

An aerial photograph of a construction site. In the center is a large pile of grey gravel. Surrounding it are several pieces of heavy machinery: a yellow CAT excavator at the top, a red and white truck on the right, a yellow wheel loader at the bottom, and another yellow excavator at the bottom left. The ground is brown and shows deep tire tracks. A large, textured mat is visible in the bottom left corner.

**USER MANUAL**  
**MODEL HC-1**

V1.6

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## Introduction

Guardhat is intended for use by industrial workers in the field. In addition to all the physical protection provided by standard personal protective equipment such as hard hats, Guardhat provides the additional features of dangerous condition detection and user notification as well as two-way communication, video recording, and image capture.

The Guardhat HC-1 model detects and communicates the following safety-related events:

- Evacuation notification
- Geofence breached
- Fall detected
- SOS / distress-alert manually initiated by the user
- Network disconnected
- Hat-not-worn detected
- Blackout zone entry or exit
- High ambient noise levels
- High/low ambient temperature
- Proximity detection to moving objects (requires additional Bluetooth beacons or tags to be installed on the moving objects)



Figure 1: Guardhat Model HC-1

## CONTACT INFORMATION

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(313) 771-2105

[info@guardhat.com](mailto:info@guardhat.com)

## DISCLAIMERS

### FCC

“Changes or modifications not expressly approved by the manufacturer could void the user’s authority to operate the equipment”. “This device complies with Part 15 of the FCC rules.

Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.”

### FCC Interference Statement (Part 15.105 (b))

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected. Consult the dealer or an experienced radio/TV technician for help.

## IC

“This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

This device may not interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.”

“Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.”

## For the USA

Contains Transmitter Modules:

FCC ID: N7NHL7588

FCC ID: 2AFDI-ITCOQ626S

FCC ID: 2AR6OGHP2470

## For Canada:

Contains Transmitter Modules:

IC: 2417C-HL7588

IC: 9049A-ITCOQ6265

IC: 24751-GHP2470



## Product Specifications

|  |   |
|--|---|
| Wireless Connectivity                                | UWB, Zigbee, Wifi, LTE, NFC, BLE, Bluetooth   |
| Multimedia Options                                   | LEDs, Audio Speakers, Microphones, 13MP Camera (video and still image), PTT, VOIP, Video Uplink |
| 3-D Location Accuracy                                | < 1 meter   |
| Sensors  | Temperature, Humidity, Pressure, Noise Level, Hat Not Worn, Fall Detection, Proximity Danger    |
| Battery Capacity (dual cell)                         | 4800 mAH (typically 8 -12 hours)  |
| Maximum Weight (with suspension)                     | 800 g / 1 lb, 12.2 oz   |
| Operating Temperature HC-1                           | -20° C to 60° C / -4° F to 140° F   |
| Operating Temperature HC-1<br>w/ LIP109-2GHA Battery | -20° C to 57° C / -4° F to 134° F   |
| Storage Temperature                                  | -20° C to 60° C / -4° F to 140° F   |
| Recommended Battery Storage Temperature              | 20° C ± 5° C / 68° F ± 9° F   |

Table 1: Product Specifications

## SAFETY

This device is to be used only as intended. The stated purposes are to act as a hard hat, provide location services, and communicate events. Use outside of this scope constitutes inappropriate usage, will void the warranty, and may cause safety hazards to personnel.

The hat is certified IP65 with the battery pack properly installed. The battery terminals on the hat and the battery pack are not protected from dust and moisture when the battery pack is not installed. Hence, prior to installing a battery pack, both the hardhat battery terminals and the battery pack terminals must be inspected and cleaned to ensure no accumulation of debris or moisture.

The HC-1 and battery packs should not be disassembled at any time. Doing so will void the warranty and may cause harm to the user. The HC-1 or battery pack should not be used thereafter.

If an HC-1 or battery under warranty becomes damaged, cease use and contact Guardhat immediately

Only dispose of a battery (damaged or otherwise) at a properly rated hazardous waste or recycling location.

To prevent possible hearing damage, do not listen at high volume levels for long periods.



**IEC 60417-6044**

## Battery

**CAUTION**  
**RISK OF EXPLOSION IF BATTERY IS REPLACED**  
**BY AN INCORRECT TYPE.**  
**DISPOSE OF USED BATTERIES ACCORDING**  
**TO THE INSTRUCTIONS.**

This device contains a **Lithium-Ion (Li-ion) Rechargeable Battery**. This battery may be forbidden aboard passenger aircraft and is not to be transported via air with a charge greater than 30% capacity per ICAO Packing Instructions 965.

Damage to a Li-ion battery may result in a flammability hazard.

Only batteries manufactured by Guardhat are safe to use with this model.

Only a Guardhat charger should be used to charge the batteries. Charging must take place only in an environmentally safe location because any intrinsic safety or ingress protection ratings held by the hard hat assembly are not applicable to a battery with exposed terminals.

## Fit

The hat must be worn snugly to prevent slipping off. Always adjust the suspension to fit the user before wearing into a work zone. (see Wearing the Hard Hat, page 13)

## WHAT'S INSIDE?

Each Guardhat shipping box includes:

- **Hard Hat.** Type I, Class G.
- **Adjustable Suspension.** HC-1 should only be used with the suspension provided by Guardhat.
- **Battery Pack.** May be a single-cell or dual-cell Lithium-Ion battery.

