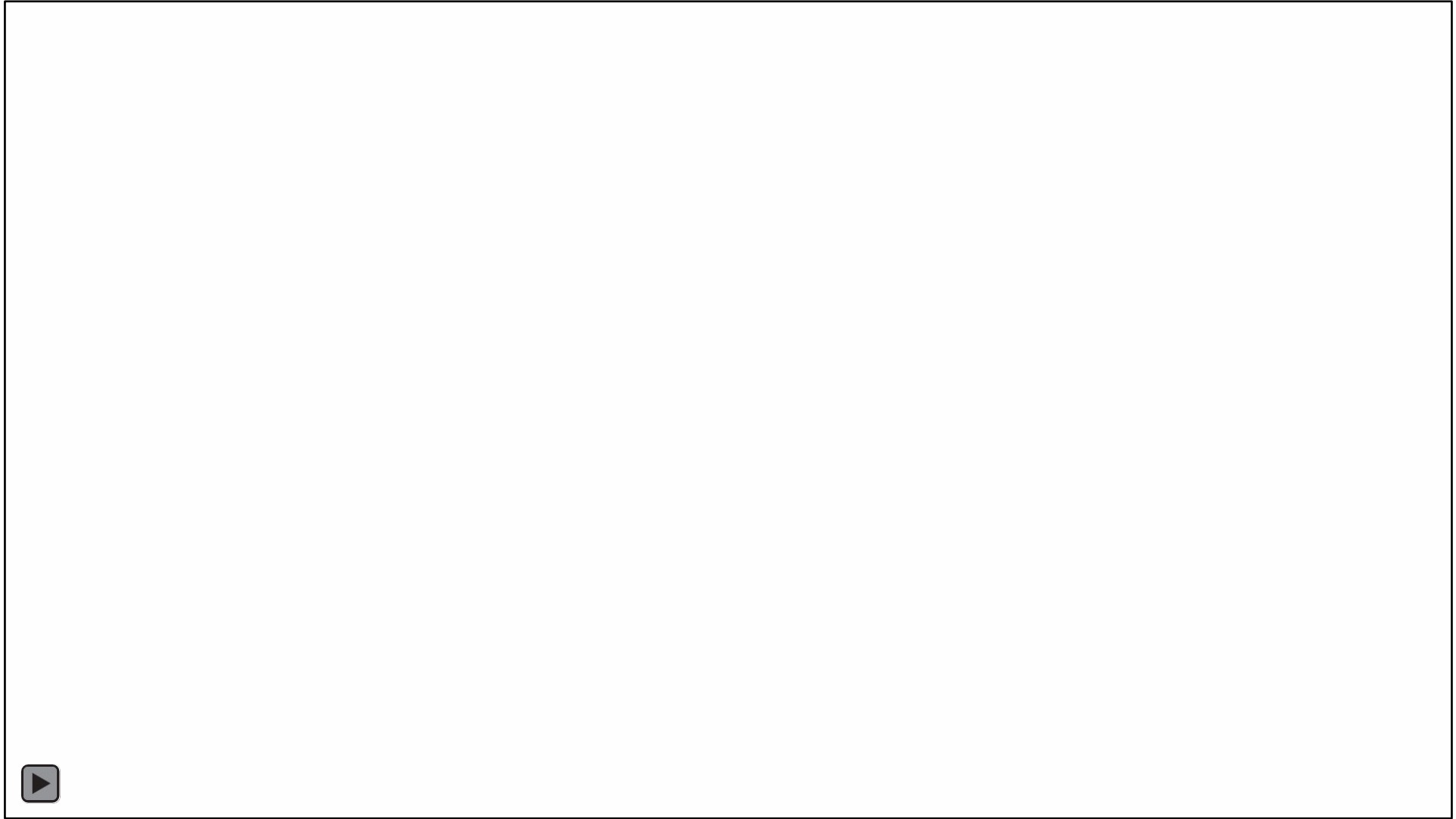
HANDS FREE DRINKING SYSTEMS



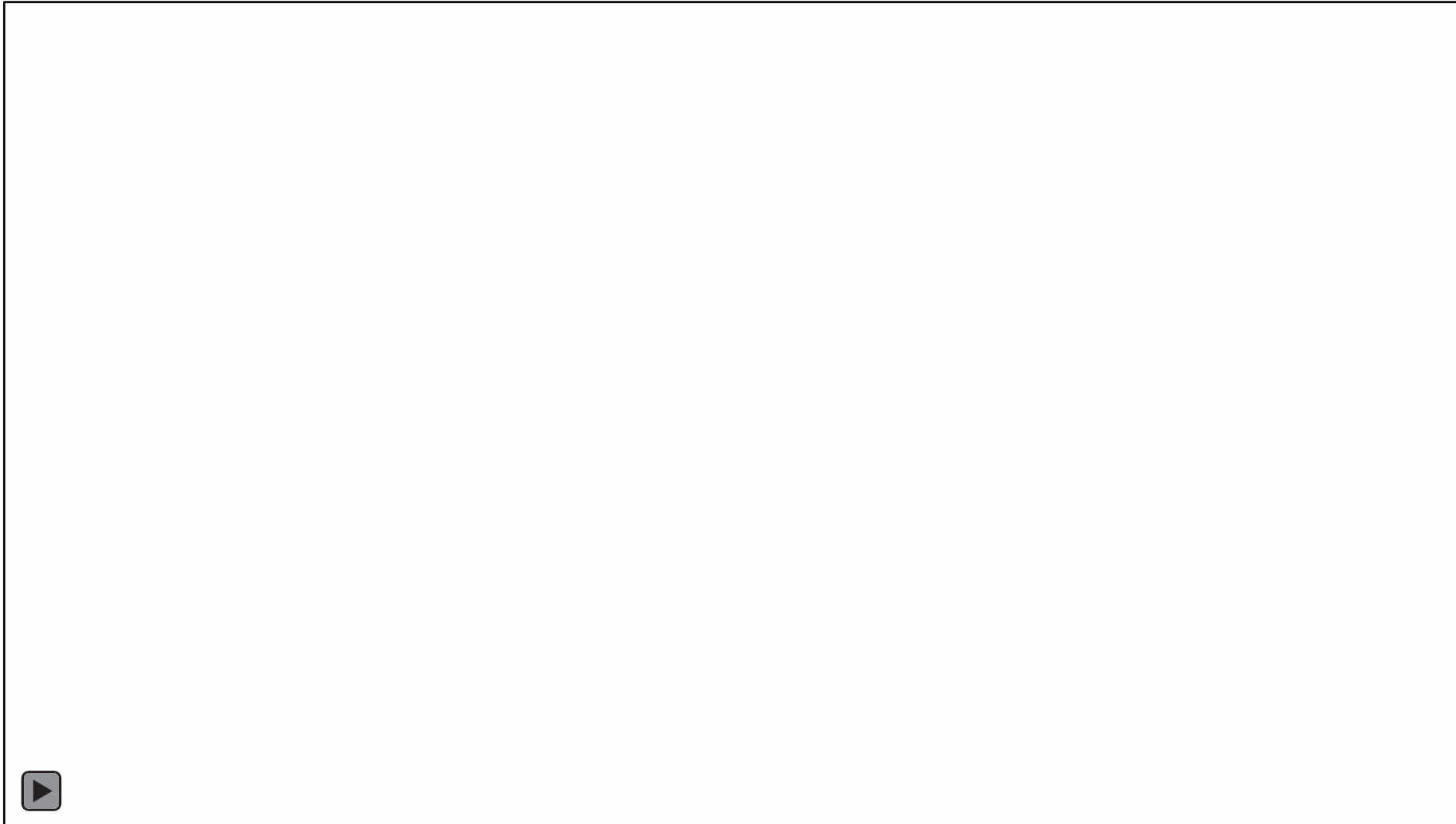
SWITCH, CAMERA + SMALL DEVICE SOLUTIONS

Manfrotto





<https://rammount.com/pages/healthcare-assistive-technology>



<https://www.bhphotovideo.com/c/search?q=mounting%20arm&sts=ma>

AMAZON!

- Never underestimate the power of using tools for its unintended purposes
- Products for the aging as AT

Amazon - a case study

- 14 y.o. boy
- Diagnosis: heart failure and stroke with R hemineglect
- Functional status: Visual impairment (slight light perception), dysarthria (affecting voice recognition), BUE weakness R>L, cognitive deficit from stroke (memory issues, difficulty following 2-step commands)
- Need: Accessing an iPhone for: calls, texts, memory help, any other activities age appropriate

Evaluation & Treatment

- Siri on new device - voice recognition failed, even after recording each training phrases
- Siri on personal device - voice file from pre-hospitalization, intermittent recognition of pt's new dysarthric speech
- Switch activated Siri
 - iOS Switch Access
 - iOS Assistive Touch
 - **Switch modified bluetooth speaker (old device from early 2010's)**

Discharge planning

- Unable to DC to home with custom switch modified speaker
- IDEA: find a bluetooth speaker with a large button, maybe a handheld device?
- AMAZON FINDs...



