



GBG SMARTVISION

GBG BearGuard AI-4G Camera

Professional Edge-AI Bear Detection & Cloud Alert Camera
Comprehensive Operating Manual (Model: BG-4G-Cloud)

Prepared For:
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Support

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1. Product Overview & Key Features

The GBG BearGuard AI-4G is a highly rugged wildlife monitoring camera designed to tackle the critical challenge of increasing human-bear encounters in Japan. By combining a 50° Field of View (FOV) passive infrared (PIR) sensor, on-device edge AI, cloud server integration, and high-speed 4G LTE cellular connectivity, it provides instantaneous detection and alerts.

HIGH EFFICIENCY POWER OPTIMIZATION (DEEP SLEEP)

The camera remains in a deep sleep state. Once the PIR sensor detects motion, the camera wakes up and immediately analyzes the scene using its built-in AI. If a Japanese bear (Asian Black Bear or Ussuri Brown Bear) is detected, it records a 5s video and uploads it directly to the cloud via LTE, triggering instant push alerts. If no bear is detected, it returns to sleep immediately, yielding up to 3 months of battery life.

Key Feature Highlights:

- **PIR Detection (50° FOV):** High-sensitivity sensor wakes the camera only when living heat signatures move, eliminating false triggers from background noise (range up to 20m).
- **In-Camera Edge AI:** Embedded deep learning model specifically trained to identify Asian Black Bears and Ussuri Brown Bears in real-time, directly on the device.
- **4MP Lens & IR Night Vision:** A 4-Megapixel camera lens with 50° FOV. Auto Day/Night switch enables crisp color daytime captures and clear monochrome nighttime captures using 850nm invisible IR LEDs.
- **LTE & Cloud App Alerts:** Built-in 4G LTE cellular connection uploads recorded 5s videos to the cloud, triggering instant push notifications to smartphone/laptop user apps (supports Docomo, Softbank, and KDDI bands).
- **Dual Power Supply:** Operates on 3x 18650 rechargeable lithium batteries or external 12V DC power input.
- **Weatherproof Housing:** Robust yellow rounded-square enclosure built to withstand harsh forest environments (-10°C to 60°C).

2. Hardware Architecture & Component Layout

This section presents annotated technical diagrams overlaid directly onto the exact camera photo renderings.

2.1 Front Housing & External Control Layout

The front exterior features a protective heavy-duty yellow casing structured into three distinct operational zones:

- **TOP ZONE - Infrared LED Window:** 4-element horizontal night vision illumination window emitting invisible 850nm IR light.
- **TOP ZONE - Ambient Light Sensor:** Small circular ambient light sensor for automatic Day/Night mode switching.
- **MIDDLE ZONE - PIR Thermal Motion Sensor:** Fresnel lens rectangular thermal infrared sensor positioned on the middle-left window (50° field of view, up to 20m range).
- **MIDDLE ZONE - HD Camera Lens:** 4-Megapixel optical camera lens assembly with 50° FOV housed in the circular middle-right window.
- **BOTTOM ZONE - Emergency / Status Button:** Large, red circular tactile button located at bottom center labeled SOS (triggers test captures and status checks).
- **SIDE - High-Gain 4G Antenna:** External omnidirectional antenna attached to the upper left side pointing upwards.
- **SIDE - Weatherproof Hinge & Latches:** Sturdy hinge mechanism on left side and double latches securing waterproof closure.



Figure 2.1: Camera Front View Photo Diagram (Top: IR & Light Sensor | Middle: PIR & Camera Lens | Bottom: SOS Button)

2.2 Internal Control Module & Interface Layout

Opening the hinged front cover reveals the internal control interface and battery compartment:

- **4G LTE Antenna:** External omnidirectional antenna attached to the upper left side.
- **Status LED Indicator:** Green diagnostic LED indicator at the top left of the control panel.
- **Bluetooth (BT) Button:** Push button in the middle for Bluetooth wireless pairing and app registration (under development).
- **Power ON/OFF Switch:** Slide switch below the BT button to toggle main system power.
- **3x 18650 Battery Compartment:** Vertical battery compartment in center holding 3x 18650 rechargeable lithium batteries.
- **Front Cover Door:** Hinged cover door on the right with a silicone seal gasket.



Figure 2.2: Camera Open Internal View Photo Diagram (Status LED, BT Button, Power Switch & Battery Compartment)

3. Status LED & Operational State Guide

The GBG BearGuard AI-Cloud features a single multi-color diagnostic Status LED (top position on the control panel) to communicate boot states, cellular registration progress, AI bear-detection outcomes, and cloud server upload status.

LED Color & Pattern	Operational Meaning	System Status / Troubleshooting Action
White	Power Initialization	System booting up immediately after the Power Switch is pushed to ON.
Flashing Yellow (Blinking)	Cellular Connecting	The camera is actively searching and registering onto the 4G mobile network.
Solid Cyan (Blue + Green)	Network Connected	Successfully registered to 4G LTE. Upload in progress or no files to send. Camera will return to standby.
Green	Upload Completed	Video and alert successfully uploaded to the cloud server. Returns to standby.
Red	Upload Failed	Connected to network but failed to reach the upload server. Check server status or firewall settings.
Flashing Red (5s) → Red	Data Connection Failure	Cannot establish mobile data connection. Check signal coverage or active data plan.
Flashing Blue & Red → Purple	SIM Card Error	Critical SIM problem. SIM card may be missing, locked, or improperly inserted.
Blue	Bear Detection	PIR motion detected; built-in edge AI identified Asian Black Bear or Ussuri Brown Bear. Recording video.
Red	No Bear Detected	PIR motion detected, but the edge AI did not identify a bear. Returns to sleep.
LED OFF	Standby / Sleep	Camera is in deep sleep mode, waiting for next PIR trigger.