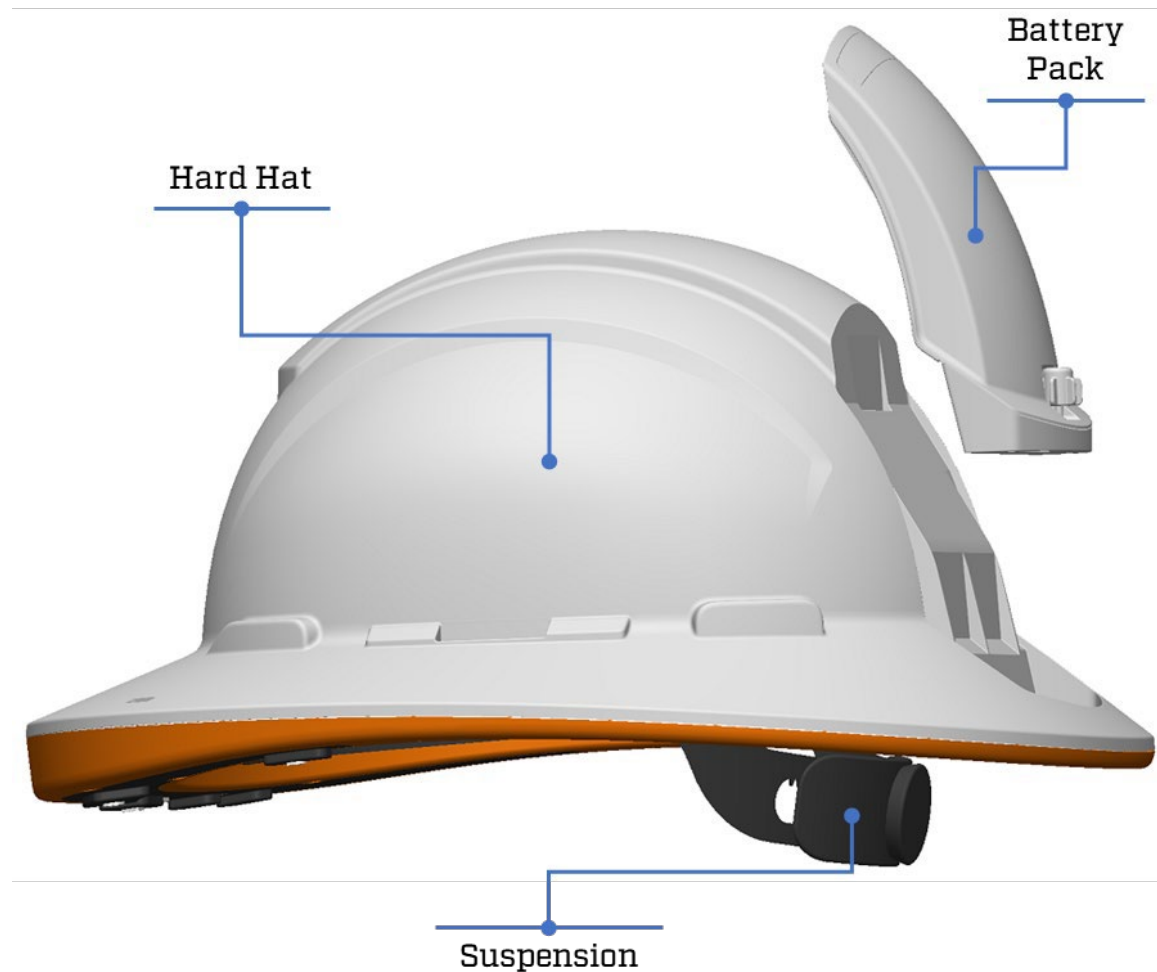


Figure 2: Hard Hat Components

**Battery Charging Station.** Can charge up to 4 battery packs simultaneously and is supplied separately.

**Additional Battery Packs.** May be procured through Guardhat to allow for extended hard hat use.

## USER INTERFACE

### Wearing the Hard Hat

Before wearing the hard hat, loosen the suspension by turning the ratchet mechanism knob counterclockwise (see *Figure 3*). Put the hard hat on your head and tighten the suspension as necessary by turning the knob clockwise.



Figure 3: Suspension Adjustment

There are five aspects to the hat's user interface.

**Buttons** are pressed by the user in order to communicate, both with the Safety Control Center (SCC) and with other users.

**LEDs** indicate to the user when there is an event or pending communication.

The **speakers** play standard and custom messages to be heard by the user. They also enable two-way communication with the SCC and/or other users.

The **microphone** allows the user to communicate directly with the SCC and/or other users as well as to capture audio to accompany a video recording.

The **camera** is capable of capturing both still images and video, which are transmitted to the SCC. It also allows for video calling to show the Safety Operator what the user sees in real time.

## Buttons

There are 7 buttons on the underside of the brim (see *Figure 5*) and 1 button on the top (see *Figure 4*).