Sponsored

Beisign BK06 Bluetooth 5.0 in Car Speakerphone with Visor Clip, Wireless Car Kit for Handsfree Talking, Motion Auto On, Siri Google Assistant Support, Dual 2W Speakers

★★★★☆ 5,592

\$29.99

Save 15% with coupon

prime

FREE delivery Tue, Jul 16 on \$35 of items shipped by Amazon

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Add to cart



Sponsored

Avantree CK11 Hands Free Bluetooth 5.0 Car Kits, 3W Loud Spe Auto On Off, Volume Knob, Wireless in Car Handsfree Speaker v

★★★★☆ 11,690

50+ bought in past month

\$39.99 List: \$49.99

prime

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Overall Pick



Handsfree Bluetooth for Cell Phone, Bluetooth 5.0 Car Speaker Assistant Car Kit Receiver Handsfree Speakerphone with Visor C

★★★★☆ 2,383

300+ bought in past month

Limited time deal

\$34.99 List: \$39.99

Save \$2.00 with coupon

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Wireless Bluetooth Media Button Remote Selfie Control Car Motorcycle Steering Wheel Music for iPhone or Android with Mount

Visit the YuYue Electronic Store

4.0 ★★★★★ 651 ratings | Search this page

200+ bought in past month

\$16.99

Get Fast, Free Shipping with Amazon Prime

FREE Returns

Get \$60 off instantly: Pay \$0.00 ~~\$16.99~~ upon approval for the Amazon Store Card. No annual fee.

Special Feature	Ergonomic
Brand	YuYue Electronic
Connectivity Technology	Bluetooth
Power Source	Battery Powered
Material	Plastic



Hands Free Cell Phone Car Kit, Bluetooth 5.0 in Car Speakerphone with Visor Clip, Siri Google Voice Command Support,Built in Mic, Support 2 Phones Connected, Bluetooth Car Speaker for Safe Driving

★★★★☆ 169

50+ bought in past month

\$19.99

Save 10% with coupon

prime

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Or fastest delivery Sun, Jul 14

Add to cart



Sponsored

Bluetooth Cell Phone Car Speakerphones TIANSHILI Wireless HandsFree Talking Visor Clip Car Kit Auto On Off,Dual Link Connectivity with Siri Google Assistant

★★★★☆ 86

\$21.99

prime

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Or fastest delivery Sat, Jul 13

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Mobile Access: Vision & Hearing Impairment



Apps/Features for Vision & Hearing Impairments

VoiceOver (iOS)

Switch Control with Audio Feedback

Automatic Captioning (iOS)

Display settings: contrast, inverted colors,
color filters, differentiate without color

Live Captioning on iOS

<https://support.apple.com/guide/iphone/get-live-captions-of-spoken-audio-iph0990f7bb/17.0/ios/17.0>