OPERATION & LED SEQUENCE EXPLANATION

1. Power On: Slides to ON -> LED Solid White (Booting) -> Flashing Yellow (Cellular Search) -> OFF (Standby).
2. Bear Detection Flow: Motion detected -> LED Solid Blue -> AI analyzes scene -> Bear found -> LED OFF (Capturing) -> Flashing Yellow (Server Connect) -> Solid Green (Upload Success) -> OFF (Return to standby).
3. Non-Target Flow: Motion detected -> LED Solid Blue -> AI analyzes scene -> No Bear found -> LED turns Solid Red -> OFF (Return to deep sleep immediately).

4. Quick Setup, Installation & Alignment Guide

Follow these step-by-step instructions to insert batteries, install cards, deploy, and verify the AI camera.

4.1 Quick Installation Steps

Step 1: Charge & Install 18650 Batteries

Open the front latch. Ensure the Power Switch is set to OFF. Insert 3x 18650 rechargeable lithium batteries into the battery compartment, taking strict care to align positive (+) and negative (-) terminals with the spring markings. Alternatively, connect an external 12V DC power input to the power jack.

Step 2: Attach Omnidirectional Antenna

Screw the 4G antenna clockwise onto the SMA connector on the left side of the housing. Tighten securely to maintain weatherproof integrity.

Step 3: Power ON & Verify Network Connection

Slide the Power Switch to ON. Observe the internal diagnostic LEDs. Wait 15-30 seconds for network registration. Verify that the Green LED illuminates.

Step 4: Bluetooth Pairing & Registration (If Needed, under development)

If you are setting up the camera for the first time, press and hold the BT pairing button for 5 seconds to activate pairing mode. Open the mobile app and scan for the camera to pair and register it to your account.

Step 5: Field Mounting & Housing Sealing

Close the front cover firmly and snap both side latches into place. Thread the mounting strap through the rear bracket slots or mount to a wall surface. Angle the PIR sensor towards the target detection area.

4.2 AI Bear Detection Lens Alignment & Testing

Before finalizing the field installation, verify the camera lens alignment and test the on-device AI bear detection using the following procedure:

Step 1: Enter PC Camera Mode

Connect the camera to your computer using a USB Micro cable. Slide the Power Switch to ON camera and wait for Blue LED. Press the Bluetooth (BT) button. The Status LED will illuminate solid Red to indicate UVC webcam mode is active.

Step 2: Verify Lens Alignment & Object Positioning

Open any webcam application (e.g., Windows Camera or macOS Photo Booth) on your computer to view the live camera feed. Adjust the camera's tilt and physical orientation to verify that the 50° FOV lens and PIR detection path are perfectly centered on the target monitoring zone.

Step 3: Restore Normal Operation Mode

Disconnect the USB cable and turn the Power Switch to OFF. To return to standard operating mode, slide the Power Switch back to ON (without holding any buttons). The Status LED will flash Yellow to register on the cellular network and then turn OFF to indicate standby deep sleep mode is active.

Step 4: Test AI Bear Detection

Trigger a PIR detection event by moving a test target in front of the lens. Observe the Status LED color sequence: if a bear is simulated/detected, the LED lights up Blue, then turns OFF, flashes Yellow (connecting to server), and turns Green (successful cloud upload). If a non-bear is detected, the LED turns Blue, switches to solid Red, and turns OFF, going back to sleep immediately.

5. Technical Specifications

Detailed engineering specifications for the GBG BearGuard AI-4G Camera:

Parameter / Specification Item	Technical Detail / Value
Model Name	GBG BearGuard AI-4G (Model: BG-4G-Cloud)
Sensor & Detection	Passive Infrared (PIR), 50° Field of View (FOV), Up to 20m range
Optics & Resolution	4 Megapixel CMOS sensor, Lens FOV 50°
Day / Night Mode	Automatic switching: Color in day / Monochrome at night with 850nm invisible IR LEDs
Edge AI Processor	Embedded on-device bear recognition algorithm (optimized for Asian Black Bear and Ussuri Brown Bear)
Connectivity	Integrated LTE SIM slot, supports Docomo, Softbank, and KDDI bands. Cloud upload of 10s video & push alerts
Power Source	Flexible: 3x 18650 Lithium-ion batteries or external 12V DC input
Environmental Resistance	Waterproof and dustproof housing, operating temperature: -10°C to 60°C
Antenna Dimensions	135 mm Omnidirectional High-Gain SMA Antenna
Power Optimization	Deep sleep standby mode, camera wakes up and processes with AI only on PIR motion detection (up to 3 months battery life)

6. Safety Precautions & Maintenance

SAFETY & WEATHERPROOFING CHECKLIST

1. Always ensure the silicone rubber gasket is clean and free of dirt before closing latches.
2. Do not mix old and new 18650 batteries or different battery chemistries.
3. Ensure the SMA antenna connector is firmly hand-tightened to prevent moisture entry.
4. Remove batteries if the camera is to be stored unused for extended periods.
5. If using an external 12V DC power source, ensure the connection is waterproofed.

Troubleshooting Guide:

- **Problem: No 4G Signal (L/M/H LEDs dark)**

Solution: Check if SIM card is correctly inserted and has active data plan. Verify antenna is securely attached. Toggle the Power Switch to ON/OFF to reboot the device.

- **Problem: Camera Fails to Power ON**

Solution: Verify 18650 battery polarity. Ensure batteries are fully charged using external USB charger. If using DC input, check that the 12V power supply is active.

- **Problem: PIR False Triggers**

Solution: Avoid pointing camera directly at moving tree branches, direct sunlight, or heat sources. Keep in mind the 50° PIR detection angle.