Figure 4: Top Button

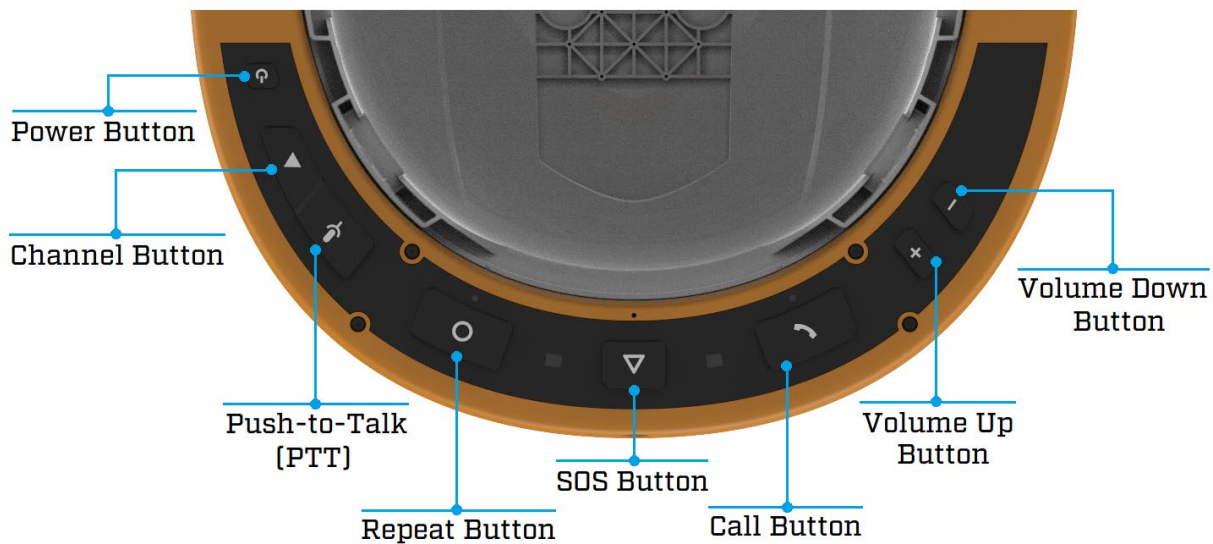


Figure 5: Brim Buttons

- **Power Button.** Used to turn the hard hat on (3 second press) and off (5 second press).
- **Channel Button.** Used to change the channel for communication using PTT.
- **Push-to-Talk (PTT).** Used to communicate directly with all users tuned to the current channel. No dialing is required for this portable-radio style communication.
- **Repeat Button.** Used to recall the last event and replay the audio associated with it.
- **SOS Button.** Used to initiate (5 second press) or cancel an SOS Event (3 second press). If an SOS event is initiated, an alert will be sent to the Safety Control Center (SCC) and nearby users.
- **Call Button.** Used to place a call to the SCC or to answer an incoming call.
- **Volume Up & Volume Down Buttons.** Used to adjust the volume level of the hard hat's speakers. Note that, for safety purposes, the volume cannot be completely muted.
- **Camera Button.** Used to capture still images and video recordings which are transmitted to the SCC.

## LED Indicators

There are 5 LEDs on the underside of the brim, visible to the user (see *Figure 6*) and two LEDs on the outside of the hat, visible to nearby personnel (see *Figure 7*).

The LEDs light up with various colors and frequencies depending on the event / message (see **TABLE** for a full list of LED indicators and the associated events).

The visual indicator of the LEDs is a key communication method that responds to events triggered by the user, by the SCC, and by the hat / the software that powers it. These lights alert users even in situations where ambient noise is too high to accurately hear audio communication.

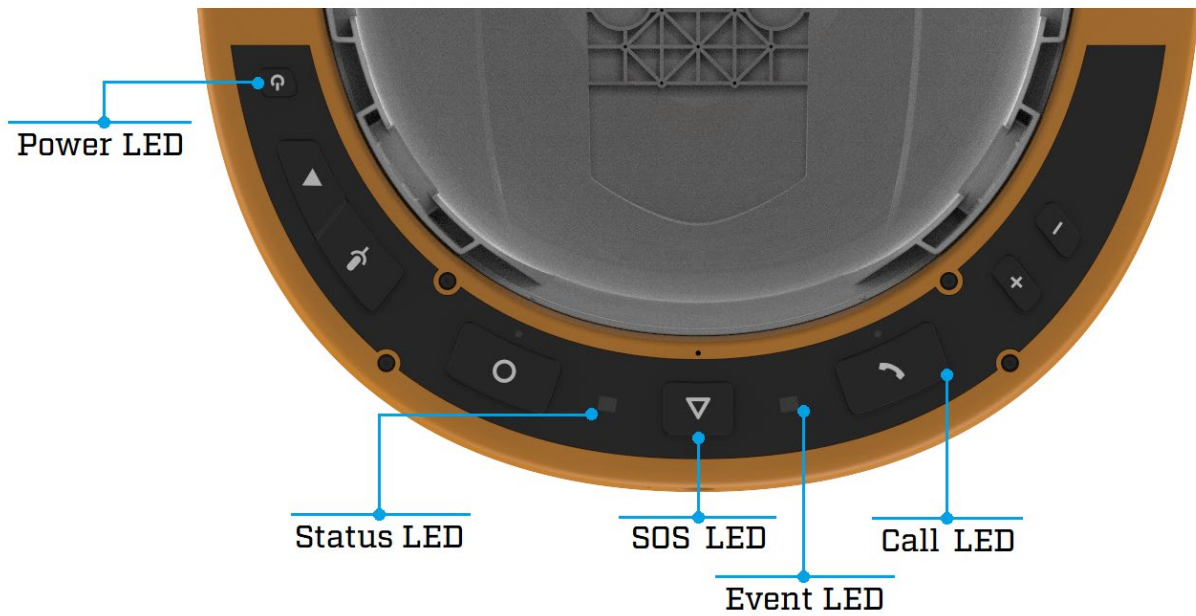


Figure 6: LED Indicators (Under the Brim)



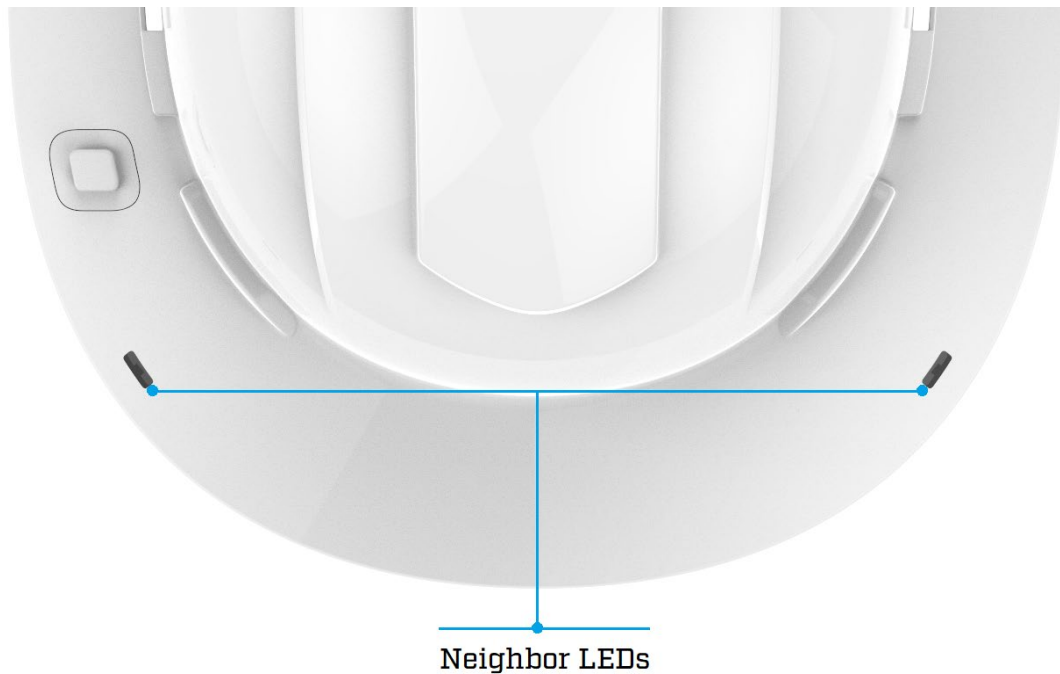


Figure 7: Neighbor LEDs

## Communication: Microphone, Speakers, & Camera

The speakers allow communication to be extremely specific. While the same color might light up for multiple events, each audio alert is unique and can provide detailed notifications.