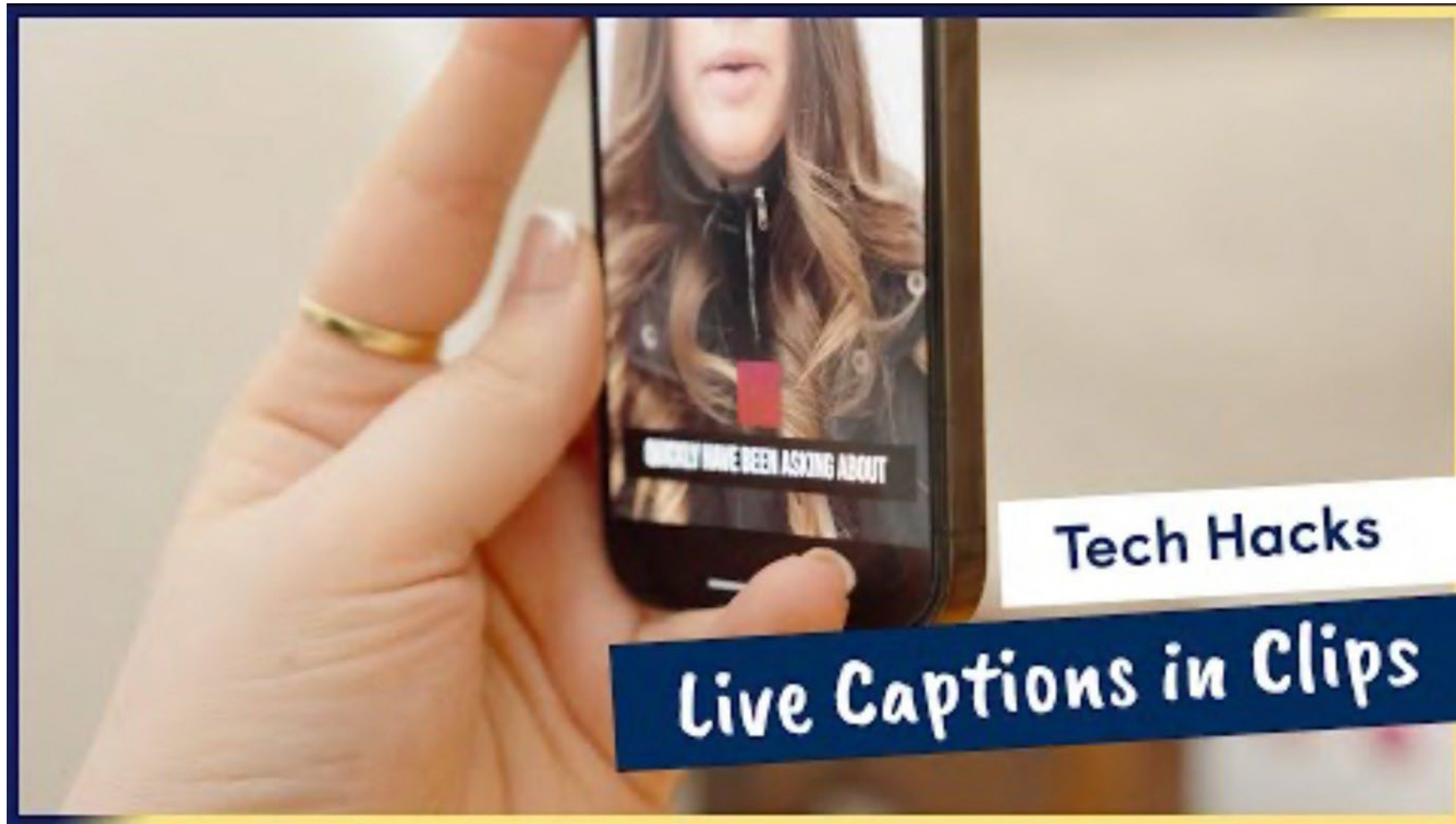
Subtitles and Captioning on iPhone

- <https://support.apple.com/guide/iphone/display-subtitles-and-captions-iph3e2e23d1/ios#:~:text=Go%20to%20Settings%20%E2%AC%82%20Accessibility%E2%AC%82%20Subtitles,Font%2C%20size%2C%20and%20color>

Subtitles and Captioning on iPhone

- <https://support.apple.com/guide/iphone/display-subtitles-and-captions-iph3e2e23d1/ios#:~:text=Go%20to%20Settings%20%E2%AC%82%20Accessibility%E2%AC%82%20Subtitles,Font%2C%20size%2C%20and%20color>