Additionally, the SCC can communicate to users via the speakers and users can communicate with each-other using Push-to-Talk for CB-Style communication.

There are two speakers, one located on each side of the hard hat brim, and two microphones; one under the brim and one next to the camera (see *Figure 8* & *Figure 9*). The speaker volume can be adjusted up or down by pressing the **+** or **-** button as shown in *Figure 8*. Note that the volume cannot be completely muted.

Messages conveyed via the speakers may be standard (e.g. “Hat not worn”) or may be custom / real time as determined by the SCC.

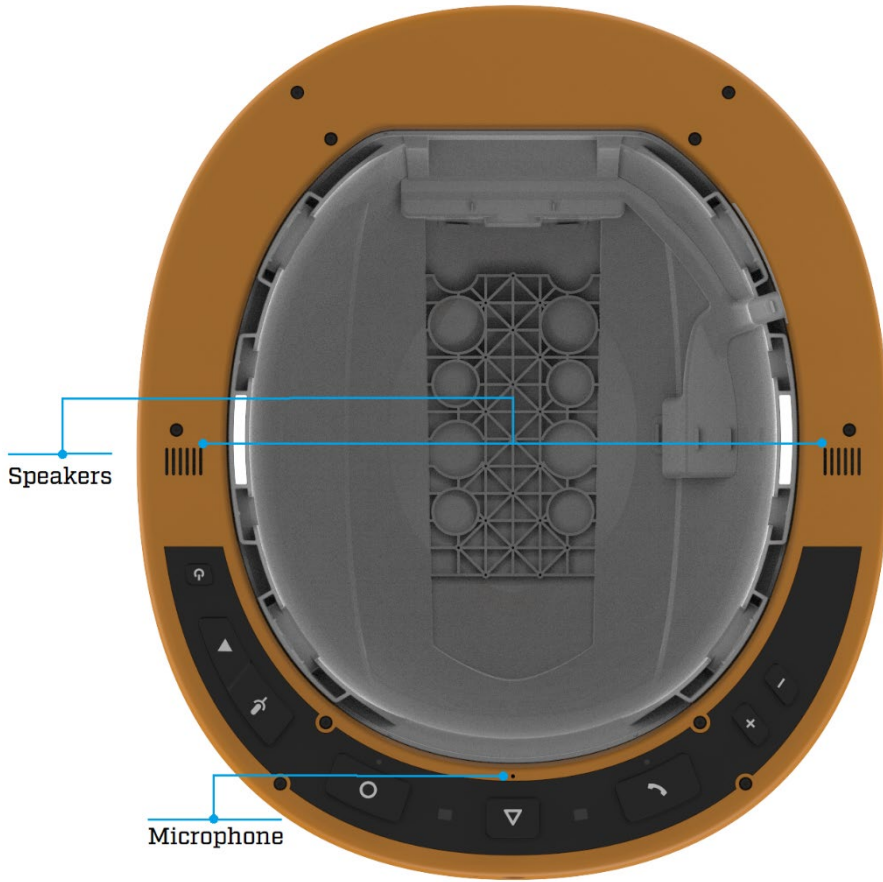


Figure 8: Communication (Bottom View)

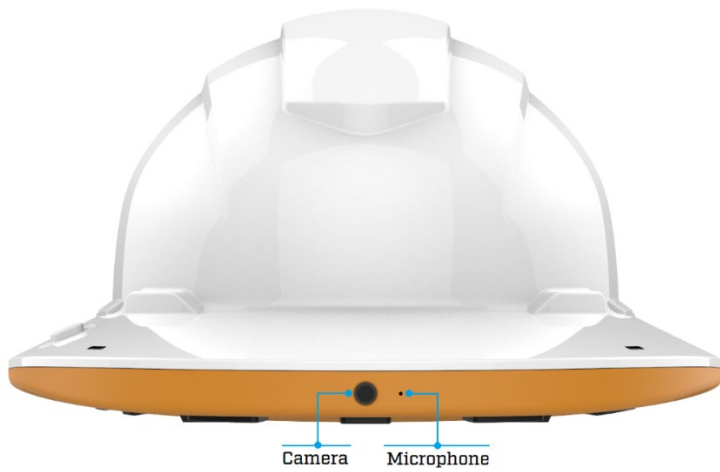


Figure 9: Communication (Front View)

## EVENTS

Guardhat model HC-1 detects a number of safety-related conditions and communicates these conditions known as events to multiple recipients, including the SCC. Your company may choose to customize which events are detected as well as the priority ranking of each event.

Event Audio is listed in English however, the audio can be configured to multiple languages depending upon the country and language of the users.

The priority of each event is only relevant if multiple events happen simultaneously. When this is the case, the event with a higher priority will be indicated first. Additional events may be queued for subsequent communication once the high priority event is resolved. “Critical” is the highest priority, followed by “non-critical” and “informational”.

Note that the Event & SOS LEDs are on the underside of the brim and are visible to the User wearing the hat (see *Figure 6*). The Neighbor LEDs are on the outside of the brim and are visible to nearby users (see *Figure 7*).

The following events are described in the subsequent tables. Figures are included for those events which include LED alerts.

- Evacuation
- SOS
- Fall
- Geofence Breach
- Network Disconnect
- Blackout Zone
- Hat Not Worn
- Elevated Noise
- High Temperature
- Low Temperature
- Acceleration
- Proximity

## Evacuation

An Evacuation Event occurs when an area is deemed unsafe or needs to be cleared of personnel for any reason. The evacuation area can include any part of the worksite, including the entire site. The SCC Operator draws a three-dimensional area in the web application to initiate an evacuation.