Live captioning on Android



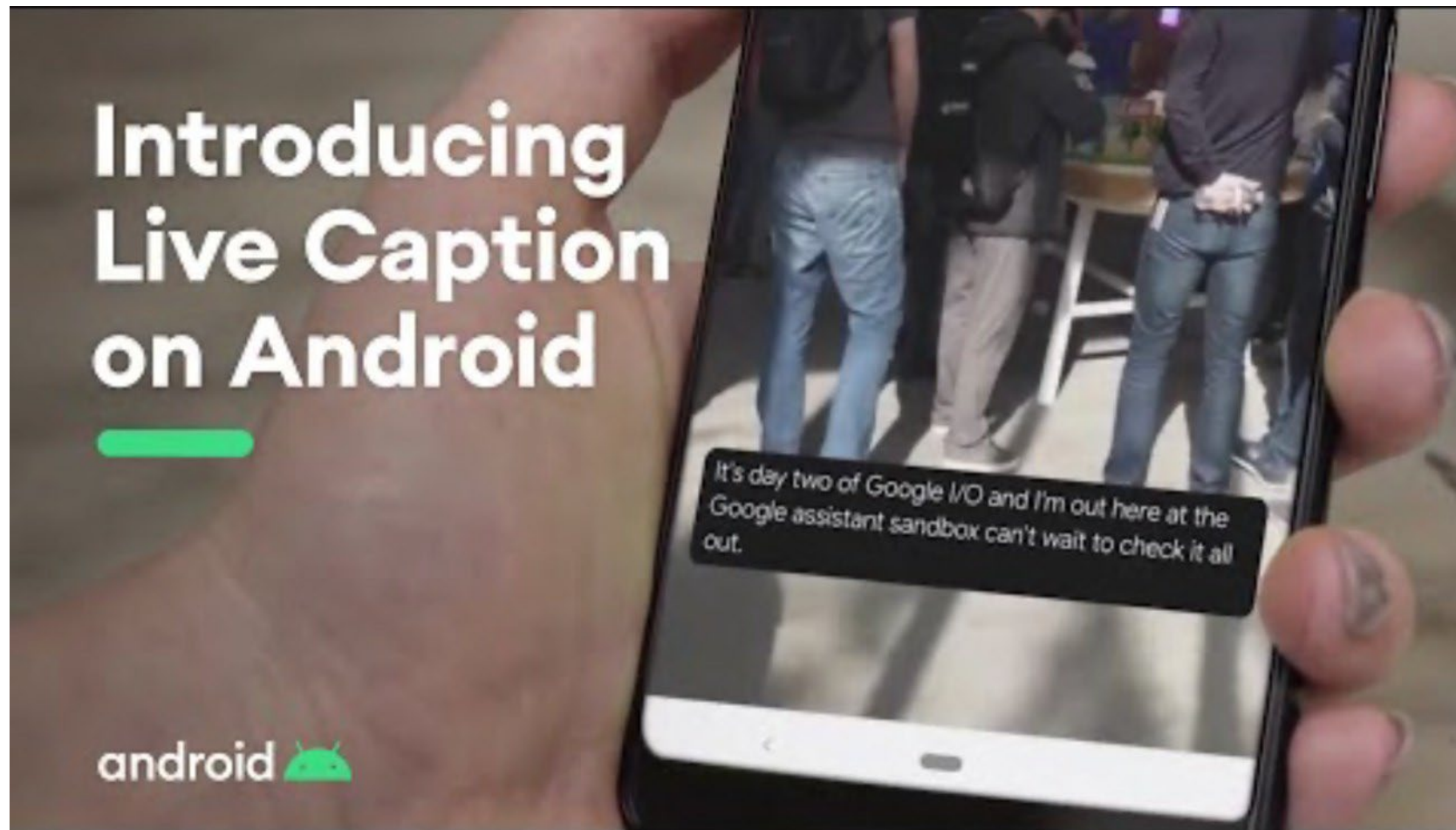
Live Captioning for spoken audio on iPhone



Live Captioning on iPhone & iPad



Live captioning on Android



Mobile Access: Mobility Impairment



Apps/Features for Mobility Impairments

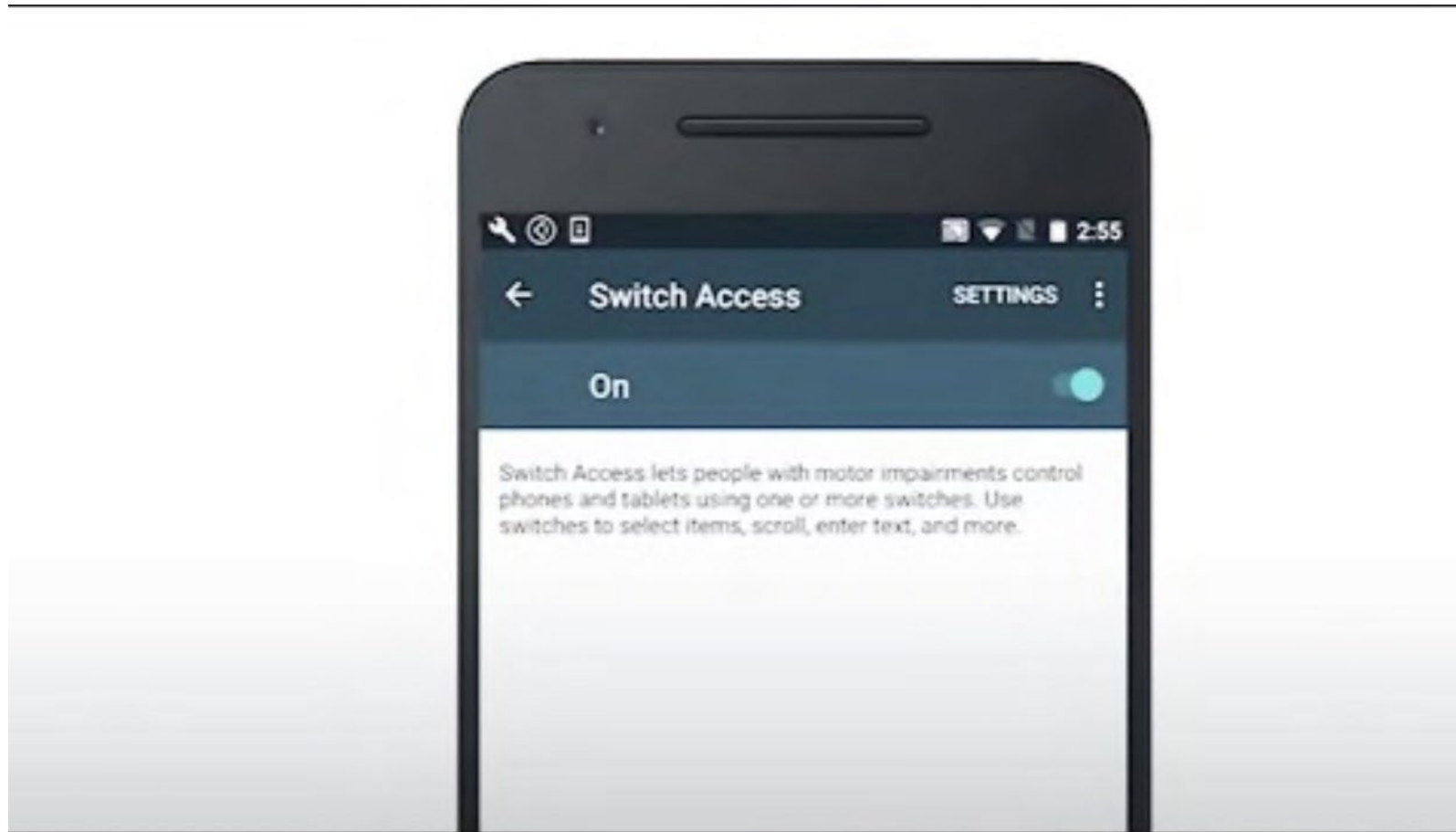
Assistive Touch (iOS)

Voice Control (iOS)

Switch Access

Smart Assistants (Siri, Google,
Alexa, etc)