Figure 10: Evacuation Event

| Item                  | Description  |
|-----------------------|--|
| Event Initiated By    | SCC Operator   |
| Reason for the Event  | Evacuation Required  |
| Event LED             | Flashing Red Event LED<br>Flashing Red Neighbor LEDs   |
| Event Audio (English) | “Emergency evacuation. Please leave the area.”   |
| User Response         | Evacuate the area and proceed to a designated evacuation assembly point.                                     |
| Event Resolution      | Event is resolved when<br>(1) User exits the evacuation area, or<br>(2) SCC operator cancels the evacuation. |
| Resolution Audio      | “Outside of evacuation zone.”  |
| Event Priority        | Critical   |

Table 2: Evacuation Event

## SOS

An SOS Event occurs when a user is in danger and/or requires immediate assistance. In addition to the SCC Operator, nearby users will be notified of the SOS request and can find the user who initiated it by the flashing LEDs visible on the outside of the hat.



Figure 11: SOS Event

| Item                  | Description   |
|-----------------------|---|
| Event Initiated By    | User  |
| Reason for the Event  | Urgent help required  |
| Event LED             | Flashing Red SOS LED<br>Flashing Red Neighbor EDs   |
| Event Audio (English) | “SOS Initiated.”  |
| User Response         | Wait for help.<br>Cancel the event if help no longer needed.                                  |
| Event Resolution      | Event is resolved if<br>(1) User cancels the event, or<br>(2) SCC operator cancels the event. |
| Resolution Audio      | “SOS canceled.”   |
| Event Priority        | Critical  |

Table 3: SOS Event

## Fall Detection

A Fall event is initiated when the hat detects a fall, indicated by a rapid drop in altitude greater than 4 feet. This setting can be customized depending upon the specifics of the worksite and situation.

| <b>Item</b>           | <b>Description</b>  |
|-----------------------|---|
| Event Initiated By    | Hat / Software  |
| Reason for the Event  | Fall detected<br>(rapid drop in altitude greater than 4 ft).                              |
| Event LED             | None  |
| Event Audio (English) | “Fall detected.”  |
| User Response         | Wait for help.<br>Contact SCC operator if no help needed.                                 |
| Event Resolution      | Event is resolved only by SCC operator after confirming that User is no longer in danger. |
| Resolution Audio      | none  |
| Event Priority        | Critical  |

Table 4: Fall Detection Event

## Geofence Breach

Geofences are defined by the SCC Operator and can be customized to allow specific personnel into the defined locations at specific times. A breach occurs when a user who is not permitted to be in the zone passes through the invisible barrier. The user will receive warnings about approaching the geofenced area before a breach occurs.



Figure 12: Geofence Breach Event

| Item                  | Description   |
|-----------------------|---|
| Event Initiated By    | Hat / Software  |
| Reason for the Event  | Unauthorized User has entered a geofenced zone.   |
| Event LED             | Flashing Red Event LED<br>Flashing Red Neighbor LEDs  |
| Event Audio (English) | “Geofence violation.”   |
| User Response         | Exit the geofenced area.  |
| Event Resolution      | Event is resolved if<br>(1) User exits the geofenced zone, or<br>(2) SCC operator cancels the geofence. |
| Resolution Audio      | “You have exited the geofence.”   |
| Event Priority        | Critical  |

Table 5: Geofence Breach Event

## Network Disconnect Event

The hat may use one of many networks including Ultra-wideband, Wifi, LTE, & Bluetooth. If there is an interruption to the network that prevents the hat from connecting to it, the network disconnect event will notify the user. If the hat is equipped with a camera, video and still images can still be recorded during the disconnect but the files will not be transmitted to the SCC until the network connection is re-established.



Figure 13: Network Disconnect Event

| Item                  | Description   |
|-----------------------|---|
| Event Initiated By    | Hat / Software  |
| Reason for the Event  | Network signal lost                                     |
| Event LED             | Solid Amber Event LED                                   |
| Event Audio (English) | "No network connection."                                |
| User Response         | Wait for connection to establish.<br>Move as necessary. |
| Event Resolution      | Event is resolved when network is reconnected           |
| Resolution Audio      | "Network connected."                                    |
| Event Priority        | Non-critical  |

Table 6: Network Disconnect Event



## Blackout Zone Event

Blackout zones are defined by the SCC Operator. These are areas where no location data or media may be transmitted from the hat. Although defined by each worksite, blackout zones likely include restrooms, locker rooms, and other locations where privacy is expected.



Figure 14: Blackout Zone Event

| Item                  | Description   |
|-----------------------|---|
| Event Initiated By    | Hat / Software  |
| Reason for the Event  | Network signal lost                                     |
| Event LED             | Solid Amber Event LED                                   |
| Event Audio (English) | "No network connection."                                |
| User Response         | Wait for connection to establish.<br>Move as necessary. |
| Event Resolution      | Event is resolved when network is reconnected           |
| Resolution Audio      | "Network connected."                                    |
| Event Priority        | Non-critical  |

Table 7: Blackout Zone Event

## Hat Not Worn Event

When the hat is powered on but is not in use, it triggers the hat not worn event. This reminds a user to wear the hat if on the worksite or to power the hat down if it is not in use.



Figure 15: Hat Not Worn Event

| Item                  | Description   |
|-----------------------|---|
| Event Initiated By    | Hat / Software  |
| Reason for the Event  | Hard hat is powered on but is not being worn by a user. |
| Event LEDs            | Flashing Amber Neighbor LEDs                            |
| Event Audio (English) | "Hat not worn."   |
| User Response         | Wear hat or power off if not in use.                    |
| Event Resolution      | Hat is worn or powered off.                             |
| Resolution Audio      | none  |
| Event Priority        | Non-critical  |

Table 8: Hat Not Worn Event

## Elevated Noise Event

Sensors in the hat respond to ambient noise over a set decibel level by providing a warning that the noise level is high enough to potentially cause hearing damage. This noise level can be customized for a worksite by the SCC Operator.



Figure 16: Elevated Noise Event

| Item                  | Description  |
|-----------------------|--|
| Event Initiated By    | Hat / Software   |
| Reason for the Event  | Ambient noise is at a level that may damage hearing.             |
| Event LEDs            | Flashing Red Event LED   |
| Event Audio (English) | "Noise level high."  |
| User Response         | Move to a quieter area if possible or engage hearing protection. |
| Event Resolution      | Noise level returns to within normal parameters                  |
| Resolution Audio      | none   |
| Event Priority        | Critical   |

Table 9: Elevated Noise Event

## Low / High Temperature Event

Sensors in the hat respond to ambient temperatures below and above set temperatures by providing a warning that the temperature is too cold or too hot. These minimum and maximum temperatures may be customized for a worksite by the SCC Operator.