Switch Control on Android



Switch Access - iOS

http://news.agrability.org/video/Switch_Access_iOS.mp4

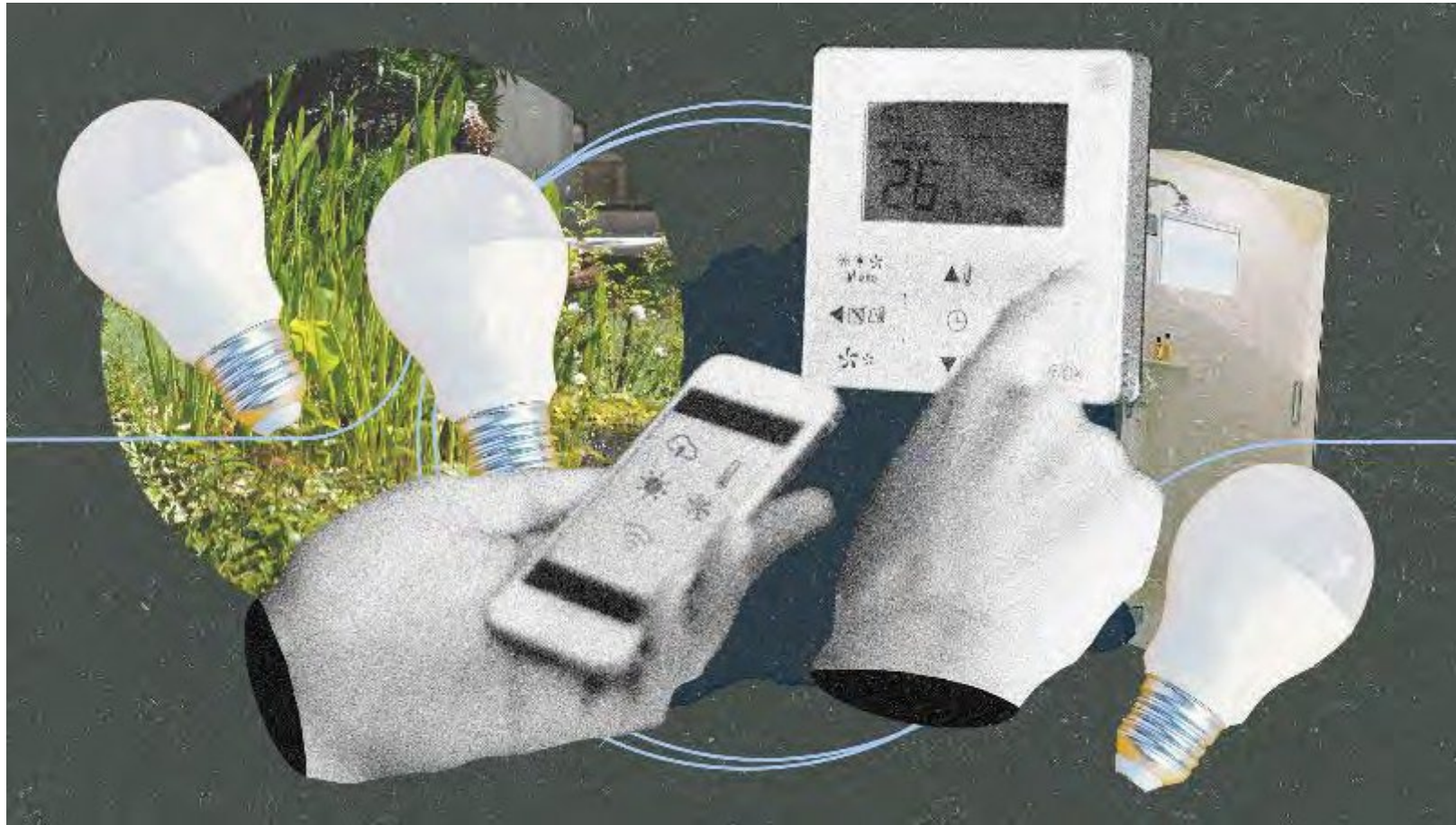


Smart Home vs. Smart Home Hub

Smart Home Devices

- Devices that can be controlled remotely using various communication methods (Internet, WiFi, Bluetooth, NFC)
- Smart home/Smart home device: A device or a home with devices that can be remotely controlled through various communication methods (internet, WiFi, Bluetooth, NFC)
- Common devices control the environment
 - Lights
 - Cameras
 - Door locks
 - Thermostat
 - Sensors (proximity to sense movement, light, audio to sense alarms and weary noises like screams)
 - Appliances (oven, coffee maker, showerheads, blinds?)
- Most of them come with their OWN app

Smart Home Devices



Smart Home Devices



GOOD HOUSEKEEPING

Smart Home Devices



Smart Home Devices vs. Smart Hubs

- Smart home hub is a hardware or software that connects devices on a home automation network and controls the communication among them
- A smart home hub can allow the user to automate actions of multiple smart devices – a command that when the smartphone approaches a home, the garage door opens, hall light turns on, and the radio tunes to a classical music station
- Farm application – when phone travels across the field, sprinklers turn on, cameras start recording, and employee is notified via announcement on a smart speaker (Echo, Apple homepod, google home)

Smart Home Hub

- Works as a translator for various Smart devices that communication with different languages (Zigbee, Z-wave, WiFi, Bluetooth)
- Smarthome bridge
- Ends in a SINGLE smarthome application
- Apple Homepod, Amazon Echo (and Dot), Google Nest Hub, Aeotec Smart Home Hub, Hubitat Elevation
- Software: Home app (iOS), Home Assistant

Smart Home Hub Automation



Do you need a Smart Home Hub?

- No, but working with individuals with disabilities, any consolidation of steps or apps or devices are always welcomed.
- All in one place vs. various apps for various devices (lights in one app, cameras in another, etc)
- Automation → HUB

Smart Agriculture



IoT & Smart Tech for Agriculture

- IoT – Internet of Things (any object that can relay information when connect to the network)
- Agricultur Setting: use of robots, drones, sensors, and computer imaging, integrated with analytical tools
- Allows for monitoring farms & analyzing data for insight
- Next → AI for Agriculture
- <https://www.cropin.com/iot-in-agriculture>

IoT & Smart Tech for Large Farms

- Drones, robotics, computer imaging
- Robotics: weeding robots, material handling (heavy lifting), harvesting robots (not tools for these activities but robots doing the work for you)
- <https://www.cropin.com/blogs/new-technologies-in-agriculture>

IoT & Smart Tech for Small Farms

- Temperature sensors, humidity sensors, propane tank level sensors, cameras, lights
- <https://www.monnit.com/applications/use-cases/smart-farming/>
- Monitoring weather & climate
- Greenhouse automation (temperature, humidity, soil condition, lighting)
- Cattle monitoring & management (similar to smart pet IoT –
- <https://easternpeak.com/blog/iot-in-agriculture-technology-use-cases-for-smart-farming-and-challenges-to-consider/>
- Pet IoT – smart feeders, interactive cameras, pet hygiene (automatic litterbox), wearable health monitor, location positioning, identification

Data-driven Farming



Example: vendor for smart farming devices



Monnit Remote Monitoring Solutions Automate Greenhouse Climate & Farm Management

- 1. Temperature Sensors
- 2. Humidity Sensors
- 3. 10 Amp Wireless Control Units
- 4. Propane Tank Level Sensors
- 5. Voltage Meters

Get alerts when the temperature in greenhouses, barns, cold storage, boilers, and more exceeds or falls out of preset preferences. Install an ALTA Wireless Temperature Sensor in nearly any area with sensor leads ranging from three to 100 feet for various placements.



[View Temperature Sensors](#)

Example: vendor for smart farming service



Remotely monitor key farm locations with cameras

Indoor & outdoor Wi-Fi using simple wireless bridges to link buildings

Receive alerts to critical issues on your farm

Remotely control & automate irrigation systems

Your Dream Farm... Available NOW!

2023 Smart Farm Innovations Catalog

Smart Irrigation System

- Control spigot rotation, automate timing, change patterns based on weather forecast



Smart Home → Smart Farm

- Utilize consumer products for farming
 - Lights, camera, locks, thermostats, consumer smart hubs
- Doesn't have to be commercial level products
- Cameras that detect faces (consumer)
- Locks with customized pins for individuals (consumer)

Questions about this presentation?
Questions about RESNA???
Consultation needs for
Accessibility Evaluation?? Help for a client to set
up a smartphone, smart devices,
environmental controls???'
PLEASE REACH OUT!

seonghee@braillebot.com

[LinkedIn](#)

STAY IN TOUCH!



References

- <https://www.techtarget.com/iotagenda/definition/smart-home-hub-home-automation-hub#:~:text=A%20smart%20home%20hub%20is,%2C%20rather%20than%20Wi%2DFi.>
- <https://www.bestbuy.com/discover-learn/what-is-a-smart-hub-and-how-do-i-choose-one/pcmcat1690916986772#:~:text=Not%20necessarily%2C%20smart%20home%20devices,technology%20much%20easier%20and%20faster.>
- <https://www.cropin.com/iot-in-agriculture>
- <https://www.cropin.com/blogs/new-technologies-in-agriculture>
- <https://www.monnit.com/applications/use-cases/smart-farming/>
- <https://easternpeak.com/blog/iot-in-agriculture-technology-use-cases-for-smart-farming-and-challenges-to-consider/>
- <https://easternpeak.com/blog/how-to-develop-an-internet-of-things-application-for-pet-care-a-go-to-market-guide/>
- <https://rammount.com/pages/healthcare-assistive-technology>
- <https://www.youtube.com/watch?v=W4A3gzlUkYg>
- <https://www.youtube.com/watch?v=hPv1PkjJ-J0>
- <https://www.youtube.com/watch?app=desktop&v=KtG9bNzY-4g>
- <https://www.youtube.com/watch?v=B5OvHAV9sXA>
- <https://youtu.be/rAIXE6iIRQ0?si=Igz6jGNacgQUviGI>
- <https://support.google.com/accessibility/android/answer/6122836?hl=en>
- <https://www.architecturaldigest.com/story/smart-home-devices-2023>
- <https://nypost.com/article/best-smart-home-devices-on-amazon/>
- <https://www.goodhousekeeping.com/uk/product-reviews/tech/g42267958/best-smart-home-devices/>