Figure 17: Low / High Temperature Event

| Item                  | Description   |
|-----------------------|---|
| Event Initiated By    | Hat / Software  |
| Reason for the Event  | Temperature is detected to be lower or higher than a set limit. |
| Event LEDs            | Flashing Red Event LED  |
| Event Audio (English) | “Ambient temp low.”<br>“Ambient temp high.”                     |
| User Response         | Move to a warmer / cooler area if possible.                     |
| Event Resolution      | Temperature returns to within normal parameters                 |
| Resolution Audio      | none  |
| Event Priority        | Critical  |

Table 10: Low / High Temperature Event

## Acceleration Event

Sensors in the hat respond to acceleration over a set limit by providing a warning that the acceleration is high, indicating that a dangerous situation may be at hand. This maximum rate of acceleration may be customized for a worksite by the SCC Operator.

| <b>Item</b>           | <b>Description</b>  |
|-----------------------|---|
| Event Initiated By    | Hat / Software  |
| Reason for the Event  | Heightened acceleration detected.                                     |
| Event LEDs            | none  |
| Event Audio (English) | "High acceleration detected."   |
| User Response         | Seek help / report conditions to SCC.                                 |
| Event Resolution      | Acceleration returns to within normal parameters or SCC cancels event |
| Resolution Audio      | none  |
| Event Priority        | Critical  |

Table 11: Acceleration Event

## Proximity Event

A Proximity event is triggered when a user is approaching an object that has been tagged with a beacon, for example, dangerous and/or moving equipment.



Figure 18: Proximity Event

| Item                  | Description  |
|-----------------------|--|
| Event Initiated By    | Hat / Software / Beacon  |
| Reason for the Event  | Hat / User is close to a Beacon  |
| Event LEDs            | Flashing Red Event LED   |
| Event Audio (English) | "Proximity Danger."  |
| User Response         | Move away from the dangerous situation / location if possible to do so safely. |
| Event Resolution      | User moves away from danger or SCC cancels event.                              |
| Resolution Audio      | none   |
| Event Priority        | Critical   |

Table 12: Proximity Event

## POWER & CONNECTIVITY

The included battery is a dual-cell 4800 mAH Lithium Ion battery, which is suitable for an eight to 12-hour shift. Multiple batteries may be purchased separately in order to extend the hat's working life before recharging.

### Installing and Removing the Battery

Only a Guardhat battery may be used with this device.

To install the battery, lower the battery pack into the compartment on the back of the hard hat and tighten the thumbscrew by turning it clockwise until it is finger-tight. (see *Figure 19*)

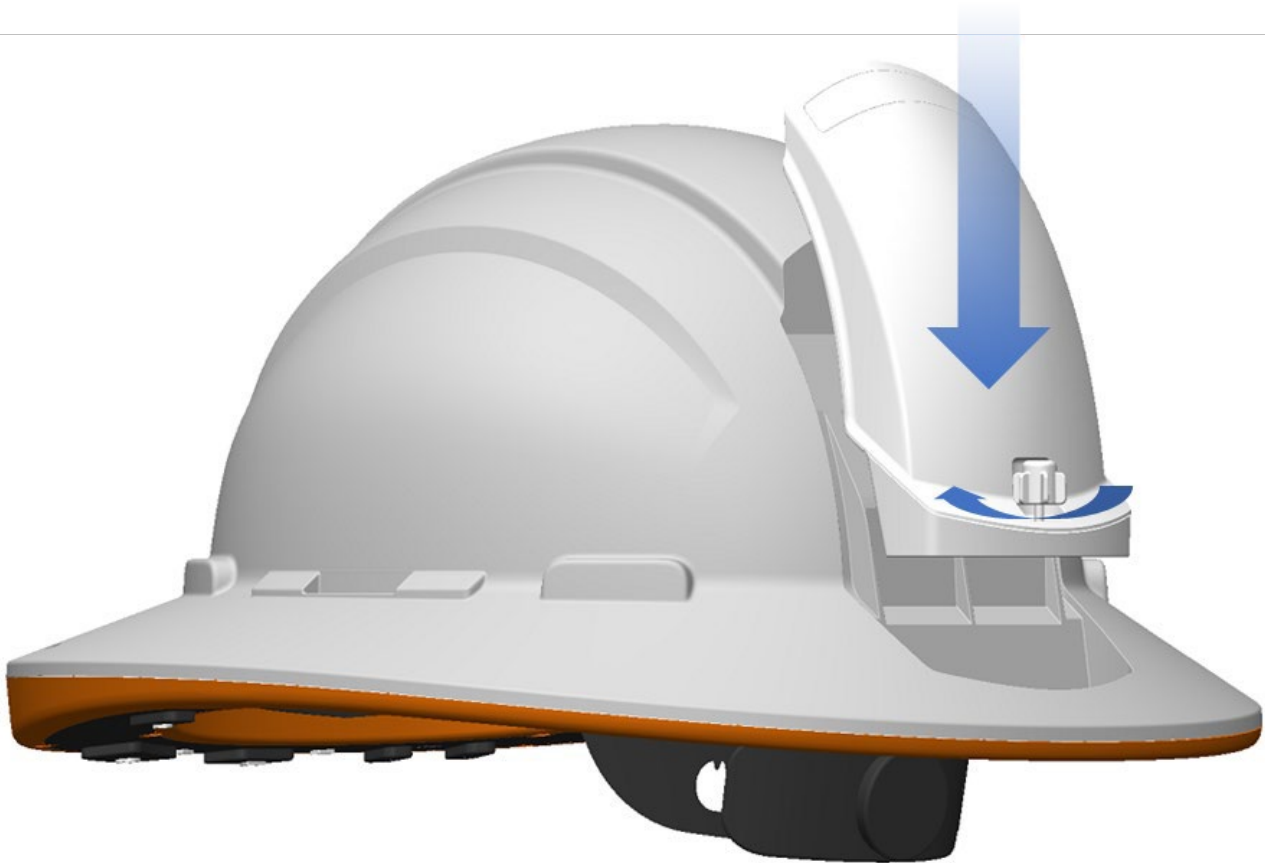


Figure 19: Battery Installation

To remove the battery, loosen the thumbscrew by turning it counterclockwise until the head of the screw reaches the top of the thumbscrew cavity and lift the battery pack straight up. (see *Figure 20*)

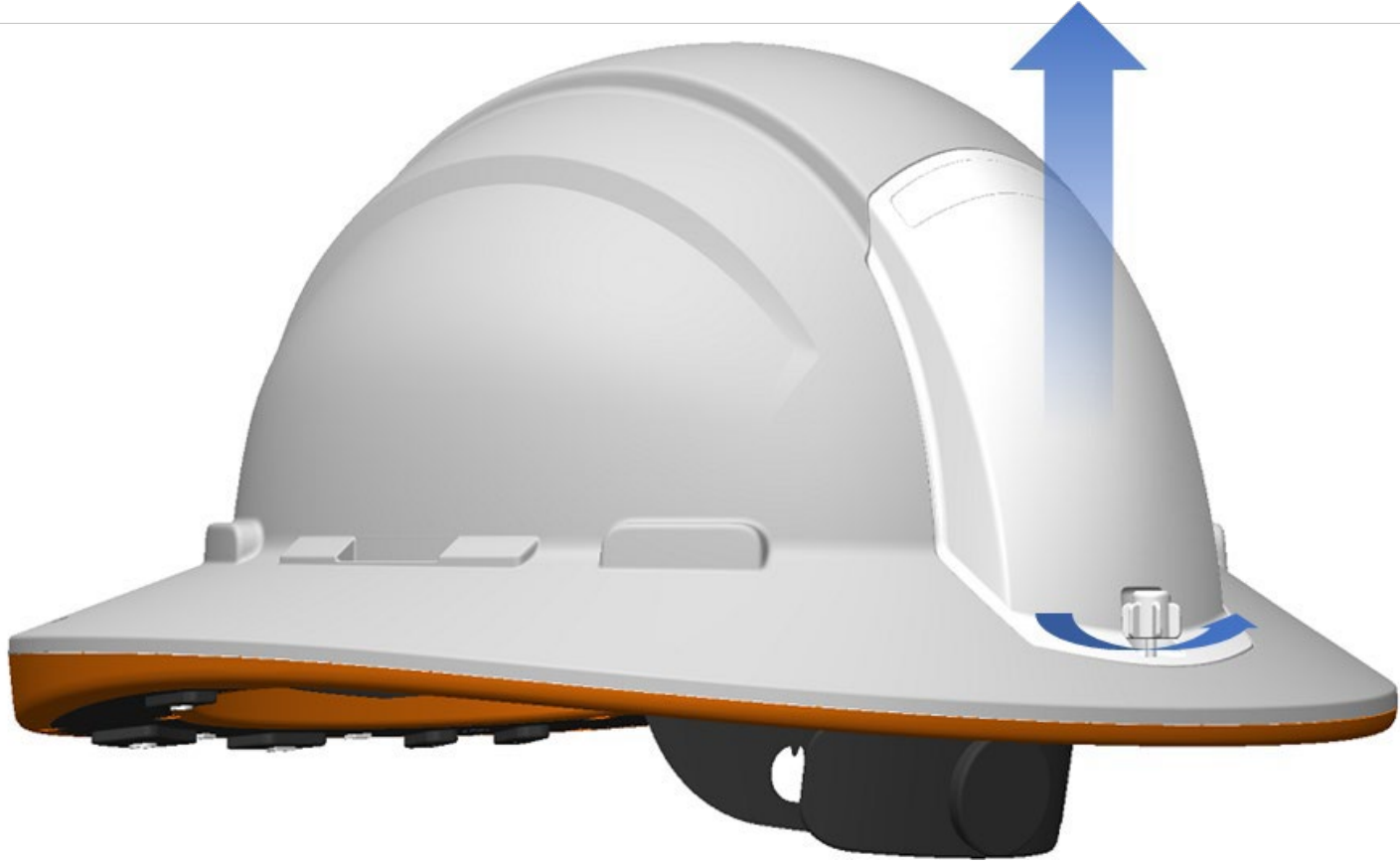


Figure 20: Battery Removal



## Charging the Battery

The battery can be charged using Battery Charging Station (supplied separately) which can charge up to 4 batteries at once. Only use a Guardhat charger in a safe environment (see SAFETY, page 10).



Figure 21: Battery Charger

When an empty charging port is ready and functional, both lights in front of it will be **Solid Green**.

To charge a Battery Pack, disengage the Battery Pack from the hard hat as in *Figure 20* and place it into a charging port.

When a battery is charging:

- A battery pack charged to less than 50% capacity will be indicated by **Solid Amber** on the left and No Light on the right. (see *Figure 22*)
- A battery pack charged between 50% and 100% capacity will be indicated by **Solid Green** on the left and **Solid Amber** on the right. (see *Figure 23*)
- A fully charged battery pack will be indicated by **Solid Green** on both LEDs. (see *Figure 24*)

- Any **Red** LEDs indicate a fault in the battery. A faulty battery should be returned if under warranty or appropriately discarded.



Figure 22: Low Charge



Figure 23: Charging



Figure 24: Fully Charged

## Turning the Hard Hat ON and OFF

When the hard hat is powered off, no LEDs are illuminated.

To turn **ON** the hard hat, press and hold the Power Button for 3 seconds. After hard hat has booted up, you will hear starting tone and the Status LED (see *Figure 6*) will light up. The color and flash pattern of the Status LED will indicate the power level of the battery and network connection status (see *Table 13*).

To turn **OFF** the hard hat, press and hold the Power Button for 5 seconds. The Power LED will **Flash Green** while hard hat is powering down.

## Hard Hat Status LED

The Status LED will indicate battery level and network connection status.

|                |   | Network Connection Status |                           | Audio                                     |
|----------------|---|---------------------------|---------------------------|---|
|                |   | Online                    | Offline                   |   |
| Battery Status | Greater than 2/3 of battery capacity    | <b>Solid Green</b>        | <b>Slow Glowing Green</b> | none                                      |
|                | Between 1/3 and 2/3 of battery capacity | <b>Solid Amber</b>        | <b>Slow Glowing Amber</b> | none                                      |
|                | Less than 1/3 of battery capacity       | <b>Solid Red</b>          | <b>Slow Glowing Red</b>   | “Battery Low.”                            |
|                | Less than 2 minutes of battery life     | <b>Flashing Red</b>       | <b>Flashing Red</b>       | “Battery critical. Power down initiated.” |

Table 13: Status LED

# USER INTERFACE REFERENCE

## LED Indicators



| LED  | Light        | Audio  | Meaning                     | Response   |
|--|--------------|--|-----------------------------|--|
| Event LED<br> | Flashing Red | “Emergency Evacuation. Please leave the area.” | Evacuation initiated        | Evacuate the area                                    |
|  |              | “Geofence violation.”                          | Unauthorized geofence entry | Exit restricted area                                 |
|  |              | “Noise level high.”                            | Noise level is too high     | Move to a quieter area or engage hearing protection. |
|  |              | “Ambient temp high.”                           | Temperature is too high.    | Move to a cooler area                                |
|  |              | “Ambient temp low.”                            | Temperature is too low.     | Move to a warmer area                                |
|  |              | “Proximity danger.”                            | Proximity danger            | Move to a safe location                              |
|  | Solid Amber  | “No network connection.”                       | Network disconnected        | Wait for reconnection                                |
|  |              | “Inside blackout zone.”                        | Blackout enter              | None required  |
| SOS LED<br> | Flashing Red | “SOS initiated.”                               | SOS Initiated               | Wait for help / Cancel if help no longer needed      |

Table 14: LED Indicators (Event & SOS)

| LED             | Light              | Audio                                     | Meaning                  | Response   |
|-----------------|--------------------|---|--------------------------|--|
| Status LED<br>□ | Solid Green        | none                                      | Battery full;<br>Online  | none   |
|                 | Solid Amber        | none                                      | Battery medium; Online   | none   |
|                 | Solid Red          | “Battery low.”                            | Battery low;<br>Online   | Replace battery soon                             |
|                 | Slow Glowing Green | none                                      | Battery full;<br>Offline | Be aware of surroundings                         |
|                 | Slow Glowing Amber | none                                      | Battery medium; Offline  | Be aware of surroundings                         |
|                 | Slow Glowing Red   | “Battery low.”                            | Battery low;<br>Offline  | Be aware of surroundings<br>Replace battery soon |
|                 | Flashing Red       | “Battery critical. Power down initiated.” | Battery Critical         | Replace battery ASAP                             |
|                 | Flashing Green     | “Power down initiated.”                   | Power down initiated     | none   |
|                 | Flashing Blue      | “Ready to pair.”                          | Bluetooth pairing        | Pair Bluetooth device.                           |

Table 15: LED Indicators (Status)

| LED                  | Light   | Audio                       | Meaning                     | Response                              |
|----------------------|---|-----------------------------|-----------------------------|---------------------------------------|
| Call LED<br><b>P</b> | Single Amber Flash  | camera shutter sound        | Picture taken               | none                                  |
|                      | Solid Amber   | “Video recording started.”  | Video recording in progress | none                                  |
|                      | Green / Blue  | Dial tone (until connected) | Outbound audio call         | none                                  |
|                      |   | Ring tone (until answered)  | Inbound audio call          | Answer by pressing Call Button        |
|                      | Flashing Blue   | Dial tone (until connected) | Outbound video call         | none                                  |
|                      |   | Ring tone (until answered)  | Inbound video call          | Answer by pressing Call Button        |
|                      | Solid Green   | call audio                  | Audio call in progress      | none                                  |
|                      | Solid Blue  | call audio                  | Video call in progress      | none                                  |
|                      |   | channel audio               | PTT active                  | Release button to hear response(s)    |
|                      | Neighbor (not visible to User) – Response is for those nearby | Flashing Red                | n/a                         | SOS initiated                         |
| n/a                  |   |                             | Evacuation initiated        | Evacuate the area                     |
| n/a                  |   |                             | Unauthorized geofence entry | Contact SCC                           |
| Flashing Amber       |   | n/a                         | Hat not worn                | Remind User to wear or power down hat |

Table 16: LED Indicators (Call & Neighbor)

## Buttons

| Button            | Press                  | Reason                  | Result                               | Audio  |
|-------------------|------------------------|-------------------------|--------------------------------------|--|
| Volume Down<br>—  | Short press            | Decrease speaker volume | Volume decreases                     | single beep at new audio level (if nothing else playing) |
| Volume Up<br>+    | Short press            | Increase speaker volume | Volume increases                     | single beep at new audio level (if nothing else playing) |
| SOS<br>△          | Hold for 5 sec         | User needs help         | SOS alert sent to SCC & nearby users | “SOS initiated.”   |
|                   | Hold for 3 sec         | Cancel active SOS       | Active SOS is canceled               | “SOS canceled.”  |
| Call<br>P         | Press                  | Make audio call to SCC  | Audio call placed                    | Dial tone (until connected)                              |
|                   | Hold for 3 sec         | Make video call to SCC  | Video call placed                    | Dial tone (until connected)                              |
|                   | Press (when ringing)   | Answer call             | Audio or video call answered         | call audio   |
|                   | Press (when connected) | End call                | Audio or video call ends             | single beep  |
| Push to Talk<br>» | Press and hold         | Communicate with group  | Broadcast over current channel       | None (User talks)  |

Table 17: Buttons (Repeat, Power, & Picture)

| Button      | Press                   | Reason                | Result  | Audio                      |
|-------------|-------------------------|-----------------------|---|----------------------------|
| Repeat<br>○ | Press                   | Repeat needed         | Replays all messages in active event queue (in order of priority) |                            |
| Power<br>⏻  | Hold for 3 sec          | Turn ON the hat       | Hat powers on   | “Device started.”          |
|             | Hold for 5 sec          | Turn OFF the hat      | Hat powers off  | “Power down initiated.”    |
| Camera      | Press                   | Take still image      | Captures image  | camera shutter sound       |
|             | Hold for 3 sec          | Begin video recording | Begins recording  | “Video recording started.” |
|             | Press (while recording) | End video recording   | Ends recording  | “Video recording ended.”   |

Table 18: Buttons (Repeat, Power, & Camera)